DOCKETED

Docket Number:	13-AFC-01
Project Title:	Alamitos Energy Center
TN #:	206427-1
Document Title:	Alamitos Energy Center Supplemental AFC
Description:	AES Supplemental Application for Certification for the Alamitos Energy Center
Filer:	Cathy Hickman
Organization:	AES Southland Development, LLC
Submitter Role:	Applicant
Submission Date:	10/26/2015 2:37:15 PM
Docketed Date:	10/26/2015

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October 23, 2015

Mr. Robert Oglesby
Executive Director
California Energy Commission
1516 Ninth Street
Sacramento, CA 95814

Re: Supplemental Application for Certification for the Alamitos Energy Center (12-AFC-01)

Dear Mr. Oglesby:

AES Alamitos Energy, LLC (AES)[1], the Applicant, submits this supplemental Application for Certification (SAFC) for the Alamitos Energy Center (AEC) located in the City of Long Beach, California. The AEC will be a natural-gas-fired, combined-cycle and simple-cycle, air-cooled, electrical generating facility with a nominal generating capacity of 1,040 megawatts (MW).

The AEC will be located on a 21-acre site within the existing power plant site, and will utilize to the extent possible existing infrastructure, including the switchyard and transmission facilities, natural gas pipeline system and water connections, process water supply lines, fire suppression and emergency services facilities, and the administration, maintenance and certain warehouse buildings. The AEC will meet the demand for new generation in the Los Angeles basin local electrical reliability area caused in large part by the closure of the San Onofre Nuclear Generating Station and anticipated retirement of over 4,000 MW of older, natural gas-fired generation currently using once-through ocean water cooling (OTC) by December 31, 2020. The AEC will provide fast-starting and stopping, flexible, controllable generation with the ability to ramp up and down through a wide range of electrical output to allow the integration of intermittent, renewable energy into the electrical grid and enable attainment of California's Renewable Energy Portfolio Standards (RPS).

I, Stephen O'Kane, an officer of AES Alamitos Energy, LLC, hereby attest under penalty of perjury under the laws of the State of California that the information set forth in the enclosed supplemental Application for Certification for the Alamitos Energy Center is true and accurate to the best of my knowledge and belief.

Sincerely,

Stephen O'Kane
Vice-President
AES Alamitos Energy, LLC

[1] AES Alamitos Energy, LLC, the project company, will be replacing AES Southland Development, LLC as the Applicant in this proceeding.

Supplemental Application for Certification

Alamitos Energy Center

October 2015

Volume 1

Submitted by



With Technical Assistance from



Report

Supplemental Application for Certification Alamitos Energy Center

Prepared for

California Energy Commission

Submitted by



October 2015

With Technical Assistance from



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Acronyms and Abbreviations

µg/m^3	microgram(s) per cubic meter
°F	degree(s) Fahrenheit
µg/L	microgram(s) per liter
µg/m^3	microgram(s) per cubic meter
µmho/cm	micromhos per centimeter
3-D	three-dimensional
AB	Assembly Bill
AC	Alternating Current
ACM	asbestos-containing material
ACS	American Community Survey
ADT	Average daily traffic
AEC	Alamitos Energy Center
AERMOD	American Meteorological Society / EPA Regulatory Model
AES-SLD	AES Southland Development, LLC
AFC	Application for Certification
AFY	acre-feet per year
ALS	Advanced Life Support
AQRV	air quality-related values
ARB	California Air Resources Board
ASME	American Society of Mechanical Engineers
AST	aboveground storage tanks
ASTM	American Society for Testing and Materials
BACT	best available control technology
bgs	below ground surface
BIOS	Biogeographic Information and Observation System
BLM	Bureau of Land Management
BLS	Basic Life Support
BMP	best management practices
BNSF	Burlington Northern Santa Fe
BOE	California Board of Equalization
Btu/kWh	British thermal units per kilowatt hour
C&D	construction and demolition
C_2H_6	ethane

C_3H_8	propane
C_4H_{10}	butane
C_5H_{12}	pentane
C_6H_{14}	hexane
CAA	Clean Air Act
CAAQS	California Ambient Air Quality Standards
CAISO	California Independent System Operator
Cal/OSHA	California Division of Occupational Safety and Health
CalARP	California Accidental Release Program
CalEPA	California Environmental Protection Agency
Caltrans	California Department of Transportation
CAM	Compliance Assurance Monitoring
CAS	Chemical Abstract Service
CBC	California Building Code
CCC	California Coastal Commission
CCGT	combined-cycle gas turbine
CCR	California Code of Regulations
CDE	California Department of Education
CDFW	California Department of Fish and Wildlife
CDOGGR	California Division of Oil, Gas and Geothermal Resources
CDP	Coastal Development Permit
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CESA	California Endangered Species Act
CFR	Code of Federal Regulations
CGS	California Geologic Survey
CH_4	methane
CHP	California Highway Patrol
CHRIS	California Historical Resources Information System
CIP	Capital Improvement Program
CIWMA	California Integrated Waste Management Act
cm	centimeter(s)
CNDDB	California Natural Diversity Database
CNPS	California Native Plant Society

CO	carbon monoxide
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalent
COD	commercial operation date
CPM	compliance project manager
CPT	cone penetration test
CPUC	California Public Utilities Commission
CRHR	California Register of Historic Resources
CRS	Cultural Resource Specialist
CSC	Species of Special Concern
CTG	combustion turbine generator
CUPA	Certified Unified Program Agency
CVC	California Vehicle Code
CWA	Clean Water Act
dB	decibel
dBA	a-weighted sound pressure level
DBE	design basis earthquake
DC	direct current
DCS	distributed control system
DESCP	Drainage, Erosion, and Sediment Control Plan
DOC	California Department of Conservation
DOF	California Department of Finance
DPM	diesel particulate matter
DPR	California Department of Parks and Recreation
dscf	dry standard cubic feet
DTSC	California Department of Toxic Substance Control
DU	dwelling unit
DWR	California Department of Water Resources
EAF	equivalent availability factor
EDD	California Employment Development Department
EDR	Environmental Data Resources
EFZ	Earthquake Fault Zone
EHS	Extremely Hazardous Substance
EMF	electromagnetic force
EMS	Environmental Management Strategies, Inc.

EMT	Emergency Medical Technician
EPA	U.S. Environmental Protection Agency
EPC	Engineering, Procurement, and Construction
EPCRA	Emergency Planning and Community Right-to-Know Act of 1986
ESA	Endangered Species Act
ESA	Environmental Site Assessment
FAA	Federal Aviation Administration
FAR	Federal Aviation Regulation
FDOT	Florida Department of Transportation
FEMA	Federal Emergency Management Agency
FERC	Federal Energy Regulatory Commission
FHWA	Federal Highway Administration
FLM	Federal Land Manager
FMMP	Farmland Mapping and Monitoring Program
FSA	Final Staff Assessment
ft-lbs/blow	foot pounds per blow
FY	fiscal year
GEP	good engineering practice
GFCI	ground fault circuit interrupter
GHG	greenhouse gas
GIS	geographic information system
GO	General Order
gpm	gallon(s) per minute
GRP	General Reporting Protocol
GSU	generator step-up
GWP	global warming potential
H_2S	hydrogen sulfide
H_2SO_4	sulfuric acid
HAP	hazardous air pollutants
HARP	ARB Hotspots Analysis Reporting Program
HBEP	Huntington Beach Energy Project
HCM	*Highway Capacity Manual*
HFCs	hydrofluorocarbons
HIST UST	historical underground storage tank
HMBP	Hazardous Materials Business Plan

hp	horsepower
HRA	human health risk assessment
HRSG	heat recovery steam generator
HSP	Health and Safety Plan
HWCL	Hazardous Waste Control Law
Hz	hertz
I/O	Input-Output
I-405	Interstate 405
ICU	Intersection Capacity Utilization
IMPROVE	Interagency Monitoring of Protected Visual Environments
ISC	Industrial Source Complex
ISO	International Organization for Standardization
ITP	Incidental Take Permit
ITS	Incidental Take Statement
JWPCP	Sanitation Districts of Los Angeles County's Joint Water Pollution Control Plant
km	kilometer(s)
KOP	key observation point
kV	kilovolt(s)
kW	kilowatt(s)
L/kg/day	liter(s) per kilogram per day
LACM	Los Angeles County Museum of Natural History
LACSD	Sanitation Districts of Los Angeles County
LADWP	Los Angeles Department of Water and Power
LAX	Los Angeles International Airport
lb CO_2e/MWh	pound(s) of CO_2e per megawatt hour
lb/day	pound(s) per day
lb/event	pound(s) per event
lb/hr	pound(s) per hour
lb/MMBtu	pound(s) per million British thermal unit
lb/yr	pound(s) per year
LBFD	Long Beach Fire Department
LBMC	City of Long Beach Municipal Code
LBPD	Long Beach Police Department
LBT	Long Beach Transit
LBWD	City of Long Beach Water Department

LCP	Local Coastal Program
LCWRP	Los Coyotes Water Reclamation Plant
L_{dn} or DNL	Day-Night Noise Level
LEPC	local emergency planning committee
L_{eq}	Equivalent Sound Level
LGB	Long Beach Airport
LHV	lower heating value
L_n	percentile level
LORS	laws, ordinances, regulations and standards
LOS	level of service
LTE	low temperature economizer
LUD	Land Use Designation
m/s	meter(s) per second
MACT	maximum achievable control technology
MBTA	Migratory Bird Treaty Act
MCC	motor control centers
MCE	maximum considered earthquake
MCL	maximum contaminant level
MD	Metropolitan District
MEIR	maximum exposed individual resident
MEIW	maximum exposed individual worker
Metro	Los Angeles County Metropolitan Transportation Authority
mG	milligauss
mg/kg day	milligram(s) per kilogram per day
mg/L	milligram(s) per liter
mg/m^3	milligram(s) per cubic meter
mgd	million gallons per day
MICR	maximum individual cancer risk
MIG	Minnesota IMPLAN Group
MMBtu	million British thermal unit(s)
MOA	Memorandum of Agreement
mph	mile(s) per hour
MPRM	Meteorological Processor for Regulatory Modeling Applications
MPSA	Mitsubishi Power Systems America
MRZ	mineral resource zones

MSA	Metropolitan Statistical Area
MSG	multi-stage generating
MT	metric ton(s)
MW	megawatt(s)
MWD	Metropolitan Water District of Southern California
N_2	nitrogen
N_2O	nitrous oxide
NA	not applicable
NAAQS	National Ambient Air Quality Standards
NAD	North American Datum
NADB	National Archaeological Database
NCEER	National Center for Earthquake Engineering Research
ND	not detected
NEC	National Electrical Code
NESC	National Electrical Safety Code
NESHAP	National Emission Standards for Hazardous Air Pollutants
NFPA	National Fire Protection Association
ng/L	nanogram(s) per liter
NH_3	ammonia
NHPA	National Historic Preservation Act
NIFZ	Newport-Inglewood Fault Zone
NO	nitric oxide
NO_2	nitrogen dioxide
NOI	Notice of Intent
NO_x	oxides of nitrogen
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NSPS	New Source Performance Standards
NSR	New Source Review
NTU	nephelometric turbidity unit
O&M	operations and maintenance
O_2	oxygen
OCA	Offsite Consequences Analysis
OCTA	Orange County Transportation Authority
OEHHA	Office of Environmental Health Hazard Assessment

OHP	Office of Historic Preservation
OSHA	U.S. Occupational Safety and Health Administration
OTC	once-through cooling
OTC Policy	*Water Quality Control Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling*
PCB	polychlorinated biphenyl
PCE	passenger car equivalent unit
PCE	perchloroethene
PCH	Pacific Coast Highway
pCi/L	picocuries per liter
PFCs	perfluorocarbons
PG&E	Pacific Gas and Electric Company
PGA	peak ground acceleration
PGA_{DBE}	design basis earthquake
PGA_{MCE}	Maximum Considered Earthquake
PM	particulate matter
PM_{10}	particulate matter with aerodynamic diameter less than or equal to 10 microns
$PM_{2.5}$	particulate matter with aerodynamic diameter less than or equal to 2.5 microns
PMI	point of maximum impact
ppb	parts per billion
ppbv	parts per billion by volume
PPE	personal protective equipment
ppm	parts per million
ppmv	parts per million by volume
ppmvd	parts per million by volume, dry basis
ppt	parts per trillion
PRMMP	Paleontological Resources Mitigation and Monitoring Plan
PRS	paleontological resources specialist
PSD	Prevention of Significant Deterioration
psi	pound(s) per square inch
PST	Pacific Standard Time
PTC	Permit to Construct
PTE	potential to emit
PTO	Permit to Operate
PTS	permanent threshold shift

Pub. L.	Public Law
Q/D factor	emissions/distance factor
REC	Recognized Environmental Condition
RECLAIM	Regional Clean Air Incentives Market
REL	Reference Exposure Level
RMP	Risk Management Plan
ROW	right-of-way
RQ	reportable quantities
RUSLE2	Revised Universal Soil Loss Equation Program
RWQCB	Regional Water Quality Control Board
S&HC	California Street and Highways Code
SAAT	site annual average ambient temperature
SCAB	Southern California Air Basin
SCAG	Southern California Association of Governments
SCAQMD	South Coast Air Quality Management District
SCCIC	South Central Coastal Information Center
SCE	Southern California Edison
SCR	selective catalytic reduction
SEADIP	City of Long Beach South East Area Development and Improvement Plan
SERC	State Emergency Response Commission
SF_6	sulfur hexafluoride
SIL	Significant Impact Level
SMARTS	Stormwater Multiple Application and Report Tracking System
SMGB	State Mining and Geology Board
SNA	John Wayne Airport
SO_2	sulfur dioxide
SoCalGas	Southern California Gas Company
SONGS	San Onofre Nuclear Generating Station
SPCC	Spill Prevention Control and Countermeasure
SPSAT	site peak summer ambient temperature
SR	State Route
SSURGO	Soil Survey Geographic Database
STATSGO2	Digital General Soil Map of the United States
STG	steam turbine generator
SUSMP	Standard Urban Storm Water Mitigation Plan

SVOC	semivolatile organic compound
SVP	Society of Vertebrate Paleontology
SWPPP	Stormwater Pollution Prevention Plan
SWRCB	State Water Resources Control Board
TAC	toxic air contaminant
T-BACT	best available control technology for toxics
TCA	1,1,1-trichloroethane
TCE	trichloroethene
TCR	The Climate Registry
TDS	total dissolved solids
TEWAC	totally enclosed water-to-air-cooled
TIWRP	City of Los Angeles Terminal Island Water Reclamation Plant
TMDLs	total maximum daily loads
TMP	Transportation Management Plan
TPQ	threshold planning quantities
tpy	ton(s) per year
TQ	threshold quantity
TSP	total suspended particulates
TTHM	total trihalomethanes
UCMP	University of California Museum of Paleontology
UNEP	United Nations Environment Programme
UPS	uninterruptible power supply
USC	United States Code
USDA	United States Department of Agriculture
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UST	underground storage tank
UTM	Universal Transverse Mercator Projection
V/C	volume to capacity
VOC	volatile organic compound
WDR	waste discharge requirements
WPA	Work Progress Administration
WRCC	Western Regional Climatic Center
yd^3	cubic yard

SECTION 1

Executive Summary

1.1 Project Overview

AES Alamitos Energy, LLC (AES) will construct, own, and operate the Alamitos Energy Center (AEC)—a natural-gas-fired, air-cooled, combined-cycle and simple-cycle, electrical generating facility in Long Beach, California. The AEC will have a nominal generating capacity of 1,040 megawatts (MW).[1] The AEC will be constructed on the brownfield site of the existing AES Alamitos Generating Station (AGS), and located on an approximately 21-acre site within a larger 71.1-acre parcel.

The AEC will meet the demand for new generation in the Los Angeles basin local electrical reliability area caused in large part to the closure of the San Onofre Nuclear Generating Station and anticipated retirement of older, natural-gas-fired generation currently using once-through ocean water cooling (OTC). As a result of the promulgation of the California State Water Resources Control Board's (SWRCB) *Water Quality Control Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling* (OTC Policy) (SWRCB, 2010) over 4,000 MW of OTC generation are expected to be retired by December 31, 2020 in the Los Angeles basin local reliability area.

The construction and operation of the AEC will provide significant, well-paying, high-quality jobs. Construction personnel requirements will peak at approximately 306 workers in July 2019, and to approximately 512 workers in January 2021. On average, the AEC will employ 191 construction personnel over the approximately 56-month construction period. With an estimated $315.55 million in construction payroll, these new jobs will be at an average hourly rate of $89 per hour, including benefits. The estimated value of materials and supplies purchased locally in Los Angeles County during construction and demolition is $132.29 million. The AEC will add an estimated 125 indirect and 464 induced jobs in Los Angeles County, adding an additional $31.13 million in annual local construction expenditures and $21.84 million in annual spending by local construction workers. With an estimated average of 36 full-time employees for operations, the AEC's approximate operation payroll, including benefits, will be $4,469,000 per year. There will also be an annual operations and maintenance budget of approximately $8,312,000, to be spent locally within Los Angeles County.

In terms of ensuring electric reliability, the California Independent System Operator (CAISO) and the California Energy Commission (CEC) have recognized the importance of the AGS location as part of the coastal OTC fleet that provides both energy and capacity to satisfy the western Los Angeles Basin Local Reliability Area requirements (CAISO, 2011). The CAISO has identified a need for power generation facilities in the western sub-area of the Los Angeles Basin Local Reliability Area to replace the ocean water OTC plants that are expected to retire as a result of the SWRCB's OTC Policy (SWRCB, 2010). The results from the CAISO's year 2021 long-term Local Capacity Requirements study estimates that between 2,370 and 3,741 MW[2] of replacement OTC generation is required in the Los Angeles Basin to meet the future needs of the area. The requirement for replacement generation in light of OTC retirements in the Los Angeles Basin, along with other long-term transmission planning assumptions, is also confirmed in CAISO's *Once-Through Cooling and AB-1318 Study Results* presented on December 8, 2011 (CAISO, 2011). CAISO also notes that many of the OTC facilities are in locations critical to local electrical reliability and repowered or replacement generating capacity with characteristics that support renewable integration in these same locations would provide both local capacity for reliability and essential grid support for a future with ever-increasing

[1] Referenced to site ambient average temperature conditions of 65.3 degrees Fahrenheit (°F) dry bulb and 62.7°F wet bulb temperature without evaporative cooler operation.

[2] This range of OTC replacement capacity corresponds to the CAISO "Trajectory" planning scenario, which has been defined as the most likely planning scenario.

amounts of variable renewable energy. The effect of the repower/replacement OTC facilities reduces the number of total megawatts required compared to new generation developed elsewhere (CAISO, 2012).

The California Public Utilities Commission (CPUC) confirmed the need for new generation in the Los Angeles Basin in a decision authorizing procurement of between 1,400 and 1,800 MW of new electrical capacity in the western Los Angeles sub-area to meet long-term local capacity requirements by 2021 and that at least 1,000 MW but no more than 1,200 MW must be from conventional gas-fired resources (including combined heat and power resources). Further, the CPUC found the following: a significant need for local generating resources to replace retiring OTC plants in the Los Angeles Basin local area under every scenario analyzed by the CAISO; that a significant amount of the 1,400 to 1,800 MW procurement be met through conventional gas-fired resources in order to ensure local capacity reliability needs are met; and that gas-fired resources at current OTC sites meet CAISO's criteria for meeting local generating needs but other resources can also meet or reduce the local generating needs but may not be as effective (CPUC, 2013).

As a modern, efficient gas-fired generation plant located at a critical grid location at an existing power plant site, the AEC will satisfy these resource and reliability needs. With the additional flexible fast start and stop characteristics of the technology employed, the AEC will also provide essential grid support as the electrical system integrates increasing amounts of intermittent renewable energy sources. In recognition of its critical grid reliability benefits, the AEC combined-cycle CTGs were selected by Southern California Edison (SCE) in its Local Capacity Requirements Request for Offer (LCR RFO) on November 5, 2014. The simple-cycle CTGs will meet the capacity needs anticipated to be identified in future procurement authorizations through the CPUC LTPP process.

The AEC will consist of two gas turbine power blocks. Power Block 1 will consist of two natural-gas-fired combustion turbine generators (CTG) in a combined-cycle configuration, two unfired heat recovery steam generators (HRSG), one steam turbine generator (STG), an air-cooled condenser, an auxiliary boiler, and related ancillary equipment (collectively, AEC CCGT). Power Block 2 will consist of four simple-cycle CTGs with fin-fan coolers and ancillary facilities (collectively, AEC SCGT). The AEC CCGTs and SCGTs are unique assets that will provide greater reliability to meet resource adequacy needs for the southern California electrical system.

As California's intermittent renewable energy portfolio continues to grow, operating in either load following or partial shutdown mode is necessary to maintain electrical grid reliability, placing an increased importance upon the rapid startup, low turndown, steep ramp rate, and superior heat rate of the MSG configuration employed at the AEC.

By using proven combined-cycle technology, the AEC CCGTs can also run as a baseload facility, as needed, providing greater reliability to meet resource adequacy needs for the southern California electrical system. As an in-basin generating asset, the AEC will provide local generating capacity, voltage support, and reactive power that are essential for transmission system reliability in the Western Los Angeles Basin sub-area and larger Los Angeles basin local reliability area. The AEC will be able to provide system stability by providing reactive power, voltage support, frequency stability, and rotating mass in the heart of the critical Western Los Angeles local reliability area. By being in a transmission constrained load center, the AEC also helps to avoid potential transmission line overloads and can provide reliable local energy supplies when electricity from more distant generating resources is unavailable.

The fast-starting, flexible AEC SCGT will be available to help facilitate renewable generation and provide additional reliability in this critical Southern California reliability area. The AEC SCGT units will help "shape and firm" renewable resources, providing grid much needed reliability. The AEC SCGTs will provide fast ramp rates, up to 53 MWs per minute, when operating above minimum gas turbine turndown capacity. In addition to individual dispatchability, these units can provide valuable services to the grid, including, capacity, frequency response, voltage support, reactive power, inertia, and other ancillary services.

The AEC's combustion turbines, auxiliary boiler, and associated equipment will include the use of best available control technology to limit emissions of criteria pollutants and hazardous air pollutants. By being able to deliver flexible operating characteristics across a wide range of generating capacity, at a relatively consistent and superior heat rate, the AEC will help lower the overall greenhouse gas emissions resulting from electrical generation in southern California and allow for greater integration of intermittent renewable resources.

The AEC will reuse, to the extent feasible, existing infrastructure including the existing SCE switchyard and transmission facilities; connections to the Southern California Gas Company (SoCalGas) natural gas pipeline system and City of Long Beach Water Department (LBWD) water connections; process water supply lines; and the administration, maintenance, and certain warehouse buildings.

The AEC will interconnect to the existing SCE 230-kilovolt switchyard adjacent to the north side of the property. Natural gas will be supplied to the AEC via an existing offsite 30-inch-diameter pipeline owned and operated by SoCalGas. The AEC will require a new natural gas metering facility and construction of two new natural gas compressor buildings (one for each power block) within the AEC footprint. Stormwater will be discharged to an existing retention basin and then ultimately to the Los Cerritos Channel via existing stormwater outfalls.

The AEC will use water provided by the LBWD for construction, operational process, and sanitary uses but at substantially lower volumes than the existing AGS has historically used. This water will be supplied through existing onsite water lines.

The AEC will include a new 1,000-foot process/sanitary wastewater pipeline to the first point of interconnection with the existing LBWD sewer system and will eliminate the current practice of treatment and discharge of process/sanitary wastewater to the San Gabriel River. The project may also require upgrading approximately 4,000 feet of the existing offsite LBWD sewer line downstream of the first point of interconnection, therefore, this possible offsite improvement to the LBWD system is also analyzed in this Application for Certification (AFC). The total length of the new pipeline (1,000 feet) and the upgraded pipeline (4,000 feet) is approximately 5,000 feet.

Construction of the AEC will use onsite laydown areas (approximately 8 acres dispersed throughout the existing AGS parcel) and an approximately 10-acre laydown area located adjacent to the existing AGS parcel south of generating Units 5 and 6. The demolition of the existing AGS units is not necessary for construction of AEC. Existing AGS Units 1–6 are currently in operation and will continue to provide essential electrical service concurrent with the construction of the AEC CCGT power block. Units 1, 2, and 5 will be retired after the AEC CCGT commences operation. Units 3, 4, and 6 will likely operate through at least December 31, 2020. The City and Project Owner have entered into a Memorandum of Understand for the demolition of the existing units. Demolition of Units 1-6 will be conducted in accordance with the MOU once all necessary regulatory approvals to retire and decommission the existing units are received. The MOU provides certainty for the public that the existing AGS units will removed after the AEC is constructed and operating.

A portion of the AEC will occupy land formerly used for AGS Unit 7 (a peaking unit). The generating unit and much of the related facilities for former Unit 7 have been decommissioned, salvaged, and removed from the site. However some components of the balance of plant for former Unit 7's remain onsite, including certain buildings, foundations and balance of equipment including underground water, fuel and other lines (referred to in this AFC as the "former Unit 7's remaining components"), which will be demolished, along with two existing wastewater retention basins and a small maintenance shop to provide the necessary space for AEC. The Assessor's Parcel Numbers for the Alamitos Energy Center site are 7237-017-805, 7237-017-806, 7237-017-807, 7237-017-808, 7237-017-809, 7237-018-807, 7237-018-808, 7237-019-808, and 7237-019-005. Appendix 1A provides the legal descriptions and title reports for the site. The site is located in Township 5 south, Range 12 west, section 2 and Township 5 south, Range 12 west, section 11, Los Alamitos quad. Appendix 1B provides a list of the property owners located within 1,000 feet of the project site.

Figure 1.1-1 is an artistic rendering of the project, Figure 1.1-2 shows the location of the project within the Los Angeles County region, Figure 1.1-3 shows the site location, and Figure 1.1-4 is a photograph of the existing site.

1.2 Project Objectives

The primary project objective of the AEC is to construct and operate a modern, state-of-the-art, efficient, fast-starting, combined-cycle and simple-cycle natural gas power plant that satisfies the local area electrical reliability needs while fulfilling the requirements of the South Coast Air Quality Management District's Rule 1304(a)(2). The basic project objectives include but are not limited to the following:

- Develop a project capable of providing energy, generating capacity, and ancillary electrical services (voltage support, spinning reserve, inertia) to satisfy Los Angeles Basin Local Reliability Area requirements and transmission grid support, particularly in the western subarea of the Los Angeles Basin.
- Provide fast starting and stopping, flexible, controllable generation with the ability to ramp up and down through a wide range of electrical output to allow the integration of the renewable energy into the electrical grid in satisfaction of California's Renewable Portfolio Standard, displacing older and less-efficient generation.
- Utilize the existing brownfield power plant site and infrastructure, including the existing AGS switchyard and related facilities, the Southern California Edison (SCE) switchyard and transmission facilities, the Southern California Gas Company (SoCalGas) natural gas pipeline system, the Long Beach Water Department (LBWD) water connections, process water supply lines, existing fire suppression and emergency service facilities, and the administration, maintenance, and certain warehouse buildings.
- Use qualifying technology under the South Coast Air Quality Management District's (SCAQMD) Rule 1304(a)(2) that allows for the replacement of older, less-efficient electric utility steam boilers with specific new generation technologies on a megawatt to megawatt basis (that is, the replacement megawatts are equal or less than the megawatts from the electric utility steam boilers).

1.3 Project Owner

The AEC owner is AES Alamitos Energy, LLC, a wholly owned subsidiary of the AES Corporation. The AES Corporation is a global power company with generation and distribution businesses across five continents. Founded in 1981, the AES Corporation built its first power plant in 1985, followed shortly thereafter by the AES Placerita plant in Newhall, California. Since 1989, AES has owned and operated both renewable energy and natural gas generating plants in California. Today, through its portfolio of thermal and renewable fuel sources, the AES Corporation safely provides affordable and sustainable energy in 18 countries. In California, the AES Corporation generates enough electricity from both thermal and renewable sources to power millions of homes and businesses. The AES Corporation brings the combined expertise of a global force of approximately 18,500 people.

1.4 Project Schedule

Construction activities at the project site are anticipated to last 56 months, from first quarter 2017 until third quarter 2021. The project will commence with site preparation and the removal of the remaining Unit 7's components and other ancillary structures to make room for the construction of AEC CCGT and SCGT power blocks. Site preparation will commence in January 2017 and construction on the AEC CCGT is expected to be complete by the first quarter of 2020. The AEC SCGT power block is scheduled to commence in the second quarter of 2020 and be complete by the third quarter of 2021. No construction overlap is expected between the AEC CCGT and AEC SCGT power blocks.

Major project milestones are listed in Table 1.4-1.

TABLE 1.4-1
AEC Schedule Major Milestones

Activity	Commence Activity	Commercial Operation
Begin Demolition of Alamitos Generating Station Unit 7	January 2017	Not Applicable
Begin Construction of AEC CCGT	Second Quarter 2017	First Quarter 2020
Begin Construction of AEC SCGT	Second Quarter 2020	Third Quarter 2021

1.5 Project Alternatives

A review of project alternatives was conducted to identify reasonable alternatives to the AEC that could feasibly attain most of the project objectives and reduce or eliminate any significant effects of the project. Based on this review, the AEC is the most efficient and effective design with the least environmental effects to meet basic project objectives. The objectives of the AEC are discussed in Section 1.2. The project alternatives analysis included the "no project" alternative, project design alternatives, and technology alternatives.

Alternative generating technologies including conventional boiler and steam turbine, simple-cycle combustion turbine, wind energy, photovoltaic and solar thermal technologies, Kalina combined-cycle, internal combustion engines and energy storage were considered but rejected because of the inability of these technologies to provide generating capacity for local reliability needs, meet peak energy demands, *and* provide flexible generation with minimum environmental effects. Alternative equipment technologies were also considered but were rejected because of their environmental effects or their inability to meet the project objectives. Public Resources Code section 25540.6 provides that there need not be a discussion of offsite alternatives for projects that are located at an existing industrial site, and where the project has a strong relationship to the existing industrial site. The AEC will be located within the boundaries of the existing AGS parcel, where a power plant has been located for nearly 60 years, will reuse existing infrastructure and facilities to the extent feasible and thus has a strong relationship to the existing industrial site. For example, the AEC will utilize the existing high-voltage electric transmission interconnection point. Relocating or duplicating the electrical interconnection and associated transmission system to support an alternative location in this densely populated and highly urbanized area would not be feasible. The transmission system that serves the western Los Angeles Basin was designed, built, and subsequently expanded around the existing power plant locations as the area became further urbanized and more densely populated. The AEC has been designed to fit within the existing electrical system and serve the current and future needs of the urban development which now constrains further expansion, replacement, or relocation of the existing electrical transmission and distribution system. Therefore, in enacting Public Resources Code Section 25540.6, the Legislature determined that it is reasonable not to analyze offsite alternatives for projects with such a strong relationship to an existing industrial site. Given the strong relationship to the existing industrial site, the AEC is exempt from further offsite alternatives analyses.

Moreover, as shown in the environmental analysis of the project, the AEC has mitigated potentially significant impacts to a level below significance thus leaving no need to analyze alternative sites which could reduce impacts. Alternative sites would fail to obtain most of the project objectives, especially the objectives of modernization and reuse of existing infrastructure. Given the substantial urban development that has grown up around the AEC site, any offsite alternatives would almost certainly have their own potential to have significant impacts and noncompliance with applicable laws, ordinances, regulations, and standards (LORS), including potential inconsistency with local coastal development plans. For these primary reasons, a suitable brownfield site could not be identified with the combination of existing infrastructure and the potential of fewer environmental impacts than those identified for the AEC.

Under the no project alternative, the AEC would not be built and the associated benefits of the AEC would not materialize, including critically needed energy and electrical generating capacity to support grid reliability in the Los Angeles Basin and western subarea and increased abilities to integrate renewable resources with the electrical grid. The no project alternative would not be preferable to the AEC because of the need for economical, reliable, and environmentally sound generation resources in the region. The no project alternative would not meet the basic project objectives, would eliminate the AEC's benefits, and would not avoid potential significant impacts. The AEC will not result in any significant impacts, therefore, the no project alternative was rejected in favor of the AEC.

The AEC will connect to the exiting natural gas supply pipeline and the existing SCE electrical system, complying with applicable LORS and avoiding any new potential impacts, so no design alternatives are required for those facilities.

While the AEC will significantly reduce the use of fresh water at the AGS site, a number of water supply alternatives were reviewed. Water for the AEC will continue to be provided by the current provider, LBWD. Potential alternative water supply sources for the AEC include ocean water from the Pacific Ocean and secondary or tertiary treated wastewater. After further review, these alternative water supply sources would create additional environmental impacts and be more costly due to the need for construction of additional infrastructure. Therefore, use of the water system provided by the LBWD is the preferred source of water for the AEC.

Several technology alternatives were also reviewed in a process that resulted in the selection of a configuration of commercially proven combined-cycle and simple-cycle technologies. The technology alternatives included generation technology alternatives, power plant cooling alternatives, fuel technology alternatives, nitrogen oxide (NO_x) control alternatives, energy storage alternatives, and waste discharge alternatives. None of these technologies was considered equal or superior to the combustion turbine technology selected for the AEC in reliability, availability, and use of resources, cost-effectiveness, or meeting the basic objectives of the project.

A comprehensive review of alternatives to the AEC technology, project design, location, and the no project alternative are presented in Section 6.0.

1.6 Environmental Considerations

Pursuant to the requirements set forth in existing environmental laws and the CEC's regulations, 16 environmental disciplines with possible associated environmental impacts that could result from the AEC were investigated. Detailed descriptions and analyses of these areas are presented in Sections 5.1 through 5.16 of this AFC. As discussed in detail in this SAFC, with the implementation of the proposed mitigation measures and Conditions of Certification, there will be no significant unmitigated environmental impacts associated with AEC construction and operation.

As a modern facility, the AEC will have lower emission rates on a kilowatt-hour production basis, with greater thermal efficiency, lower greenhouse gas emissions, and lower criteria pollutant emissions. In general, as a brownfield site devoid of significant biological resources, the AEC addresses and minimizes a host of potential environmental impacts in nearly every discipline analyzed in this SAFC.

This executive summary highlights findings related to five subject areas that have historically been of interest in CEC proceedings: air quality, biological resources, noise, visual resources, and water resources.

1.6.1 Air Quality

The AEC site is located in an area designated as nonattainment for state and federal ozone and for the state nitrogen dioxide (NO_2) PM_{10} and $PM_{2.5}$ standards. The site is designated as federal maintenance and nonattainment for PM_{10} and $PM_{2.5}$ standards, respectively.

An assessment of project impacts on air quality was conducted using a comprehensive, numerical air dispersion modeling system. No significant air quality impacts would result from the project because emissions will be controlled through the use of inherently low-emission natural gas combustion turbine technology and best available emission control technology. In addition, the potential public health impacts from the operation of the AEC would not exceed applicable thresholds as demonstrated by the Human Health Risk Assessment included in Section 5.9, Public Health.

Federal and state nonattainment pollutants emitted from the project would be fully offset under the provisions of South Coast Air Quality Management District (SCAQMD) Rule 1304(a)(2) and the procedures and processes in Rule 1315. Emission offsets for PM_{10}, SO_2, and volatile organic compounds, and RECLAIM Trading Credits for NO_x emissions would be retired and accounted for consistent with federal, state, and SCAQMD requirements for the project. The project would be consistent with the SCAQMD's plan to eliminate older, less-efficient power generating plants and would generate in excess of $70 million in fees to the SCAQMD to be used for local air quality improvement projects consistent with the SCAQMD's Air Quality Management Plan. The AEC will help California and southern California obtain their Clean Energy and Clean Air objectives by lowering the total emissions associated with electrical power generation and enabling a greater percentage of renewable generation to serve southern California demand. See Section 5.1, Air Quality, for a detailed analysis of the air quality impacts from the project.

Consistent with the Energy Action Plan, as drafted by the CEC and the CPUC, the AEC will assist in meeting the state's goal of ensuring that electric energy in the state is "adequate, affordable, technologically advanced, and environmentally sound." It will also assist in meeting greenhouse gas reduction targets under the Global Warming Solutions Act of 2006 (AB 32), and will help utilities integrate renewable energy into their systems as required under California's RPS. The AEC will also provide needed electric generation capacity with improved efficiency and operational flexibility to help meet southern California's long-term electricity needs and Clean Air objectives.

1.6.2 Biological Resources

There are no federal or state listed threatened, endangered, or candidate plant or wildlife species at the AEC site or along the offsite pipeline alignment. In addition, there is no suitable terrestrial or aquatic habitat on the AEC site or along the offsite pipeline alignment. Potential indirect impacts from operation of the facility will be less than significant. Potential impacts to wildlife or plants that could occur as a result of construction and operation of the AEC will be less than significant with avoidance, incorporation of project design features, and implementation of mitigation measures.

The AEC will draw process water from an existing water supply system and then discharge wastewater to the LBWD's sanitary system. There will be a significant decrease in outfall discharge from current use levels because facility process and sanitary discharge to the San Gabriel River will be eliminated. The discharge of stormwater will be via the existing, permitted outfalls. Section 5.2, Biological Resources, provides a detailed analysis of biological resources.

1.6.3 Noise

Ambient noise monitoring was conducted at the project site, and an acoustical model was prepared for the project. The final design of the AEC facility will ensure the applicable City of Long Beach noise ordinances are met and no significant noise impact will result from the project. The AEC will implement measures to minimize potential noise impacts from project construction and operation such as a noise hot line, noise complaint resolution, and if a traditional, high-pressure steam blow process is used, the Project Owner will limit use to daytime hours and equip the steam blow piping with a silencer that reduces the noise of steam blows. Section 5.7, Noise, provides a detailed analysis of the noise assessment.

1.6.4 Visual Resources

The AEC is located in an industrial area and has been designed in keeping with the surrounding industrial landscape. Based on an analysis of simulated views of the project from four key observation points, the AEC

will have no significant visual impacts. Section 5.13, Visual Resources, provides a detailed discussion of the visual resources assessment.

1.6.5 Water Resources

Process wastewater and sanitary wastewater will be conveyed to the LBWD sanitary system through a new wastewater pipeline connection eliminating the current practice of discharge from the AGS into the San Gabriel River. Stormwater will be collected into the existing stormwater system that includes onsite retention basins and then ultimately discharged to the Los Cerritos Channel in compliance with the National Pollutant Discharge Elimination System General Permit for discharge of stormwater associated with industrial activities.

The annual water requirements for operation of the AEC will be substantially less than historical water consumption of the existing AGS. Maximum AEC water use will be approximately 130 acre-feet per year, the AGS has historically used approximately 441 acre-feet per year (2013/2014 annual average). Section 5.15, Water Resources, provides a detailed analysis of water resources.

1.7 Key Benefits

1.7.1 Reliability and Environmental

The AEC will provide up to 1,040 MW of operationally flexible, and efficient generating capacity to the Los Angeles Basin Local Reliability Area in general, and specifically to the western Los Angeles Basin sub-area.[3] The project will provide local capacity for reliability needs, serve peak southern California energy demand, and provide flexible generation to allow the integration of the ever-increasing contribution of variable renewable energy into the electrical grid.

In addition to an efficient and low heat rate, the AEC's operational flexibility will mean the facility will be able to run at partial load while maintaining a low greenhouse gas emission rate. Quick-staring capabilities also mean that the AEC will not need to operate at times of low power demand to keep "warm" to be called upon on short notice, thereby decreasing emissions compared to conventional power plants that must be kept on and "idling" between periods of high electricity demand.

As more renewable electrical resources are brought on line as a result of electric utilities meeting California's RPS, projects strategically located within load centers and designed for fast starts and ramp-up/ramp-down capability, such as the AEC, will be critical in supporting local electrical reliability and grid stability. Thus, the AEC avoids the potentially significant effects associated with the addition of transmission system improvements and other generation to meet this reliability need. The AEC will serve the western Los Angeles Basin load center without constructing new transmission facilities.

The AEC will have superior thermal efficiency, resulting in fewer air emissions of criteria pollutants on a pound-per-megawatt basis than the existing AGS, providing positive public health benefits. By being able to deliver flexible operating characteristics across a wide range of generating capacity, at a relatively consistent and superior heat rate, and enabling an ever-increasing amount of intermittent renewable energy the AEC will help lower the overall greenhouse gas emissions resulting from electrical generation in southern California.

The AEC design achieves a very high level of efficiency across a wide range of generating capacity, making it the most efficient design for the intended operational profile. By replacing the existing AGS, the AEC will be providing fast response, modern, clean and efficient electrical power that fully supports and will enable California to achieve a much greater use of, and reliance on, intermittent renewable electricity sources, such as wind and solar, while also serving local electrical reliability needs, furthering California's RPS and

[3] As defined by the CAISO's "Local Capacity Technical Study Overview and Results" report dated April 17, 2012.

greenhouse gas policies. Additionally, the AEC, with its more compact combined-cycle design and shorter exhaust stacks, will result in a reduced visual impact compared to the existing AGS.

In terms of biological resources, locating the project on an existing brownfield site avoids potential impacts to critical habitats and other wildlife areas. Reuse of existing infrastructure avoids and minimizes potential land use impacts. But for a single wastewater line to connect to the existing LBWD system, the AEC does not require the construction of any other new offsite linears, including gas and water supply lines, and transmission interconnections. This reduces potential offsite environmental impacts.

1.7.2 Employment and Economic Benefits

The AEC's capital cost for power plant equipment is estimated to be between approximately $1.1 billion and $1.3 billion, and the total project cost represents an even larger investment in southern California. There will be approximately $132.29 million in local purchases of materials and supplies during construction and approximately $8,312,000 per year of local operational expenditures. In addition, the AEC is expected to bring increased property tax revenue to the City of Long Beach.

The AEC will result in a peak of approximately 306 construction workers in July 2019 during construction of Power Block 1, and 512 workers in January 2021 for Power Block 2. The average workforce for both power blocks over the 56-month construction period will be 191 workers. The operating facility will permanently employ an average workforce of 36, including plant operators, supervisors, administrative personnel, mechanics, and electricians. Operational staff will typically work in three rotating shifts with administrative and supervisory staff working 8-hour shifts, 5 days a week. The facility will be capable of operating 24 hours per day, 7 days per week.

The AEC will use the services of local or regional firms for major maintenance and overhauls, plant supplies, and other support services throughout the life of the facility, resulting in additional direct employment and economic benefits.

1.8 Persons Who Prepared the AFC

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

1.9 References

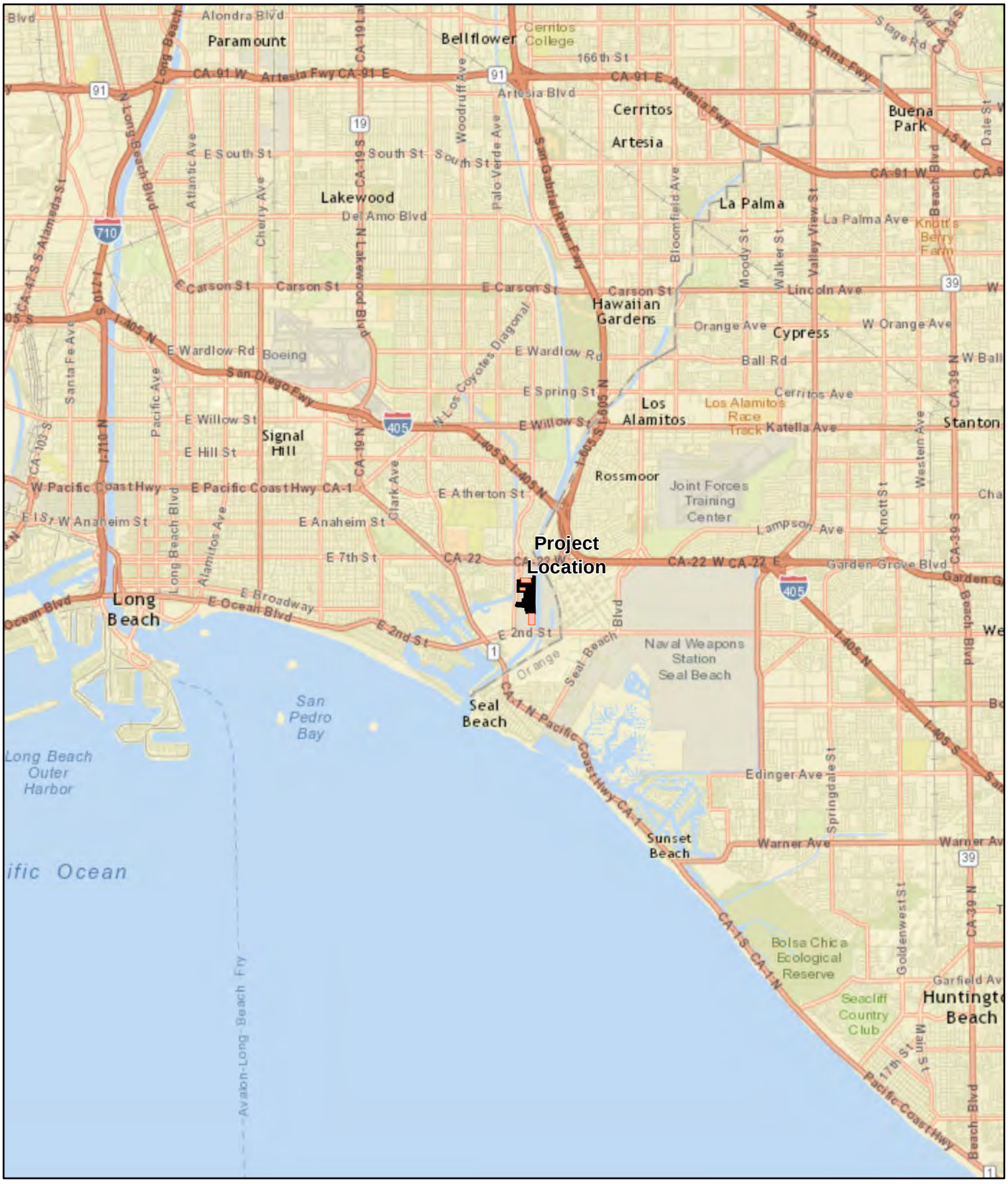
California Independent System Operator (CAISO). 2011. *Once-Through Cooling & AB1318 Study Results*. December 8.

California Independent System Operator (CAISO). 2012. 2012/2013 Transmission Planning Process Unified Planning Assumptions and Study Plan. March 30.

California Public Utilities Commission (CPUC). 2013. Decision Authorizing Long-Term Procurement for Local Capacity Requirements (Decision 13-02-015). February 13.



Figure 1.1-1
Artist Rendering
Alamitos Energy Center
Long Beach, California
October 2015



Legend

- AGS Site
- Parking/Laydown Construction Area

0 1 2 Miles

N

FIGURE 1.1-2
Regional Location Map
Alamitos Energy Center
Long Beach, California
October 2015



Legend

- AGS Boundary
- AEC Site
- Parking/Laydown Construction Area
- Natural Gas Metering Station
- Construction Access Road
- Proposed New Process/ Sanitary Wastewater Pipeline to First Point of Interconnection
- Potential Sewer Upgrade

0 1,000 2,000 Feet

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FIGURE 1.1-3
Site Location Map

Alamitos Energy Center
Long Beach, California
October 2015

CH2MHILL

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Figure 1.1-4
Photograph of the Existing Site
Alamitos Energy Center
Long Beach, California
October 2015

SECTION 2

Project Description

The Alamitos Energy Center (AEC) is a nominal 1,040-megawatt (MW), natural-gas-fired, combined-cycle and simple-cycle, air-cooled electrical generating facility that will be constructed on the site of the AES Alamitos Energy, LLC (AES) Alamitos Generating Station (AGS), an existing and operating power plant in Long Beach, California. The AEC will be located on an approximately 21-acre site within the approximately 71-acre AGS parcel.

The AEC will consist of two gas turbine power blocks. Power Block 1 will consist of two natural-gas-fired combustion turbine generators (CTG) in a combined-cycle configuration with two unfired heat recovery steam generators (HRSG), one steam turbine generator (STG), an air-cooled condenser, an auxiliary boiler, and related ancillary equipment (collectively, AEC CCGT). Power Block 2 will consist of four simple-cycle CTGs with fin-fan coolers and ancillary facilities (collectively, AEC SCGT). The AEC CCGTs and SCGTs are unique assets that will provide greater reliability to meet Resource Adequacy needs for the southern California electrical system.

To provide fast starting and stopping, flexible generating resources, the AEC CCGTs will be configured and deployed as a multistage generating (MSG) facility. The MSG configuration will allow the AEC units to generate power across a wide and flexible operating range while maintaining a relatively constant and efficient heat rate. The AEC CCGTs can serve both peak and intermediate loads with the added capabilities of rapid startup, significant turndown capability (ability to turn down to a low load), and fast ramp rates (10 percent per minute for the CCGT power block when operating above minimum gas turbine turndown capacity). As California's intermittent renewable energy portfolio continues to grow, operating in either load following or partial shutdown mode is necessary to maintain electrical grid reliability, placing an increased importance upon the rapid startup, low turndown, steep ramp rate, and superior heat rate of the MSG configuration employed at the AEC.

By using proven combined-cycle technology, the AEC CCGTs can also run as a baseload facility, as needed, providing greater reliability to meet Resource Adequacy needs for the southern California electrical system. As an in-basin generating asset, the AEC will provide local generating capacity, voltage support, and reactive power that are essential for transmission system reliability in the Western Los Angeles Basin sub-area and larger Los Angeles basin local reliability area. The AEC will be able to provide system stability by providing reactive power, voltage support, frequency stability, and rotating mass in the heart of the critical Western Los Angeles local reliability area. By being in a transmission constrained load center, the AEC also helps to avoid potential transmission line overloads and can provide reliable local energy supplies when electricity from more distant generating resources is unavailable.

The fast-starting, flexible AEC SCGT will be available to help facilitate renewable generation and provide additional capacity in this critical Southern California reliability area. These LMS units will help "shape and firm" renewable resources, providing grid much needed reliability. The SCGTs will provide fast ramp rates, up to 53 MWs per minute for the SCGT power block, when operating above minimum gas turbine turndown capacity. In addition to individual dispatchability, these units can provide valuable services to the grid, including, capacity, frequency response, voltage support, reactive power, inertia, and other ancillary services.

The AEC's combustion turbines, auxiliary boiler, and associated equipment will include the use of best available control technology to limit emissions of criteria pollutants and hazardous air pollutants. By being able to deliver flexible operating characteristics across a wide range of generating capacity, at a relatively consistent and superior heat rate, the AEC will help lower the overall greenhouse gas (GHG) emissions resulting from electrical generation in southern California and allow for greater integration of intermittent renewable resources, thereby progressing California's goal of reducing GHGs from the electricity system.

The AEC will be developed on a brownfield site and reuse existing infrastructure and services, avoiding any new impacts and ground disturbing activities wherever feasible. The AEC will interconnect to the existing Southern California Edison (SCE) 230-kilovolt (kV) switchyard adjacent to the north side of the AGS property line. Natural gas will be supplied to the AEC via the existing offsite 30-inch-diameter pipeline owned and operated by Southern California Gas Company (SoCalGas). The AEC will require a new natural gas metering facility and construction of two new natural gas compressor buildings (one for each power block) within the AEC footprint. Stormwater runoff from the power block areas will be directed to new oil/water separators and sumps before being directed to an existing retention basin and then ultimately discharged to the Los Cerritos Channel via existing stormwater outfalls. The AEC will use water provided by the City of Long Beach Water Department (LBWD) under its water service tariff for construction, operational process, and sanitary uses but at substantially lower volumes than the existing AGS historically has used. This water will be supplied through existing onsite water lines.

The AEC will include a new 1,000-foot process/sanitary wastewater pipeline to the first point of interconnection with the existing LBWD sewer system and will eliminate the current practice of treatment and discharge of process and sanitary wastewater to the San Gabriel River. The project may also require upgrading approximately 4,000 feet of the existing offsite LBWD sewer line downstream of the first point of interconnection, therefore, this possible offsite improvement to the LBWD system is also analyzed in this AFC. The total length of the new pipeline (1,000 feet) and the upgraded pipeline (4,000 feet) is approximately 5,000 feet.

Construction of the AEC will require the use of onsite laydown areas, approximately 8 acres dispersed throughout the existing site, and an additional approximately 10-acre laydown area located adjacent to the AGS site south of existing generating Units 5 and 6. The demolition of the existing and operating AGS units is not necessary for construction of AEC. Existing AGS Units 1 through 6 are currently in operation and will continue to provide essential electrical service concurrent with the construction of the AEC CCGT power block. Units 1, 2, and 5 will be retired once the AEC CCGT commences operation. Units 3, 4, and 6 will likely operate through at least December 31, 2020.

A portion of the AEC will occupy land formerly used for AGS Unit 7 (a retire turbine peaking unit). The generating unit and some of the related facilities for former Unit 7 have been decommissioned, salvaged, and removed from the site. However some components of the balance of plant for former Unit 7's remain on-site, including certain buildings, foundations and balance of equipment including underground water, fuel and other lines (referred to in this AFC as the "former Unit 7's remaining components") and fuel tank. These buildings and equipment along with two retention basins and two small maintenance shops will be demolished and removed from the site as part of the site preparation activities for the AEC.

Construction activities at the AEC site are anticipated to last 56 months, from first quarter 2017 until third quarter 2021. The project will commence with site preparation and the removal of the remaining Unit 7's components and other ancillary structures to make room for the construction of AEC CCGT and SCGT power blocks. Site preparation will commence in the first quarter of 2017 and construction on the AEC CCGT is expected to commence the second quarter of 2017. Construction on the AEC CCGT is expected to be complete by the first quarter of 2020. The AEC SCGT power block is scheduled to commence in the second quarter of 2020 and to reach completion in the third quarter of 2021. No construction overlap is expected between the AEC CCGT and AEC SCGT power blocks.

Owing to the critical need for generating capacity at the AGS site at all times, existing Units 1 through 6 will remain in operation through much of the AEC development and construction. Given the land available, the need for regulatory approval before the existing AGS can be taken out of service, and the fact that the existing Units 1-6 do not need to be removed to enable the construction of the AEC, the existing power plant will not impede construction of AEC. The City and Applicant have entered into a Memorandum of Understand (MOU) for the demolition of the existing units. Demolition of Units 1-6 will be conducted in accordance with the MOU once all necessary regulatory approvals to retire and decommission the existing

units are received. The MOU provides certainty for the public that the existing AGS units will removed after the AEC is constructed and operating.

2.1 Generation Facility Description, Design, and Operation

The AEC is a natural-gas-fired, air-cooled electrical generating facility rated at a nominal generating capacity of 1,040 MWs. The AEC has been designed using commercially proven technology equipped with environmental monitoring, protection, and safety systems to provide safe and reliable operation over a minimum 30-year operating life.

The AEC will be located on an approximately 21-acre site within the approximately 71-acre AGS parcel. An approximately 10-acre temporary construction laydown area south the AEC site within the AGS parcel (Figure 2.1-1) is also included as part of the project. Figure 2.1-2 shows the proposed AEC equipment general arrangement.

The AEC CCGT will be located on the southern-most portion of the AEC site, on the former AGS fuel oil storage site, which was sold then reacquired by the Applicant in late 2014. AEC CCGT will include the following principal design elements:

- Two General Electric (GE) 7FA.05 CTGs with a nominal rating of 227 MW each. The CTGs will be equipped with evaporative coolers on the inlet air system and dry low oxides of nitrogen (NO_x) combustors
- One, single-flow, impulse, down exhaust condensing STG with a nominal rating of approximately 229 MW
- Two HRSGs of the horizontal gas flow, triple-pressure, natural-circulation type; each HRSG will be equipped with a selective catalytic reduction (SCR) unit in the ductwork for the control of NO_x emissions and an oxidation catalyst to control carbon monoxide (CO) and volatile organic compound (VOC) emissions, and the HRSGs will not employ supplemental firing
- One air-cooled condenser and a closed-loop fin-fan cooler
- Natural gas compressor
- One generator step-up (GSU) transformer per each GE 7FA gas turbine and one for the steam turbine
- One 230-kV interconnection to the existing SCE switchyard, which is adjacent to the site

The AEC SCGT will be located on the northern portion of the AEC site, adjacent to the San Gabriel River. The AEC SCGT will include the following principal design elements:

- Four GE Energy LMS 100 PB natural-gas-fired combustion turbine-generators (CTGs) with a nominal rating of 100 MW each
- Each CTG is equipped with selective catalytic reduction (SCR) equipment containing catalysts to further reduce NOx emissions, and an oxidation catalyst to reduce carbon monoxide (CO) emissions
- Auxiliary equipment associated with each CTG will include an inlet air filter house with evaporative cooler, turbine inter-cooler and associated intercooler circulating pumps
- Two CTGs will share one fin-fan heat exchanger and one GSU transformer
- Natural gas compressors
- One 230-kV interconnection to the existing onsite SCE 230-kV switchyard (see Section 3.0, Transmission Systems Engineering)

The two power blocks will share the following design elements:

- Direct connection to an existing SoCalGas 30-inch-diameter natural gas pipeline and metering station

- Connection to existing onsite municipal and industrial water lines
- Fire water and suppression systems
- A new 1,000-linear-foot process/sanitary wastewater pipeline to the first point of interconnection with the existing LBWD sewer system at the east end of East Vista Street in Long Beach
- An existing stormwater retention pond
- Water treatment and storage systems

2.1.1 Site Arrangement and Layout

Primary access to the AEC site will be provided via the existing main entrance off of North Studebaker Road, north of the intersection of Westminster Avenue. Figure 2.1-1 shows the facility site plan, Figure 2.1.2 shows the general arrangement and layout of the facility, and Figures 2.1-3a through 2.1-3d show typical elevation views of the project.

The 71.3-acre AGS parcel is bounded to the north by the SCE switchyard and State Route 22 (East 7th Street); to the east by the San Gabriel River and, beyond that, the Los Angeles Department of Water and Power Haynes Generating Station; to the south by the former Plains West Coast Terminals petroleum storage facility and undeveloped property; and to the west by the Los Cerritos channel, AGS cooling-water canals, and the residences west of the channel.

The existing AGS currently has six operating generating units (Units 1 through 6). Units 1, 2, and 5 will be retired once the AEC CCGT reaches the commissioning stage of development and becomes operational. The remaining units will retire consistent with the OTC regulations and local reliability needs. The existing plant has various ancillary facilities that will be used to support the AEC, such as the administration, maintenance, and certain warehouse buildings; existing SoCalGas natural gas pipeline; LBWD water connections; the southernmost existing stormwater retention pond and outfalls; and the existing SCE switchyard. Other existing infrastructure at the AGS, such as the fire water distribution, including two emergency electric-driven fire water pumps and process water distribution and storage systems, will be reused to the greatest extent possible.

2.1.1.1 Pipelines

The AEC will rely on existing natural gas, water, and process water supply lines. A new, 1,000-foot-long process/sanitary wastewater pipeline will be constructed to the first point of interconnection with the existing LBWD sewer system and a possible upgrading of an additional 4,000 linear feet of the LBWD sewer system just downstream of the first point of interconnection to the LBWD sewer system is also considered in the environmental review for this AFC.

Natural Gas Supply Pipeline. Natural gas will be supplied to the AEC via the existing 30-inch-diameter pipeline that currently serves existing Units 5 and 6. No new offsite natural gas supply pipelines will be necessary for the project. The existing natural gas pipeline is owned and operated by SoCalGas. The pipeline operates at a nominal pressure of 165 pounds per square inch, and enter the existing AGS site at the northeast corner of the facility near the existing 230-kV switchyard. The existing gas metering station and ancillary equipment will be retained for the existing units and a new gas metering station will be constructed on the northeast corner of the site. The natural gas will flow into the new gas metering station and then to a new gas pressure-control station and gas scrubber/filtering equipment that will be constructed by the Project Owner as part of the project. Natural gas will then be distributed onsite to the combustion turbine fuel gas compressors and, subsequently, the combustion turbines.

Water Supply Pipeline. Water for the site is supplied from two separate existing LBWD pipeline interconnections. Because the AEC's combined-cycle technology requires much less water than the existing AGS's boiler systems, the AEC's water requirements are significantly less than the existing generating

station's current use. All of the existing connections will be used to support the AEC. No new offsite water supply pipelines will be required for the project.

Plant Process and Sanitary Wastewater Pipeline. The project's only offsite linear is an offsite pipeline for discharge of plant process and sanitary wastewater to the Sanitation Districts of Los Angeles County via the LBWD sewer system. A new 1,000-foot-long, 6-inch-diameter pipeline will connect the AEC to the existing LBWD sewer system. The new, offsite pipeline will commence at the west side of the site near the intersection of Studebaker Road and the northern cooling water canal. The pipeline will cross under Studebaker Road then turn south to the intersection with Loynes Drive. The pipeline will then turn west and will cross over the Los Cerritos Channel (affixed to the bridge). After crossing the channel, the pipeline will turn north on East Vista Street to connect into the existing system in the residential subdivision.

The extent of any potential upgrades to the existing LBWD sewer pipeline downstream of the first point of interconnection has been analyzed by the LBWD. At present, no further upgrades to the sewer pipeline would be required with the interconnection of the AES. The LBWD will ultimately determine the scope and conduct of any potential upgrades. While it is not certain that there will need to be any upgrades downstream of the new 1,000-foot section, to ensure a timely and comprehensive review of potential project impacts, the environmental analyses in this AFC assume a capacity upgrade to an existing approximately 4,000-foot-long existing sewer pipeline downstream of the first point of interconnection with the existing LBWD system (starting at eastern end of East Vista Street and ending at an existing interconnection tee along East Pacific Coast Highway) is included in the environmental analysis of the project (see Figure 2.1-1). While it is still to be determined if any or all of this existing 4,000-foot section of LBWD sewer pipeline downstream of the first point of interconnection maybe upgraded, out of an abundance of caution the potential impacts of upgrading the entire existing 4,000-foot section are analyzed in this AFC. It is anticipated that for both the new construction and for any upgrades, an average 10-foot-wide construction corridor will be necessary.

Stormwater Disposal. Stormwater from the AEC power blocks will be directed to two new oil/water separators and sumps then to the southernmost existing onsite retention basin before being discharged to the existing stormwater outfalls which discharge into the AGS cooling water canals and ultimately to the Los Cerritos channel.

Fire Protection Water. Fire protection water will be provided by two sources: the primary source will be supplied via a connection to the existing water distribution system and the secondary source will be supplied from a new, 600,000-gallon onsite fire/service water storage tank, which will be operated in accordance with National Fire Protection Association (NFPA) guidelines to provide 2 hours of protection for the onsite worst-case single fire. New onsite fire water piping and hydrants will be constructed for the AEC as necessary. Existing fire protection service, fire water pumps, and hydrant lines will also remain in service for the rest of the AGS site.

2.1.2 Process Description

The AEC CCGT power block will consist of the following equipment or equivalent: two GE 7FA.05 CTGs equipped with dry low-NO_x combustors and evaporative coolers; two HRSGs without supplemental firing; SCR for NO_x emission control, an oxidation catalyst equipment to control CO and VOCs; one single-casing, STG; one air-cooled condenser; one 71-million British thermal unit (MMBTU) auxiliary boiler; and associated support equipment.

The AEC SCGT power block will consist of the following equipment: four GE LMS 100 PB CTGs equipped with dry low-NOx combustors, evaporative coolers, and intercoolers. The units will be equipped with SCRs for NOx emission control and oxidation catalyst equipment to control CO and VOCx.

The technology for the AEC will be configured and deployed as an MSG asset designed to generate power across a wide range of capacity with superior and relatively constant thermal efficiency and maximum operating flexibility. The project will include multiple generators, often termed "embedded generating

units," whereby combinations of embedded generating units comprise the full operational capability for each power block, from minimum to maximum generating capacity. AEC will have the ability to generate power across a wide range of output from minimum turndown of a single AEC SCGT to maximum output of the entire project. The AEC CCGT, including STG, is designed to function in a 1-on-1 configuration at minimum load up to the maximum heat input of two combustion turbines and two HRSG operating at 100 percent load.

2.1.3 AEC CCGT Process

Combustion air will flow through the inlet air filters, evaporative inlet air coolers, associated air inlet ductwork, and silencers before being compressed in the CTG's compressor section and then entering the CTG's combustion sections. Natural gas will be mixed with the compressed air prior to being introduced to the combustion sections and ignited. The hot combustion gases will expand through the power turbine section of the CTGs, causing them to rotate and drive the CTG compressors and two electric generators. The CTG exhaust gases of approximately 1,100°F will be used to generate steam in the HRSGs. The hot combustion exhaust gases will exit the turbine sections and enter the HRSG where they will heat water (feed water), converting it into superheated steam. The HRSG will employ a triple pressure design reheat system. High-pressure, intermediate-pressure, and low-pressure steam will be delivered to the steam turbine. As the steam expands as it passes through the steam turbine, the thermal energy is converted to mechanical energy as the turbine rotates and then converted to electrical energy as the steam turbine turns a third generator. The low-pressure steam exiting the steam turbine will enter the air-cooled condenser, which will remove heat from the low-pressure steam (causing the steam to condense to water) and release the heat to the ambient air. The condensed water, or condensate, will be returned to the HRSG feed water system for reuse. The generating units are expected to have an overall annual availability of approximately 98.4 percent.

The heat balances for the project's modes of operation are shown in Figures 2.1-4a and 2.1-4b for the site ambient air temperature conditions[4] with no evaporative cooling of the CTG inlet air. The use of the evaporative coolers is not intended as power augmentation (i.e. to produce additional power above rated nominal net capacity), but rather will be employed to mitigate CTG ambient condition degradation and to maintain the facility at or near the nominal generating capacity. The predicted net electrical output of the CCGT power block under the summer condition is approximately 667 MW (gross) at a heat rate of approximately 6,119 British thermal units per kilowatt-hour (Btu/kWh-net) on a lower heating value (LHV) basis. This corresponds with a thermal efficiency of approximately 56 percent on a LHV basis.

The combustion turbines will include the use of best available control technology (BACT) to limit emissions of criteria pollutants and hazardous air pollutants. NO_x will be controlled to 2.0 parts per million by volume, dry basis (ppmvd), corrected to 15 percent oxygen through the use of dry low-NO_x combustors and SCR. An oxidation catalyst will also be used to control CO emissions to 2.0 ppmvd at 15 percent oxygen and VOC emissions to 2.0 ppmvd at 15 percent oxygen. BACT for particulate matter (airborne matter with an equivalent aerodynamic diameter of less than 10 microns [PM_{10}] and 2.5 microns [$PM_{2.5}$]) and sulfur dioxide emissions will be controlled with the exclusive use of natural gas with a sulfur content not to exceed 0.75 grains per 100 dry standard cubic feet (dscf). Emissions of excess ammonia not used in the SCR process (ammonia slip) will be limited to 5.0 ppmvd at 15 percent oxygen.

2.1.4 Simple-Cycle Process

The AEC SCGT power block will consist of the following equipment: GE LMS 100 PB simple-cycle intercooled gas turbines each with dry low NOx combustors and SCR systems for NO_x emissions control, and oxidation catalyst equipment to control CO and VOC emissions; two fin-fan heat exchangers (one per two CTGs); and associated support equipment.

[4] Site average ambient temperature is 65.3°F (Dry Bulb) and relative humidity of 87%.

The combustion turbine subsystems include inlet air filtration and evaporative inlet cooling system, intercooling system, generator and excitation systems, and turbine control and instrumentation. CTG combustion air will flow through the inlet air filters, evaporative inlet air coolers, and associated air inlet ductwork before being compressed and cooled in the intercooler and CTG compressor section and then entering the CTG combustion sections. Natural gas will be mixed with the cool compressed air prior to being introduced to the combustion sections and ignited. The hot combustion gases will expand through the power turbine section of the CTGs, causing them to rotate and drive the electric generators and CTG compressors. The hot combustion gases will exit the turbine sections and enter the SCR and the oxidation catalysts. The LMS-100 is a 3-spool gas turbine prime mover that uses an intercooler between the Low Pressure Compressor (LPC) and the High Pressure Compressor (HPC). Intercooling provides significant benefits to the Brayton cycle by reducing the work of compression for the HPC. This allows for higher-pressure ratios, thus increasing overall efficiency. The reduced inlet temperature for the HPC allows increased mass flow resulting in higher specific power.

The heat balances for the AEC SCGT are shown in Figures 2.1-3a and 2.1-3b for the low ambient temperature and average ambient air temperature conditions[5] with no evaporative cooling of the CTG inlet air or supplemental firing. The use of the evaporative coolers is not intended for use as power augmentation above nominal net output, but rather will be employed to mitigate CTG degradation (ambient and mechanical) to maintain the facility at or near the nominal generating capacity. The predicted net electrical output of the simple-cycle power block under these conditions is approximately 379 MW at a heat rate of approximately 8,291 British thermal units per kilowatt-hour (Btu/kWh-net) on a lower heating value (LHV) basis. This corresponds with a thermal efficiency of approximately 41 percent on a LHV basis.

The SCGT combustion turbines will include the use of best available control technology (BACT) to limit emissions of criteria pollutants and hazardous air pollutants. NO_x will be controlled to 2.5 parts per million by volume, dry basis (ppmvd), corrected to 15 percent oxygen through the use of dry low-NO_x combustors and SCR. An oxidation catalyst will also be used to control CO emissions to 4.0 ppmvd at 15 percent oxygen and VOCs emissions to 2.0 ppmvd at 15 percent oxygen. BACT for particulate matter (with a diameter less than 10 and 2.5 microns [PM_{10} and $PM_{2.5}$]) and sulfur dioxide (SO_2) will be the exclusive use of natural gas with a sulfur content not to exceed 0.75 grains per 100 standard cubic feet of natural gas (gr/100 scf). Emissions of excess ammonia (ammonia slip) not used in the SCR process will be limited to 5.0 ppmvd at 15 percent oxygen.

2.1.5 Major Generating Facility Components CCGT Power Block

The following paragraphs describe the major components of the AEC generating facility.

2.1.5.1 Combustion Turbine Generators

Natural gas combustion in the CTGs will produce thermal energy, which is converted into mechanical energy required to drive the combustion turbine compressors and two electrical generators. Each CTG system will contain supporting systems and associated auxiliary equipment.

Each combustion turbine will drive a hydrogen cooled synchronous generator. Each CTG will be equipped with the following systems and components:

- Inlet air filters, inlet silencers, and evaporative coolers
- Metal acoustical enclosure
- Lubrication oil system for the combustion turbine and the generator
- Dry low-NOx combustion system
- Compressor wash system

[5] Site extreme low temperature is 28°F (Dry Bulb) and relative humidity of 76%. Average ambient temperature is 65.3°F (Dry Bulb) and relative humidity of 87%

- Fire detection and protection system (using either carbon dioxide or water mist spray)
- Fuel gas system, including flow meter, strainer, and duplex coalescing filter
- Static Starter system
- Turbine controls
- Hydrogen-cooled synchronous generator
- Generator controls, protection, excitation, power system stabilizer, automatic voltage regulator (AVR) and automatic generation control

The CTGs and accessory equipment will be contained in acoustical enclosures for noise reduction.

2.1.5.2 Heat Recovery Steam Generators

The HRSGs will transfer heat from the exhaust gases of the CTGs to the feedwater to produce, high-pressure, intermediate pressure, and low-pressure steam. Each HRSG is a triple pressure, reheat, natural circulation horizontal unit equipped with inlet and outlet ductwork, insulation, lagging, SCR/CO catalyst assemblies and exhaust stack. The HRSGs will not employ duct burners.

Condensate will be pumped from the air-cooled condenser receiver tank through the HRSG low temperature economizer to the LP evaporator and then to the LP steam drums. Steam from the LP drum will flow through superheater sections and then enter the LP section of the steam turbines.

The LP drums will provide suction to the feedwater pumps, which will provide feedwater to the HP and IP sections of the HRSG. The HP and IP sections each contain economizer sections, evaporator sections, drums and superheater sections. HP superheated steam is furnished to the HP section of the steam turbine. HP turbine exhaust steam, called cold reheat, is sent back to the HRSG where it is reheated in the HRSG reheater section, combined with the HRSG superheater IP steam, and then is sent to the steam turbine IP section. Attemperation will be provided upstream of all final HRSG superheater sections to control the steam temperature to the steam turbine.

2.1.5.3 Steam Turbine System

The steam turbine system consists of a condensing steam turbine, gland steam seal system, lubricating oil system, hydraulic control system, and steam admission/induction valves.

The steam turbine is a triple pressure, reheat, side exhaust turbine with a totally enclosed water to air-cooled generator. Turbine configuration is a single combined high-pressure/intermediate pressure casing and a single double flow low-pressure turbine. Steam is admitted through a combined main steam stop/control valve and a combined reheat stop/control valve. A separate LP steam induction point is also provided. Standard acoustical enclosures are provided for the HP/IP section and the generator.

2.1.6 Major Generating Facility Components SCGT Power Block

2.1.6.1 Combustion Turbine Generators

Natural gas combustion in the CTGs will produce thermal energy, which is converted into mechanical energy required to drive the combustion turbine compressors and electrical generators. Each CTG system will contain supporting systems and associated auxiliary equipment.

The combustion turbine will drive an air-cooled, 3-phase, 2-pole synchronous generator.
The CTGs will be equipped with the following systems and components:

- Inlet air filters, and evaporative coolers
- Intercooler
- Weather proof acoustical enclosure
- Lubrication oil system for the combustion turbine and the generator

- Dry low-NO_x combustion system
- Oxidation catalyst and SCR emissions control systems
- Compressor wash system
- Fire detection and protection system (using carbon dioxide)
- Fuel gas system, including strainer, and duplex filter
- Starter system
- Fire Protection System
- Turbine controls
- Generator controls, protection, excitation, power system stabilizer, and automatic generation control for each generator

The CTGs and accessory equipment will be contained in acoustical enclosures for noise reduction.

2.1.7 Major Electrical Equipment and Systems CCGT Block

Electric power produced by the AEC CCGT blocks will be transmitted to the electrical grid through the 230-kV generation tie line connecting the project to the existing onsite SCE switchyard (see Section 3.0, Transmission System Engineering, for a discussion of the AEC interconnection to the existing SCE 230-kV switchyard). A small amount of electric station power will be used onsite to power auxiliaries such as gas compressors, pumps and fans, control systems, and general facility loads including lighting, heating, and air conditioning. A station battery system also will be used to provide direct current (DC) voltage as backup power for control systems and other critical uses. Transmission and auxiliary uses are discussed in the following subsections.

2.1.7.1 Alternating Current (AC) Power—Transmission

Power will be generated by the two CTGs and one STGs at 13.8-kV and stepped up by sixteen fan-cooled GSU transformers to 230-kV for transmission to the grid. Auxiliary power will be fed from the 13.8-kV bus through multiple separate station unit service transformers, which will step the power down to 4.16 kV for onsite use. Each CTG will have a 13.8-kV generator circuit breaker, located on the generator output, to isolate and synchronize the CTG to the grid during startup. Surge arresters will be provided at the high-voltage bushings to protect the transformers from surges on the 230-kV system caused by lightning strikes or other system disturbances. The transformers will be set on concrete pads within berms designed to contain the transformer oil in the event of a leak or spill. The high-voltage side of the GSU transformers will be connected to SCE switchyard circuit breakers and associated equipment with the SCE high-voltage transmission system. Section 3.0, Transmission System Engineering, presents additional information regarding the electrical transmission system.

2.1.7.2 AC Power—Distribution to Auxiliaries

Auxiliary power for the AEC is supplied at 4.16-kV and 480 volts AC by a double-ended, 4.16-kV switchgear lineup and a double-ended, 480-volt load center substation arrangement. Two mineral-oil-filled, 13.8-kV/4.16-kV station unit service transformers on each power block will supply primary power to the switchgear and then subsequently to large motor loads and to the 4.16-kV side of the 4.16-kV/480-volt, mineral oil-filled load center transformers. The high-voltage side of the station unit service transformers will be connected to a tap on the 13.8-kV isolated phase bus duct, which connects the generator to the respective GSU transformer low voltage (secondary) winding. The 4.16-kV switchgear lineup will supply power to the large motor loads and to the load center transformers for 480-volt power distribution. The 4.16-kV switchgear will have vacuum interrupter circuit breakers for the main incoming feeds and for power distribution.

Each load center transformer will be mineral-oil-filled and will supply 480-volt, three-phase power to the CTG and balance-of-plant 480-volt motor control centers (MCC).

The MCCs will provide power through feeder breakers to the various 480-volt motor loads, and other low-voltage plant loads, including 480-volt power distribution panels, and lower-voltage lighting and distribution panel transformers. Power for the AC power supply (240-volt/120-volt) system will be provided by the 480-volt MCCs and 480-volt power panels. Dry-type transformers will transform 480-volt power to 240/120-volt power.

The fuel gas compressors will receive their power at 13.8 kV via a separate auxiliary connection that will be tied to the 13.8-kV bus duct between the generator output breakers and the GSU low-voltage connection.

2.1.7.3 Essential Services Bus

A 480-volt AC bus will provide power to essential loads, which will include, but will not be limited to, ventilation, critical lighting, and a charger to the 125-volt DC power supply system. Each of the four power blocks will have a 480-volt AC bus.

2.1.7.4 125-volt DC Power Supply System

Each power block will have a 125-volt DC power supply system consisting of one battery bank, a battery charger, and one or more distribution panels. The panels will supply DC pumps, circuit breaker line power, and an uninterruptible power supply (UPS) system. Each power block DC buses will be connected with a tiebreaker. Each CTG and the plant switchyard will be provided with its own separate battery systems, chargers, and panel boards.

Under normal operating conditions, the essential services buses provide 480-volt, three-phase AC power to the battery chargers and continuously charge the battery banks while supplying power to the DC loads.

Under abnormal or emergency conditions, when power from the essential services bus is unavailable, the batteries supply DC power to the DC system loads. Recharging of a discharged battery occurs whenever 480-volt power becomes available from the essential services bus. The rate of charge depends on the characteristics of the battery, battery charger, and the connected DC load during charging. The anticipated maximum recharge time will be 24 hours.

2.1.7.5 Uninterruptible Power Supply System

Each power block will have a critical service 120-volt AC, single-phase, 60-hertz bus. It will be powered through the UPS system to supply AC power to instrumentation and loads which will include, but not be limited to, distributed control system (DCS) operator stations, DCS controllers, the continuous emissions monitoring system, and protection and safety systems.

A UPS inverter will supply 120-volt AC single-phase power to the UPS panel boards that supply critical AC loads. The UPS inverter will be fed from the station 125-volt DC power supply system and alternatively from the essential services bus through a transformer. The UPS system will consist of one full-capacity inverter, a static transfer switch, a manual bypass switch, an alternate source transformer, and one or more panel boards.

The normal source of power to the system will be from the 125-volt DC power supply system through the inverter to the UPS panel board. A solid-state static transfer switch will continuously monitor the inverter output and the alternate AC source. The transfer switch will automatically transfer essential AC loads without interruption from the inverter output to the alternate source upon loss of the inverter output.

2.1.7.6 Construction and Commissioning Power Supply

The AEC will use power from a new independent electrical feed connecting to the existing onsite 66-kV source located adjacent to the 220-kV switchyard for construction and commissioning.

2.1.8 Major Electrical Equipment and Systems SCGT Power Block

2.1.8.1 Alternating Current (AC) Power—Transmission

The SCGT power block will consist of two sets of two CTGs operating at 13.8 kV and connected to a three-winding GSU transformer by way of isolated-phase bus duct. Each CTG will have a 13.8-kV generator circuit breaker located in-line in the isolated-phase bus duct to synchronize the CTG to the grid during startup. Each GSU transformer will step the output voltage of two CTGs to 230 kV for transmission to the grid. Each of the two GSU transformers will be connected to a 230-kV collector bus through 230-kV gas circuit breakers. The collector bus includes a 230-kV line disconnect switch to isolate the collector bus from the transmission system.

Surge arresters will be provided at the high-voltage bushings of the GSU transformers to protect from surges on the 230-kV system caused by lightning strikes or other system disturbances. The transformers will be set on concrete pads within berms designed to contain transformer oil in the event of a leak or spill.

Section 3.0, Transmission System Engineering, presents additional information regarding the electrical transmission system. Figure 3.1-1 is a one-line diagram of the facility's electrical system.

2.1.8.2 AC Power—Distribution to Auxiliaries

Auxiliary power for the power block is provided by two 13.8-4.16 kV unit auxiliary transformers (UATs) per set CTGs. The high voltage winding of the UATs is tapped off of the CTG isolated phase bus duct. The low voltage winding is connected to a lineup of 4160 V metal clad switchgear by way of nonsegregated phase bus duct. The 4160 V switchgear consists of a main vacuum circuit breaker and bus, combination vacuum motor starters for the larger plant motors ($\geq$200 hp), and a vacuum feeder breaker that supplies a 4160-480-volt (V) unit substation transformer (UST). All circuit breakers and motor starters are electrically operated.

The 480V switchgear consists of a main air circuit breaker and feeder breakers that supply one or more motor control centers (MCC). The 480V MCC(s) consists of combination magnetic motor starters for the smaller plant motors (< 200 hp) and feeder breakers for miscellaneous plant loads. These loads include 120/240 V single-phase and/or 120/208 V three-phase load centers (distribution transformer/panelboards) as required. A single 120 V uninterruptable power supply (UPS) is also provided for critical loads, such as the turbine and BOP control systems.

2.1.8.3 125-volt DC Power Supply System

The power block will have two 125V DC systems each consisting of one battery bank, a battery charger, and one or more distribution panels. The panels will supply DC pumps, the 4160 switchgear, and other miscellaneous loads. The battery and battery charger are sized to supply the entire power block in the event of loss of a charger. A tiebreaker and interconnecting cable are provided between the DC systems for this purpose. The plant switchyard will be provided with its own 125V DC system for GSU transformer, bus and transmission line protection, control, and communications.

2.1.8.4 Uninterruptible Power Supply System

The power block will be provided with two packaged, 120V AC, single-phase uninterruptable power supply (UPS) systems to supply critical 120V AC loads, such as the BOP distributed control system, the continuous emissions monitoring system, and life safety systems.

Each UPS will be supplied at 480V, which is rectified to charge an integral battery and supply a 480V output inverter. The inverter output voltage is stepped down with a stand-alone 480-120V output transformer, which in turn supplies a main 120V AC UPS distribution panel.

In the event of loss of the 480V supply to the UPS, critical loads will continue to be served uninterrupted, by way of the integral UPS battery and inverter. The battery is typically sized to provide three hours of backup power at rated output. In the event of failure of the output inverter, the UPS contains an internal solid-state bypass switch that will automatically connect the 480V supply directly to the 480-120V output transformer, bypassing the UPS rectifier/battery/inverter altogether.

Each UPS system includes a manual maintenance bypass arrangement that will connect a separate source of 480V power directly to the output transformer and isolate the UPS for maintenance or replacement.

2.1.8.5 Alternate Power Source

The AEC will not utilize an alternate power source.

2.1.9 Fuel System

The CTGs will be designed to burn natural gas only. The natural gas requirement during full load operation at SAAT conditions is approximately 8,137 MMBtu/hr-HHV.

2.1.10 Plant Cooling Systems

2.1.10.1 CCGT Plant Cooling

The steam turbine cycle heat rejection system will consist of an air-cooled condenser, which will eliminate the need for ocean water for once-through cooling. The heat rejection system will receive exhaust steam from the low-pressure section of the steam turbine and condense it to water (condensate) for reuse. The condenser will be designed to operate at a pressure of approximately 1.8 pounds per square inch absolute during base load operation at summer design conditions of 89°F dry bulb and 70°F wet bulb. It will transfer approximately 1,300 MMBtu/hr to the ambient air as a result of condensing steam at these operating conditions.

Balance of plant systems will be cooled by closed-loop fluid coolers using water. CTG, STG, gas compressors, and other balance-of-plant auxiliary equipment requiring cooling will be integrated into the closed cooling water loop.

2.1.10.2 SCGT Plant Cooling

The simple-cycle heat rejection system will consist of one air-cooled closed loop fluid cooler per two CTGs to reject waste heat from the intercooler and other gas turbine auxiliaries. Each cooler will reject approximately 222 MMBtu/hr to the ambient air.

2.1.11 Water Supply and Use

The AEC will use water provided by the LBWD for process and potable uses. The project will continue to use the existing water main connection along Studebaker Road.

Plant makeup water will be fed directly from LBWD service connections through metering equipment into the new service water tank. A new 340,000-gallon deionized water tank will be added to the project to provide operational service water storage.

Figures 2.1-5a through 2.1-5c provide the water balances for the AEC. Figures 2.1-5a and 2.1-5b provide the AEC CCGT water balances with the CTGs at 100 percent load with CTG inlet air evaporative cooler operating at the annual average and maximum ambient temperatures. Figure 2.1-5c provides the AEC SCGT water balances with the CTGs operating at 100 percent load with CTG inlet evaporative cooling operating at the annual average and maximum ambient temperatures.

2.1.11.1 CCGT Water Requirements

The water needs for the AEC CCGT power block while operating at average ambient conditions and at the peak consumption rate (two CTGs at 100 percent load with inlet air evaporative cooling operating) in terms of water demand were developed. Table 2.1-1 presents the AEC CCGT water consumption.

TABLE 2.1-1

Estimated Daily and Annual Water Use for AEC CCGT Operations

Water Use	Average Daily Use Rate (gpm)	Peak Use Rate (gpm)	Maximum Annual Use[a] (acre-feet per year)
Process Water	54.43	194	--
Sanitary Water	0.57	0.57	--
Total	55	195	130

[a] Assumes 4,600 hours of combined-cycle operation, including start-up and shutdowns. Total water use includes AEC SCGT water consumption.

Note:

gpm = gallon(s) per minute

2.1.11.2 SCGT Water Requirements

The water needs for the AEC SCGT while operating at the average ambient temperature and at the peak consumption rate (two CTGs at 100 percent load with inlet air evaporative cooling operating) in terms of water demand were developed. Table 2.1-2 presents the AEC SCGT water use.

TABLE 2.1-2

Estimated Daily and Annual Water Use for AEC Operations

Water Use	Average Daily Use Rate (gpm)	Peak Use Rate (gpm)	Maximum Annual Use[a] (acre-feet per year)
Simple-Cycle Process Water	12.4	161.3	--
Simple-Cycle Sanitary Water	0.34	0.34	--
Simple-Cycle Total	12.8	161.6	--

[a] Assumes 2,000 hours of simple-cycle operation. Total water consumption in acre-feet per year presented in Table 2.1-1. Total AEC water use presented in Table 2.1-1.

Note:

gpm = gallon(s) per minute

2.1.11.3 AEC Summary Water Requirements

For the site average ambient conditions, AEC will use approximately 68 gpm and the maximum water consumption at the highest ambient conditions, water use will be 357 gpm. The maximum annual AEC water consumption will be 130 acre-feet per year.

2.1.11.4 Wastewater Discharge

Table 2.1-3 presents the maximum discharge rate and average annual expected wastewater discharge for AEC.

TABLE 2.1-3

Estimated Daily and Annual Wastewater Discharge for AEC Operations

Wastewater Use	Average Daily Discharge Rate (gpm)	Maximum Daily Discharge Rate (gpm)	Average Annual Discharge[a] (acre-feet per year)
Wastewater to City Sewer	16	99	11

[a] Assumes 4,600 hours of combined-cycle operation and 2,000 hours of simple-cycle operation, including start-up and shutdowns.

2.1.11.5 Water and Wastewater Treatment

Makeup water for the steam cycle will have contaminants removed (demineralized) by passing the service water through a reverse osmosis system followed by an electrodeionization (EDI) system. The deionized water will be sent to a new demin water storage tank. Deionized water is used for feedwater makeup for the steam cycle. Feedwater makeup water will be deaerated and fed to the condensate receiver or the condensate storage tank. Blowdown (condensate removed from the HRSGs to reduce water contaminants) will be discharged to an atmospheric flash tank where the flash steam will be vented to atmosphere and the condensate will be cooled prior to transfer to the service water storage tank for reuse.

Wastewater from combustion turbine water washes will be collected in combustion turbine drain tanks and then trucked offsite for disposal. Service water will be used for makeup to the combustion turbine evaporative coolers, equipment washdown, and other miscellaneous plant uses.

Blowdown from the combustion turbine evaporative coolers will be discharged to the plant process drain system and directed to the service water storage tank for reuse. The unused portion will ultimately be discharged to the sewer.

Stormwater from process areas that could potentially include oil or other lubricants will be directed to an oil/water separator for removal of accumulated oil that may result from equipment leakage or small spills and large particulate matter that may be present from equipment washdowns. The oil-free stormwater from the process areas and from the pavement areas will be directed to an existing retention basin and then discharged to the existing outfalls. The residual oil-containing sludge will be collected via vacuum truck and disposed of as hazardous waste.

2.1.11.6 AEC CCGT Air-Cooled Condenser System

Exhaust steam from the STG will be condensed in an air-cooled condenser. The use of an air-cooled condenser will eliminate the significant water demand required for condensing STG exhaust steam in a conventional surface condenser/cooling tower arrangement. To condense steam in an air-cooled condenser, large fans blow ambient air across finned tubes through which low-pressure steam flows. The low-pressure steam is cooled to a temperature at which point it is condensed back into water (condensate). It is collected in a receiver located under the air-cooled condenser. Condensate pumps will return the condensate from the receiver back to the HRSGs for reuse.

2.1.11.7 Closed-loop Cooling System

The AEC CCGT and AEC SCGT power blocks will have closed-loop cooling systems that will provide cooling water for various plant equipment, such as the CTG and STG generator coolers, CTG and STG lubrication oil coolers, AEC SCGT intercoolers, and boiler feedwater pumps. The primary means of heat rejection for this closed-loop system will be air-cooled heat exchangers. The air-cooled heat exchangers will use large fans to blow ambient air across finned tubes through which the closed-loop cooling water will flow. The air-cooled heat exchanger will consume minimal water.

2.1.12 Emission Control and Monitoring

Air emissions from the combustion of natural gas in the CTGs and auxiliary boiler will be controlled using state-of-the-art systems. To ensure that the systems perform correctly, continuous emission monitoring of stack exhaust flow rate, temperature, oxygen, NO_x, and CO will be performed as well as the natural gas heat input, generator output, and ammonia injection rate into the pollution control system. Section 5.1, Air Quality, includes additional information on emission control and monitoring.

2.1.12.1 NO_x Emission Control

The AEC power blocks are designed to be fast-start and fast-ramp units that will require an immediate and varying supply of ammonia at precise concentrations for emissions control. The new generating units and auxiliary boiler will be supported by new 19 percent aqueous ammonia systems with storage tanks and

ammonia injection grids to supply ammonia to SCR systems designed for the exhaust gas environment specific to the unit being served.

2.1.12.2 NOx Emission Control CCGT

The CCGTs will employ dry low NOx combustors and SCR to control NO_x concentrations in the exhaust gas emitted to the atmosphere to 2.0 ppmvd from the HRSG stacks. The SCR process will use 19 percent aqueous ammonia. Ammonia slip, or the concentration of unreacted ammonia in the exiting exhaust gas, will be limited to 5.0 ppmvd from the HRSG stacks. The SCR equipment will include a reactor chamber, catalyst modules, ammonia storage system, ammonia vaporization and injection system, and monitoring equipment and sensors. The project will install a new 19 percent aqueous ammonia delivery system, which consists of a 40,000-gallon ammonia tanks, a spill containment basin, and a refilling station with a spill containment basin and sump.

The auxiliary boiler that supports the CCGT start-up will also employ a SCR system to control NO_x concentrations in the exhaust gas emitted to the atmosphere to 5.0 ppmvd from the boiler stacks. The SCR process will use 19 percent aqueous ammonia from the CCGT ammonia storage tank. Ammonia slip, or the concentration of unreacted ammonia in the exiting exhaust gas, will be limited to 5.0 ppmvd from the HRSG stacks. The SCR equipment will include a reactor chamber, catalyst modules, injection system, and monitoring equipment and sensors.

2.1.12.3 NOx Emission Control SCGT

The SCGTs will also use dry low NOx combustors and SCR to control NO_x concentrations in the exhaust gas emitted to the atmosphere to 2.5 ppmvd from the stacks. The SCR process will use ammonia from the 19 percent aqueous ammonia tank. Ammonia slip, or the concentration of unreacted ammonia in the exiting exhaust gas, will be limited to 5.0 ppmvd from the stacks. The SCR equipment will include a mixing chamber, catalyst modules, ammonia storage system, ammonia vaporization and injection system, and monitoring equipment and sensors. The SCGT power block will make use of an ammonia delivery system, which will consist of a single 40,000-gallon ammonia tank, a spill containment basin, and a refilling station with a spill containment basin and sump.

The combustion turbines will include the use of best available control technology (BACT) to limit emissions of criteria pollutants and hazardous air pollutants. NO_x will be controlled to 2.5 parts per million by volume, dry basis (ppmvd), corrected to 15 percent oxygen through the use of dry low-NO_x combustors and SCR. Emissions of excess ammonia (ammonia slip) not used in the SCR process will be limited to 5.0 ppmvd at 15 percent oxygen.

2.1.12.4 Carbon Monoxide and Volatile Organic Compounds

For the CCGT power block an oxidizing catalytic converter will be used to reduce the CO concentration in the exhaust gas emitted to the atmosphere from the HRSG stacks to 2.0 ppmvd and VOCs to 2.0 ppmvd.

For the SCGT power block an oxidizing catalytic converter will be used to reduce the CO concentration in the exhaust gas emitted to the atmosphere from the stacks to 4.0 ppmvd and VOC to 2.0 ppmvd.

2.1.12.5 Particulate Emission Control

Particulate emissions (PM_{10} and $PM_{2.5}$) will be controlled through the use of best combustion practices and the sole use of inherently low-sulfur natural gas fuel. The BACT for particulate emissions from combustion sources is the use of clean natural gas. In addition, particulate emissions from the AEC will be further limited by the use of a high-efficiency inlet air filtration system, which will remove particulates in the ambient air prior to entering the CTG processes. The dry low-NO_x combustors in the CTG further insure particulate emissions are limited to measurement detection limits by combusting natural gas as close to the stoichiometric air-fuel mixture point as possible.

2.1.12.6 Continuous Emission Monitoring

Continuous emission monitoring systems (CEMS) will sample, analyze, and record fuel gas flow rate, NO_x and CO concentration levels, and percentage of oxygen in the exhaust gas from each of the six HRSG stacks. The CEMS system will generate reports of emission data in accordance with permit requirements and will send alarm signals to the plant supervisory control system when emissions approach or exceed preselected limits.

2.1.13 Waste Management

Waste management is the process whereby all wastes produced at the AEC are properly collected and disposed. Wastes include process and sanitary wastewater, nonhazardous waste (liquid and solid), and hazardous waste (liquid and solid). Waste management is discussed in more detail in Section 5.14.

2.1.13.1 Stormwater Collection, Treatment, and Disposal

Stormwater that falls within process equipment containment areas will be collected and discharged to a process drain system, which will consist of oil/water separators, sump, and a retention basin. Stormwater that falls within the plant in pavement area and outside the process equipment containment areas will either percolate directly into the soil or drain over the surface and directed into the retention basin to assist with the removal of suspended solids. The stormwater collected in the retention basin will be discharged through the existing outfalls. The residual oil-containing sludge collected in the oil/water separation tanks will be collected via vacuum truck and disposed of as hazardous waste. The water balance diagrams show the expected wastewater streams. Table 2.1-3 shows the flow rates for the AEC annual average and maximum conditions, respectively.

2.1.13.2 Plant Drains and Oil/Water Separator

General plant drains will collect containment area wash down, sample drains, and drainage from facility equipment drains. Water from these areas will be collected in a system of floor drains, hub drains, sumps, and piping and routed to the process drain collection system. Drains that potentially could contain oil or grease will first be routed through an oil/water separator.

The CCGT and SCGT power blocks will each employ one oil/water separator. The oil/water separator will be an aboveground tank with a capacity 5,000 gallons and a maximum throughput of 400 gallons per minute.

Process wastewater streams that are unlikely to contain oil and grease, including CTG inlet air evaporative cooler blowdown, HRSG blowdown, blowdown from the auxiliary cooling system fin-fan fluid cooler, and reverse osmosis reject will bypass the oil/water separator and directed to the service water system for reuse or discharged offsite via a new sewer line. Miscellaneous wastewaters, including those from combustion turbine water washes and from some water treatment membrane-based system's cleaning operations, will be collected in holding tanks or sumps and will be trucked offsite for disposal at an approved wastewater disposal facility.

2.1.13.3 Sanitary Wastewater

Sanitary wastewater from sinks, toilets, showers, dishwashers, and other sanitary facilities will be discharged to a new sewer line. The water balance diagrams, Figures 2.1-5 a through 2.1-5c, show the expected wastewater streams. Tables 2.1-2 and 2.1-3 show the flow rates for AEC for the annual average and maximum conditions, respectively.

2.1.13.4 Solid Wastes

The AEC will produce maintenance and plant wastes typical of 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 refuse generated by workers. Solid wastes will be trucked offsite for recycling or disposal (see Section 5.14).

2.1.13.5 Hazardous Wastes

Several methods will be used to properly manage and dispose of operational hazardous wastes generated by the AEC. Waste lubricating oil will be recovered and recycled 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 recycled 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 alkaline and acid cleaning solutions used during preoperational chemical cleaning and in turbine wash waters. These wastes, which are subject to high metal concentrations, will be temporarily stored onsite in portable tanks or sumps, and disposed of offsite in accordance with applicable regulatory requirements.

2.1.14 Management of Hazardous Materials

A variety of chemicals will be stored and used during AEC construction and operation. 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 most other chemicals will be stored in returnable delivery containers. Chemical storage and chemical feed areas will be designed to contain leaks and spills. Concrete containment pits and drain-piping design will allow a full-tank capacity spill without overflowing the containment area. For multiple tanks located within the same containment area, the capacity of the largest single tank will determine the volume of the containment area and drain piping. Containment areas subject to rainfall will be provided additional containment volume sufficient to contain the rainfall from a 25-year, 24-hour storm event. Drain piping for reactive chemicals will be trapped and isolated from other drains to eliminate noxious or toxic vapors.

Safety showers and eyewashes will be provided adjacent to, or in the vicinity of, chemical storage and use areas. Plant personnel will use approved personal protective equipment 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.

The ammonia tanks containment structures will be designed and installed to specifically limit the amount of ammonia vapor involved in the event of a tank failure.

A list of the chemicals anticipated to be used at the AEC and their storage locations is provided in Section 5.5, Hazardous Materials Handling. The list identifies each chemical by type, intended use, and estimated quantity to be stored onsite.

2.1.15 Fire Protection

The existing fire protection system will be modified for the AEC and the rest of the AGS site and equipment to meet all LORS while reusing existing equipment to the maximum extent possible. The system design will protect personnel and limit property loss and plant downtime in the event of a fire. The primary source of fire protection water will be supplied via a connection to the existing water distribution system. A new 8-inch onsite fire water loop and hydrants will be constructed around each of the new power blocks and tied into existing on site firewater hydrant lines. No new offsite linears will be needed for fire protection.

The secondary source of fire protection water will be supplied from the 600,000-gallon service water storage tank, which will provide 2 hours of protection for the onsite worst-case single fire.

Two existing electric fire pumps, connected to two independent power feeds from SCE distribution system, will be provided to pump water from the onsite storage tank. Fire protection water from the existing water supply connection and service water storage tank will be provided to a dedicated underground fire loop piping system. Fixed fire-suppression systems will be installed at determined fire risk areas. Sprinkler systems also will be installed in the administration and maintenance buildings as required by NFPA and local code requirements. The CTG units will be protected by a carbon dioxide fire protection system. Hand-held

fire extinguishers of the appropriate size and rating will be located in accordance with NFPA 10 throughout the facility.

Section 5.5, Hazardous Materials Handling, includes additional information on fire and explosion risk, and Section 5.10, Socioeconomics, provides information on local fire protection capability.

2.1.16 Plant Auxiliaries

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

2.1.16.1 Lighting

The AEC will require night lighting for safety and security. The lighting system will provide illumination for operation under normal conditions, for safety under emergency conditions, and for manual operations during a power outage. The system will also provide 120-volt convenience outlets for portable lamps and tools.

To reduce offsite lighting impacts, lighting for the AEC will be restricted to areas required for safety and operation. Exterior lights will be hooded and will be directed onsite to minimize glare and light spill off of the site. Low-pressure sodium or light-emitting diode lamps and fixtures of a nonglare type will be specified. In addition, switched lighting circuits will be provided for areas where lighting is not required for normal operation or safety to allow these areas to remain dark at most times and to minimize the amount of lighting potentially visible offsite.

2.1.16.2 Grounding

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

The station-grounding grid will be designed for adequate capacity to dissipate the ground fault current from the ground grid under the most severe conditions in areas of high ground fault current concentration. The grid spacing will maintain safe voltage gradients. Bare conductors will be installed below grade in a grid pattern. Each junction of the grid will be bonded together by an exothermic weld. 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 conductors will be brought from the ground grid to connect to building steel and nonenergized metallic parts of electrical equipment.

2.1.16.3 Distributed Control System

The DCS is integrated with the CTG controls and also provides modulating control, digital control, monitoring, and indicating functions for each power block.

The DCS will provide the following functions:

- Coordinate automatic and manual control of the CTGs and other systems which for the CCGT include the STG and HRSG.
- Control the balance-of-plant systems in response to plant demand.
- Monitor controlled plant equipment and process parameters and deliver this information to plant operator.
- Provide control displays (printed logs, LCD video monitors) for signals generated within the system or received from the input/output equipment.
- Provide consolidated plant process status information through displays presented in a timely and meaningful manner.

- Provide alarms for out-of-limit parameters or parameter trends, display on alarm video monitor(s), and record on an alarm log printer.
- Provide storage and retrieval of historical data.

The DCS will be a redundant microprocessor-based system and will consist of the following major components:

- Operator consoles with display video monitors
- Input/output cabinets
- Historical data unit
- Printers
- Data links to the CTG and the CCGT's STG control systems

The DCS will have a functionally distributed architecture allowing integration of balance-of-plant equipment that may be controlled locally via a programmable logic controller. The DCS will interface with each power block to provide automatic and manual 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 and a UPS. As part of the quality control program, daily operator logs will be available for review to determine the status of the operating equipment.

2.1.16.4 Cathodic Protection

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

2.1.16.5 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. The instrument air system will provide the source of air for the service air system. Each service air header will include a backpressure-regulating valve to maintain a minimum air system pressure, regardless of service air use. For purposes of reliability, each power block will have two 100-percent-capacity air compressors. The service air and instrument air system will feed from the same compressors.

2.1.16.6 Instrument Air

The instrument air system will be fed from the service air system and will provide dry, oil-free air to pneumatic devices for system controls and protection, bypassing the service air through air dryers. 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.

2.1.17 Interconnection to the Electrical Grid

For the CCGT block, the two CTGs and one STG will be connected to three separate two-winding, three-phase, GSU transformers. For the SCGT block, each pair of CTGs will be connected to one GSU transformer. The SCE switchyard will contain new 230-kV circuit breakers and air break disconnect switches to interconnect the new AEC units to the SCE 230-kV transmission system. Refer to Section 3.0, Transmission System Engineering, for additional information on the switchyards and generation tie line.

2.2 Project Construction

Construction of the generating facility, from final engineering design and planning to commercial operation date is expected to take place from the first quarter of 2017 to the third quarter of 2021 or approximately 57 months. Major milestones are listed in Table 2.2-1.

TABLE 2.2-1
AEC Project Schedule Major Milestones

Activity	Estimated Commence Activity	Estimated Commercial Operation
Begin Site Preparation	1st Q 2017	N/A
Begin Construction of CCGT power block	2nd Q 2017	1st Q 2020
Begin Construction of SCGT power block	2nd Q 2020	3rd Q 2021

2.2.1 Construction Schedule and Workforce

For the CCGT, there will be an average and peak workforce of approximately 182 and 306, respectively, of construction craft people, supervisory, support, and construction management personnel onsite during construction. Peak workforce will occur in July 2019 (month 26). Appendix 5.10B provides the projected construction craft personnel power by month.

For the SCGT, there will be an average and peak workforce of approximately 222 and 512, respectively, of construction craft people, supervisory, support, and construction management personnel onsite during construction. Peak workforce will occur in January 2021 (month 44).

The construction plan is based on a single shift composed of a 10-hour workday, Monday through Friday, and a single 8-hour shift on Saturday. Construction will typically take place between the hours of 7:00 a.m. and 7:00 p.m., Monday through Friday, and 9:00 a.m. and 6:00 p.m. on Saturday, consistent with City of Long Beach ordinances. Overtime and additional shift work may be used to maintain the construction schedule or to complete critical construction activities (for example, pouring concrete at night during hot weather, working around time-critical shutdowns and constraints). During the commissioning and startup phase of each of the power blocks, some activities may continue 24 hours per day, 7 days per week.

2.2.2 Construction Plans

An Engineer-Procurement-Construction (EPC) contractor will be selected for the engineering, procurement, and construction of the facility. Subcontractors will be selected by the general contractor for specialty work as needed.

2.2.2.1 Mobilization

The EPC contractor will mobilize after full notice to proceed. Initial site work will include site grading and stormwater control. A rock aggregate will be used for temporary roads, laydown, work areas, and onsite construction parking areas.

2.2.2.2 Construction Office Facilities

The existing AGS administration building will be used as shared offices for construction staff as well as construction offices for owner, contractor, and subcontractor personnel.

Parking for construction workers will be provided onsite. These areas will provide adequate parking space for construction personnel as well as visitors during construction.

2.2.2.3 Construction Laydown and Storage

In addition to field office siting, areas within the site will be used for offloading and laydown and for storage of materials, equipment, and vehicles. Construction laydown areas will be within existing site boundaries. These areas include the parking lot north of existing Units 1 through 4 and the area between existing Units 1 and 2 and their intake canal, and includes an existing warehouse bounded by these two features. Construction access will be generally from Studebaker Road. Large or heavy equipment, such as the turbines, generators, GSU transformers, and HRSG modules will be delivered to the site by heavy haul truck/trailer.

Construction of the AEC will require the use of onsite laydown areas, approximately 8 acres dispersed throughout the existing AGS site and an approximately 10-acre laydown area located adjacent to the existing AGS site south of generating Units 5 and 6.

2.2.2.4 Emergency Facilities

Emergency services will be coordinated with the local fire department and hospitals. An urgent care facility will be contacted to arrange for nonemergency physician referrals. First aid kits will be provided around the site and will be regularly maintained. At least one person trained in first aid will be part of the construction crew. In addition, all foremen and supervisors will be given first aid training and will be trained in the use of a portable automatic external defibrillator.

Fire extinguishers will be located throughout the site at strategic locations at all times during construction.

2.2.2.5 Construction Utilities

During construction, existing, onsite utility lines will be used for the construction offices, laydown area, and the AEC site.

Temporary construction power will be obtained from SCE. Area lighting will be provided and strategically located for safety and security.

2.2.2.6 Site Services

The following site services will be provided by the EPC contractor:

- Environmental health and safety training
- Site security
- Site first aid
- Construction testing (e.g., nondestructive examination, hydrostatic testing)
- Fire protection including extinguisher maintenance
- Furnishing and servicing of sanitary facilities
- Trash collection and disposal
- Disposal of hazardous materials and waste in accordance with local, state, and federal regulations

2.2.2.7 Construction Materials and Equipment

Construction equipment will be at the AEC site from shortly after notice to proceed has been issued to the EPC contractor. The type of equipment onsite will coincide with the erection work being performed. Appendix 2B lists the construction equipment anticipated to be on the AEC site.

Materials such as concrete, pipe, wire and cable, fuels, reinforcing steel, and small tools and consumables will be delivered to the site by truck. Some of the heavy equipment items will be transported by rail. Rail deliveries will be offloaded in the Long Beach area and transported by truck to the site. Appendix 2C shows the anticipated number of construction truck deliveries to the AEC site. Truck deliveries of construction materials and equipment will generally occur on weekdays between 6:00 a.m. and 6:00 p.m.

2.2.2.8 Construction Noise

Typically, noisy construction will be scheduled to occur between 7:00 a.m. and 7:00 p.m. Monday through Friday, and 9:00 a.m. to 6:00 p.m. on Saturday. Additional hours may be necessary to make up schedule deficiencies or to complete critical construction activities (for example, pouring concrete at night during hot weather, working around time-critical shutdowns and commissioning 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. Because AEC construction will be completed while the existing AGS is still in operation, the public will be partly shielded from noise, visual, and dust impacts resulting from project construction activities. See Section 5.7, Noise, for a discussion and analysis of construction noise.

2.2.2.9 Construction Lighting

Lighting will be required to facilitate AEC night construction and commissioning activities. Construction lighting will, to the extent feasible and consistent with worker safety codes, be directed toward the center of the construction site and shielded to prevent light from straying offsite. Task-specific construction/ commissioning lighting will be used to the extent practical while complying with worker safety regulations. Typically, construction will be scheduled to occur during daylight hours. Additional hours may be necessary to make up schedule deficiencies or to complete critical construction activities (for example, pouring concrete at night during hot weather, working around time-critical shutdowns and constraints) as permitted by the applicable LORS. During some construction periods and during the commissioning/startup phase of the project, some activities will continue 24 hours per day, 7 days per week. During periods when nighttime construction/commissioning activities take place, illumination that meets state and federal worker safety regulations will be required. To the extent possible, the nighttime construction/commissioning lighting will be erected pointing toward the center of the site where activities are occurring and will be shielded. Task-specific lighting will be used to the extent practical while complying with worker safety regulations. Despite these measures, there may be limited times during the construction/commissioning period when the AEC site may appear as a brightly lit area as seen in close views and from distant residential areas.

2.3 Facility Operation

The facility will be capable of being dispatched throughout the year and will have annual availability above 98 percent.

The AEC will employ a staff of 51 to operate the facility. Staff will include power plant operators, supervisors, administrative personnel, mechanics, and electricians (Tables 2.3-1 and 2.3-2). Operational staff will work in three rotating shifts with administrative and supervisory staff working 8-hour shifts, 5 days a week. The facility will be capable of operating 24 hours per day, 7 days per week.

TABLE 2.3-1
Typical CCGT Plant Operation Workforce

Classification	Number
Plant Manager	1
Operations Leader	1
Maintenance Leader	0
Environmental Engineer	1
Maintenance Planner	1
Power Plant Operators	9
Controls Specialty	5
Mechanic	3
Admin	2
Total	**23**

TABLE 2.3-2
Typical SCGT Plant Operation Workforce

Classification	Number
Power Plant Operators	5
Controls Specialty	4
Mechanic	4
Total	**13**

As California's intermittent renewable energy portfolio continues to grow, operating in either load following or partial shutdown mode will become more and more common, thus placing an increased importance upon the rapid startup, high turndown, steep ramp rate, and superior heat rate of the MSG units employed at the AEC. By being able to deliver flexible operating characteristics across a wide range of generating capacity, at a relatively consistent and superior heat rate, the AEC will help lower the overall GHG emissions resulting from electrical generation in southern California.

In the unlikely event of a situation that causes a longer-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 a contingency plan will be in conformance with all applicable LORS and protection of public health, safety, and the environment, depending on the expected duration of the shutdown (see Section 2.8, Facility Closure).

2.4 Engineering

In accordance with CEC regulations, this section, together with the engineering appendixes and Section 4.0, Natural Gas Supply, presents information concerning AEC design and engineering. The LORS applicable to engineering are provided, along with a list of agencies that have jurisdiction, the contact persons within those agencies, and a list of the permits that will be required.

Descriptions of the following design criteria are included in Appendix 2D:

- Civil Engineering
- Structural Engineering
- Mechanical Engineering
- Electrical Engineering
- Control Engineering
- Chemical Engineering
- Geological and Foundation Engineering

2.4.1 Facility Safety Design

The AEC 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.

2.4.2 Natural Hazards

The principal natural hazards associated with the AEC site are earthquakes, floods, and tsunami. The site is located in a seismically active area, as is the majority of southern California, and the potential for strong ground motion in the project area is considered significant during the design life of the proposed structures. Structures will be designed to meet the seismic requirements of California Code of Regulations Title 24 and the California Building Code. Section 5.4, Geological Hazards and Resources, discusses the geological hazards of the area and site. This section includes a review of potential geological hazards, seismic ground motions,

and the potential for soil liquefaction caused by ground shaking. Appendix 2D includes the structural seismic design criteria for the buildings and equipment.

According to the Federal Emergency Management Agency (see Section 5.15), the site is not within the 100-year floodplain. Section 5.15, Water Resources, includes additional information on the potential for flooding.

2.4.3 Emergency Systems and Safety Precautions

This section discusses the fire protection systems, emergency medical services, and safety precautions to be used by project personnel. Section 5.10, Socioeconomics, includes additional information on area medical services, and Section 5.16, Worker Health and Safety, includes additional information on safety for workers. Appendix 2D contains 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.

2.4.3.1 Fire Protection Systems

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

Carbon Dioxide and Dry Chemical Fire Protection Systems. These systems protect the CTGs and certain accessory equipment compartments from fire. The system will have fire detection sensors in all protected compartments. Actuating one sensor will provide a high-temperature alarm on the CTG control panel. Actuating a second sensor will trip the CTG, turn off ventilation, close ventilation openings, and automatically release the gas and chemical agents. The gas and chemical agents will be discharged at a design concentration adequate to extinguish the fire.

Sprinkler and Deluge Systems. These systems protect STG equipment, buildings, and large transformers and specific electrical equipment rooms. The STG lubrication oil reservoir will be protected by dry pilot sprinklers, and the STG bearing areas will be protected with pre-action sprinkler systems. Buildings will generally be protected by automatic wet-type sprinkler systems. Large transformers (GSU and auxiliary transformers) will be protected by automatic water spray (deluge) systems. Electrical equipment and battery rooms will be protected with pre-action sprinkler systems.

Fire Hydrants/Hose Stations. This system will supplement the plant's fixed fire suppression systems. Water will be supplied from the plant fire water system.

Fire Extinguisher. The plant administrative/control/warehouse/maintenance buildings, water treatment building, and other structures will be equipped with portable fire extinguishers as required by the local fire department.

Local Fire Protection Services. In the unlikely event of a fire not contained by the AEC's fire suppression systems and the plant's personnel, the City of Long Beach Fire Department would be called upon for assistance. The Hazardous Materials Business Plan (see Section 5.5, Hazardous Materials Handling) for the plant will include all information necessary to allow firefighting and other emergency response agencies to plan and implement safe responses to fires, spills, and other emergencies.

2.4.3.2 Personnel Safety Program

The AEC 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 Section 5.16, Worker Health and Safety.

2.5 Facility Reliability

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

2.5.1 Facility Operating Range and Availability

The AEC will be designed to operate between about 5 and 100 percent of maximum load to support dispatch service in response to customer demands for electricity. The AEC will be designed for a minimum 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 operating 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 for the power plant, which considers 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 AEC is estimated to be approximately 98 percent. The EAF 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.

2.5.2 Redundancy of Critical Components CCGT

The following subsections identify equipment redundancy as it applies to AEC availability. Specifically, redundancy in the combined-cycle power block (AEC CCGT) and in the balance-of-plant systems that serve it is described. The AEC will be served by the following balance-of-plant systems: fuel supply system, DCS, boiler feedwater system, condensate system, deionized water system, power cycle makeup, and storage, steam condensing system, closed-cycle cooling water system, and compressed air system. Major equipment redundancy is summarized in Table 2.5-1.

TABLE 2.5-1

Major Equipment Redundancy of AEC Combined-Cycle Gas Turbine

Description	Number Per CCGT Block	Note
Combined-Cycle CTGs and HRSGs	2 – 50% trains	Steam turbine bypass system allows both CTG/HRSG trains to operate at base load with the steam turbine out of service
STG	1 – 100%	See note above pertaining to CTGs and HRSGs
HRSG Feedwater Pumps	2-100% per HRSG	—
Condensate Pumps	2 – 50%	—
Air-Cooled Condenser	1 – 100%	Condenser must be in operation for plant to operate, however, it will include approximately 30 cells; thus there is a level of redundancy in fans, gearboxes, and motors.
Auxiliary Cooling Water Pumps	2 – 100%	—
Closed-loop Cooling Fluid Cooler (Auxiliary Cooling Water)	1 – 100%	—
Air Compressors	2 – 100%	—
Fuel Gas Compressors per Block	3 – 50%	There will be a total of 3 electrically driven gas compressors with 100% block flow rate capacity. Two gas compressors are expected to operate at 50% Block flow rate with one 100% block flow rate available at all times.
Reverse Osmosis Units	1 – 100%	For two 100% reverse osmosis units at the site.
CEDI Water Polishers	100% spare capacity	—

2.5.2.1 Combined-Cycle Gas Turbine

Two CTG/HRSG power generation trains will operate in parallel within the combined-cycle gas turbine. Each train will be powered by a CTG. Each CTG will provide approximately 35 percent of the total AEC CCGT output. The heat input from the exhaust gas from each CTG will be used in the steam generation system to produce steam. Thermal energy in the steam from the steam generation system will be converted to mechanical energy and then to electrical energy in the STG subsystem. The expanded steam from the STG will be condensed and recycled to the feedwater system. Power from the STG subsystem will contribute approximately 30 percent of the total unfired AEC CCGT output (assuming both CTG/HRSG trains operating). Major equipment redundancies are listed in Table 2.5-1.

2.5.2.2 CTG Subsystems

The CTG subsystems will include the combustion turbine, inlet air filtration, cooling/heating system, lubrication oil systems, starting system, fuel system, generator and excitation systems, and turbine control and instrumentation. The combustion turbine will produce thermal energy through the combustion of natural gas. The thermal energy will be converted into mechanical energy through rotation of the combustion turbine, which drives the compressor and generator. Exhaust gas from the combustion turbine will be used to produce steam in the associated HRSG. The generator excitation system will be a solid-state static system. Combustion turbine control and instrumentation will cover the turbine governing system, the protective system, and the sequence logic.

2.5.2.3 Heat Recovery Steam Generator Subsystems

The steam generation system will consist of the HRSG and blowdown systems. The HRSG system will provide for the transfer of heat from the exhaust gas of a combustion turbine for the production of steam. This heat transfer will produce steam at the pressures and temperatures required by the steam turbine. The HRSG system will consist of ductwork, heat transfer sections, an SCR system, and an oxidation catalyst module, as well as safety and auto relief valves and processing of continuous and intermittent blowdown drains.

2.5.2.4 Steam Turbine Generator Subsystems

The steam turbine will convert the thermal energy to mechanical energy to drive the STG shaft to make electrical energy in the generator. The basic subsystems will include the steam turbine and auxiliary systems, turbine and generator lubrication oil systems, generator/exciter system, and turbine control and instrumentation.

2.5.2.5 Plant Distributed Control System

The DCS will be a redundant microprocessor-based system and will have a functionally distributed architecture comprising a group of similar redundant processing units; these units will be linked to a group of operator consoles and an engineer workstation by redundant data highways. Each processor will be programmed to perform specific dedicated tasks for control information, data acquisition, annunciation, and historical purposes. Because they will be redundant, no single processor failure can cause or prevent a unit trip.

The DCS will interface with the control systems furnished by the STG, HRSG, and fuel gas compressors 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 enough redundancy to preclude a single device failure from significantly affecting overall plant control and operation. Consideration will be given to the action performed by the control and safety devices in the event of control circuit failure. Controls and controlled devices will move to the safest operating condition upon failure or loss of power.

Plant operation will be controlled from the operator panel in any control panel within each CTG. The control panel will consist of individual, cross-connected LCD/keyboard consoles and one engineering workstation. Each LCD/keyboard console will be an independent electronic package so that failure of a single package will

not disable more than one LCD/keyboard. The engineering workstation will allow the control system operator interface to be revised by authorized personnel.

2.5.2.6 Heat Recovery Steam Generator Feedwater System

The HRSG feedwater system will transfer feedwater from the deaerator to the HRSGs. The system will consist of two, 100-percent-capacity pumps for supplying each HRSG. Each pump will be multistage, horizontal, and motor-driven and will include regulating control valves, minimum flow recirculation control, and other associated pipes and valves. The low-pressure system will receive feedwater directly from the low-pressure economizer using the pressure supplied by the condensate pumps.

2.5.2.7 Condensate System

The condensate system will provide a flow path from the condensate receiver to the HRSG low-pressure economizers. The condensate system will include three, 50-percent-capacity, multistage, vertical, motor-driven condensate pumps.

2.5.2.8 Power Cycle Makeup Water Treatment System

A single water treatment system will be used to provide power cycle makeup water to the four power blocks. The water treatment system will include two, 100-percent-capacity trains of two-pass reverse osmosis equipment followed by an EDI system.

2.5.2.9 Power Cycle Makeup and Storage

The power cycle makeup and storage subsystem provides deionized water storage and pumping capabilities to supply high-purity water for system cycle makeup, CTG water wash, and chemical cleaning operations. The major components of the system are a single deionized water storage tank and two 100-percent-capacity, horizontal, centrifugal, cycle makeup water pumps.

2.5.2.10 Compressed Air System

The compressed air system will be designed to supply service and instrument air for the facility. Dry, oil-free instrument air will be provided for pneumatic devices for system controls and protection throughout the plant. Compressed service air will be provided to appropriate areas of the plant as utility stations consisting of a ball valve and quick disconnect fittings.

The instrument air system will be given demand priority over the service air system. A backpressure control valve will cut off the air supply to the service air header to maintain the minimum required instrument air pressure.

Each power block will be equipped with two, 100-percent-capacity, oil-free, rotary screw package air compressors, which will supply compressed air to the service and instrument air systems. Two, 100-percent-capacity, heatless desiccant air dryers will be provided to dry the service and instrument air.

2.5.3 Redundancy of Critical Components SCGT

The following subsections identify equipment redundancy as it applies to AEC SCGT availability. Specifically, redundancy in the SCGT power block and in the balance-of-plant systems that serve it is described. The SCGT power block will be served by the following balance-of-plant systems: fuel supply system, DCS, closed-cycle cooling water system, and compressed air system. Major equipment redundancy is summarized in Table 2.5-2.

2.5.3.1 SCGT Power Block

The SCGT power block consists of two separate CTG power generation trains that operate in parallel. Each CTG will provide approximately 25 to 50 percent of the total SCGT power block output.

The SCGT power block components will be purchased as a pre-engineered system from the OEM. The level of redundancy established by the OEM follows generally acceptable industry practice, such as 2x100 percent

capacity on critical pumps for lube oil and cooling water. High levels of redundancy occur on critical instruments. Major equipment redundancies are listed in Table 2.5-2.

TABLE 2.5-2
Major Equipment Redundancy of Simple-Cycle Power Block

Description	Number Per SCGT Block	Note
Simple-Cycle CTGs	4 – 25% trains	—
Auxiliary Cooling Water Pumps	2 – 100%	—
Closed-loop Cooling Fluid Cooler (Auxiliary Cooling Water)	2 – 100%	—
Air Compressors	2 – 100%	—
Fuel Gas Compressors per SCGT Block	3 – 50%	—

2.5.3.2 CTG Subsystems

The combustion turbine subsystems include inlet air filtration and evaporative inlet cooling system, intercooling system, generator and excitation systems, and turbine control and instrumentation. CTG combustion air will flow through the inlet air filters, evaporative inlet air coolers, and associated air inlet ductwork before being compressed in the CTG compressor section and then entering the CTG combustion sections. Natural gas will be mixed with the compressed air prior to being introduced to the combustion sections and ignited. The hot combustion gases will expand through the power turbine section of the CTGs, causing them to rotate and drive the electric generators and CTG compressors. The hot combustion gases will exit the turbine sections and enter the SCR and the oxidation catalysts. The generator will be air cooled. The generator excitation system will be a brushless excitation system with a permanent magnet generator. A combustion turbine control and instrumentation system (interfaced with the plant control system) will cover the turbine governing system and the turbine protection system.

2.5.3.3 SCGT Plant Distributed Control System

The SCGT DCS will be a redundant microprocessor-based system and will have a functionally distributed architecture comprising a group of similar redundant processing units; these units will be linked to a group of operator consoles and an engineer workstation by redundant data highways. Each processor will be programmed to perform specific dedicated tasks for control information, data acquisition, annunciation, and historical purposes. Because they will be redundant, no single processor failure can cause or prevent a unit trip.

The DCS will interface with the control systems furnished by the CTG, fuel gas compressor and other auxiliary suppliers 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 enough redundancy to preclude a single device failure from significantly affecting overall plant control and operation. Consideration will be given to the action performed by the control and safety devices in the event of control circuit failure. Controls and controlled devices will move to the safest operating condition upon failure or loss of power.

Plant operation will be controlled from the operator panel in the control room. The operator panel will consist of two individual LCD/keyboard consoles, one engineering workstation, and one historian workstation. Each LCD/keyboard console will be an independent electronic package so that failure of a single

package will not disable more than one LCD/keyboard. The engineering workstation will allow the control system operator interface to be revised by authorized personnel.

2.5.4 Fuel Availability

Fuel will be delivered via the existing SoCalGas 30-inch-diameter gas pipelines. SoCalGas has confirmed that its system has enough capacity to supply the AEC at this location. A will-serve letter from SoCalGas is included in Appendix 2E.

2.5.5 Water Availability

The AEC will use a maximum of 130 acre-feet per year of water provided by the LBWD for power plant process water, fire protection, and potable uses.

The availability of water to meet the needs of the AEC is discussed in more detail in Section 5.15, Water Resources. A will-serve letter from the LBWD is included in Appendix 2E.

2.5.6 Sewer and Wastewater Treatment Availability

The AEC will discharge a maximum of 11 acre-feet per year of wastewater, consisting of process and sanitary wastewater. Sanitary wastewater and process water will be discharged to the public sewer system.

The availability of wastewater collection and treatment capacity to meet the AEC's needs is discussed in more detail in Section 5.15, Water Resources. A will-serve letter from the LBWD for connection to the City of Long Beach sewer lines is included in Appendix 2E.

2.5.7 Project Quality Control

The AEC quality control program 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 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 generating 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.

2.5.7.1 Project Stages

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

- **Conceptual Design Criteria.** Activities such as definition of requirements and engineering analyses.
- **Detail Design.** Activities such as the preparation of calculations, drawings, and lists needed to describe, illustrate, or define systems, structures, or components.
- **Procurement Specification Preparation.** Activities necessary to compile and document the contractual, technical, and quality provisions for procurement specifications for plant systems, components, or services.
- **Manufacturer's Control and Surveillance.** Activities necessary to ensure that the manufacturers conform to the provisions of the procurement specifications.
- **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.
- **Receipt Inspection.** Inspection and review of product at the time of delivery to the construction site.

- **Construction/Installation.** Inspection and review of storage, installation, cleaning, and initial testing of systems or components at the facility.
- **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.
- **Plant Operation.** As the project progresses, the design, procurement, fabrication, erection, and checkout of each generating facility system will progress through the stages defined above.

2.5.7.2 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 the 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 the AEC to control operation and maintenance quality. A specific program for this project will be defined and implemented during initial plant startup.

2.6 Electric Production and Thermal Efficiency

While the AEC's annual electrical production for the years 2020 and beyond cannot be forecasted with certainty, due the efficiency of the plant and given the operating characteristics as described above, the AEC is expected to have a plant capacity factor of approximately 50 percent. The maximum annual generation possible from the facility is estimated to be approximately 3,744 gigawatt hours per year (based on a nominal base load megawatt ratings of 640 MWs for the AES CCGT for 4600 hours per year and 400 MWs AES SCGT for 2000 hours per year).

2.6.1 Thermal Efficiency CCGT

The maximum gross thermal efficiency that can be expected from the CCGT configuration specified for AEC is approximately 56 percent on a lower heating value basis. This level of efficiency is achieved when the facility is base-loaded. Other types of operations, particularly those at less than full gas turbine output, will result in lower efficiencies. However, the AEC design achieves a very high level of efficiency across a wide range of generating capacity. The basis of AEC operations will be system dispatch within California's power generation and transmission system. It is expected that the AEC will be primarily operated in load-following

or cycling service. The number of startup and shutdown cycles is expected to range between 50 and 500 per year per CTG.

Plant fuel consumption will depend on the operating profile of the power plant. It is estimated that the range of fuel consumed by the power plant will be from a minimum of near zero BTUs per hour to a maximum of approximately 4,621 MMBtu/hr (HHV basis), including the auxiliary boiler.

2.6.2 Thermal Efficiency SCGT

The maximum gross thermal efficiency that can be expected from the SCGT configuration specified for AEC is approximately 41 percent on a lower heating value basis. This level of efficiency is achieved when the facility is base-loaded. Other types of operations, particularly those at less than full gas turbine output, will result in lower efficiencies. However, the AEC design achieves a very high level of efficiency across a wide range of generating capacity. The basis of AEC operations will be system dispatch within California's power generation and transmission system. It is expected that the SCGT power block will be primarily operated in load-following or cycling service. The number of startup and shutdown cycles is expected to range between 50 and 400 per year per CTG.

Plant fuel consumption will depend on the operating profile of the power plant. It is estimated that the range of fuel consumed by the power plant will be from a minimum of near zero BTUs per hour to a maximum of approximately 3,516 MMBtu/hr (HHV basis) at minimum ambient conditions.

2.7 Facility Closure

Facility closure can be temporary or permanent. Temporary closure is defined as a shutdown for a period exceeding the time required for normal maintenance, including closure for overhaul or replacement of the combustion turbines. 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 because of plant age, damage to the plant beyond repair, or other reasons. The following sections discuss temporary and permanent facility closure.

2.7.1 Temporary Closure

For a temporary facility closure, security of the facilities will be maintained on a 24-hour basis, and the 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 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 handled according to applicable LORS, as discussed in Section 5.14, Waste Management.

Where the temporary closure includes damage to the facility, and there is a release or threatened release of regulated substances or other hazardous materials into the environment, procedures will be followed as set forth in a Risk Management Plan and a Hazardous Materials Business Plan to be developed as described in Section 5.5, Hazardous Materials Handling. 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 regulated substance/hazardous material release is contained and cleaned up, temporary closure will proceed as described above for a closure where there is no release of hazardous materials.

2.7.2 Permanent Closure

The expected operating life of the generation facility is 30 years, though it may be capable of being operated beyond this expected life, depending on actual operating conditions and demand on the facility. 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 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 would be submitted to the CEC for approval prior to decommissioning. The plan would address 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. If possible, unused chemicals will be sold 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 decommissioning activities.



Legend

- AGS Boundary
- AEC Site
- Parking/Laydown Construction Area
- Natural Gas Metering Station
- Construction Access Road
- Proposed New Process/ Sanitary Wastewater Pipeline to First Point of Interconnection
- Potential Sewer Upgrade

0 1,000 2,000 Feet

N

FIGURE 2.1-1
Site Location Map

Alamitos Energy Center
Long Beach, California
October 2015

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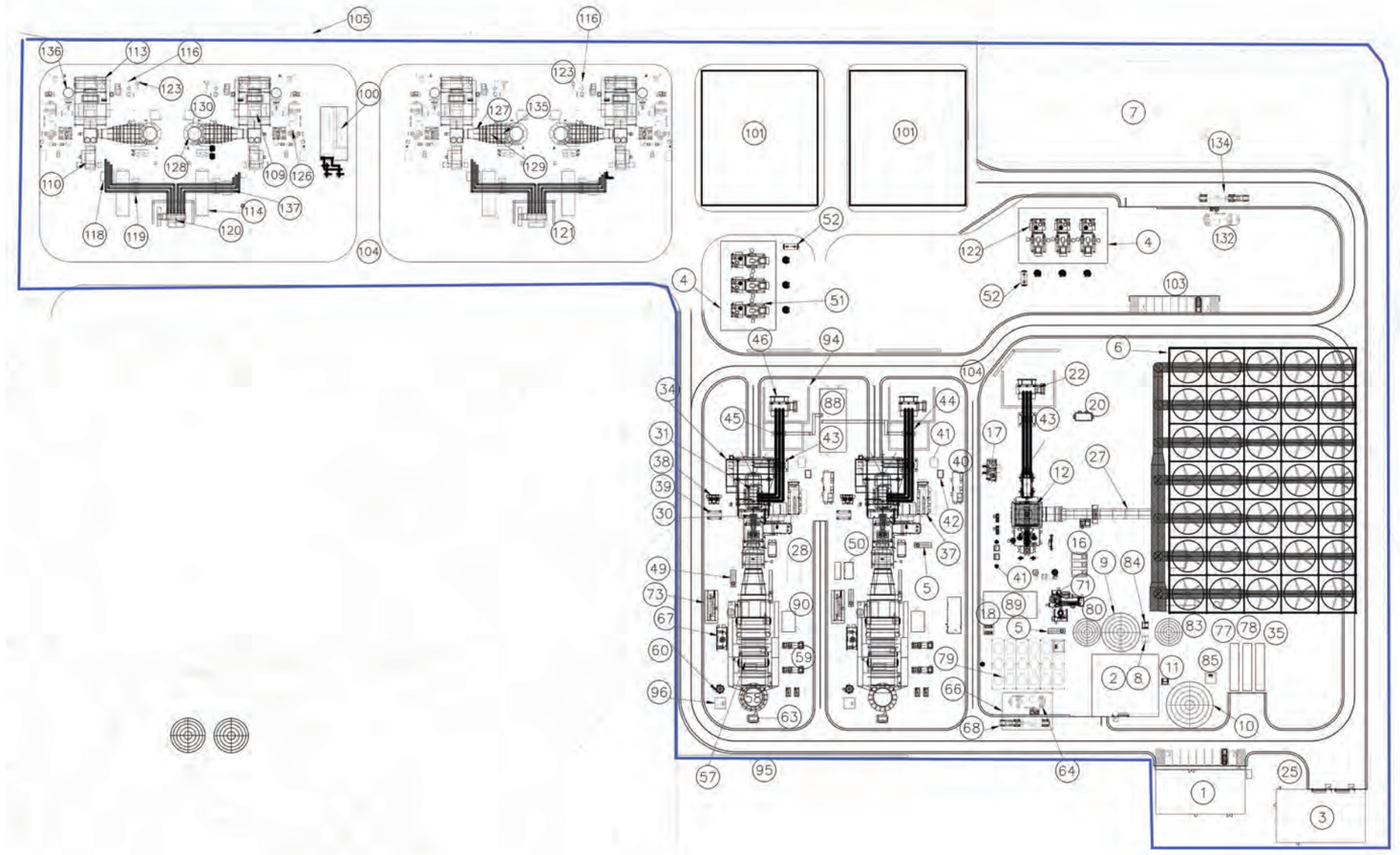
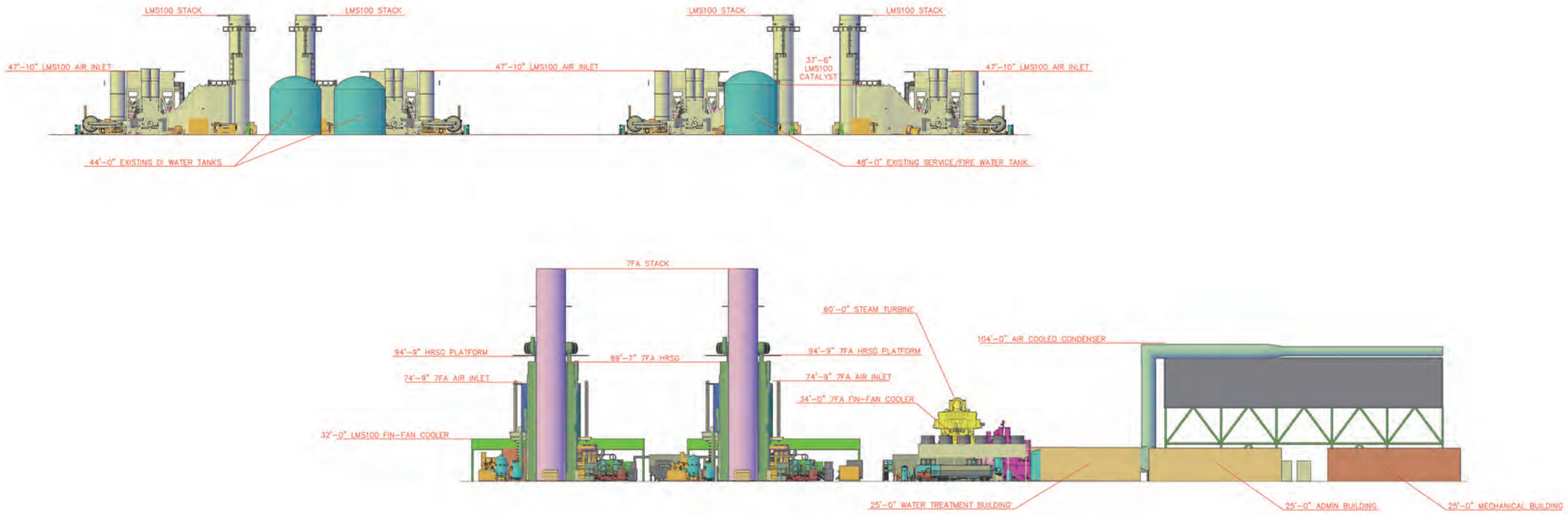


LMS 100 LEGEND	
NO.	DESCRIPTION
99	
100	MEDIUM VOLTAGE ELECTRICAL ENCLOSURE
101	FIN FAN COOLER
102	
103	PARKING AREA
104	ROADWAY
105	SITE FENCE
106	
107	
108	
109	COMBUSTION TURBINE
110	COMBUSTION TURBINE GENERATOR
111	
112	
113	AIR INLET FILTER
114	PACKAGED ELECTRICAL ELECTRONIC CONTROL CENTER (PEECC)
115	
116	FUEL GAS HEATER
117	
118	GENERATOR BREAKER
119	AUXILIARY TRANSFORMER
120	CTG STEP-UP TRANSFORMER
121	TRANSFORMER WALL
122	FUEL GAS COMPR. BUILDING
123	FUEL GAS REGULATOR
124	
125	
126	INTERCOOLER SKID
127	CTG EXHAUST DUCT
128	STACK
129	SCR
130	CONTINUOUS EMISSIONS MONITORING SYS. EQUIP.
131	
132	AMMONIA STORAGE TANK
133	AMMONIA INJECTION SKID
134	AMMONIA UNLOADING CONTAINMENT AREA
135	CO CATALYST (BY OWNER)
136	COMBUSTION TURBINE HRH SILENCER STACK
137	ISO-PHASE BUS DUCT

2X1 7FA LEGEND	
NO.	DESCRIPTION
1	ADMINISTRATION BUILDING
2	WATER TREATMENT BUILDING
3	WAREHOUSE BUILDING
4	GAS COMPRESSOR BUILDING
5	OIL/WATER SEPERATOR
6	AIR COOLED CONDENSER
7	RETENTION BASIN
8	DEMIN WATER PUMPS
9	DEMIN WATER STORAGE TANK
10	SERVICE WATER STORAGE TANK
11	SERVICE WATER PUMPS
12	STEAM TURBINE AND GENERATOR
13	
14	
15	
16	CONDENSATE PUMPS
17	STG LUBE OIL MODULE
18	CLOSED COOLING WATER PUMPS
19	
20	STG EXCITATION UNIT EQUIPMENT (SEC)
21	
22	STG STEP-UP TRANSFORMER
23	
24	
25	PARKING AREA
26	
27	ACC STEAM DUCT
28	CHEMICAL FEED CANOPY
29	
30	COMBUSTION TURBINE
31	COMBUSTION TURBINE GENERATOR
32	
33	
34	AIR INLET FILTER
35	HYDROGEN STORAGE
36	
37	PEECC
38	FUEL GAS FILTER/SEPERATOR
39	FUEL GAS STARTUP HEATER
40	UNIT EXCITATION/LCI EQUIPMENT
41	ISOLATION TRANSFORMER
42	EXCITATION TRANSFORMER
43	GENERATOR BREAKER
44	ISO PHASE BUS DUCT
45	AUXILIARY TRANSFORMER
46	CTG STEP-UP TRANSFORMER
47	
48	
49	WATER WASH DRAINS TANK
50	WATER WASH SKID
51	FUEL GAS COMPRESSORS
52	FUEL GAS COMPRESSOR DRAINS TANK
53	
54	
55	
56	
57	HRSG
58	STACK
59	BOILER FEEDWATER PUMPS
60	BLOWDOWN TANK
61	
62	
63	CEMS
64	AMMONIA STORAGE TANK
65	
66	AMMONIA CONTAINMENT AREA
67	AMMONIA INJECTION SKID
68	AMMONIA UNLOADING CONTAINMENT AREA
69	
70	
71	AUXILIARY BOILER AND ASSOCIATED EQUIPMENT
72	
73	IP WATER FUEL GAS HEATER
74	
75	
76	
77	CO2 STORAGE TANK
78	NITROGEN STORAGE
79	AIR COOLED HEAT EXCHANGER
80	WASTE WATER TANK
81	
82	
83	CONDENSATE TANK
84	CONDENSATE TRANSFER PUMPS
85	RECYCLE SYSTEM SUMP
86	
87	
88	MEDIUM VOLTAGE ELECTRICAL ENCLOSURE
89	STG ELECTRICAL ENCLOSURE
90	HRSG ELECTRICAL ENCLOSURE
91	
92	
93	
94	TRANSFORMER WALL
95	ACOUSTICAL BARRIER
96	CEMS CABINET
97	
98	

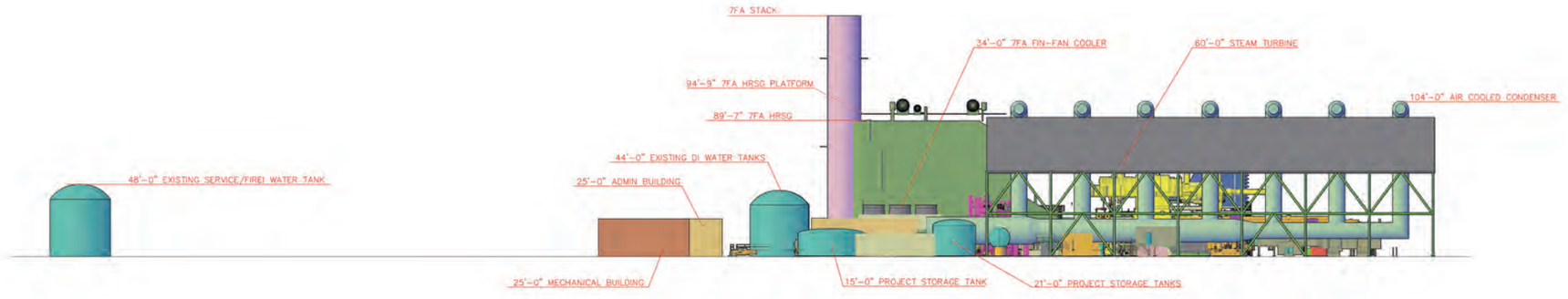
FIGURE 2.1-2
General Arrangement
Alamitos Energy Center
Long Beach, California
October 2015





North

FIGURE 2.1-3a
Elevation View - Looking East
Alamitos Energy Center
Long Beach, California
October 2015





North

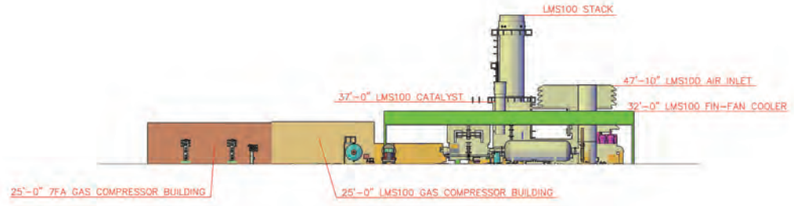
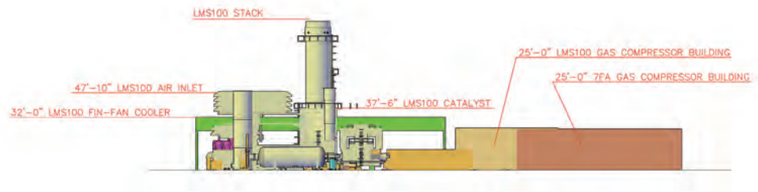
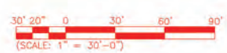
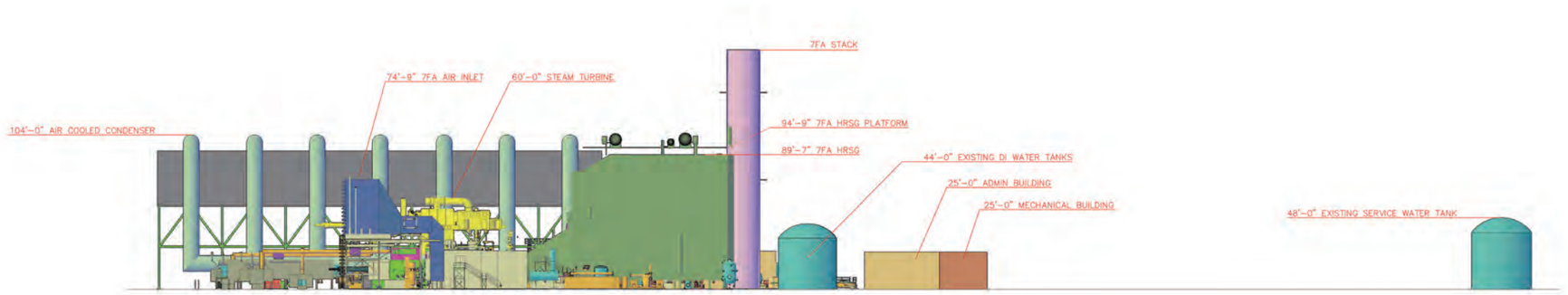




FIGURE 2.1-3b
Elevation View - Looking North
Alamitos Energy Center
Long Beach, California
October 2015





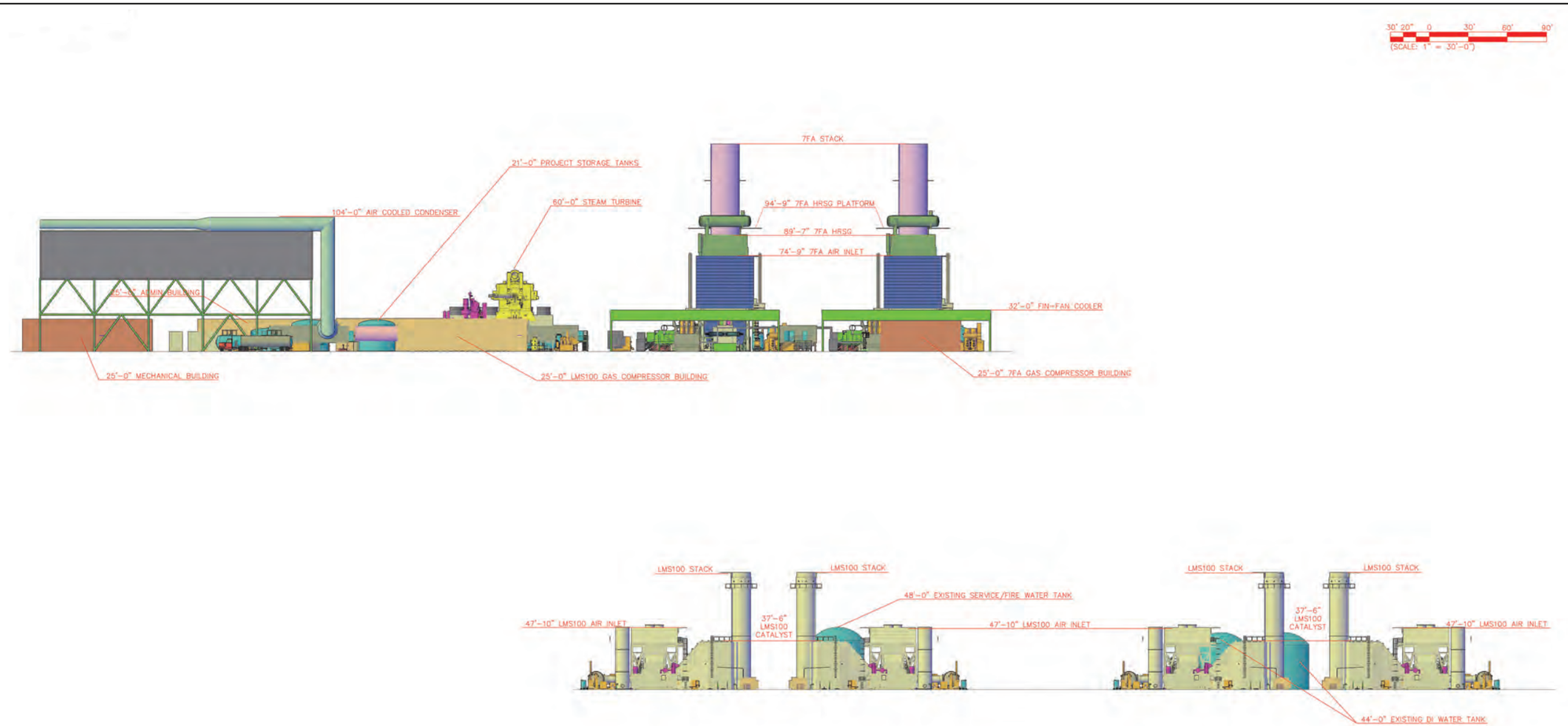


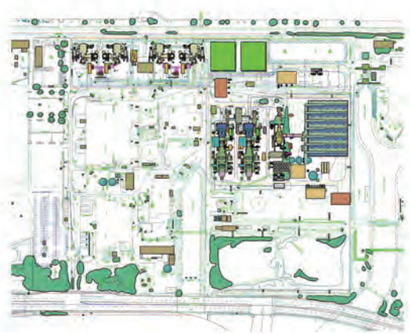


North



FIGURE 2.1-3c
Elevation View - Looking South
Alamitos Energy Center
Long Beach, California
October 2015





North



KEYPLAN

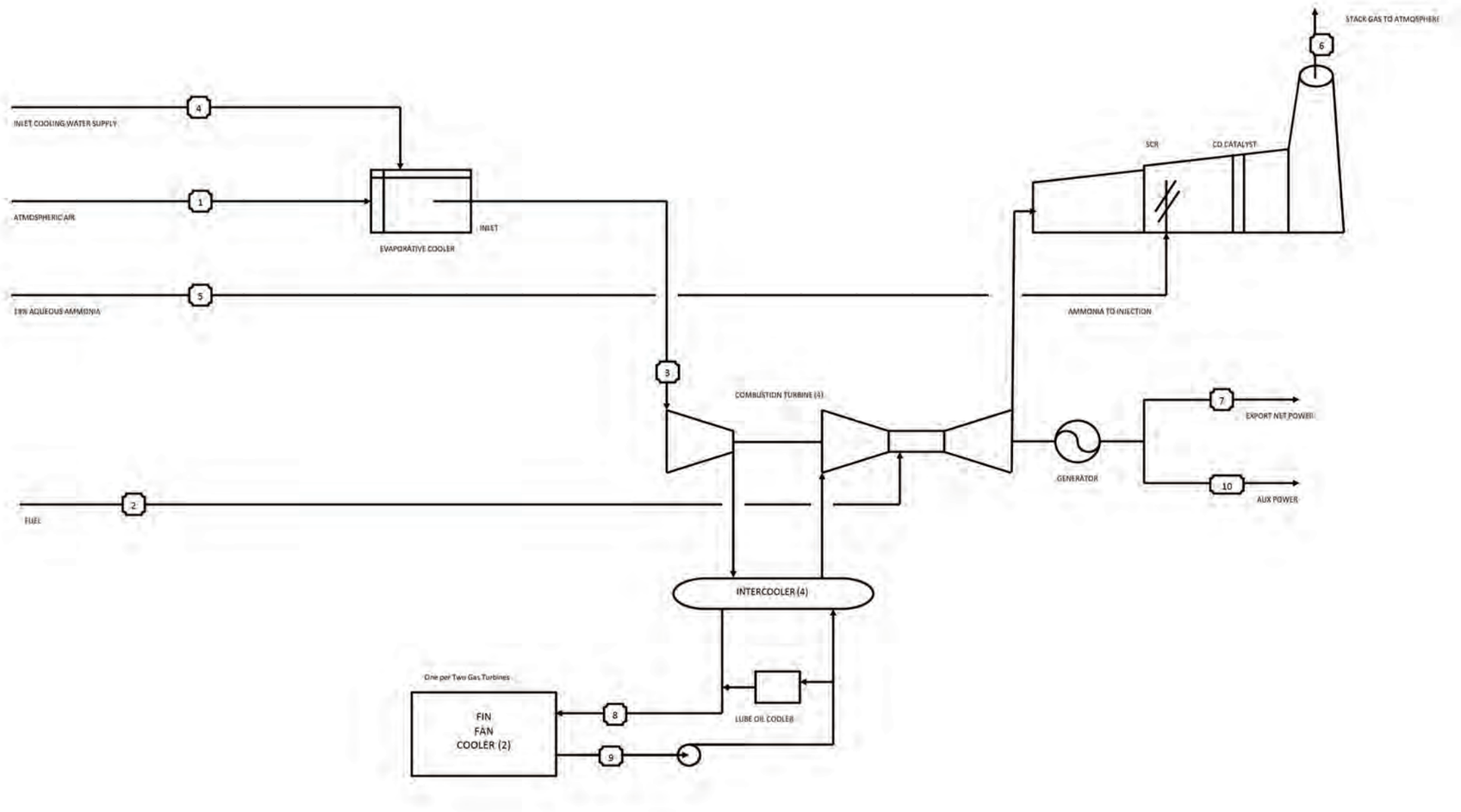
FIGURE 2.1-3d
Elevation View - Looking West
Alamitos Energy Center
Long Beach, California
October 2015

Alamitos Energy Center

Combined Cycle Gas Turbine Heat Balance

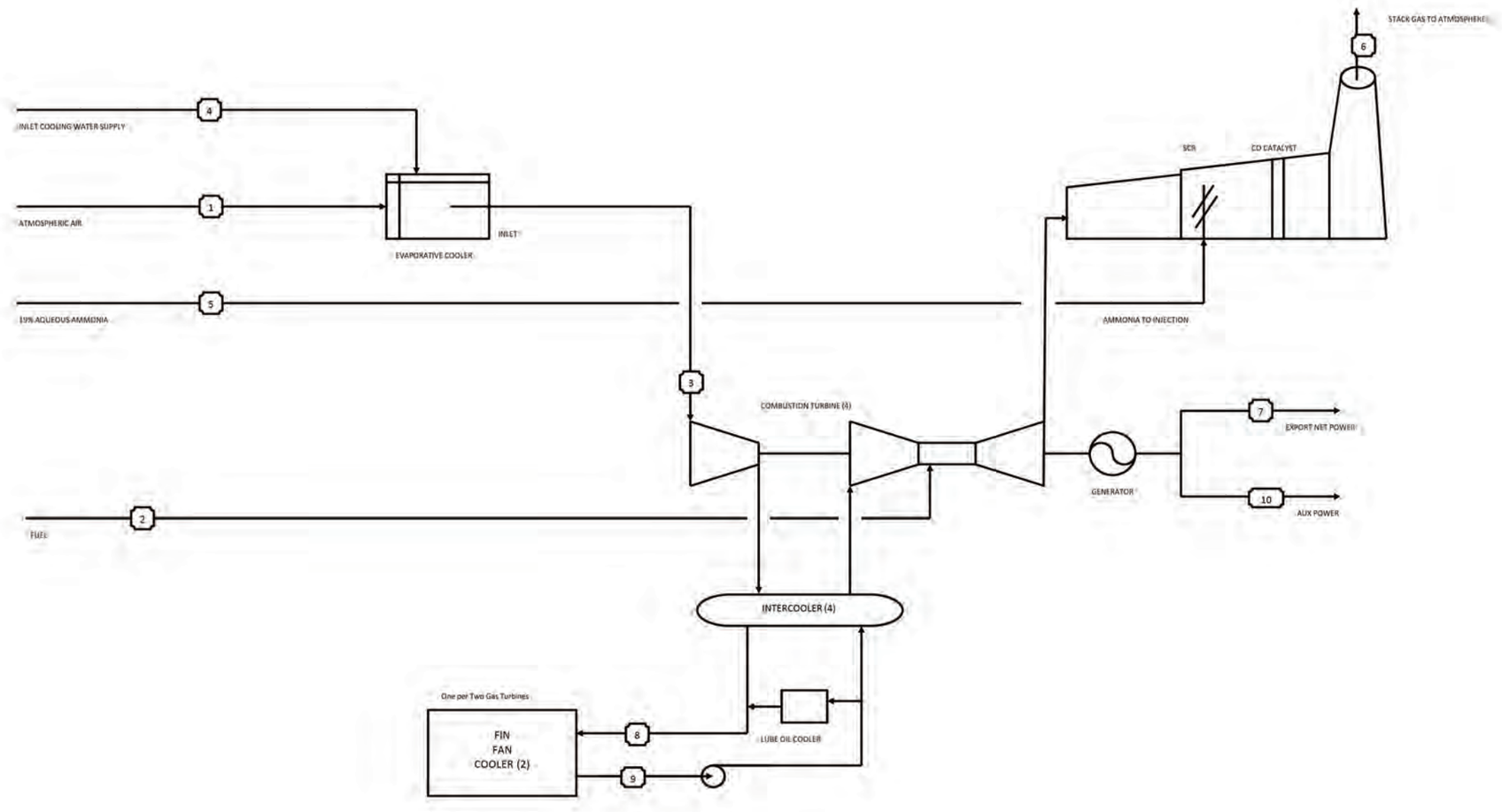
Case Number	1	2
CTG Model	7FA.05	7FA.05
CTG Fuel Type	NG	NG
CTG Load	max	max
CTG Inlet Air Cooling	On	On
Ambient Temperature, F	65.8	89
HRSG Duct Firing	N/A	N/A
Fuel Sulfur Content (grains/100 standard cubic feet)	0.3	0.3
Ambient Conditions		
Ambient Temperature, F	65.8	89
Ambient Relative Humidity, %	58%	39%
Atmospheric Pressure, psia	14.68	14.68
Combustion Turbine Performance		
CTG Inlet Air Conditioning Effectiveness, %	90%	90%
CTG Compressor Inlet Dry Bulb Temperature, F	57.7	71.9
CTG Compr. Inlet Relative Humidity, %	94.8%	91.2%
Inlet Loss, in. H2O	3.95	3.95
Exhaust Loss, in. H2O	15.0	13.5
CTG Load Level (percent of Base Load)	100%	100%
Gross CTG Output, kW	226,639	220,404
Gross CTG Heat Rate, Btu/kWh (LHV)	8,868	8,991
Gross CTG Heat Rate, Btu/kWh (HHV)	9,842	9,978
Net CTG Output, kW	226,139	219904
Net CTG Heat Rate, Btu/kWh (LHV)	8,888	9011
Net CTG Heat Rate, Btu/kWh (HHV)	9,864	10001
Gross 2x1 Combined Cycle kW's per CTG	681,987	667,260
Net 2x1 Combined Cycle kW's per CTG	661,210	647,660
CTG Heat Input, MMBtu/h (LHV)	2,010	1,982
CTG Heat Input, MMBtu/h (HHV)	2,231	2,199
CTG Exhaust Flow, 10^3 lb/h	4,308	4,259
CTG Exhaust Temperature, F	1,131	1,144

FIGURE 2.1-4a
CCGT Heat Balance
Alamitos Energy Center
Long Beach, California
October 2015



HEAT AND MATERIAL BALANCE FOR AMBIENT CONDITIONS											
		DATA REPRESENTS FOUR COMBUSTION TURBINE GENERATORS									
	UNITS	1	2	3	4	5	6	7	8	9	10
FLOW	lb/hr	6864824	153200	6864824	-	-	7020000				
FLOW	gpm					1.5			27200	27200	
TEMPERATURE	dF	28	77	28	-	-	789		64	85	
LHV HEAT INPUT	mmBtu/hr		3168								
POWER	KW							385410			15858
NET LHV HEAT RATE	Btu/kwhr							8218			

FIGURE 2.1-4b
SCGT Low Ambient Temperature Heat Balance
Alamitos Energy Center
Long Beach, California
October 2015

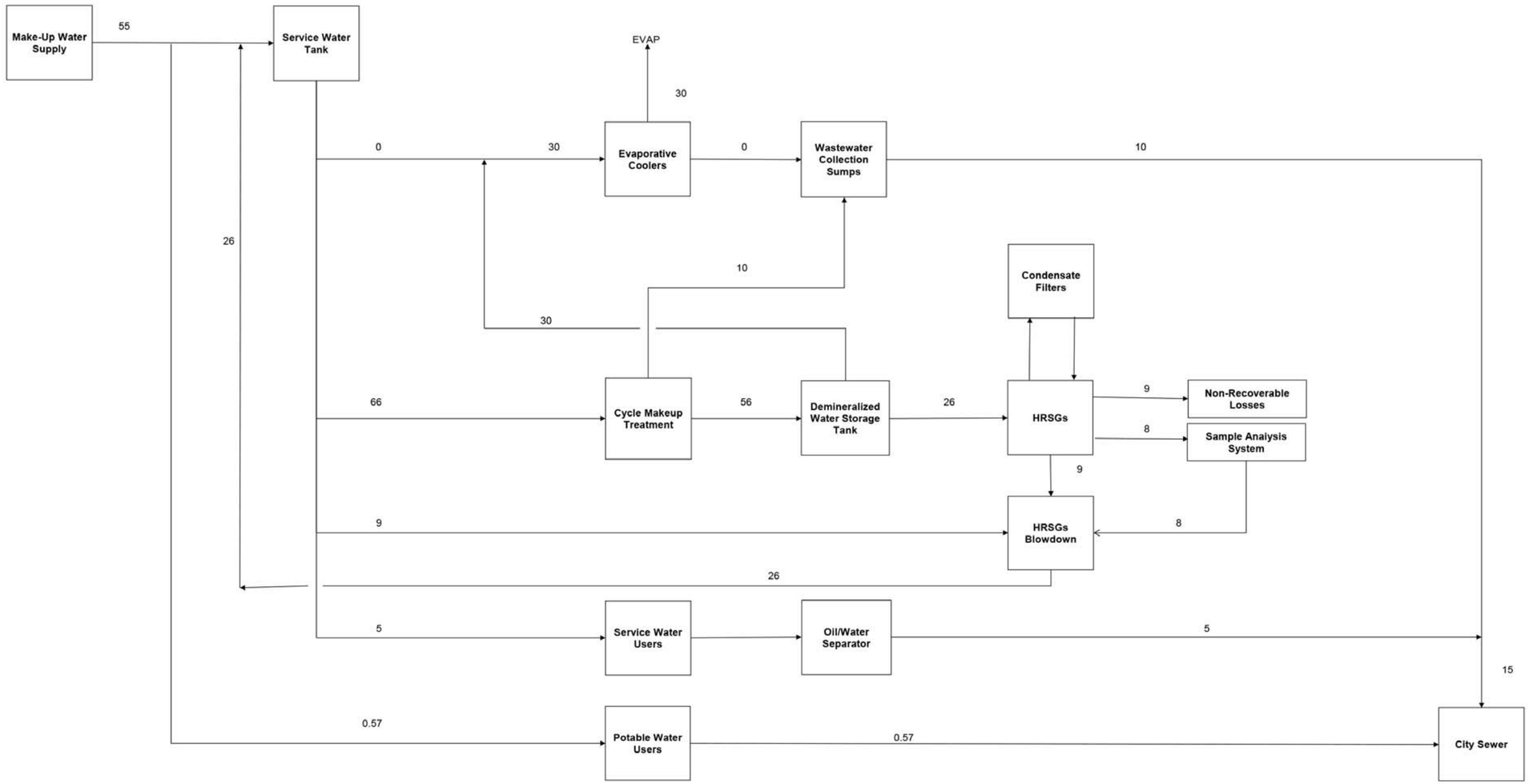


HEAT AND MATERIAL BALANCE FOR AMBIENT CONDITIONS

DATA REPRESENTS FOUR COMBUSTION TURBINE GENERATORS

	UNITS	1	2	3	4	5	6	7	8	9	10
FLOW	lb/hr	6729960	152140	6729960	-		6884000				
FLOW	gpm					15			27200	27200	
TEMPERATURE	dF	65.3	77	65.3	-	-	798		105.9	72.3	
LHV HEAT INPUT	mmBtu/hr		3144								
POWER	KW							379375			15777
NET LHV HEAT RATE	Btu/kwhr							8291			

FIGURE 2.1-4c
SCGT Average Ambient Temperature Heat Balance
Alamitos Energy Center
Long Beach, California
October 2015

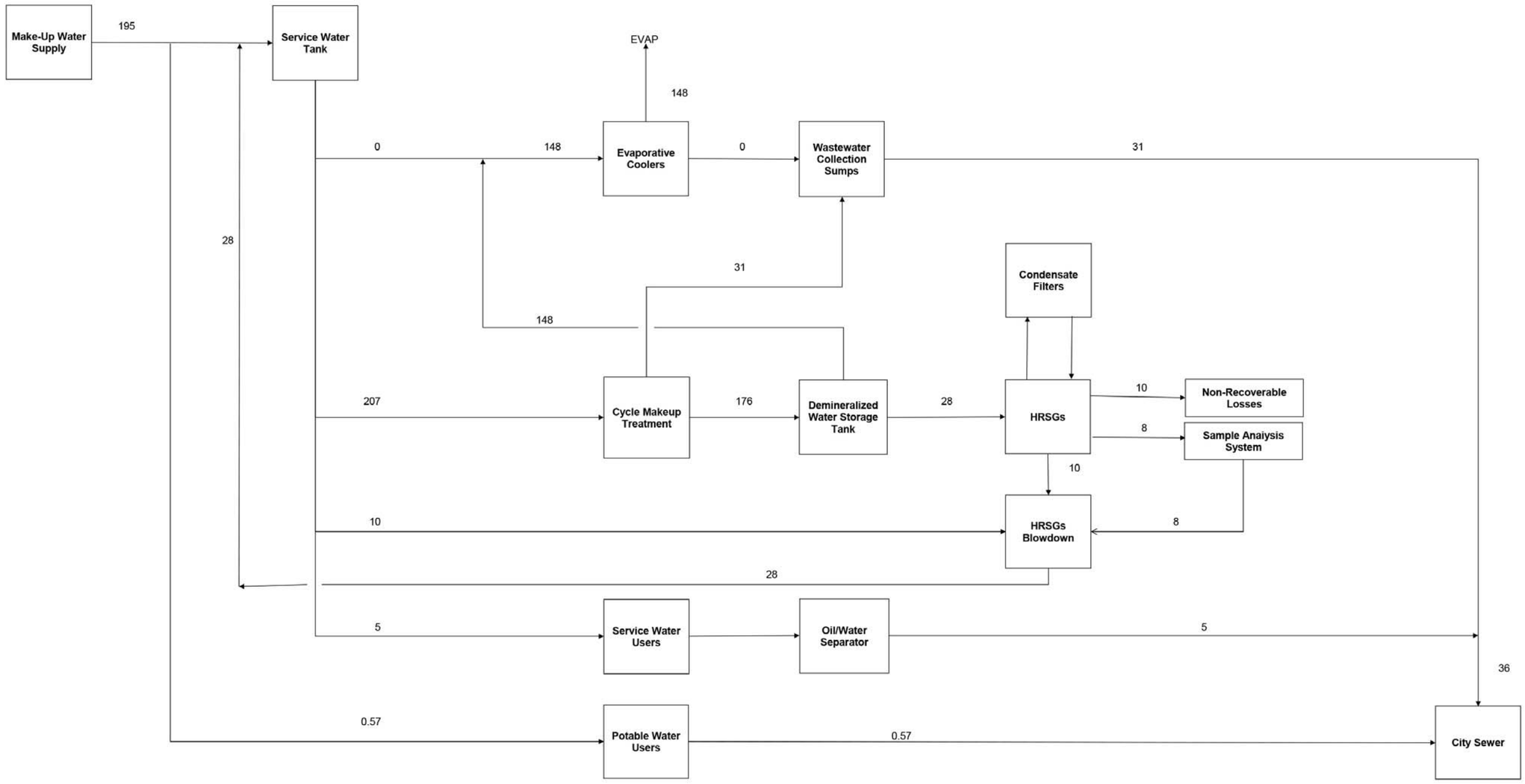


DESIGN CRITERIA:

CYCLE MAKEUP RATE	1%
AMBIENT TEMPERATURE (F)	65.3F
RELATIVE HUMIDITY (%)	86.80%
RO RECOVERY	85%

PRELIMINARY

FIGURE 2.1-5a
CGGT Annual Average Ambient Temperature Water Balance
Alamitos Energy Center
Long Beach, California
October 2015



DESIGN CRITERIA:

CYCLE MAKEUP RATE	1%
AMBIENT TEMPERATURE (F)	107°F
RELATIVE HUMIDITY (%)	10.73%
RO RECOVERY	85%

PRELIMINARY

FIGURE 2.1-5b
CGGT High Ambient Temperature Water Balance
Alamitos Energy Center
Long Beach, California
October 2015

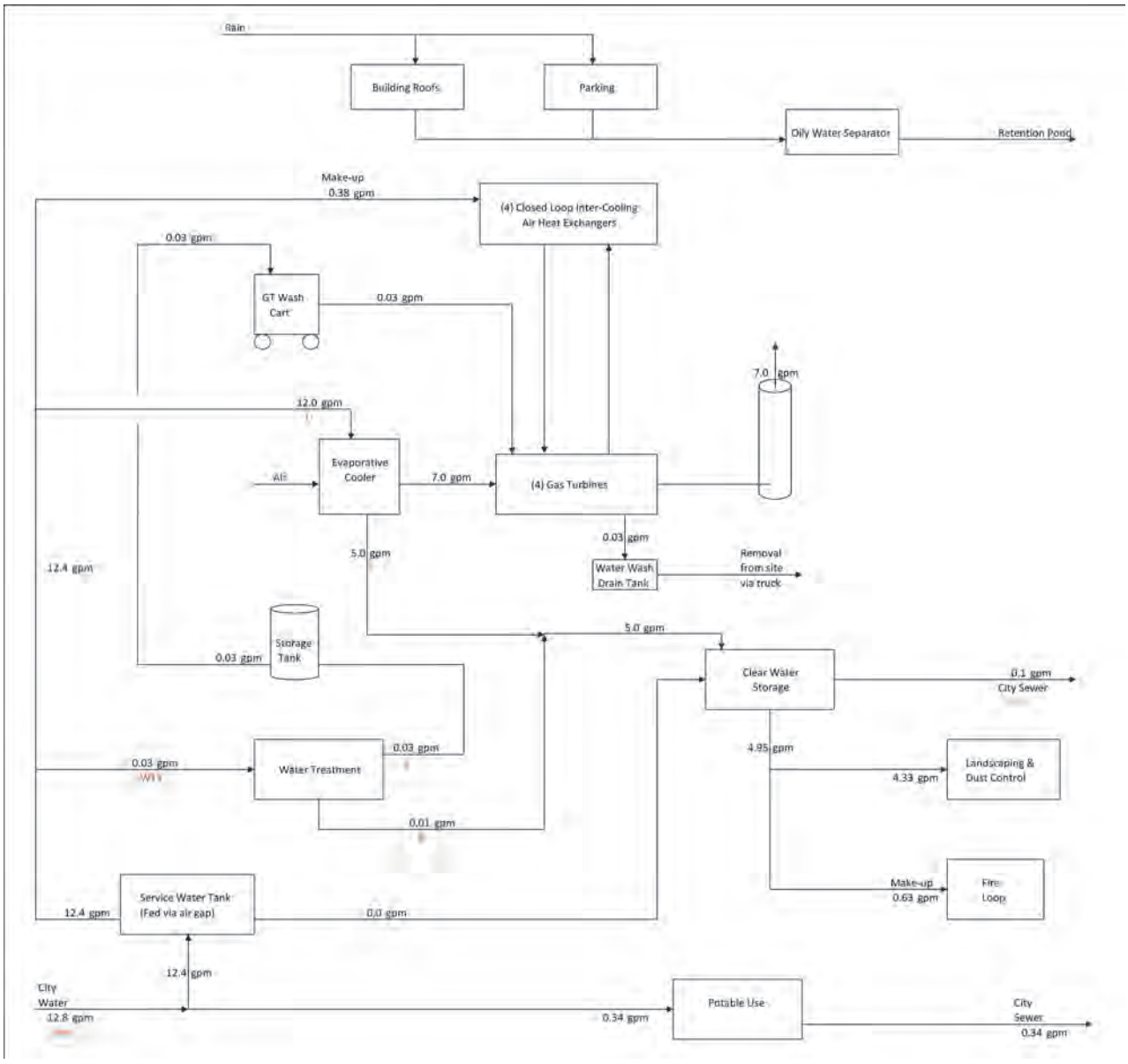


FIGURE 2.1-5c
SGGT Annual Average Ambient Temperature Water Balance
Alamitos Energy Center
Long Beach, California
October 2015

SECTION 3

Transmission System Engineering

This section discusses the 230-kilovolt (kV) generation tie lines between the Alamitos Energy Center (AEC) and the existing California Independent System Operator (CAISO)-operated and Southern California Edison (SCE)-owned substation located on the AEC site as well as the potential impacts that operation of the AEC will have on the flow of electrical power on the CAISO-controlled grid in the southern California region. This analysis contains the following discussions:

- Transmission and Generation Tie Lines Description, Design, and Operation (Section 3.1)
- Transmission Interconnection Studies (Section 3.2)
- Transmission Line Safety and Nuisances (Section 3.3)
- Applicable Laws, Ordinances, Regulations, and Standards (Section 3.4)
- Permits and Permit Schedule (Section 3.5)

3.1 Transmission and Generation Tie Lines Description, Design, and Operation

The AEC will connect to the regional electrical grid using the existing SCE 230-kV switchyard located on a parcel owned by SCE within the existing Alamitos Generating Station (AGS) site. No new offsite transmission lines will be needed for the AEC. AEC combined-cycle gas turbine (CCGT) and simple-cycle gas turbine (SCGT) power blocks will connect into the existing SCE switchyard via two new single-circuit 230-kV lines. Figure 3.1-1 shows the electrical system one-line diagram within the power block, and the configuration of the AEC generation tie lines to the existing onsite SCE switchyard. Figure 3.1-2 shows typical support tower designs that could be used for the generation tie lines connecting the AEC to the SCE switchyard.

3.1.1 Overhead Line Characteristics

No changes are planned for the existing transmission line circuits connecting the SCE/CAISO-controlled switchyard to the CAISO transmission system. The new onsite 230-kV generation tie lines from the AEC power blocks to the SCE switchyard will be designed as single-circuit or double-circuit, self-supporting steel or concrete structures, which may be installed on concrete pier foundations.

The insulators for the 230-kV generation tie lines will be polymer or porcelain with overall lengths of approximately 10 to 15 feet. The conductor phase-to-phase spacing and conductor height above ground will be in compliance with National Electrical Code (NEC) and National Electrical Safety Code (NESC) clearances.

3.1.2 230-kV Switchyard Characteristics

AEC will have a 230-kV switchgear to receive the power from each generator unit and step-up transformer and combine and meter the power for delivery to the SCE substation located onsite. The generation block switchgear will be an outdoor conventional design and utilize standard utility grade equipment and designs. The substation will conform to the requirements of NEC and NESC as well as local code requirements for seismic integrity.

Station service power will be provided via the onsite SCE 230-kV switchyard with emergency back-up power from the local SCE distribution network.

3.1.3 Power Plant Interconnect Characteristics

The AEC generation tie lines will use 230-kV isolation switches and gas-insulated circuit breakers for each block and individual generator step-up transformers for each of the generating units within each power block. All generation tie lines from the AEC to the SCE switchyard will be constructed as overhead lines. No underground generation tie lines are proposed. The generation tie lines to the SCE switchyard and all equipment will be designed to ensure compliance with applicable NEC and NESC rules following the CAISO

requirements. Standby power for the AEC when not generating will be back-fed through the generator step-up transformer and auxiliary transformer.

3.2 Transmission Interconnection Studies

AEC is a repowering of the existing generating plant and replacement of the existing generating capacity. The California ISO has provided a procedure for the repowering of existing generating units provided that the repower capacity is equal or less than the original total capacity. Essentially this “Grandfathers” the CAISO Network transmission capacity to the new generating unit.

The CAISO Generator Repowering procedure is covered in detail in Section 11.0 of the CAISO Business Practice Manual (BPM) for Generator Management.

In part the Generator Management BPM States:

> *The CAISO’s procedures for evaluating repower requests by an owner of an existing Generating Unit made pursuant to Section 25.1.2 of the CAISO tariff allows such entities to obtain a CAISO three-party GIA without having to participate in the CAISO Generator Interconnection and Deliverability Allocation Procedure (GIDAP) study process if they demonstrate that the “total capability and electrical characteristics of the Generating Unit will remain substantially unchanged.”*

The BPM for Generator Management and be found here:
http://bpmcm.caiso.com/Pages/BPMDetails.aspx?BPM=Generator%20Management

AES submitted a repowering request to the CAISO on March 9, 2012 for four combined-cycle blocks totaling 1902.867 MW under Section 25.1.2 of the CAISO Tariff. The repowering request was approved by the CAISO on August 1, 2012. AES is in the process of preparing an amended repowering request to reflect the new configuration for the Alamitos Energy Center. We anticipate that this will be approved by the CAISO in the first half of 2016.

Appendix 3A contains copies of correspondence between the Applicant and the CAISO.

3.3 Transmission Line Safety and Nuisances

To interconnect the new generating blocks to the SCE/CAISO switchyard the project will construct short overhead 230-kV tie lines. The lines will be designed and constructed in compliance with applicable codes and standards including National Electrical Code (NEC) and National Electrical Safety Code (NESC).

These overhead lines are within the controlled AEC site and not accessible by the general public. This section discusses the safety and nuisance issues associated with the project’s electric lines.

3.3.1 Electrical Clearances

Typical high-voltage overhead transmission lines are composed of conductors connected to supporting structures by means of porcelain, glass, or polymer insulators. The air surrounding the energized conductor acts as the insulating medium. Maintaining sufficient clearances, or air space, around the conductors to protect the public and utility workers is paramount to the safe operation of the transmission line. The required safety clearance required for the conductors is determined by considering various factors such as: the 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 NESC (IEEE C2) and California Public Utilities Commission (CPUC) General Order (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, and airports
- Distance from the energized conductors to buildings and signs
- Distance from the energized conductors to other parallel power lines

The 230-kV generation tie lines connecting the AEC power blocks to the SCE switchyard will be designed to meet appropriate national, state, and local clearance requirements.

3.3.2 Electrical Effects

The potential electrical effects of high-voltage transmission lines, both within the AEC site and outside of the AEC site, 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 because of 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. 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. Based on the analyses below, the new generation tie line for the AEC will not result in any significant impacts to electric and magnetic fields or audible noise or radio and television interference.

3.3.2.1 Electric and Magnetic Fields

Operating power lines, like the energized components of electrical motors, home wiring, lighting, and other electrical appliances, produce electric and magnetic fields and a corresponding electromagnetic force (EMF). The fields produced by the alternating current electrical power system in the United States has a frequency of 60 hertz, 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 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. The electric field around a transmission line remains steady and is not affected by the common daily and seasonal fluctuations in the loading of cables.

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 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. In the absence of conclusive or evocative evidence, some states, including California, have chosen not to specify maximum acceptable levels of EMF. Instead, these states, including California, mandate a program of prudent avoidance whereby EMF exposure to the public would be minimized by encouraging electric utilities to use cost-effective techniques to reduce the levels of EMF.

The new generation tie lines that connect the AEC power blocks to the existing SCE 230-kV switchyard are located within the existing AGS site and will not affect the public because they do not extend off the AEC site. Further, no changes are proposed for the transmission lines connecting the SCE switchyard to the CAISO transmission system. The estimated electric field of the existing 230-kV SCE transmission line at the center of the SCE right-of-way (ROW) from the SCE 230-kV switchyard to SCE Barre, Lighthipe and Center substation is 0.84 kV/meter, and is 0.66 kV/meter at the edge of the ROW. The estimated magnetic field under the SCE 230-kV transmission line and at the center of the ROW is 44.23 mG (0.04423 G), and 34.62 mG (0.03462 G) at the edge of the ROW, which are well below regulatory levels established by states that do have limits. Other states have established regulations for magnetic field strengths that have limits ranging from 150 mG to 250 mG at the edge of the ROW, depending on the voltage of the transmission line.

Additionally, the estimated electric field of the new AEC generation tie lines that connect to the existing SCE 230-kV switchyard are within the boundary of the existing Alamitos Generating Station. The estimated electric field under the AEC generation tie lines is approximately 0.73 kV/meter right under the lines, and is 0.45 kV/meter at the edge of the AEC site boundary. The estimated magnetic field directly under these AEC 230-kV transmission tie lines to the SCE switchyard is approximately 63.44 mG (0.06344 G) right under the lines, and 38.88 mG (0.03888 G) at the edge of the AEC site boundary, which are well below regulatory levels established by states that do have limits as stated above.

3.3.2.2 Audible Noise and Radio and Television Interference

Corona from a transmission line may result in the production of audible noise or radio and television interference. 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, foreign material 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.

The existing AGS Units 1 through 6 interconnect to the SCE 230-kV switchyard with six separate 230-kV generation tie lines; these two lines will be replaced with two new 230-kV generation tie lines from the AEC power blocks to the existing SCE switchyard. The new generation tie lines will be located within the AEC site and will be designed and constructed to reduce project-related audible noise and radio and television interference. No changes are proposed for the transmission lines connecting the SCE switchyard to the CAISO transmission system.

3.3.2.3 EMF, Audible Noise, and Radio and Television Interference Assumptions

EMF, audible noise, and radio and television interference near power lines vary with regard to the line design, line loading, distance from the line, and other factors. The new overhead 230-kV line located between the AEC power blocks and the SCE 230-kV switchyard are entirely located within the AEC site. The potential interferences described in this section will not affect the public outside of the AEC site.

Electric fields, corona, audible noise, and radio and television interference depend on line voltage and not the level of power flow. The six existing AGS generation tie lines are rated at 230 kV, and the four new AEC generation tie lines that will replace them are also rated at 230 kV. Therefore, the audible noise associated with the new AEC generation tie lines will be similar to or slightly less than the existing noise generated by the AGS.

Corona typically becomes a design concern for transmission lines having voltages of 345-kV and above. Because the AEC's generation tie lines are rated at less than 345 kV and will be constructed on the AEC site, no corona-related design issues are expected.

The magnetic field is proportional to line loading (amperes), which varies as demand for electrical power varies and as generation from the generating facility is changed by the system operators to meet changes in demand.

As noted in the discussion above, AEC construction and operation, including the four generation tie AEC replacing the existing six to the SCE's existing switchyard and transmission system, are not expected to result in significant changes in EMF levels, corona, audible noise, or radio and television interference.

3.3.2.4 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 on the electric field strength, the size and shape of the conducting object, and the object-to-ground resistance. When a conducting object is isolated from the ground and a grounded person touches the object, a perceptible current or shock may occur as the current flows to ground. The mitigation for potential hazardous and nuisance shocks is to ensure that metallic objects on or near the ROW are grounded, and that sufficient clearances are provided at roadways and parking lots to keep electric fields at these locations low enough to prevent vehicle short-circuit currents from exceeding 5 milliamperes.

Magnetic fields also can 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 potential hazard is to ensure multiple grounds on fences or pipelines, especially those orientated parallel to the transmission line.

The proposed AEC 230-kV generation tie lines will be constructed in conformance with the NESC and CPUC GO-95 and Title 8 California Code of Regulations (CCR) 2700 requirements. Therefore, hazardous shocks are unlikely to occur as a result of project construction, operation, or maintenance.

3.3.3 Aviation Safety

Federal Aviation Administration (FAA) Regulations, 14 Code of Federal Regulations (CFR) Part 77, establish standards for determining obstructions in navigable airspace and set forth requirements for notification of proposed construction. These regulations require FAA notification for construction over 200 feet above ground level. Notification also is required if the obstruction is lower than specified heights and falls within restricted airspace in the approaches to public or military airports and heliports. For airports with runways longer than 3,200 feet, the restricted space extends 20,000 feet (3.3 nautical miles) from the runway. For airports with runways measuring 3,200 feet or less, the restricted space extends 10,000 feet (1.7 nautical miles). For public or military heliports, the restricted space extends 5,000 feet (0.8 nautical mile).

There are no public airports with runways within 3.3 miles of the AEC. There are no heliports within 0.8 miles of the AEC. The Los Alamitos Army Airfield is approximately 2.7 miles northeast of the AEC.

As part of the analysis for the AEC, the FAA Notice Criteria Tool has been used to determine whether the generation tie line for the AEC may meet Federal Aviation Regulation 77.13 (FAR §77.13) requirements regarding the need to notify FAA of AEC construction. Although the generation tie line is under 200 feet in height, the FAA criteria tool indicates that the generation tie line is in proximity to a navigation facility and may impact assurance of navigation signal reception. The notice criteria tool results are provided in Appendix 3B.

3.3.4 Fire Hazards

The existing 230-kV generation tie lines have been designed, constructed, and maintained in accordance with applicable standards including GO-95, which establishes clearances from other manmade and natural

structures as well as tree-trimming requirements to mitigate fire hazards. SCE is expected to maintain the transmission line corridor and immediate area in accordance with existing regulations and accepted industry practices that will include identification and abatement of fire hazards.

The new 230-kV overhead generation tie lines will be designed in accordance with applicable standards including the NESC and GO-95.

3.4 Applicable Laws, Ordinances, Regulations, and Standards

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

3.4.1 Design and Construction

Table 3.4-1 lists the LORS for the design and construction of the AEC onsite generation tie lines.

TABLE 3.4-1
Design and Construction LORS for the Electrical Transmission

LORS	Applicability	AFC Section Explaining Conformance
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.	Section 3.3
GO-52, CPUC, "Construction and operation of power and communication lines for the prevention or mitigation of inductive interference"	Applies to the design of facilities to provide or mitigate inductive interference.	Section 3.3.2.4
GO-95, CPUC, "Overhead electric line construction"	CPUC rule covers all aspects of design, construction, operation, and maintenance of electrical transmission line and fire safety (hazards).	Section 3.3.1
IEEE 1119, "IEEE Guide for Fence Safety Clearances in Electric-Supply Stations"	Recommends clearance practices to protect persons outside the facility from electric shock.	Section 3.3.1

Note:

IEEE = Institute of Electrical and Electronics Engineers

3.4.2 Electric and Magnetic Fields

The LORS pertaining to EMF are listed in Table 3.4-2.

TABLE 3.4-2
Electric and Magnetic Field LORS

LORS	Applicability	AFC Section Explaining Conformance
Decision 93-11-013, CPUC	Presents the CPUC position on EMF reduction.	Section 3.3.2.1
GO-131-D, CPUC, "Rules for Planning and Construction of Electric Generation, Line, and Substation Facilities in California"	Establishes the CPUC construction application requirements, including requirements related to EMF reduction.	Section 3.3.2.1

TABLE 3.4-2
Electric and Magnetic Field LORS

LORS	Applicability	AFC Section Explaining Conformance
ANSI/IEEE 544-1994, "Standard Procedures for Measurement of Power Frequency Electric and Magnetic Fields from AC Power Lines"	Presents the standard procedure for measuring EMF from an electric line that is in service.	Section 3.3.2.1

Note:

ANSI = American National Standards Institute

3.4.3 Hazardous Shock

Table 3.4-3 lists the LORS regarding hazardous shock protection that apply to the generation tie lines and the project. Additional LORS for the project are also discussed in the each section of this AFC. The existing SCE 230-kV switchyard is located within the secured area of the existing AGS. The SCE switchyard is fenced to protect any person within the AEC site from entering the switchyard where they could be exposed to associated hazardous shocks resulting from electrical faults from the new AEC equipment or the SCE high-voltage transmission system.

The new AEC 230-kV generation tie lines will be designed in accordance with applicable LORS.

TABLE 3.4-3
Hazardous Shock LORS

LORS	Applicability	AFC Section Explaining Conformance
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.	Section 3.3.2.4
ANSI/IEEE 80, "IEEE Guide for Safety in Alternating Current Substation Grounding"	Presents guidelines for assuring safety through proper grounding of alternating current outdoor substations.	Section 3.3.2.4
NESC, ANSI C2, Section 9, Article 92, Paragraph E; Article 93, Paragraph C	Covers grounding methods for electrical supply and communications facilities.	Section 3.3.2.4

3.4.4 Communication Interference

The LORS pertaining to communication interference are listed in Table 3.4-4.

TABLE 3.4-4
Communication Interference LORS

LORS	Applicability	AFC Section Explaining Conformance
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.	Section 3.3.2

TABLE 3.4-4
Communication Interference LORS

LORS	Applicability	AFC Section Explaining Conformance
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.	Section 3.3.24
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.	Section 3.3.2.2

Note:

CEC = California Energy Commission

3.4.5 Aviation Safety

Table 3.4-5 lists the aviation safety LORS that may apply to the generation tie lines and the project. LORS for the project are also discussed in the each section of this AFC.

TABLE 3.4-5
Aviation Safety LORS

LORS	Applicability	AFC Section Explaining Conformance
Title 14 CFR, Part 77, "Objects Affecting Navigable Airspace"	Describes the criteria used to determine whether a "Notice of Proposed Construction or Alteration" (FAA Form 7450-1) is required for potential obstruction hazards.	Section 3.3.3
FAA Advisory Circular No. 70/7450-1G, "Obstruction Marking and Lighting"	Describes the FAA standards for marking and lighting of obstructions as identified by FAA Regulations Part 77.	Section 3.3.3
California Public Utilities Code, Sections 21001–24451	Discusses the permit requirements for construction of possible obstructions in the vicinity of aircraft landing areas, in navigable airspace, and near the boundaries of airports.	Section 3.3.3

3.4.6 Fire Hazards

Table 3.4-6 lists the LORS governing fire hazard protection for the generation tie lines and the project. LORS for the project are discussed in the appropriate sections of this AFC.

TABLE 3.4-6
Fire Hazard LORS

LORS	Applicability	AFC Section Explaining Conformance
14 CCR §§ 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.	Section 3.3.4
ANSI/IEEE 80, "IEEE Guide for Safety in AC Substation Grounding"	Presents guidelines for assuring safety through proper grounding of AC outdoor substations.	Section 3.3.4

TABLE 3.4-6
Fire Hazard LORS

LORS	Applicability	AFC Section Explaining Conformance
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).	Section 3.3.4

3.4.7 Jurisdiction

Table 3.4-7 identifies national, state, and local agencies with jurisdiction to issue permits or approvals, conduct inspections, or enforce the above-referenced LORS. Table 3.4-7 also identifies the responsibilities of these agencies as they relate to the construction, operation, and maintenance of the AEC.

TABLE 3.4-7
National, State, and Local Agencies with Jurisdiction over Applicable LORS

Agency or Jurisdiction	Responsibility
FAA	Establishes regulations for marking and lighting of obstructions in navigable airspace (AC No. 70/7450-1G).

3.5 Permits and Permit Schedule

Other than the CEC certification, no other state, local, or regional permits are required to comply with the transmission impacts of the project.

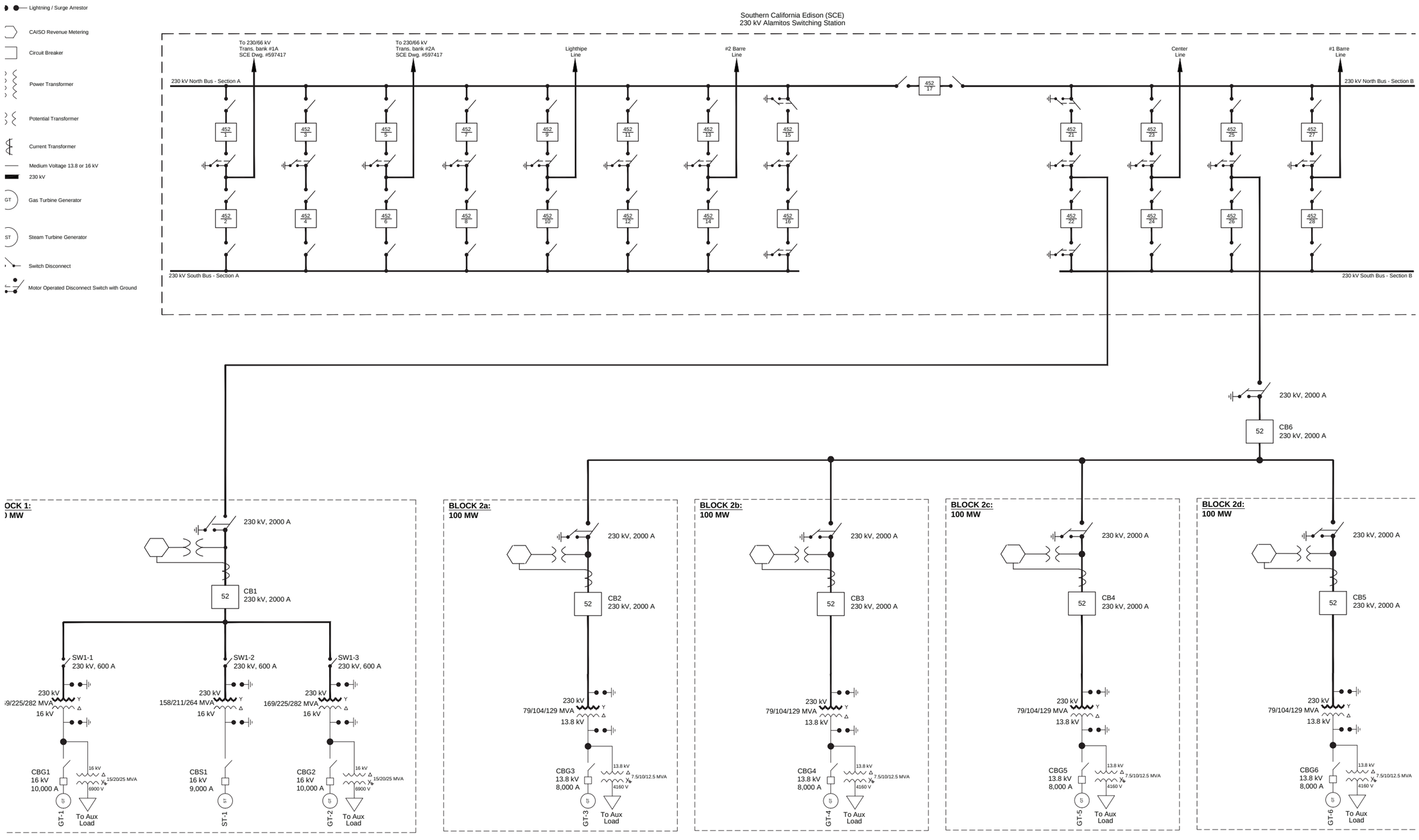
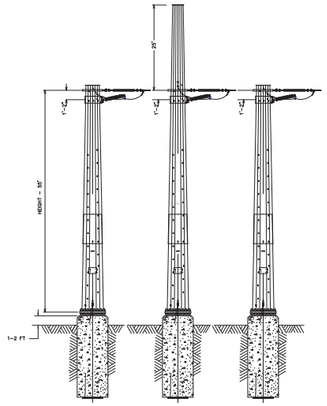


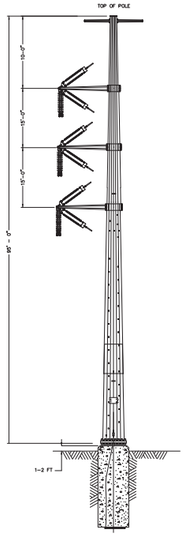
FIGURE 3.1-1
Electrical System One-Line Diagram
Alamitos Energy Center
Long Beach, California
October 2015

Source: Electric Power Engineers, 10/20/2015

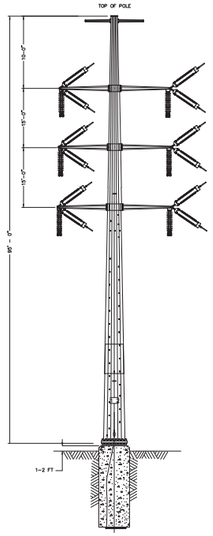
NOT TO SCALE



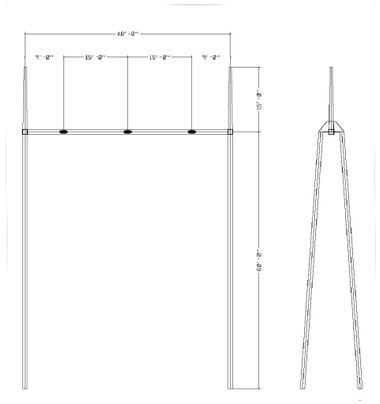
Single Circuit Horizontal Dead End



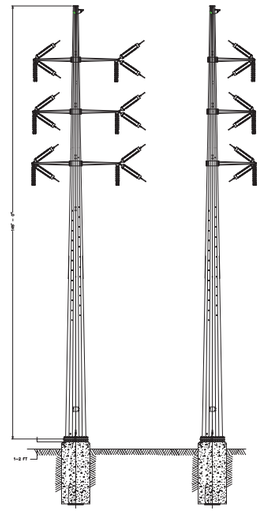
Single Circuit Dead End
Structures: B3–1, B3–2, B3–3
B4–1



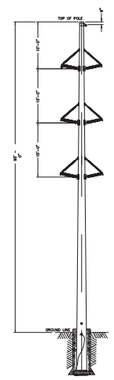
Double Circuit Dead End
Structures: B1–1



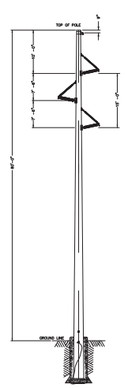
230 kV 60' A–Frame Dead End



Three Circuit Dead End
Structures: B2–1 & B2–2



Double Circuit Braced Post



Single Circuit Braced Post Delta

FIGURE 3.1-2
Typical Transmission Tower Design
Alamitos Energy Center
Long Beach, California

Source: Electric Power Engineers, 10/15/2013.

CH2MHILL

SECTION 4

Natural Gas Supply

Natural gas will be supplied to the Alamitos Energy Center (AEC) via the existing 30-inch-diameter pipeline that currently serves Units 5 and 6 of the Alamitos Generating Station (AGS). A separate pipeline serves AGS Units 1 through 4. No new offsite natural gas supply pipelines will be necessary for the project. The existing natural gas pipelines are owned and operated by Southern California Gas Company (SoCalGas). The pipelines operate at a nominal 165 pounds per square inch and enter the existing AGS parcel at two points: a pipeline runs parallel to the San Gabriel River to serve existing Units 5 and 6 at the northeast corner of the facility near the existing 230-kilovolt switchyard, and a second pipeline enters the site near the vehicle entrance along Studebaker Road to serve existing Units 1 through 4.

The AEC combustion turbine generators (CTG) will only combust natural gas. The total natural gas requirement during operation for the six CTGs at the fuel use ambient[6] condition is approximately 8,137 million British thermal units per hour higher heating value basis.

SoCalGas also owns and operates two existing onsite natural gas metering and valve stations. The existing SoCalGas metering stations will remain in service during AEC construction for continued operation of the existing AGS Units 1 through 6.

SoCalGas will construct a new gas metering station to support the AEC that will be located in the northeastern corner of the site as shown in Figure 2.1-2. The potential environmental impacts associated with the construction of the new SoCalGas gas metering station are considered and analyzed as part of this Application for Certification.

Construction activities related to the new metering station will likely include minor grading; installation of aboveground and belowground piping, gas metering equipment, gas conditioning facilities, pressure regulation systems; and provisions for pigging facilities that may be added at the discretion of SoCalGas. A distribution power line also will be installed to provide power for metering station operation lighting and communication equipment. A chain-link fence will be installed around the gas metering station for security.

Natural gas will flow from the new SoCalGas metering station to onsite AEC gas pressure-control stations and gas scrubber/filtering equipment to be located in the northeastern corner of the site. Before being supplied to the CTGs, the natural gas will be compressed, scrubbed, and filtered consistent with standard industry practices. A new natural gas pipeline will be routed between each compressor building and each unit. The existing pipeline will be decommissioned and remain in place. The natural gas for the AEC building heating systems will flow through the metering station and gas pressure control station, and will not require compression or filtering.

[6] Referenced to an ambient average temperature of 28 degrees Fahrenheit dry bulb.

SECTION 5

Environmental Information

This chapter contains 16 individual sections, each with a divider and tab heading. The sections represent the 16 environmental, public health and safety, and local impact assessment disciplines for which the California Energy Commission (CEC) Energy Facilities Siting Regulations (Title 20, California Code of Regulations, Section 1704, Appendix B) require information in an Application for Certification. The sections have a standardized format under the following headings:

- Affected Environment
- Environmental Analysis
- Cumulative Effects
- Mitigation Measures
- Laws, Ordinances, Regulations, and Standards (LORS)
- Agencies and Agency Contacts
- Permits and Permit Schedules

The Introduction briefly describes the subject matter and organization of each section. Affected Environment includes relevant background information about the project's environmental, social, and regulatory settings. Environmental Analysis analyzes the potential environmental consequences of the construction and operation of the Alamitos Energy Center. The section begins with a list of the criteria used to determine whether environmental effects of the project qualify as significant adverse environmental impacts. Cumulative Effects discusses potential effects of the project that are not significant adverse impacts, but that could reach significance cumulatively in combination with other projects. Mitigation Measures describes any mitigation measures necessary to reduce potential impacts below the level of significance. Laws, Ordinances, Regulations, and Standards discusses and lists the LORS that pertain to the project for a given discipline and includes a demonstration that the project, as designed, would comply with all applicable LORS. Agencies and Agency Contacts is a list of federal agencies with permitting authority over the project, and state and local regulatory agencies that would have such permitting authority, but for the exclusive purview of the CEC to license thermal power plants with a capacity of 50 megawatts or more in California. This section also contains a list of regulatory agency staff and their contact information. Permits and Permit Schedules lists applicable permits and their schedules.

5.1 Air Quality

This section describes and evaluates the potential air quality effects of the Alamitos Energy Center (AEC). Section 5.1.1 describes the project setting, and Section 5.1.2 provides an overview of the project related to air quality. Section 5.1.3 provides an overview of the existing air quality settings. Section 5.1.4 provides an overview of air quality standards. Section 5.1.5 presents information on the existing air quality in the region and in the general area of the project. Section 5.1.6 provides the project's environmental analysis related to air quality, the emission estimates for the facility, and the methodology used to determine the potential air quality impacts associated with construction, commissioning, and operation of the AEC. Section 5.1.7 evaluates potential cumulative effects to air quality, and Section 5.1.8 addresses proposed mitigation measures that would avoid or minimize any adverse impacts. Section 5.1.9 describes the laws, ordinances, regulations, and standards (LORS) that apply to the project, and Section 5.1.10 presents agencies and agencies' contacts. Section 5.1.11 identifies the permits and permit schedule related to air quality, and Section 5.1.12 contains the references used to prepare this section. Potential public health risks posed by emissions of toxic air contaminants (TAC), including ammonia, are addressed in Section 5.9, Public Health.

5.1.1 Setting

AES Alamitos Energy, LLC, will construct, own, and operate the AEC, a natural- gas-fired, air-cooled, combined-cycle and simple-cycle, electrical generating facility in Long Beach, California. The proposed AEC will have a nominal generating capacity of 1,040 megawatts (MW). The AEC will be constructed on the site of the existing AES Alamitos Generating Station (AGS), located on an approximately 21-acre site within a larger, 71.1-acre parcel.

The AEC will feature two gas turbine power blocks. Combined-cycle power block will consist of two natural-gas-fired combustion turbine generators (CTG) in a combined-cycle configuration, two unfired heat recovery steam generators (HRSG), one steam turbine generators, an air-cooled condenser, an auxiliary boiler, and related ancillary equipment. Simple-cycle power block will consist of four simple-cycle LMS-100 CTGs with fin-fan coolers and ancillary facilities.

The AEC will meet the demand for new generation in the Los Angeles basin local electrical reliability area. The demand is caused in large part by the closure of the San Onofre Nuclear Generating Station and the anticipated retirement of the older, natural-gas-fired generation currently using once-through ocean water-cooling (OTC). As a result of the promulgation of the California State Water Resources Control Board's (SWRCB) *Water Quality Control Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling* (SWRCB, 2010), more than 4,000 MW of OTC generation are expected to be retired in the Los Angeles local electrical reliability area by December 31, 2020.

The AEC will use water provided by the City of Long Beach Water Department (LBWD) for construction, operational process, and sanitary uses but at substantially lower volumes than the existing AGS historically has used. This water will be supplied through existing, onsite water lines. The AEC will include a new, 1,000-foot process/sanitary wastewater pipeline to the first point of interconnection with the existing LBWD sewer system, the potential upgrade of an additional 4,000 feet of existing pipeline downstream from the first point of interconnection, and the elimination of the current practice of treatment and discharge of process/sanitary wastewater to the San Gabriel River. Stormwater runoff from the power block areas will be directed to oil/water separators and to an existing retention basin and then ultimately discharged to the Los Cerritos channel via existing stormwater outfalls.

The AEC will interconnect to the existing, Southern California Edison (SCE) 230-kilovolt (kV) switchyard adjacent to the north side of the AGS. Natural gas will be supplied to the AEC via the existing, offsite, 30-inch-diameter pipeline owned and operated by Southern California Gas Company (SoCalGas) that currently serves Units 5 and 6 of the AGS. The AEC will require construction of new natural gas-metering facilities and construction of two new natural gas compressor buildings within the AEC footprint.

The AEC is designed to serve both peak and intermediate loads with the added capabilities of rapid startup, significant turndown capability (ability to turn down to a low load), and fast ramp rates. As California's intermittent renewable energy portfolio continues to grow, operating in either load-following or partial shutdown mode will become necessary to maintain electrical grid reliability, thus placing an increased importance upon the rapid startup, high turndown, steep ramp rate, and superior heat rate employed at the AEC.

As an in-basin generating asset, the AEC will provide local generating capacity, voltage support, and reactive power that are essential for transmission system reliability in the Western Los Angeles basin subarea and larger Los Angeles basin local reliability area. The AEC will be able to provide system stability by supplying reactive power, voltage support, frequency stability, and rotating mass in the heart of the critical Western Los Angeles local reliability area. By virtue of its location in a transmission constrained load center, the AEC also helps to avoid potential transmission line overloads and can provide reliable local energy supplies when electricity from more distant generating resources is unavailable. In recognition of its critical grid reliability benefits, the AEC combined-cycle CTGs were selected by SCE in its Local Capacity Requirements Request for Offer on November 5, 2014, and the simple-cycle CTGs will meet the capacity needs anticipated to be identified in future California Public Utilities Commission Long-term Procurement Plans.

Owing to the critical need for generating capacity at the AEC site at all times, existing Units 1 through 6 will remain in operation through much of the AEC development and construction. Given that the removal of existing Units 1 through 6 is not required for construction of the AEC, the continued operation of the AGS will not impede AEC construction. Demolition of the retired and decommissioned turbine peaking generating Unit 7 and fuel tank, ancillary equipment, small maintenance shops, and two retention basins will be required for site preparation for the construction of the AEC. Construction and site preparation activities at the AEC site are anticipated to last 56 months, from the first quarter of 2017 until the third quarter of 2021. The project will commence construction with the removal of former Unit 7's building and ancillary equipment, fuel storage tank, tank berms, small maintenance shops, and two wastewater retention basins in January 2017 to make room for construction and laydown area for the AEC CCGT. Construction of the AEC CCGT will commence during the second quarter of 2017 and will be completed by the second quarter of 2020. The AEC CCGT is expected to commence commercial operation before May 1, 2020. Construction of the AEC SCGT is scheduled to proceed from the second quarter of 2020 through the third quarter of 2021, and Power Block 2 is expected to commence commercial operation in the third quarter of 2021. A temporary construction access road may be constructed offsite beginning at the intersection of Studebaker Road and Loynes Drive traveling southeast to the AEC site. Construction of the AEC will require the use of onsite laydown areas (approximately 8 acres dispersed throughout the existing site) and an approximately 10-acre laydown area located adjacent to the existing site.

5.1.2 Project Overview as it Relates to Air Quality

The AEC CCGT will consist of two General Electric (GE) Frame 7FA.05 CTGs, one steam turbine generator, an air-cooled condenser, and an auxiliary boiler. Each CTG will be equipped with an unfired HRSG. The combined-cycle CTGs will use dry low oxides of nitrogen (NO_x) burners and selective catalytic reduction (SCR) to limit NO_x emissions to 2 parts per million by volume (ppmv). Emissions of carbon monoxide (CO) will be limited to 2 ppmv and volatile organic compounds (VOC) to 2 ppmv through the use of best combustion practices and the use of an oxidation catalyst. The auxiliary boiler will use SCR and flue gas recirculation to limit NO_x emissions to 5 ppmv and CO emissions to 50 ppmv. Best combustion practices and burning pipeline-quality natural gas will minimize emissions of the remaining pollutants from the combined-cycle CTGs and auxiliary boiler.

The AEC SCGT will consist of four GE LMS-100PB CTGs with intercooling supported by fin-fan coolers. The simple-cycle CTGs will use dry low NO_x burners and SCR to limit NO_x emissions to 2.5 ppmv. Emissions of CO will be limited to 4 ppmv and VOC to 2 ppmv through the use of best combustion practices and an oxidation

catalyst. Best combustion practices and the use of pipeline-quality natural gas will minimize emissions of the remaining pollutants.

The project's air quality and other related objectives and its ability to realize the project's benefits is also contingent on the use of the offset provisions contained in South Coast Air Quality Management District's (SCAQMD) Rule 1304(a)(2). Rules 1304 and 1304.1 allow the replacement of older, less-efficient electric utility steam boilers with specific new generation technologies on a MW-to-MW basis (that is, the replacement MW are equal to or less than the MW produced from the electric utility steam boilers).

5.1.3 Existing Site Conditions

The AEC will be constructed entirely within the 71-acre site of the existing AGS, an operating power plant in Long Beach, California. The AEC site is located at 690 N. Studebaker Road.

5.1.3.1 Geography and Topography

The existing AGS is located on a gently sloping coastal terrace above the Alamitos Bay marina, and the topography of the site ranges from approximately 7 to 20 feet above mean sea level. The nearest complex terrain (terrain exceeding stack height) in relation to the AEC is located in the city of Signal Hill, approximately 3.5 miles northwest of the AEC site. Although Signal Hill is the highest area within 6 miles of the AEC site, it is not a significant terrain feature, with gradual rising terrain less than 0.5 mile in width. The nearest Class I area is the San Gabriel Wilderness, which is approximately 33 miles (approximately 53 kilometers [km]) northeast of the AEC site.

5.1.3.2 Climate and Meteorology

The climate of the South Coast Air Basin (SCAB) is determined by its terrain and geographical location. The SCAB is a coastal plain with connecting broad valleys and low hills, bounded by the Pacific Ocean in the southwest quadrant with high mountains forming the remainder of the perimeter. The general region lies in the semi-permanent high-pressure zone of the eastern Pacific. As a result, the climate is mild, tempered by cool sea breezes. This usually mild climatological pattern is interrupted by periods of extremely hot weather, winter storms, or Santa Ana winds (SCAQMD, 1993).

The annual average temperature varies little throughout the 6,600-square-mile SCAB, averaging 62 degrees Fahrenheit (°F). However, with a less-pronounced oceanic influence, the eastern portion shows greater variability in annual minimum and maximum temperatures. Practically all of the annual rainfall in the SCAB falls during the November–April period. Summer rainfall normally is restricted to widely scattered thundershowers near the coast and slightly heavier shower activity in the east and over the mountains. Annual average rainfall varies from 9 inches in Riverside to 14 inches in downtown Los Angeles; however, higher amounts are measured at foothill locations. Monthly and yearly rainfall totals are extremely variable. Rainy days vary from 5 to 10 percent of all days in the SCAB, the frequency of such days being higher near the coast. Except for infrequent periods when dry, continental air is brought into the SCAB by offshore winds, the ocean effect is dominant. Periods with heavy fog are frequent, and low stratus clouds, sometimes referred to as "high fog," are a characteristic climate feature. Annual average relative humidity is 70 percent at the coast and 57 percent in the eastern part of the SCAB (SCAQMD, 1993).

Long-term average temperature and precipitation data have been collected from the Long Beach Daugherty Field surface climatological station near the AEC site. The data indicate that the normal daily maximum temperatures are relatively consistent throughout the year, with average daily maximum temperatures ranging from 67.0 to 83.9°F, and normal daily minimum temperatures ranging from 45.3 to 64.9°F (Western Regional Climatic Center [WRCC], 2015). The Long Beach location receives an average of 12 inches of rain annually (WRCC, 2015).

Atmospheric stability and mixing heights are important parameters in the determination of pollutant dispersion. Atmospheric stability reflects the amount of atmospheric turbulence and mixing. In general, the less stable an atmosphere, the greater the turbulence, which results in more mixing and better dispersion. The mixing height, measured from the ground upward, is the height of the atmospheric layer in which

convection and mechanical turbulence promote mixing. Good ventilation results from a high mixing height and at least moderate wind speeds within the mixing layer.

With very light average wind speeds, the SCAB's atmosphere has a limited capability to disperse air contaminants horizontally. Downtown Los Angeles wind speeds average 5.7 miles per hour with little seasonal variation. Summer wind speeds average slightly higher than winter wind speeds. Inland areas record slightly lower wind speeds than downtown Los Angeles, while coastal wind speeds average about 2 miles per hour higher than downtown Los Angeles. The dominant daily wind pattern is a daytime sea breeze and a nighttime land breeze. This regime is broken only by occasional winter storms and infrequent strong northeasterly Santa Ana flows from the mountains and deserts north of the SCAB (SCAQMD, 1993).

Along the southern California coast, surface air temperatures are relatively cool. The resultant shallow layer of cool air at the surface, coupled with warm, dry, subsiding air from aloft, produces early morning inversions on approximately 87 percent of the days of the year. The SCAB-wide average occurrence of inversions at the ground surface is 11 days per month; the averages vary from 2 days in June to 22 days in December and January. Higher inversions, but less than 2,500 feet above sea level, occur 22 days each month—occurring on an average of 25 days in June and July to 4 days in December and January. Restricted maximum mixing heights, 3,500 feet above sea level or less, average 191 days each year. The potential for high concentrations varies seasonally for many contaminants. During late spring, summer, and early fall, light winds, low mixing heights, and brilliant sunshine combine to produce conditions favorable for the maximum production of photochemical oxidants, mainly ozone. During the spring and summer, when fairly deep marine layers are frequently found in the SCAB, sulfate concentrations are at their peak (SCAQMD, 1993).

5.1.4 Overview of Air Quality Standards

The U.S. Environmental Protection Agency (EPA) has established National Ambient Air Quality Standards (NAAQS) for the following seven pollutants, termed criteria pollutants: ozone, nitrogen dioxide (NO_2), CO, sulfur dioxide (SO_2), particulate matter with aerodynamic diameter less than or equal to 10 microns (PM_{10}), particulate matter with aerodynamic diameter less than or equal to 2.5 microns ($PM_{2.5}$), and airborne lead. The federal Clean Air Act (CAA) requires the EPA to designate areas (counties) as attainment or nonattainment with respect to each criteria pollutant, depending on whether the areas meet the NAAQS. An area that is designated nonattainment means the area is not meeting the NAAQS and is subject to planning requirements to attain the standard.

In addition to the seven pollutants listed above, the California Air Resources Board (ARB) has established state standards for visibility-reducing particles, sulfates, hydrogen sulfide (H_2S), and vinyl chloride. Similar to EPA, ARB designates counties in California as attainment or nonattainment with respect to the California Ambient Air Quality Standards (CAAQS). The state standards were designed to protect the most sensitive members of the population, such as children, the elderly, and people who suffer from lung or heart diseases.

Both state and federal ambient air quality standards are based on two variables: maximum concentration and an averaging time over which the concentration would be measured. Maximum concentrations were based on levels that may have an adverse effect on human health. The averaging times were based on whether the damage caused by the pollutant would occur during exposures to a high concentration for a short time (for example, 1 hour), or during exposures to a relatively lower average concentration over a longer period (8 hours, 24 hours, or 1 month). For some pollutants, there is more than one air quality standard, reflecting both short- and long-term effects. Table 5.1-1 presents the NAAQS and CAAQS.

TABLE 5.1-1

Ambient Air Quality Standards

Pollutant	Averaging Time	California	National
Ozone	1-hour	0.09 ppm (180 µg/m³)	—
	8 hour	0.070 ppm (137 µg/m³)	0.070 ppm (137 µg/m³)
CO	1-hour	20 ppm (23 mg/m³)	35 ppm (40 mg/m³)
	8-hour	9.0 ppm (10 mg/m³)	9 ppm (10 mg/m³)
NO_2	1-hour	0.18 ppm (339 µg/m³)	100 ppb (188 µg/m³) [a]
	Annual Arithmetic Mean	0.030 ppm (57 µg/m³)	0.053 ppm (100 µg/m³)
SO_2 [b]	1-hour	0.25 ppm (655 µg/m³)	75 ppb (196 µg/m³)
	3-hour (Secondary Standard)	—	0.5 ppm (1,300 µg/m³)
	24-hour	0.04 ppm (105 µg/m³)	—
PM_{10}	24-hour	50 µg/m³	150 µg/m³
	Annual Arithmetic Mean	20 µg/m³	—
$PM_{2.5}$	24-hour	—	35 µg/m³ [c]
	Annual Arithmetic Mean	12 µg/m³	12 µg/m³ [d]
Sulfates	24-hour	25 µg/m³	—
Lead	30-day Average	1.5 µg/m³	—
	Calendar Quarter	—	1.5 µg/m³
H_2S	1-hour	0.03 ppm (42 µg/m³)	—
Vinyl Chloride	24-hour	0.01 ppm (26 µg/m³)	—
Visibility-reducing Particles	8-hour (10 a.m. to 6 p.m. PST)	In sufficient amount to produce an extinction coefficient of 0.23 per km due to particles when the relative humidity is less than 70 percent	—

[a] To attain this standard, the 3-year average of the 98th percentile of the 1-hour daily maximum concentrations at each monitor within an area must not exceed 100 ppb.

[b] On June 2, 2010, EPA established a new 1-hour SO_2 standard, effective August 23, 2010, which is based on the 3-year average of the annual 99th percentile of 1-hour daily maximum concentrations. The EPA also revoked both the 24-hour SO_2 standard of 0.14 ppm and the annual primary SO_2 standard of 0.030 ppm, effective August 23, 2010. The secondary SO_2 standard was not revised at that time; however, the secondary standard is undergoing a separate review by EPA.

[c] The 24-hour standard is attained when 98 percent of the daily concentrations, averaged over 3 years, are equal to or less than the standard.

[d] 3-year average of the weighted annual mean concentrations.

Notes:

mg/m³ = milligram(s) per cubic meter
µg/m³ = microgram(s) per cubic meter
ppb = part(s) per billion
ppm = part(s) per million
PST = Pacific Standard Time

Source: ARB, 2015a

5.1.5 Existing Air Quality

The federal CAA requires EPA to classify areas in the country as attainment or nonattainment with respect to each criteria pollutant, depending on whether areas meet the NAAQS. In addition, ARB makes area designations within California for CAAQS. The attainment statuses for the NAAQS and CAAQS are listed in Table 5.1-2.

TABLE 5.1-2

State and Federal Air Quality Designations for Los Angeles County (SCAB), California

Pollutant	State Designation	Federal Designation
Ozone	1-hour: Nonattainment (Extreme) 8-hour: Nonattainment	1-hour: N/A 8-hour: Nonattainment (Extreme)
CO	1-hour: Attainment 8-hour: Attainment	1-hour: Attainment 8-hour: Attainment
NO_2	1-hour: Attainment Annual: Attainment	1-hour: Attainment Annual: Attainment
SO_2	1-hour: Attainment 24-hour: Attainment	1-hour: Attainment 24-hour: N/A
PM_{10}	24-hour: Nonattainment Annual: Nonattainment	24-hour: Attainment[a] Annual: N/A
$PM_{2.5}$	24-hour: N/A Annual: Nonattainment	24-hour: Nonattainment Annual: Nonattainment
Lead	Attainment	Nonattainment
H_2S, Sulfates	Unclassified, Attainment	N/A, N/A

[a] Effective July 26, 2013, Los Angeles County was reclassified by the EPA from nonattainment to attainment for PM_{10} (78 Federal Register 38223; EPA-R09-OAR-2013-0007-0021).

Notes:

N/A = Not applicable (i.e., no standard)

Sources: ARB, 2015b; EPA, 2015a

According to Appendix B (g)(8)(G) of the California Energy Commission (CEC) data adequacy checklist, the ambient concentrations of all criteria pollutants for the previous 3 years as measured at the three ARB-certified monitoring stations closest to the project site, along with an analysis of whether these data are representative of conditions at the project site, is required. The applicant may also substitute an explanation regarding why information from one, two, or all stations is either not available or unnecessary. Table 5.1-3 lists the pollutants monitored at each of the monitoring stations used for the AEC's air quality analyses. A discussion of the representativeness of each station is included in Section 5.1.6.3.

Several monitoring stations are located near the AEC site, including monitoring stations in the cities of Long Beach, Anaheim, and Compton. The three closest ARB-certified monitoring stations relative to the AEC site with three or more years of data available are located approximately 4.6 miles northwest of the AEC site in South Long Beach (South Coastal Los Angeles County 2), 6.4 miles northwest of the AEC site in North Long Beach (South Coastal Los Angeles County 1), and 7.2 miles to the northwest of the AEC site in (Hudson) Long Beach (South Coastal Los Angeles County 3, EPA ID 06-037-4006). Other ARB-certified monitoring stations identified near the AEC site include the Central Orange County monitoring station in Anaheim and the South Central Los Angeles County monitoring station in Compton. However, these monitoring stations are farther from the AEC site and less representative than the three other monitoring stations identified. Therefore, these monitoring stations were not evaluated as part of the air quality analysis and will not be discussed in any more detail.

The ambient air quality data are based on data published by ARB (ADAM Web site), SCAQMD (SCAQMD Web site), and EPA (AIRS Web site). The SCAQMD data summaries were used as the primary source of data, and the ARB and EPA database summaries were used when data were unavailable on the SCAQMD Web site. The modeled concentrations will be combined with the respective background concentrations presented in Table 5.1-27 and used for comparison to the NAAQS and CAAQS.

TABLE 5.1-3

Summary of the Nearest Monitoring Stations and the Pollutants at Each Station

Monitoring Location	Ozone	NO_2	CO	SO_2	PM_{10}	$PM_{2.5}$
South Coastal Los Angeles County 1 (North Long Beach)	Yes	Yes	Yes	Yes	Yes	Yes
South Coastal Los Angeles County 2 (South Long Beach)	N/A	N/A	N/A	N/A	Yes	Yes
South Coastal Los Angeles County 3, EPA ID 06-037-4006 (Long Beach) [a]	Yes	Yes	Yes	Yes	N/A	N/A

[a] Station, referred to as the Hudson site by the SCAQMD, was commissioned in 2010 and, at the request of the SCAQMD, is used to represent hourly NO_2 background because EPA Region 9 believes that it captures the large NO_x sources in the Ports area that are upwind of the project site.

Notes:

Yes = Pollutant was monitored at this location
N/A = Not applicable (i.e., pollutant was not monitored at this location)

5.1.5.1 Nitrogen Dioxide

NO_2 is a byproduct of combustion sources such as on-road and off-road motor vehicles or stationary fuel-combustion sources. The principle form of nitrogen oxide produced by combustion is nitric oxide (NO); however, NO reacts quickly with oxygen to form NO_2, creating a mixture of NO and NO_2 commonly called NO_x (SCAQMD, 1993). Exposures to NO_2, along with pollutants from vehicle exhaust, are associated with respiratory symptoms, episodes of respiratory illness, and impaired lung function (ARB, 2015c). The SCAB is currently designated attainment status for NO_2 by both EPA and ARB.

As shown in Table 5.1-4, the 1-hour (max and 98th percentile) and annual NO_2 concentrations measured at the North Long Beach and Hudson Long Beach stations have not exceeded either the state or federal standards for the five most recent years of data.

TABLE 5.1-4

Background NO_2 Concentrations (µg/m³)

Station	Averaging Time	CAAQS/NAAQS	2009	2010	2011	2012	2013
South Coastal Los Angeles County 1 (North Long Beach	1-hour (Max) 1-hour (98th Percentile) Annual[a]	339/— —/188 57/100	209 132 39.9	175 132 37.3	200 127 33.3	145 118 INC	126 105 INC
South Coastal Los Angeles County 3, EPA ID 06-037-4006 (Hudson Long Beach)	1-hour (Max) 1-hour (98th Percentile) Annual[a]	339/— —/188 57/100	NM NM NM	222 134 41.4	169 139 39.9	170 146 INC	153 134 INC

[a] Annual Arithmetic Mean

Notes:

INC = Incomplete (i.e., data were collected but did not meet the completeness criteria)
NM = Pollutant was not measured at this station during this year

Sources: SCAQMD, 2015b; ARB, 2015d; and EPA, 2015b

5.1.5.2 Ozone

Ozone is a photochemical oxidant that is formed when VOC and NO_x react in the presence of ultraviolet sunlight. The principal sources of NO_x and VOC, often termed ozone precursors, are combustion processes (including motor vehicle engines) and evaporation of solvents, paints, and fuels.

Exposure to levels of ozone above the current ambient air quality standards can lead to human health effects such as lung inflammation, lung tissue damage, and impaired lung functioning. Ozone exposure is also associated with symptoms such as coughing, chest tightness, shortness of breath, and the worsening of

asthma symptoms. The greatest risk for harmful health effects belongs to outdoor workers, athletes, children, and others who spend greater amounts of time outdoors during smoggy periods. Elevated ozone levels can reduce crop and timber yields, as well as damage native plants. Ozone can also damage materials such as rubber, fabrics, and plastics (ARB, 2015c). The SCAB is designated as a nonattainment area for ozone by both EPA and ARB.

As shown in Table 5.1-5, the current state regulatory 1-hour ozone concentration standards were exceeded in 2010 at both stations. Similarly, the measured 8-hour ozone concentrations exceeded the federal and state standards at both stations in 2010. The measured 1-hour and 8-hour ozone concentrations were below the federal and state standards in 2009, 2011, 2012, and 2013.

TABLE 5.1-5

Background Ozone Concentrations (µg/m³)

Station	Averaging Time	CAAQS/NAAQS	2009	2010	2011	2012	2013
South Coastal Los Angeles County 1 (North Long Beach)	1-hour	180/—	175	198	143	165	INC
	8-hour	137/137	133	165	120	132	INC
South Coastal Los Angeles County 3, EPA ID 06-037-4006 (Hudson Long Beach)	1-hour	180/—	NM	194	145	157	177
	8-hour	137/137	NM	165	124	130	136

Notes:

INC = Incomplete (i.e., data were collected but did not meet the completeness criteria)

NM = Pollutant was not measured at this station during this year

Sources: SCAQMD, 2015b; ARB, 2015d; and EPA, 2015b

5.1.5.3 Sulfur Dioxide

SO_2 is a colorless, pungent gas formed primarily by the combustion of sulfur-containing fossil fuels. Effects from SO_2 exposures at levels near the 1-hour standard include broncho-constriction accompanied by symptoms that may include wheezing, shortness of breath, and chest tightness, especially during exercise or physical activity (ARB, 2015c). The SCAB is designated as attainment for SO_2 by both EPA and ARB.

As shown in Table 5.1-6, the 1-hour (max and 99th percentile) and 24-hour SO_2 concentrations measured at the North Long Beach and Hudson Long Beach monitoring stations have not exceeded state or federal standards in the five most recent years of data.

TABLE 5.1-6

Background SO_2 Concentrations (µg/m³)

Station	Averaging Time	CAAQS/NAAQS	2009	2010	2011	2012	2013
South Coastal Los Angeles County 1 (North Long Beach)	1-hour (Max)	655/—	52.4	105	38.8	INC	INC
	1-hour (99th Percentile)	—/196	31.4	41.9	28.0	INC	INC
	24-hour	105/—	13.1	15.7	10.5	INC	INC
South Coastal Los Angeles County 3, EPA ID 06-037-4006 (Hudson Long Beach)	1-hour (Max)	655/—	NM	94.2	113	59.4	39.5
	1-hour (99th Percentile)	—/196	NM	41.9	64.7	55.8	30.4
	24-hour	105/—	NM	10.5	31.4	10.5	10.5

Notes:

EPA Secondary Standard.

INC = Incomplete (i.e., data were collected but did not meet the completeness criteria)

NM = Pollutant was not measured at this station during this year

Sources: SCAQMD, 2015b; ARB, 2015d; and EPA, 2015b

5.1.5.4 Carbon Monoxide

CO is a colorless, odorless gas formed by incomplete combustion of fossil fuels. Exposure to CO near the levels of the NAAQS and CAAQS can lead to fatigue, headaches, confusion, and dizziness (ARB, 2015c). The SCAB is designated as attainment for the CO standards by both EPA and ARB.

As shown in Table 5.1-7, the 1-hour and 8-hour CO concentrations measured at the North Long Beach and Hudson Long Beach monitoring stations have not exceeded either the state or federal standards in the past 5 years.

TABLE 5.1-7
Background CO Concentrations (µg/m³)

Station	Averaging Time	CAAQS/NAAQS	2009	2010	2011	2012	2013
South Coastal Los Angeles County 1 (North Long Beach)	1-hour	23,000/40,000	3,437	3,437	3,666	2,979	INC
	8-hour	10,000/10,000	2,520	2,406	2,979	2,520	INC
South Coastal Los Angeles County 3, EPA ID 06-037-4006 (Hudson Long Beach)	1-hour	23,000/40,000	NM	4,695	4,237	4,810	4,695
	8-hour	10,000/10,000	NM	2,978	3,779	2,978	2,978

Notes:

INC = Incomplete (i.e., data were collected but did not meet the completeness criteria)

NM = Pollutant was not measured at this station during this year

Sources: SCAQMD, 2015b; ARB, 2015d; and EPA, 2015b

5.1.5.5 Fine Particulates (PM_{10} and $PM_{2.5}$)

Fine particulate matter (PM_{10} and $PM_{2.5}$) includes a wide range of solid or liquid particles, including smoke, dust, aerosols, and metallic oxides. Extensive research indicates that exposures to ambient PM_{10} and $PM_{2.5}$ concentrations that exceed current air quality standards are associated with increased risk of hospitalization for lung- and heart-related respiratory illness, including emergency room visits for asthma. Particulate matter (PM) exposure is also associated with increased risk of premature death, especially in the elderly and people with pre-existing cardiopulmonary disease. In children, studies have shown associations between PM exposure and reduced lung function and increased respiratory symptoms and illnesses (ARB, 2015c). The SCAB is designated as attainment and nonattainment by EPA for PM_{10} and $PM_{2.5}$ standards, respectively, and nonattainment by ARB for both PM_{10} and $PM_{2.5}$ standards.

As shown in Table 5.1-8, PM_{10} concentrations measured at the North Long Beach and South Long Beach monitoring stations did not exceed the 24-hour PM_{10} NAAQS in the past 5 years. The 24-hour PM_{10} CAAQS was not exceeded during the past 5 years at the North Long Beach monitoring station. The 24-hour PM_{10} CAAQS was exceeded at the South Long Beach monitoring station for four of the five years. The annual PM_{10} CAAQS has been exceeded each year at both monitoring stations in the past 5 years.

TABLE 5.1-8
Background PM_{10} Concentrations (µg/m³)

Station	Averaging Time	CAAQS/NAAQS	2009	2010	2011	2012	2013
South Coastal Los Angeles County 1 (North Long Beach)	24-hour	50/150	38.9	44.0	43.0	45.0	37.0
	Annual[a]	20/—	29.1	22.0	24.2	23.3	23.2
South Coastal Los Angeles County 2 (South Long Beach)	24-hour	50/150	83.0	76.0	50.0	54.0	54.0
	Annual[a]	20/—	33.2	27.3	28.7	25.5	27.3

TABLE 5.1-8

Background PM_{10} Concentrations ($\mu g/m^3$)

Station	Averaging Time	CAAQS/NAAQS	2009	2010	2011	2012	2013

[a] Annual Arithmetic Mean

Sources: SCAQMD, 2015b; ARB, 2015d; and EPA, 2015b

As shown in Table 5.1-9, the 24-hour (98th percentile) and annual $PM_{2.5}$ concentrations measured at the North Long Beach and South Long Beach monitoring stations have not exceeded either the state or federal standards in the past 4 years. In 2009, annual concentrations measured at both stations exceeded the state and federal annual standard and the 24-hour $PM_{2.5}$ (98th percentile) NAAQS at the North Long Beach monitoring station.

TABLE 5.1-9

Background $PM_{2.5}$ Concentrations ($\mu g/m^3$)

Station	Averaging Time	CAAQS/NAAQS	2009	2010	2011	2012	2013
South Coastal Los Angeles County 1 (North Long Beach)	24-hour (98th Percentile)	—/35	38.9	28.3	27.8	26.4	26.1
	Annual[a]	12/12	14.2	10.5	11.0	10.4	11.3
South Coastal Los Angeles County 2 (South Long Beach)	24-hour (98th Percentile)	—/35	30.5	26.5	26.6	25.1	24.6
	Annual[a]	12/12	12.5	10.4	10.7	10.6	11.0

[a] Annual Arithmetic Mean

Sources: SCAQMD, 2015b; ARB, 2015d; and EPA, 2015b

5.1.5.6 Greenhouse Gases

ARB has promulgated new laws to address the potential effects of increasing atmospheric concentrations of carbon dioxide (CO_2) and other greenhouse gases (GHG). On September 20, 2006, California signed into law the California Global Warming Solutions Act of 2006 (Assembly Bill [AB] 32, codified at Section 1, Division 25.5, Section 38500 et seq. of the California Health & Safety Code). This law requires ARB to design and implement emission limits, regulations, and other measures, such that statewide GHG emissions are reduced in a technologically feasible and cost-effective manner to 1990 levels by 2020 (representing a 25 percent reduction), and are further reduced by 2050 (an 80 percent reduction over 1990 levels).

AB 32 does not amend or preempt other environmental laws, such as the Warren-Alquist Act or the California Environmental Quality Act (CEQA). Instead, it provides for creation of a GHG emissions program that will involve identification of covered sources, prioritization of covered sources by sector for regulation based on significance of source contribution to GHG emissions, and, eventually, regulation of but a few *de minimis*, exempted sources. ARB has selected, created, and begun implementation of the California Cap-And-Trade Program to further the purposes of AB 32.

GHGs include the following pollutants:

- CO_2 is a naturally occurring gas, as well as a by-product of burning fossil fuels and biomass, land-use changes, and other industrial processes. It is the principal anthropogenic GHG that affects the Earth's radiative balance.
- Methane (CH_4) is a GHG with a global warming potential (GWP) most recently estimated at 25 times that of CO_2. GWP is a measure of how much a given mass of GHG is estimated to contribute to global warming and is a relative scale that compares the mass of one GHG to that same mass of CO_2. CH_4 is produced through anaerobic (without oxygen [O_2]) decomposition of waste in landfills, animal digestion,

decomposition of animal wastes, production and distribution of natural gas and petroleum, coal production, and incomplete fossil fuel combustion.

- Nitrous oxide (N_2O) is a GHG with a GWP most recently estimated at 298 times that of CO_2. Major sources of N_2O include soil cultivation practices, especially the use of commercial and organic fertilizers, fossil fuel combustion, nitric acid production, and biomass burning.
- Hydrofluorocarbons (HFCs) are compounds containing only hydrogen, fluorine, chlorine, and carbon. HFCs have been introduced as a replacement for the chlorofluorocarbons identified as ozone-depleting substances.
- Perfluorocarbons (PFCs) are compounds containing only fluorine and carbon. Similar to HFCs, PFCs have been introduced as a replacement for chlorofluorocarbons. PFCs are also used in manufacturing and are emitted as by-products of industrial processes. PFCs are powerful GHGs.
- Sulfur hexafluoride (SF_6) is a colorless gas soluble in alcohol and ether, and is slightly soluble in water. It is a very powerful GHG used primarily in electrical transmission and distribution systems, as well as dielectrics in electronics.

Emissions of HFCs, PFCs, or SF_6 are not expected to be significant for the AEC relative to the other GHGs. Therefore, the project impact assessment is focused on the impacts from emissions of CO_2, CH_4, and N_2O.

5.1.6 Environmental Analysis

This section describes the analysis conducted to assess the ambient air quality impacts from the AEC and to demonstrate compliance with the local, state, and federal air quality requirements for criteria pollutants. Emission estimates are presented for construction, commissioning, and operation. Dispersion model selection and setup are also described (emissions scenarios and release parameters, building wake effects, meteorological data, and receptor locations). Results are presented for the dispersion modeling analysis and are compared to the applicable local, state, and federal air quality regulations.

5.1.6.1 Criteria Pollutant and Greenhouse Gas Emission Estimates

Criteria pollutant emission rates were calculated for three components of the project: construction of the new electrical generating components, commissioning activities, and operation. Hourly, daily, and annual criteria pollutant emissions were calculated based on a 56-month construction schedule, 4,612 hours of operation, including 500 startups and shutdowns, per combined-cycle turbine per year, and 2,358 hours of operation, including 500 startups and shutdowns, per simple-cycle turbine per year. Operational emissions from an auxiliary boiler and oil-water separator system were also incorporated, as appropriate. The criteria pollutants evaluated include NO_x, SO_2, VOC, CO, PM_{10}, and $PM_{2.5}$.

Construction Emissions. Onsite construction activities will consist of the installation of the AEC CCGT and AEC SCGT. The AEC CCGT will consist of two GE Frame 7FA.05 natural-gas-fired combustion turbines, one steam turbine, and an air-cooled condenser. The AEC SCGT will consist of four GE LMS-100 natural-gas-fired combustion turbines and four closed-loop cooling fin-fan coolers. The AEC will reuse existing onsite water, natural gas, and stormwater pipelines as well as electrical transmission facilities to the maximum extent possible; however, some modification and interconnection of the AEC facility into these systems may be required. Additionally, the AEC will include a new 1,000-foot process/sanitary wastewater pipeline and the potential upgrade of an additional 4,000 feet of existing process/sanitary wastewater pipeline.

Construction and site preparation activities at the project site are anticipated to last 56 months, from the first quarter of 2017 until the third quarter of 2021. The project will commence construction with the removal of former Unit 7's building and ancillary equipment, fuel storage tank, tank berms, small maintenance shops, and two wastewater retention basins in January 2017 to make room for construction and laydown area for the AEC CCGT. Construction of the AEC CCGT will commence during the second quarter of 2017 and will be completed by the second quarter of 2020. The AEC CCGT is expected to commence commercial operation before May 1, 2020. The construction of AEC SCGT is scheduled to

commence in the second quarter of 2020 through the third quarter of 2021 and is expected to commence commercial operation in the third quarter of 2021. A temporary construction access road may be constructed offsite beginning at the intersection of Studebaker Road and Loynes Drive traveling southeast to the AEC site. Construction of the AEC will require the use of onsite laydown areas (approximately 8 acres dispersed throughout the existing site) and an approximately 10-acre laydown area located adjacent to the existing site.

Onsite and offsite project emissions from construction have been divided into two categories: (1) vehicle and construction equipment exhaust; and (2) fugitive dust from vehicle and construction equipment, including grading, bulldozing, and truck loading/dumping during AEC construction.

The following criteria pollutant emissions have been calculated: NO_x, SO_2, VOC, CO, PM_{10}, and $PM_{2.5}$. Fugitive dust and construction equipment exhaust emissions have been estimated using methodology and emission factors consistent with the California Emissions Estimator Model (CalEEMod; Version 2013.2.2), which incorporates OFFROAD20011 and portions of the EPA's *AP-42* (ENVIRON, 2013; EPA, 2006; SCAQMD, et. al., 2011). It was assumed that construction equipment would meet the Tier 4 final engine control standards. Vehicle exhaust emissions for travel on both paved and unpaved roads were estimated using EMFAC2014 (Version 1.0.1) emission factors, as consistent with the CalEEMod methodology.[7] As appropriate, fugitive dust emissions would be mitigated by watering; the control efficiency for each mitigation measure applied was determined per the SCAQMD's *CEQA Air Quality Handbook* (SCAQMD, 2007). It is not expected that large stockpiles of earthen materials would be present during AEC construction; therefore, wind-blown fugitive dust emissions from earthen stockpiles were assumed to be negligible.

Maximum daily and annual emissions were estimated based on the number and type of construction equipment, the number of heavy-duty trucks, and the workforce projected for each month of construction. It was conservatively assumed that the construction activities would occur 10 hours per day, 23 days per month. The maximum daily emissions occur during month 13 for VOC, NO_x, and CO; during month 15 for PM_{10} and $PM_{2.5}$; and during month 12 for SO_2. The maximum annual construction emissions vary for all pollutants, occurring between months 9 and 20 for VOC for $PM_{2.5}$; between months 10 and 21 for PM_{10}; between months 8 and 19 for NO_x and SO_2; and between months 11 and 22 for CO.[8]

The maximum daily and annual emissions from the combined onsite and offsite construction activities are presented in Table 5.1-10. The detailed emission calculations for construction are provided in Appendix 5.1A. Note that the daily and annual maximum NO_x emissions provided below are less than, but of the same order of magnitude as, the AEC construction emissions presented in the AEC Application for Certification (December 2013).

TABLE 5.1-10

Maximum Daily and Annual Emissions from Construction[a]

Construction Emissions	NO_x	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Maximum Daily Emissions (lb/day)	142	113	7.16	0.61	23.4	7.90
Maximum Annual Emissions (tpy)	15.2	14.9	0.82	0.069	2.73	0.91

[a] Maximum daily and annual emissions include contributions from onsite construction equipment, onsite vehicles, and offsite vehicles. The PM_{10} and $PM_{2.5}$ emissions include exhaust and fugitive dust emissions.

[7] CalEEMod is a statewide computer model created by ENVIRON and SCAQMD to quantify criteria pollutant and GHG emissions associated with the construction activities from a variety of land use projects (ENVIRON, 2013). Developed in cooperation with air districts throughout the state, CalEEMod is intended to standardize air quality analyses while allowing air districts to provide specific defaults reflecting regional conditions, regulations, and policies (SCAQMD, et. al., 2011).

[8] Construction of the AEC CCGT occurs during months 1 through 34. These activities contribute to the maximum daily and annual construction emissions.

TABLE 5.1-10

Maximum Daily and Annual Emissions from Construction[a]

Construction Emissions	NO_x	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$

Notes:

lb/day = pound(s) per day
tpy = ton(s) per year

The maximum annual GHG emissions from construction activities are presented in Table 5.1-11. Construction equipment GHG emissions have been estimated using emission factors from The Climate Registry (TCR) (TCR, 2015), and fuel consumption rates from OFFROAD2011. Vehicle emissions (from vehicles used in commuting and from trucks) have been estimated using TCR emission factors (TCR, 2015) and fuel economy values from the EMFAC2014 Web Tool Database, based on EMFAC2007 vehicle categories.[9] No significant emissions of HFCs, PFCs, or SF_6 are expected during construction.

SCAQMD staff has recommended a GHG significance threshold that would apply to stationary source/industrial projects and would include direct and indirect emissions during construction and operation. Following the Tier 3 screening level approach, construction emissions would be amortized over the life of the project (assumed as 30 years) and would be added to the operational emissions for comparison to the significance threshold of 10,000 metric tons (MT) of carbon dioxide equivalent (CO_2e).[10] Because the GHG potential to emit (PTE) emissions from AEC operation are expected to exceed 1,000,000 MT of CO_2e, the project would exceed the 10,000 MT of CO_2e limit. However, the AEC has been designed to incorporate energy-efficient technologies for reducing GHG PTE emissions from the power generation equipment; additionally, SCAQMD will define the BACT for reducing GHG emissions as part of the Prevention of Significant Deterioration (PSD) permitting process. Therefore, for purposes of evaluating the potential GHG impacts associated with AEC construction activities, the construction GHG emissions in Table 5.1-11 were compared to the 10,000 MT of CO_2e threshold. Based on this comparison, the annual GHG emissions from construction activities before amortization would be significantly less than 10,000 MT of CO_2e. As a result, it is concluded that the GHG emissions from construction activities are less than significant.

Estimated total fuel use during construction would be 1,016,406 gallons of diesel and 279,954 gallons of gasoline. Construction equipment fuel consumption rates were obtained from the OFFROAD2011 model. Vehicle fuel economies were estimated using the EMFAC2014 Web Tool Database, based on EMFAC2007 vehicle categories. Detailed GHG emission and fuel use calculations are included in Appendix 5.1A.

TABLE 5.1-11

Maximum Annual Greenhouse Gas Emissions Estimates for AEC Construction Activities

GHG Emissions	CO_2	CH_4	N_2O	CO_2 Equivalent[a]
Total (MT/yr)	6,591	0.13	0.057	6,611

[a] CO_2e assumes a GWP of 25 for CH_4 and 298 for N_2O (TCR, 2015).

Note:

MT/yr = metric ton(s) per year

Commissioning Emissions. During commissioning, each turbine will be initially operated at various load rates without the benefit of the emission control systems while these systems are being commissioned and

[9] The database is available online at http://www.arb.ca.gov/emfac/2014/.

[10] Information on thresholds is available online at http://www.aqmd.gov/home/regulations/ceqa/air-quality-analysis-handbook/ghg-significance-thresholds.

tested. The emission estimates are based on the estimated duration of each commissioning event, emission control efficiencies expected for each event, and turbine operating rates. The commissioning phase for each turbine type is described in more detail below.

Combined-cycle Turbines. The total duration of the AEC CCGT commissioning period is expected to be up to 1,992 hours (996 hours per turbine). During the commissioning period, each GE 7FA.05 will be operated for up to 216 hours without emission control systems in operation. The maximum hourly and event commissioning emission rates for the GE 7FA.05s are presented in Table 5.1-12. Because commissioning is expected to be completed within 1,992 hours (for both turbines), annual impacts for the combined commissioning and operation of the AEC CCGT were also evaluated since annual emissions during the commissioning year could be higher than those during a noncommissioning year. Therefore, the annual average emission rates associated with commissioning and operation of the GE 7FA.05s are also presented in Table 5.1-12. Detailed calculations are provided in Appendix 5.1B.

TABLE 5.1-12

GE 7FA.05 Turbine Commissioning Emission Rates

Commissioning Emissions	VOC	CO	NO_X	SO_2	PM_{10}	$PM_{2.5}$
Short-Term Emission Rates						
Maximum Hourly, lb/hr (per turbine) [a]	270	1,900	130	4.86	8.50	8.50
Total Commissioning Period, tons (per 2x1 block) [b]	14.7	101	27.6	4.84	8.47	8.47
Annual Emission Rates						
Annual Average Hourly, lb/hr (per turbine) [c]	N/A	N/A	12.3	N/A	5.44	5.44
Total Commissioning/Operation Period, tons (per 2x1 block) [d]	N/A	N/A	108	N/A	47.7	47.7

[a] SO_2, PM_{10}, and $PM_{2.5}$ emissions are not emitted in amounts greater than normal operating rates.

[b] Total commissioning period SO_2, PM_{10}, and $PM_{2.5}$ emissions are based on the maximum emission rates at 28°F (see Appendix 5.1B) multiplied by the total number of commissioning hours.

[c] Annual average hourly emissions for evaluating annual impacts are based on the sum of total commissioning emissions and annual operation emissions per turbine, divided by 8,760.

[d] Total commissioning/operation period emissions are based on the total commissioning period emissions presented here and the annual average operation emission rates at 65.3°F and 100 percent load (see Appendix 5.1B).

Note:

N/A = Not applicable (i.e., no annual average ambient air quality standard exists for these pollutants; therefore, annual average emissions were not modeled)

Simple-Cycle Turbines. The total duration of the AEC SCGT commissioning period is expected to be up to 1,120 hours (280 hours per turbine). During the commissioning period, each GE LMS-100 will be operated for up to 4 hours without emission control systems in operation. The maximum hourly and event commissioning emission rates for the GE LMS-100s are presented in Table 5.1-13. Because commissioning is expected to be completed within 1,120 hours, annual impacts for the combined commissioning and operation of the AEC SCGT were also evaluated since annual emissions during the commissioning year could be higher than those during a noncommissioning year. Therefore, the annual average emission rates associated with commissioning and subsequent operation of the GE LMS-100s are also presented in Table 5.1-13. Detailed calculations are provided in Appendix 5.1B.

TABLE 5.1-13

GE LMS-100 Turbine Commissioning Emission Rates

Commissioning Emissions	VOC	CO	NO_X	SO_2	PM_{10}	$PM_{2.5}$
Short-Term Emission Rates						
Maximum Hourly, lb/hr (per turbine) [a]	5.08	244	40.1	1.62	6.23	6.23
Total Commissioning Period, tons (per 4-turbine block) [b]	1.67	50.8	11.4	0.91	3.49	3.49
Annual Emission Rates						
Annual Average Hourly, lb/hr (per turbine) [c]	N/A	N/A	3.65	N/A	1.88	1.88
Total Commissioning/Operation Period, tons (per 4-turbine block) [d]	N/A	N/A	63.9	N/A	32.9	32.9

[a] SO_2, PM_{10}, and $PM_{2.5}$ emissions are not emitted in amounts greater than normal operating rates.

[b] Total commissioning period SO_2, PM_{10}, and $PM_{2.5}$ emissions are based on the maximum emission rates at 65.3°F (see Appendix 5.1B) multiplied by the total number of commissioning hours.

[c] Annual average hourly emissions for evaluating annual impacts are based on the sum of total commissioning emissions and annual operation emissions per turbine, divided by 8,760.

[d] Total commissioning/operation period emissions are based on the total commissioning period emissions presented here and the annual average operation emission rates at 65.3°F and 100 percent load (see Appendix 5.1B).

Note:

N/A = Not applicable (i.e., no annual average ambient air quality standard exists for these pollutants; therefore, annual average emissions were not modeled)

Turbine Emissions—Operations. Operational emission estimates were prepared for the combustion turbine and auxiliary boiler startup and shutdown modes and the steady-state operating modes. Emission estimates for these operating modes are based on manufacturer data and engineering estimates. Natural gas will be the only fuel burned at the AEC. Operational emissions were estimated for two GE 7FA.05s, four GE LMS-100s, and one auxiliary boiler, as described in the following sections. The GE 7FA.05s will use dry low NO_x combustors, combined with SCR, to limit emissions of NO_x to 2 ppmv, corrected to 15 percent O_2 (ppmvdc). Best combustion practices, combined with the use of an oxidation catalyst, will be used to limit CO and VOC emissions to 2 ppmvdc and 2 ppmvdc, respectively. The GE LMS-100s will use dry low NO_x combustors, combined with SCR, to limit emissions of NO_x to 2.5 ppmvdc. Best combustion practices, combined with the use of an oxidation catalyst, will be used to limit CO and VOC emissions to 4 ppmvdc and 2 ppmvdc, respectively. The auxiliary boiler will use SCR and flue gas recirculation to limit emissions of NO_x and CO to 5 ppmv and 50 ppmv, corrected to 3 percent O_2, respectively. PM_{10}, $PM_{2.5}$, and SO_2 emissions will be kept to a minimum through the exclusive use of natural gas, inlet air filtration (for PM control), and the oxidation catalyst system.

Combined-Cycle Turbines.

Startup and Shutdown Emissions. During the startup and shutdown operating modes, the emission control systems are not fully functional, which may result in higher air emission rates for VOC, CO, and NO_X relative to the steady-state operating mode.[11] Three startup scenarios and one shutdown scenario have been developed for the GE 7FA.05s. The time from fuel initiation until reaching the base load operating rate is expected to take up to 60 minutes for a cold start event and up to 30 minutes for a warm or hot start event. A shutdown event is expected to take up to 30 minutes. The maximum GE 7FA.05 startup and shutdown emission rates are

[11] Emission rates of SO_2, PM_{10}, and $PM_{2.5}$ are expected to be equal to or lower than normal operating rates due to reduced loads during startup/shutdown events.

presented in Table 5.1-14, on a pound(s) per event (lb/event) and pound(s) per hour (lb/hr) basis. Detailed calculations are provided in Appendix 5.1B.

TABLE 5.1-14

GE 7FA.05 Startup/Shutdown Emission Rates [a]

	NO_x	CO	VOC	SO_2 [b]	PM_{10}	$PM_{2.5}$
Cold Start						
Startup (lb/event/turbine)	61.0	325	36.0	—	—	—
Startup (lb/hr/turbine)	61.0	325	36.0	< 4.86	< 8.50	< 8.50
Warm Start [c]						
Startup (lb/event/turbine)	17.0	137	25.0	—	—	—
Startup (lb/hr/turbine)	25.2	142	25.8	< 4.86	< 8.50	< 8.50
Hot Start [c]						
Startup (lb/event/turbine)	17.0	137	25.0	—	—	—
Startup (lb/hr/turbine)	25.2	142	25.8	< 4.86	< 8.50	< 8.50
Shutdown [c]						
Shutdown (lb/event/turbine)	10.0	133	32.0	—	—	—
Shutdown (lb/hr/turbine)	18.2	138	32.8	< 4.86	< 8.50	< 8.50

[a] Maximum emission rates were based on an ambient temperature of 20°F. Startup and shutdown emission rates at other ambient temperatures are provided in Appendix 5.1B.

[b] The maximum SO_2 hourly emission rate is based on a fuel sulfur concentration of 0.75 grain of sulfur per 100 dry standard cubic feet (dscf) of natural gas.

[c] The NO_x, CO, and VOC emissions for the balance of the hour for a warm start, hot start, and shutdown event were based on the hourly emission rate for 100 percent load at 28°F.

Steady-State Operating Emissions. The GE 7FA.05 operational emission rates for steady-state operations have been provided by the manufacturer. The SO_2 emission rate was estimated based on a fuel sulfur concentration of 0.75 grain of sulfur per 100 dry standard cubic feet (dscf) of natural gas. The emission rates for the GE 7FA.05s are shown in Table 5.1-15. Emission estimates are provided in Appendix 5.1B.

TABLE 5.1-15

Maximum Pollutant Emission Rates for Operation of One GE 7FA.05 Turbine [a]

Pollutant	ppmvd @ 15% O_2	Emission Rate (lb/hr)
NO_x	2 (1-hour)	16.5
CO	2 (1-hour)	10.0
VOC	2 (1-hour)	1.58
SO_2 [b]	N/A	4.86
$PM_{10}/PM_{2.5}$ [c]	N/A	8.50
Ammonia	5	15.3

[a] Maximum values are for each turbine at an ambient temperature of 28°F and excludes startups and shutdowns.

[b] Estimated using a maximum fuel sulfur concentration of 0.75 grain of sulfur per 100 dscf of natural gas.

[c] 100 percent of PM emissions assumed to be emitted as PM_{10} and $PM_{2.5}$.

Note:

N/A = Not applicable

Simple-Cycle Turbines.

Startup and Shutdown Emissions. Similar to the GE 7FA.05s, the GE LMS-100 emission control systems are not fully functional during the startup and shutdown operating modes, which may result in higher air emission

rates for VOC, CO, and NO_x relative to the steady-state operating mode.[12] One startup scenario and one shutdown scenario have been developed for the GE LMS-100s. The time from fuel initiation until reaching the base load operating rate is expected to take up to 30 minutes for a hot start event. A shutdown event is expected to take up to 13 minutes. The maximum GE LMS-100 startup and shutdown emission rates are presented in Table 5.1-16, on a lb/event and lb/hr basis. Detailed calculations are provided in Appendix 5.1B.

TABLE 5.1-16

GE LMS-100 Startup/Shutdown Emission Rates [a]

	NO_x	CO	VOC	SO_2 [b]	PM_{10}	$PM_{2.5}$
Hot Start [c]						
Startup (lb/event/turbine)	16.6	15.4	2.80	—	—	—
Startup (lb/hr/turbine)	20.7	19.4	3.95	< 1.62	< 6.23	< 6.23
Shutdown [c]						
Shutdown (lb/event/turbine)	3.12	28.1	3.06	—	—	—
Shutdown (lb/hr/turbine)	9.56	34.4	4.86	< 1.62	< 6.23	< 6.23

[a] Maximum emission rates were provided by the manufacturer. Additional details are provided in Appendix 5.1B.

[b] The maximum SO_2 hourly emission rate is based on a fuel sulfur concentration of 0.75 grain of sulfur per 100 dscf of natural gas.

[c] The NO_x, CO, and VOC emissions for the balance of the hour for a hot start and shutdown event were based on the hourly emission rate for 100 percent load at 28°F.

Steady-State Operating Emissions. The GE LMS-100 operational emission rates for steady-state operations have been provided by the manufacturer. The SO_2 emission rate was estimated based on a fuel sulfur concentration of 0.75 grain of sulfur per 100 dscf of natural gas. The emission rates for the GE LMS-100s are shown in Table 5.1-17. Emission estimates are provided in Appendix 5.1B.

TABLE 5.1-17

Maximum Pollutant Emission Rates for Operation of One GE LMS-100 Turbine [a]

Pollutant	ppmvd @ 15% O_2	Emission Rate (lb/hr)
NO_x	2.5 (1-hour)	8.23
CO	4 (1-hour)	8.01
VOC	2 (1-hour)	2.30
SO_2 [b]	N/A	1.62
$PM_{10}/PM_{2.5}$ [d]	N/A	6.23
Ammonia	5	6.09

[a] Maximum values are for each turbine at an ambient temperature of 28°F and excludes startups and shutdowns.

[b] Estimated using a maximum fuel sulfur concentration of 0.75 grain of sulfur per 100 dscf of natural gas.

[d] 100 percent of PM emissions assumed to be emitted as PM_{10} and $PM_{2.5}$.

Note:

N/A = Not applicable

Auxiliary Boiler.

Startup Emissions. As with the combustion turbines, the auxiliary boiler emission control systems are not fully functional during the startup operating modes, which may result in higher air emission rates for VOC,

[12] Emission rates of SO_2, PM_{10}, and $PM_{2.5}$ are expected to be equal to or lower than normal operating rates due to reduced loads during startup/shutdown events.

CO, and NO_x relative to the steady-state operating mode.[13] Three startup scenarios have been developed for the auxiliary boiler. The time from fuel initiation until reaching the base load operating rate is expected to take up to 170 minutes for a cold start event, 85 minutes for a warm start event, and 25 minutes for a hot start event. The maximum auxiliary boiler startup emission rates are presented in Table 5.1-18, on a lb/event and lb/hr basis. Detailed calculations are provided in Appendix 5.1B.

TABLE 5.1-18

Auxiliary Boiler Startup Emission Rates [a, b]

	VOC	CO	NO_X	SO_2	PM_{10}
Cold Start					
Startup (lb/event)	4.69	4.34	4.22	—	—
Startup (lb/hr)	1.65	1.53	1.49	< 0.048	< 0.30
Warm Start					
Startup (lb/event)	2.34	2.17	2.11	—	—
Startup (lb/hr)	1.65	1.53	1.49	< 0.048	< 0.30
Hot Start					
Startup (lb/event)	0.69	0.64	0.62	—	—
Startup (lb/hr)	0.85	2.29	0.87	< 0.048	< 0.30

[a] Event emission rates were provided by the manufacturer.

[b] Hourly emission rates represent the highest hour during the event.

Steady-State Operating Emissions. The auxiliary boiler operational emission rates for steady-state operations, shown in Table 5.1-19, have been estimated based on the maximum heat input rating and the assumption that the boiler will operate at 100 percent load. Detailed calculations are provided in Appendix 5.1B.

TABLE 5.1-19

Maximum Pollutant Emission Rates for Steady-State Operation of One Auxiliary Boiler

Pollutant	ppmvd @ 3% O_2	Emission Rate (lb/hr) [a]
VOC	N/A	0.28
CO	50 (1-hour)	2.83
NO_X	5 (1-hour)	0.42
SO_2	N/A	0.048
$PM_{10}/PM_{2.5}$	N/A	0.30
Ammonia	5	0.16

[a] Maximum hourly emission rates assume 100 percent load.

Note:

N/A = Not applicable

Facility Emissions. Emission sources at the AEC would include two GE 7FA.05 combined-cycle combustion turbines, four GE LMS-100 simple-cycle combustion turbines, and an auxiliary boiler. Natural gas will be the only fuel used during plant operation. The typical natural gas composition is shown in Table 5.1-20. Natural gas combustion results in the formation of NO_x, CO, unburned hydrocarbons (VOC), SO_2, PM_{10}, and $PM_{2.5}$.

[13] Emission rates of SO_2, PM_{10}, and $PM_{2.5}$ are expected to be equal to or lower than normal operating rates due to reduced loads during startup events.

Because natural gas is a clean-burning fuel, there will be minimal formation of combustion PM_{10}, $PM_{2.5}$, and SO_2.

TABLE 5.1-20

Typical Natural Gas Specifications

Component Analysis		Chemical Analysis	
Component	**Average Concentration, Volume**	**Molecular Weight**	**Weighted Average**
CH_4	96.19	16.04	15.43
C_2H_6	1.67	30.07	0.50
C_3H_8	0.27	44.00	0.12
C_4H_{10}	0.098	58.12	0.057
C_5H_{12}	0.0072	72.15	0.0052
C_6H_{14}	0.022	86.18	0.019
N_2	0.41	28.01	0.11
CO_2	1.34	44.01	0.59
		Average	**16.83**

Notes:

C_2H_6 = Ethane
C_3H_8 = Propane
C_4H_{10} = Butane
C_5H_{12} = Pentane
C_6H_{14} = Hexane
N_2 = Nitrogen

Table 5.1-21 presents the maximum fuel use expected for each of the combustion emission sources included at the AEC, as well as the facility total. Detailed calculations are provided in Appendix 5.1B.

TABLE 5.1-21

Estimated Facility Fuel Use (MMBtu) [a, b]

Period	GE 7FA.05 (per unit) [a]	GE LMS-100 (per unit) [b]	Auxiliary Boiler [c]	Total Fuel Use (All Units)
Per hour	2,275	879	70.8	8,137
Per day	54,604	21,094	878	194,460
Per year	10,374,700	2,064,775	310,096	29,318,594

[a] The maximum hourly and daily fuel use were based on the maximum heat input for the turbine at an ambient temperature of 28°F. The annual fuel use was based on an average heat input at 65.3°F, 4,100 hours of steady-state operation per turbine, and 500 startups and shutdowns per turbine.

[b] The maximum hourly and daily fuel use were based on the maximum heat input at an ambient temperature of 28°F. The annual fuel use was based on an average heat input at 65.3°F, 2,000 hours of steady-state operation per turbine, and 500 startups and shutdowns per turbine.

[c] Fuel use was based on operation at 100 percent load. Additionally, the annual fuel use assumed 120 startups and 8,760 hours of operation.

Note:

MMBtu = million British thermal unit(s)

For the combined-cycle combustion turbines, maximum hourly NO_x, VOC, and CO emissions are based on a cold startup event. Because PM and SO_2 emissions are based on fuel consumption, the maximum hourly PM_{10}, $PM_{2.5}$, and SO_2 emissions are based on each turbine operating at full load at the minimum ambient temperature. Similarly, maximum hourly NO_x, VOC, and CO emissions for the simple-cycle combustion

turbines are based on one hot startup, one shutdown, and the balance of the hour at full load at the minimum ambient temperature. The maximum hourly PM_{10}, $PM_{2.5}$, and SO_2 emissions for the simple-cycle combustion turbines are based on each turbine operating at full load at the minimum ambient temperature. Maximum hourly emissions for the auxiliary boiler assume operation at 100 percent load, without any startups.

Monthly and annual emissions for the combined- and simple-cycle turbines are based on the operating profile presented in Table 5.1-22. The annual natural gas sulfur content is expected to average 0.25 grain per 100 dscf. However, on rare occasions, the natural gas fuel sulfur content can deviate and approach up to 0.75 grain of sulfur per 100 dscf. Therefore, hourly SO_2 emissions have been estimated assuming a natural gas sulfur content of 0.75 grain per 100 dscf. Daily, monthly, and annual SO_2 emissions are based on an expected average fuel sulfur level of 0.25 grain per 100 dscf of natural gas. Monthly and annual emissions for the auxiliary boiler assume operation at 100 percent load with 10 startups per month.

TABLE 5.1-22
Combustion Turbine Operating Profile

	GE Frame 7FA.05		GE LMS-100	
Parameter	**Events**	**Hours**	**Events**	**Hours**
Annual Hours	--	4,100	--	2,000
Annual Cold Startup	24	24.0	0	--
Annual Warm Startup	100	50.0	0	--
Annual Hot Startup	376	188	500	250
Annual Shutdown	500	250	500	108
Total Annual Startup/ Shutdown Hours	--	512	--	358
Total Annual Operating Hours (per turbine)	--	4,612	--	2,358
Monthly Cold Startup	2	2.00	0	--
Monthly Warm Startup	15	7.50	0	--
Monthly Hot Startup	45	22.5	62	31.0
Monthly Shutdown	62	31.0	62	13.4
Total Monthly Startup/ Shutdown Hours (per turbine)	--	63.0	--	44.4
Monthly Operating Hours (per turbine)	--	681	--	700

Table 5.1-23 presents the AEC PTE criteria pollutant emissions. Detailed calculations are provided in Appendix 5.1B.

TABLE 5.1-23
AEC Facility Emissions

	NO_x	SO_2 [a]	VOC [b]	CO	PM_{10}	$PM_{2.5}$
Maximum Hourly Emissions, lb/hr						
Per GE 7FA.05 [c]	16.5	4.86	1.58	10.0	8.50	8.50
Per GE LMS-100 [d]	8.23	1.62	2.30	8.01	6.23	6.23

TABLE 5.1-23

AEC Facility Emissions

	NO_x	SO_2 [a]	VOC [b]	CO	PM_{10}	$PM_{2.5}$
Auxiliary Boiler [e]	0.42	0.048	0.28	2.83	0.30	0.30
Average Daily Facility Emissions [f], lb/day	1,782	160	562	2,600	1,044	1,044
Maximum Monthly Facility Emissions [g], lb/month	53,461	4,811	16,861	78,000	31,312	31,312
Average Annual Facility Emissions, tpy [h]	134	11.3	49.4	246	69.3	69.3

[a] Hourly SO_2 emissions are based on a maximum fuel sulfur content of 0.75 grain per 100 dscf of natural gas. Daily, monthly, and annual SO_2 emissions are based on an average fuel sulfur content of 0.25 grain per 100 dscf of natural gas.

[b] Average daily, maximum monthly, and average annual facility emissions include VOC emissions from two oil-water separator systems (see Appendix 5.1B, Table 5.1B.17).

[c] Maximum hourly VOC, CO, and NO_x emissions were based on a cold startup. Maximum hourly SO_2, PM_{10}, and $PM_{2.5}$ emissions were based on each turbine operating at full load at 28°F.

[d] Maximum hourly VOC, CO, and NO_x emissions were based on one hot startup, one shutdown, and the balance of the hour at full load at 28°F. Maximum hourly SO_2, PM_{10}, and $PM_{2.5}$ emissions were based on each turbine operating at full load at 28°F.

[e] Maximum hourly emissions assume operation at 100 percent load. Startup emissions are not included.

[f] Average daily emissions represent the maximum monthly total divided by 30 days.

[g] Maximum monthly emissions are based on the following:

- GE 7FA.05s: 2 cold startups, 15 warm startups, 45 hot startups, 62 shutdowns, and 681 hours of stead-state operation at 100 percent load and 65.3°F.
- GE LMS-100s: 62 hot startups, 62 shutdowns, and 700 hours of steady-state operation at 100 percent load and 65.3°F.
- Auxiliary Boiler: 10 startups and 31 days of operation.

[h] Average annual emissions are based on the following:

- GE 7FA.05s: 24 cold startups, 100 warm startups, 376 hot startups, 500 shutdowns, and 4,100 hours of steady-state operation at 100 percent load and 65.3°F.
- GE LMS-100s: 500 hot startups, 500 shutdowns, and 2,000 hours of steady-state operation at 100 percent load and 65.3°F.
- Auxiliary Boiler: 120 startups and 365 days of operation.

Criteria pollutant emissions from worker commutes and material deliveries were also calculated. The emissions are presented in Table 5.1-24. Emissions were estimated using emission factors from EMFAC2014. Detailed calculations are included in Appendix 5.1B.

TABLE 5.1-24

Criteria Pollutant Emissions from Worker Commute and Deliveries During Operation

Emission Source	VOC	CO	NO_x	SO_2	PM_{10}	$PM_{2.5}$
Worker Commute (lb/yr)	17.0	945	82.5	2.62	44.8	18.6
Material Deliveries (lb/yr)	0.76	3.23	24.6	0.10	0.73	0.34
Total (lb/yr)	**17.7**	**948**	**107**	**2.72**	**45.5**	**19.0**

5.1.6.2 Greenhouse Gas Emission Estimates

Combustion of natural gas in the combined- and simple-cycle combustion turbines and auxiliary boiler would result in emissions of CO_2, CH_4, and N_2O. GHG emissions for normal facility operations were calculated based on the maximum fuel use predicted for AEC and TCR emission factors (TCR, 2015). The emission factors used to estimate the GHG emissions are summarized in Appendix 5.1B. Emissions of CO_2, N_2O, and CH_4 resulting from AEC operation are presented in Table 5.1-25.

TABLE 5.1-25

Estimated Annual Greenhouse Gas Emissions from AEC

	CO_2	CH_4	N_2O	CO_2e[a]
AEC (PTE), MT/yr	1,551,247	51.4	67.3	1,572,593

[a] Value includes SF_6 emissions associated with 12 circuit breakers with an assumed annual leak rate of 0.1 percent (see Appendix 5.1B, Table 5.1B.18).

GHG emissions from worker commutes and material deliveries were also calculated as part of the analyses. The GHG emissions are presented in Table 5.1-26. Emissions were estimated using TCR emission factors (TCR, 2015) and fuel economy values from the EMFAC2014 Web Tool Database, based on EMFAC2007 vehicle categories. Detailed calculations are included in Appendix 5.1B.

TABLE 5.1-26

Greenhouse Gas Emissions from Worker Commute and Deliveries During Operation

	GHG Emissions (MT/yr)			
Emission Source	**CO_2**	**CH_4**	**N_2O**	**CO_2e**
Worker Commute, MT/yr	160	0.0075	0.0016	160
Material Deliveries, MT/yr	5.06	0.000014	0.000014	5.06
Total (MT/yr)	**165**	**0.0076**	**0.0016**	**165**

5.1.6.3 Air Quality Impact Analysis Methodology

An ambient air quality impact analysis was conducted to compare worst-case ground-level impacts resulting from the AEC with established state and federal ambient air quality standards and applicable SCAQMD significance criteria. The analysis was conducted in accordance with the air quality impact analysis guidelines presented in EPA's 40 Code of Federal Regulations (CFR) Part 51, Appendix W: *Guideline on Air Quality Models* (EPA, 2005), SCAQMD's *AQMD Modeling Guidance for AERMOD* (SCAQMD, 2015a), and the *Dispersion Modeling Protocol for the Alamitos Energy Center*[14] (see Appendix 5.1F).

The analysis includes an evaluation of the possible effects of simple, intermediate, and complex terrain, and aerodynamic effects (downwash) due to nearby building(s) and structures on plume dispersion and ground-level concentrations. A numerical Gaussian plume model was used in this analysis. The model assumes that the concentrations of emissions within a plume can be characterized by a Gaussian distribution of gaseous concentrations about the plume centerline. Gaussian dispersion models are approved by EPA and SCAQMD for regulatory use and are based on conservative assumptions (that is, the models tend to over-predict actual impacts by assuming steady-state conditions, no pollutant loss through conservation of mass, no chemical reactions, etc.).

The subsections below present the following information:

- Modeling methodology for evaluating the impacts on ambient air quality
- Modeling scenarios and source data used to evaluate the impacts on ambient air quality
- Modeling results compared to the CAAQS and NAAQS

Modeling Methodology for Evaluating Impacts on Ambient Air Quality. The air dispersion modeling was conducted based on guidance presented in the *Guideline on Air Quality Models* (EPA, 2005) and the EPA-approved dispersion model, AERMOD (Version 15181).

[14] This modeling protocol was submitted to the CEC in September 2015. Comments were received via email on October 8, 2015. Responses to comments received have been incorporated into this analysis, as applicable.

Model Selection. The AERMOD model is a steady-state, multiple-source, dispersion model that incorporates hourly meteorological data inputs and local surface characteristics. The AERMOD model is well suited for this assessment based on the ability of the model to handle the various physical characteristics of project emission sources, including point, area, and volume source types. The required emission source data inputs to AERMOD include source locations, source elevations, stack heights, stack diameters, stack exit temperatures, stack exit velocities, and pollutant emission rates. The source locations are specified for a Cartesian (x,y) coordinate system where x and y are distances east and north in meters, respectively. The Cartesian coordinate system used for these analyses is the Universal Transverse Mercator Projection (UTM), 1983 North American Datum (NAD 83).

Model Options. The technical options selected for the AERMOD model include:

- Regulatory default control options
- Urban dispersion mode because land use within 3 km of the AEC site is primarily classified as urban based on the Auer Method. A population of 9,862,049 was also used in AERMOD, as recommended by the SCAQMD for projects in Los Angeles County (SCAQMD, 2015a).
- Receptor elevations and controlling hill heights obtained from AERMAP (Version 11103) output

The model output is included on the attached modeling file compact disc.

Where noted, NO_2 concentrations were determined using a default ambient ratio of 0.75 NO_2/NO_x (i.e., 75 percent of NO_x emissions are converted to NO_2) for annual predicted impacts and 0.8 for 1-hour predicted impacts (EPA, 2010; EPA, 2011).

Meteorological Data. The CEC requires a minimum of 1 year of meteorological data approved by ARB or the local air pollution control district to be used in the air dispersion modeling analysis. SCAQMD model guidance recommends use of the nearest station to the project site.

According to EPA's *Guideline on Air Quality Models* (EPA, 2005), representativeness of meteorological data used in dispersion modeling depends on (1) the proximity of the meteorological monitoring site to the area under consideration; (2) the complexity of the terrain; (3) the exposure of the meteorological monitoring site; and (4) the period of time during which data are collected.

Two SCAQMD meteorological data collection sites were identified in proximity to the AEC: Long Beach, which is collocated with the North Long Beach ambient monitoring station, and Anaheim. Of the two locations, the North Long Beach site was selected as the most representative for meteorological data based on the following factors:

- The monitoring site is the closer of the two to the AEC (approximately 6.4 miles to the northwest of the AEC site, versus 10.1 miles to the east-northeast for the Anaheim monitoring station).
- There are no complex terrain features between the two locations.
- The land uses surrounding the monitoring site and the AEC site are similar (both are surrounded by a blend of low-, medium-, and high-intensity land uses with open water less than 10 miles to the south-southwest).

Therefore, the North Long Beach station is considered representative of the AEC site, and the meteorological data collected at the North Long Beach station will be used to model the ambient air quality impacts. The meteorological data used for this analysis have been compiled by SCAQMD specifically for use in dispersion modeling analyses and include the periods of January 1, 2006, through December 31, 2009, and January 1, 2011, through December 31, 2011.[15] The surface data have also been coupled with the

[15] At the direction of the SCAQMD, 2010 meteorological data were not recommended for use because the data do not meet the 90 percent completeness requirements. Similarly, 2012 meteorological data were not recommended for use because the collected wind speeds are suspicious.

National Climatic Data Center twice-daily soundings from the San Diego Miramar National Weather Service station (Station #03190). The final preprocessed AERMET data files for 2006 through 2009 and 2011 were provided via e-mail by the SCAQMD.

The annual and quarterly wind rose plots for the North Long Beach meteorological station are presented in Appendix 5.1C.

Background Data. As outlined in 40 CFR 51, Appendix W, Section 9.2, the background data used to evaluate the potential air quality impacts need not be collected on a project site, as long as the data are representative of the air quality in the subject area. The following three criteria were used for determining whether the background data are representative of: (1) location, (2) data quality, and (3) data currentness. These criteria are defined and applied to the project as follows:

- **Location:** The measured data must be representative of the areas where the maximum concentration occurs for the proposed stationary source, existing sources, and a combination of the proposed and existing sources.

  The nearest monitoring station relative to the project site is the South Long Beach monitoring station (South Coastal Los Angeles County 2). This monitoring station is located approximately 4.6 miles northwest of the project site. The proximity to the ocean are similar at both locations and no significant terrain features are in the vicinity of either the project site or monitoring station that would significantly affect the representativeness of the winds or monitored background concentrations. However, because this South Long Beach monitoring station only measures PM_{10} and $PM_{2.5,}$ the South Long Beach monitoring station is considered the most representative location for only those two pollutants. The nearest representative location for the remaining pollutants was selected based on the surrounding features, as discussed below.

  The North Long Beach monitoring station (South Coastal Los Angeles County 1) is close to the AEC site (approximately 6.4 miles to the northwest), is located in an urban area near two large industrial sources (the Port of Long Beach and the Long Beach airport), and collects monitored background concentrations comparable to the other monitoring station options located in Long Beach. In addition, the North Long Beach monitoring station measures each of the pollutants required in the air quality impact analysis. The Anaheim monitoring station (Central Orange County) is directly downwind from the project site, but is farther away (approximately 10.1 miles to the east-northeast), farther inland than the project site, and collects monitored background concentrations lower than those collected at the North Long Beach monitoring station (i.e., the North Long Beach monitoring station represents a more conservative analysis).

  Based on the information above, the ambient data collected at the North Long Beach monitoring station are considered representative of the project site for the following pollutants not monitored at the South Long Beach monitoring station: CO, SO_2, ozone, and annual NO_2. Additionally, a meteorological dataset has also been collected at the North Long Beach monitoring station and is considered representative of the project site using the criteria above.

  At the request of the SCAQMD, hourly NO_2 data collected at the Hudson Long Beach monitoring station (South Coastal Los Angeles County 3, EPA ID 06-037-4006) are considered representative of the AEC site. This monitoring station is located approximately 7.2 miles to the northwest of the AEC site and is considered representative because it captures the large NO_x-emitting sources in the Ports area that are upwind of the proposed project.

- **Data quality:** Data must be collected and equipment must be operated in accordance with the requirements of 40 CFR 58, Appendices A and B, and PSD monitoring guidance.

  The SCAQMD, ARB, and EPA ambient air quality data summaries were used as the primary sources of data. Therefore, the data at each of the monitoring stations listed in Table 5.1-3 meet the data quality requirements of 40 CFR 58, Appendices A and B, and PSD monitoring guidance.

- **Data currentness:** The data are current if they have been collected within the preceding 3 years and are representative of existing conditions.

  The modeled concentrations will be combined with the respective background concentrations from the three most recent years and used for comparison to the ambient air quality standards. Therefore, the data at each of the monitoring stations listed in Table 5.1-3 represent the three most recent years of data available.[16]

Based on the criteria presented above, the three most recent years of background hourly NO_2 data from the Hudson Long Beach monitoring station, the three most recent years of background CO, SO_2, ozone, and annual NO_2 data from the North Long Beach monitoring station, and the three most recent years of background PM_{10} and $PM_{2.5}$ data from the South Long Beach monitoring station were combined with the modeled concentrations and used for comparison to the ambient air quality standards. For each pollutant, the most recent three years of available monitoring data were used to determine the maximum or average background concentration, as applicable based on the standard. A summary of the background concentrations for 2009 through 2013 is presented in Table 5.1-27. In a few instances, 2012 or 2013 data were unavailable so 2009 or 2010 data were used to maintain the three most recent years of data, as noted in Table 5.1-27.[17]

Receptor Grid Spacing. The base modeling receptor grid for the AERMOD modeling consists of receptors that are placed at the ambient air boundary (i.e., the project's property boundary) and Cartesian-grid receptors that are placed beyond the Project's site boundary at spacing that increases with distance from the origin. Property boundary receptors were placed at 30-meter intervals. Beyond the project's property boundary, receptor spacing was as follows:

- 50-meter spacing from property boundary to 500 meters from the origin
- 100-meter spacing from beyond 500 meters to 3 km from the origin
- 500-meter spacing from beyond 3 km to 10 km from the origin
- 1,000-meter spacing from beyond 10 km to 25 km from the origin
- 5,000-meter spacing from beyond 25 km to 50 km from the origin

[16] It should be noted that the recently established site in Long Beach (South Coastal Los Angeles County 3, EPA ID 06-037-4006) does not have three complete years of data available. In 2012, NO_2 was only monitored during peak conditions; therefore, the collected data do not meet the completeness criteria for an annual averaging time.

[17] Background concentrations shown in Table 5.1-27 are the most recent five years of data from the most representative monitoring stations. Though more recent monitoring data may be available from alternate stations, based on the locations of these stations, these data would not be considered representative and are not, therefore, recommended for use in the air quality impacts analysis.

TABLE 5.1-27

Background Air Concentrations (2009-2013) [a]

Pollutant	Averaging Time	2009		2010		2011		2012		2013		Maximum	Average
		Ppm	µg/m³	ppm	µg/m³	ppm	µg/m³	ppm	µg/m³	ppm	µg/m³	µg/m³	µg/m³
Ozone [b]	1-hour	0.089	175	0.101	198	0.073	143	0.084	165	INC	INC	198	--
	8-hour	0.068	133	0.084	165	0.061	120	0.067	132	INC	INC	165	--
CO [b]	1-hour	3.0	3,437	3.0	3,437	3.2	3,666	2.6	2,979	INC	INC	3,666	--
	8-hour	2.6	2,520	2.1	2,406	2.6	2,979	2.2	2,520	INC	INC	2,979	--
NO_2	1-hour (maximum) [c]	--	--	0.1180	222	0.0900	169	0.0905	170	0.0813	153	170	--
	1-hour (98th percentile) [c]	--	--	0.0710	134	0.0740	139	0.0774	146	0.0713	134	--	140
	Annual [b, d]	0.0212	39.9	0.0198	37.3	0.0177	33.3	INC [e]	INC [e]	INC [e]	INC [e]	39.9	--
SO_2 [b]	1-hour (maximum)	0.0200	52.4	0.0400	105	0.0148	38.8	INC	INC	INC	INC	105	--
	1-hour (99th percentile)	0.0120	31.4	0.0160	41.9	0.0107	28.0	INC	INC	INC	INC	--	33.8
	3-hour [f]	0.0200	52.4	0.0400	105	0.0148	38.8	INC	INC	INC	INC	105	--
	24-hour	0.005	13.1	0.006	15.7	0.004	10.5	INC	INC	INC	INC	15.7	--
PM_{10} [g]	24-hour	--	83.0	--	76.0	--	50.0	--	54.0	--	54.0	54.0	--
	Annual	--	33.2	--	27.3	--	28.7	--	25.5	--	27.3	28.7	--
$PM_{2.5}$ [g]	24-hour (98th percentile)	--	30.5	--	26.5	--	26.6	--	25.1	--	24.6	--	25.4
	Annual	--	12.5	--	10.4	--	10.7	--	10.6	--	11.0	11.0	--

[a] The SCAQMD, ARB, and EPA ambient air quality data summaries were used as reference.

[b] Data from the North Long Beach monitoring station.

[c] Data from the Hudson Long Beach monitoring station.

[d] Annual Arithmetic Mean.

[e] SCAQMD specifically requested that background data from the Hudson Long Beach monitoring station be used for 1-hour NO_2 only. Therefore, annual NO_2 concentrations for 2012 and 2013 were not filled with data from the Hudson Long Beach monitoring station, based on the assumption that concentrations collected at the North Long Beach monitoring station would be more representative, even if older than the three most recent years.

[f] Background concentrations for the 3-hour EPA Secondary Standard for SO_2 were not available for the three most recent years. Therefore, the maximum 1-hour background concentrations were conservatively used.

[g] Data from the South Long Beach monitoring station.

Notes:

INC = Incomplete (i.e., the data collection was incomplete for these years)
N/A = Not applicable (i.e., background data were not available for these years)

Sources: SCAQMD, 2015b; ARB, 2015d; EPA, 2015b

All receptors and source locations were expressed in a UTM NAD 83, Zone 11 coordinate system. AERMAP (Version 11103) was used to calculate the receptor elevations and the controlling hill heights. Terrain in the vicinity of the project was accounted for by assigning base elevations to each receptor. National Elevation Dataset files from the United States Geological Survey were obtained in one-third arc-second resolution for the 50-km grid. The AERMAP domain was large enough to encompass the 10 percent slope factor required for calculating the controlling hill height. Based on the outcome of the dispersion modeling analysis using the grid spacing above, the maximum predicted concentrations for the construction, commissioning, and operational stages of the project were located within the 50-meter spacing receptor grid. As a result, a supplemental refined receptor grid was not required per standard modeling protocols.

A plot of the receptor grid is presented in Appendix 5.1C.

Building Downwash and Good Engineering Practice Assessment. For the analysis of the potential impacts during operation, EPA's Building Profile Input Program – Plume Rise Model Enhancement (BPIP-Prime, Version 04274) was used to calculate the projected building dimensions required for AERMOD evaluation of impacts from building downwash. Building downwash was included in AERMOD for each phase of AEC construction, commissioning, and operation, based on the buildings and structures present during each respective phase.

Good engineering practice (GEP), as used in the modeling analyses, is the maximum allowed stack height to ensure that emissions from the stack do not result in excessive concentrations of any air pollutant in the immediate vicinity of the source as a result of atmospheric downwash, eddies, or wakes that may be created by the source itself, nearby structures, or nearby terrain obstacles. In addition, the GEP modeling restriction ensures that any required regulatory control measure is not compromised by the effect of that portion of the stack that exceeds the GEP.

EPA's guidance for determining GEP stack height (H_g) (EPA, 1985) is based on the height of a nearby structure(s) measured from the ground-level elevation at the base of the stack (H) and the lesser dimension, height, or projected width of the nearby structure(s) (L) as follows:

$$H_g = H + 1.5L$$

The GEP modeling restriction is the greater of the calculated GEP stack height or 65 meters. The height of the proposed stacks at the AEC are less than 65 meters, ranging from 24.4 meters to 42.7 meters. Therefore, the proposed AEC stack heights do not exceed GEP stack height.

Modeling Scenarios and Source Data Used to Evaluate Impacts on Ambient Air Quality

In evaluating the potential impacts of the AEC on ambient air quality, modeling of the worst-case ambient impacts for the project was compared to the CAAQS, NAAQS, and the applicable SCAQMD new source review and PSD thresholds.

Construction Impacts Analysis. As previously discussed, the construction activities contributing to the maximum emissions are associated with construction of the AEC CCGT, which will occur for approximately 34 months and coincide with operation of the existing AGS units. To evaluate the overall potential air quality impacts from the construction activities, the maximum daily, monthly, and annual rolling 12-month emissions were developed. A description of the maximum annual construction emissions was provided in Section 5.1.6.1 and a complete summary of the combined maximum daily, monthly, and annual construction emissions is provided in Appendix 5.1A.

The SCAQMD's *CEQA Air Quality Handbook* (1993)[18] includes the SCAQMD's daily CEQA significance thresholds for construction. Therefore, the maximum daily emissions from the construction activities have

[18] According to the SCAQMD website: "The CEQA Air Quality Handbook (SCAQMD, 1993) is still the currently available guidance document for preparing air quality analyses, but is in the process of being revised (and will be called the AQMD Air Quality Analysis Guidance Handbook). The 1993

been compared to the SCAQMD *CEQA Air Quality Handbook*'s significance thresholds in Table 5.1-28. As shown in Table 5.1-28, the maximum daily emissions are less than the significance thresholds for all pollutants except NO_x. Therefore, the daily emissions associated with construction activities are expected to be less than significant with the exception of NO_x.

TABLE 5.1-28
Maximum Daily Construction Emissions[a]

Construction Emission Source	NO_x	CO	VOC	SO_2	PM_{10}	$PM_{2.5}$
Maximum Daily Emissions (lb/day)	142	113	7.16	0.61	23.4	7.90
SCAQMD CEQA Significance Threshold (lb/day)	100	550	75	150	150	55
Exceed Threshold? (Yes or No)	Yes	No	No	No	No	No

[a] Maximum daily emissions include contributions from onsite construction equipment and onsite and offsite vehicles. The PM_{10} and $PM_{2.5}$ emissions include exhaust and fugitive dust emissions.

In addition to the SCAQMD *CEQA Air Quality Handbook's* significance thresholds, the CEC requires an assessment of the potential ambient air quality impacts for construction activities. However, construction activities associated with the AEC would overlap with operation of the existing AGS units and operation of the AEC CCGT. As the impacts of these overlap scenarios would result in larger modeled impacts, an analysis of impacts from construction activities alone was not conducted. Impacts associated with the overlap scenarios are discussed later in this section.

For these overlap scenarios, the construction exhaust emissions were modeled as a set of point sources spaced approximately 25 meters apart over the construction areas with a horizontal stack release. The horizontal release type is an AERMOD beta option (i.e., nonregulatory default option), which negates mechanical plume rise. This conservative approach was used because it is unknown whether the construction equipment will have vertically oriented exhaust stacks. Stack release parameters consisted of a stack release temperature of 533 degrees Kelvin (K; 500°F), a stack diameter of 0.127 meters (5 inches), and a release height of 4.6 meters (15 feet) based on data for typical construction equipment. The construction-generated wind-blown and fugitive dust emissions were modeled as area sources assuming a ground-level release height with an initial vertical dimension of one meter. A detailed summary of the modeling assumptions and emission factors used to estimate the construction emission rates is presented in Appendix 5.1A.

Commissioning Impacts Analysis. During the commissioning of the AEC, the units in each power block will be operated at various load rates without the benefit of the emission control systems to ensure proper operation of the equipment. To provide a complete analysis, a dispersion modeling analysis was conducted for the commissioning of each of the power blocks. For the AEC CCGT, it was conservatively assumed that both turbines would be commissioned simultaneously. For the AEC SCGT, it was conservatively assumed that all four turbines would be undergoing simultaneous commissioning activities while both combined-cycle turbines were operating in cold-start mode. The AERMOD dispersion analysis was conducted using the parameters and emission rates for commissioning of the AEC CCGT, as presented in Table 5.1-29, and the parameters and emission rates for commissioning of the AEC SCGT, as presented in Table 5.1-30.

The short-term concentrations of NO_2 and CO (the 1-hour and 8-hour impacts) from the commissioning of the project were combined with the ambient background concentrations and compared to the short-term ambient air quality standards. Emission rates of PM_{10}, $PM_{2.5}$, and SO_2 are expected to be equal to or lower than normal operating rates due to reduced loads during commissioning. Although commissioning of the AEC CCGT and AEC SCGT is expected to be completed within 180 days and 90 days, respectively, annual impacts for a rolling 12-month period were also evaluated because annual emissions during the

CEQA Air Quality Handbook is still available, however, there are sections that are obsolete. A list of these obsolete sections can be found on the CEQA Air Quality Handbook (1993) webpage." (Information at: http://www.aqmd.gov/home/regulations/ceqa/air-quality-analysis-handbook)

commissioning year (for both power blocks) could be higher than those during a noncommissioning year. As a result, annual NO_2, PM_{10}, and $PM_{2.5}$ impacts from commissioning with operation were combined with the ambient background concentrations and compared to the annual ambient air quality standards. Additional modeling assumptions used to determine the maximum commissioning emissions are presented in Appendix 5.1B. A summary of the dispersion modeling input files is presented in Appendix 5.1C. The results of the commissioning modeling analysis are presented in the following section.

TABLE 5.1-29

AEC CCGT Commissioning Dispersion Modeling Scenarios

Scenarios	No. of Turbines/ Modeling Load	Exit Velocity (m/s)	Exhaust Temperature (K)	Emission Rates [a] (lb/hr)				
				1-hour NO_x	1-hour CO	8-hour CO	Annual NO_x	Annual $PM_{10}/PM_{2.5}$
CTG Testing (Full Speed No Load)	Two/10%	9.33	361	130	1,900	1,900	N/A	N/A
Steam Blows	Two/40%	11.9	359	68.3	N/A	N/A	N/A	N/A
Emissions Tuning	Two/80%	16.1	366	63.0	N/A	N/A	N/A	N/A
Combined Commissioning and Operation [b]	Two/Worst-Case	11.8	350	N/A	N/A	N/A	9.12	5.44

[a] Emission rate given per turbine.

[b] Emissions rates, stack exit velocity, and stack temperature for the combined annual commissioning and operation are based on the operational load resulting in the highest modeled impact of NO_x, PM_{10}, and $PM_{2.5}$.

Notes:

m/s = meter(s) per second
N/A = Not applicable

TABLE 5.1-30

AEC SCGT Commissioning Dispersion Modeling Scenarios

Scenarios	No. of Turbines/ Modeling Load	Exit Velocity (m/s)	Exhaust Temperature (K)	Emission Rates [a] (lb/hr)				
				1-hour NO_x	1-hour CO	8-hour CO	Annual NO_x	Annual $PM_{10}/PM_{2.5}$
Testing (Full Speed No Load)	Four/5%	10.0	728	40.1	244	244	N/A	N/A
DLN Emissions Tuning	Four/100%	33.3	694	N/A	90.0	90.0	N/A	N/A
Emissions Tuning	Four/75%	23.8	748	N/A	72.5	72.5	N/A	N/A
Combined Commissioning and Operation [b]	Four/Worst-Case	23.6	746	N/A	N/A	N/A	2.95	1.88

[a] Emission rate given per turbine.

[b] Emissions rates, stack exit velocity, and stack temperature for the combined annual commissioning and operation are based on the operational load resulting in the highest modeled impact of NO_x, PM_{10}, and $PM_{2.5}$.

Note:

N/A = Not applicable

Operation Impacts Analysis. Turbine emissions and stack parameters, such as flow rate and exit temperature, would exhibit some variation with ambient temperature and operating load. Therefore, to evaluate the worst-case air quality impacts, a dispersion modeling analysis was conducted at minimum, average, and full load at 28°F, 65.3°F, and 107°F for each turbine type. Source parameters for the GE 7FA.05 and GE LMS-100 exhaust stacks were based on information provided by the manufacturer. A summary of the source parameters and the source UTM locations for each modeled scenario is included in Appendix 5.1C.

AEC CCGT. The hourly emission rates used to estimate the maximum 1-hour predicted impacts from the operation of the AEC CCGT were based on the conservative assumption that both GE 7FA.05 units would be in cold startup mode within the same hour. The 1-, 3-, and 24-hour SO_2 emission rates were estimated based on a fuel sulfur concentration of 0.75 grain of sulfur per 100 dscf of natural gas. The hourly emission rate for the 8-hour CO averaging period was based on one cold start, one warm start, two shutdowns, and the balance of the period at steady-state operation. The hourly 24-hour PM_{10} and $PM_{2.5}$ emission rates were 8.5 lb/hr for each modeling scenario. The annualized hourly NO_x, PM_{10}, and $PM_{2.5}$ emission rates for the annual impact assessment were based on the following:

- 4,100 hours of turbine operation at minimum, average, and maximum load
- 24 cold startups
- 100 warm startups
- 376 hot startups
- 500 shutdowns

The combined-cycle emission rates and operating scenario resulting in the maximum predicted concentrations are presented in Table 5.1-31.

TABLE 5.1-31
AEC CCGT Emission Rates and Operating Scenarios Corresponding to the Highest Predicted AERMOD Impacts

	Operating Scenario	Ambient Temperature (°F)	Operating Load (%)	Exhaust Velocity (ft/s)	Exhaust Temperature (°F)	Turbine Emission Rate (lb/hr)[a]
NO_2						
1-hour	03	28	Minimum	40.0	170	61.0
1-hour (federal)	03	28	Minimum	40.0	170	61.0
Annual	07	65.3	Minimum	38.8	170	5.97
CO						
1-hour	03	28	Minimum	40.0	170	325
8-hour	03	28	Minimum	40.0	170	95.2
SO_2						
1-hour	02	28	Average	51.2	178	3.84
1-hour (federal)	06	65.3	Average	48.9	175	3.72
3-hour	06	65.3	Average	48.9	175	3.72
24-hour	06	65.3	Average	48.9	175	3.72
PM_{10}						
24-hour	07	65.3	Minimum	38.8	170	8.50
Annual	07	65.3	Minimum	38.8	170	4.48
$PM_{2.5}$						

TABLE 5.1-31

AEC CCGT Emission Rates and Operating Scenarios Corresponding to the Highest Predicted AERMOD Impacts

	Operating Scenario	Ambient Temperature (°F)	Operating Load (%)	Exhaust Velocity (ft/s)	Exhaust Temperature (°F)	Turbine Emission Rate (lb/hr)[a]
24-hour	07	65.3	Minimum	38.8	170	8.50
Annual	07	65.3	Minimum	38.8	170	4.48

[a] Emission rates are based on the following assumptions:

- The maximum 1-hour NO_x and CO emission rates are based on a 60-minute cold startup event at 20°F.
- The 1-, 3-, and 24-hour SO_2 emission rates are based on the worst-case fuel sulfur content of 0.75 grain per 100 dscf of natural gas.
- The 8-hour CO emission rate is based on one cold startup event, one warm startup event, and two shutdown events, and operating at minimum load for the remaining hours.
- The annual emission rates for NO_x, PM_{10}, and $PM_{2.5}$ were based on 4,100 hours of turbine operation at minimum load, 24 cold startup events, 100 warm startup events, 376 hot startup events, and 500 shutdown events.

Simple-Cycle Power Block. The hourly emission rates used to estimate the maximum 1-hour predicted impacts from operation of the AEC SCGT were based on the conservative assumption that all four GE LMS-100 units would be in startup mode within the same hour. The 1-, 3-, and 24-hour SO_2 emission rates were estimated based on a fuel sulfur concentration of 0.75 grain of sulfur per 100 dscf of natural gas. The hourly emission rate for the 8-hour CO averaging period was based on two startups, two shutdowns, and the balance of the period at steady-state operation. The hourly 24-hour PM_{10} and $PM_{2.5}$ emission rates were 6.23 lb/hr for each modeling scenario. The annualized hourly NO_x, PM_{10}, and $PM_{2.5}$ emission rates for the annual impact assessment were based on the following:

- 2,000 hours of turbine operation at minimum, average, and maximum load
- 500 startups
- 500 shutdowns

The simple-cycle emission rates and operating scenario resulting in the maximum predicted concentrations are presented in Table 5.1-32.

TABLE 5.1-32

AEC SCGT Emission Rates and Operating Scenarios Corresponding to the Highest Predicted AERMOD Impacts

	Operating Scenario	Ambient Temperature (°F)	Operating Load (%)	Exhaust Velocity (ft/s)	Exhaust Temperature (°F)	Turbine Emission Rate (lb/hr)[a]
NO_2						
1-hour	03	28	Minimum	78.0	888	21.2
1-hour (federal)	03	28	Minimum	78.0	888	21.2
Annual	07	65.3	Minimum	77.4	883	2.29
CO						
1-hour	03	28	Minimum	78.0	888	44.9
8-hour	03	28	Minimum	78.0	888	15.0
SO_2						
1-hour	01	28	Maximum	109	789	1.62
1-hour (federal)	05	65.3	Maximum	108	798	1.61
3-hour	05	65.3	Maximum	108	798	1.61

TABLE 5.1-32

AEC SCGT Emission Rates and Operating Scenarios Corresponding to the Highest Predicted AERMOD Impacts

	Operating Scenario	Ambient Temperature (°F)	Operating Load (%)	Exhaust Velocity (ft/s)	Exhaust Temperature (°F)	Turbine Emission Rate (lb/hr)[a]
24-hour	05	65.3	Maximum	108	798	1.61
PM_{10}						
24-hour	07	65.3	Minimum	77.4	883	6.23
Annual	07	65.3	Minimum	77.4	883	1.68
$PM_{2.5}$						
24-hour	07	65.3	Minimum	77.4	883	6.23
Annual	07	65.3	Minimum	77.4	883	1.68

[a] Emission rates are based on the following assumptions:

- The maximum 1-hour NO_x and CO emission rates are based on 60 minutes of a startup event.
- The 1-, 3-, and 24-hour SO_2 emission rates are based on the worst-case fuel sulfur content of 0.75 grain per 100 dscf of natural gas.
- The 8-hour CO emission rate is based on two startup events, two shutdown events, and operating at minimum load for the remaining hours.
- The annual emission rates for NO_x, PM_{10}, and $PM_{2.5}$ were based on 2,000 hours of turbine operation at minimum load, 500 startup events, and 500 shutdown events.

Because the maximum hourly, daily, and annual screening ground-level impacts occurred within the 50-meter receptor grid, a supplemental 50-meter dispersion modeling grid at the point of maximum ground-level impact was not necessary per standard modeling protocols. The results of the modeling analysis are presented in the following section and in Appendix 5.1C.

Auxiliary Boiler. The hourly emission rates used to estimate the maximum 1-hour and 3-hour predicted impacts from operation of the auxiliary boiler were based on the maximum hourly firing rate, and excluded startup and shutdown events. The hourly emission rate for the 8-hour CO averaging period was based on one cold startup event and the balance of the period at operation at the maximum hourly firing rate. The hourly 24-hour SO_2, PM_{10}, and $PM_{2.5}$ emission rates were based on the 30-day average monthly emission rates, where monthly emission rates were based on the following:

- 31 days of operation
- 2 cold startups
- 4 warm startups
- 4 hot startups

The annualized hourly NO_x, PM_{10}, and $PM_{2.5}$ emission rates for the annual impact assessment were based on the following:

- 8,760 hours of operation
- 24 cold startups
- 48 warm startups
- 48 hot startups

The auxiliary boiler emission rates and stack parameters included in each combined- and simple-cycle modeled scenario are presented in Table 5.1-33.

TABLE 5.1-33

Auxiliary Boiler Emission Rates and Stack Parameters

	Exhaust Velocity (ft/s)	Exhaust Temperature (°F)	Emission Rate (lb/hr)[a]
NO_2			
1-hour	69.5	318	0.42
1-hour (federal)			0.42
Annual			0.23
CO			
1-hour	69.5	318	2.83
8-hour			2.37
SO_2			
1-hour	69.5	318	0.048
1-hour (federal)			0.048
3-hour			0.048
24-hour			0.025
PM_{10}			
24-hour	69.5	318	0.16
Annual			0.15
$PM_{2.5}$			
24-hour	69.5	318	0.16
Annual			0.15

[a] Emission rates are based on the following assumptions:

- The maximum 1-hour NO_x and CO and 1-hour and 3-hour SO_2 emission rates are based on normal operation at the maximum hourly firing rate.
- The 8-hour CO emission rate is based on one cold startup event and operating at the maximum firing rate for the remaining hours.
- The daily emission rates for SO_2, PM_{10}, and $PM_{2.5}$ were based on 31 days of operation, 2 cold startup events, 4 warm startup events, and 4 hot startup events, averaged over 30 days.
- The annual emission rates for NO_x, PM_{10}, and $PM_{2.5}$ were based on 8,760 hours of operation, 24 cold startup events, 48 warm startup events, and 48 hot startup events.

Rule 1303 and Rule 1304. SCAQMD Rule 1303 requires an ambient air quality analysis for each new emission source to demonstrate that a proposed project will not cause a violation or make significantly worse an existing violation of the CAAQS or NAAQS. Under SCAQMD Rule 1304(a)(2), there is an exemption from the dispersion modeling requirements of SCAQMD Rule 1303(b)(1) and the offset requirement of SCAQMD Rule 1303(b)(2) for projects like the AEC that are classified by SCAQMD's rules as "Electric Utility Steam Boiler Replacement," defined in pertinent part as the replacement of electric utility steam boiler(s) with combined-cycle gas turbine(s)." Therefore, SCAQMD Rule 1304(a)(2) expressly provides that a SCAQMD Rule 1303, Appendix A-2 review is not required as part of this air quality impacts analysis.

Per SCAQMD Rule 1303(b)(5)(C), a modeling analysis is required to evaluate impacts on plume visibility if the net emission increase from the new or modified source exceeds 15 tpy of PM_{10} or 40 tpy of NO_x; and the location of the source, relative to the closest boundary of a specified federal Class I area, is within 28 km. (There is no exemption from this modeling requirement for Electric Utility Steam Boiler Replacement

projects.) Net emissions of PM_{10} and NO_x will exceed the emissions thresholds but the distance to the nearest Class I area is approximately 53 km. Therefore, a visibility analysis is not required for Class I areas under SCAQMD Rule 1303.

Although not required by its rules, the SCAQMD requested an analysis of the project's impacts on visibility for nearby State Parks and National Wilderness Areas designated as Class II areas. As such, a visibility analysis for Class II areas was performed using the EPA-recommended VISCREEN model. The general procedures to determine visibility impacts followed the approach outlined in the *Workbook for Plume Visual Impact Screening and Analysis (Revised)* (EPA, 1992), with clarification of particular inputs below:

- Background visual ranges for the Class II areas were determined using maps supplied by the Interagency Monitoring of Protected Visual Environments (IMPROVE). The average of the annual upper and lower bounds were used.
- When a Tier 1 approach exceeded the Class I criterion for color difference and contrast, a Tier II assessment was conducted. The Tier II assessment used the North Long Beach AERMET meteorological dataset, which was provided by SCAQMD staff for the years 2006 through 2009 and 2011. These data were preprocessed with the EPA Meteorological Processor for Regulatory Modeling Applications (MPRM, Version 99349) for the Industrial Source Complex (ISC) modeling system.[19]

Based on a survey of State Parks and National Wilderness Areas designated as Class II areas within 50 km of the AEC, the following Class II areas were included in the visibility assessment:

- Crystal Cove State Park
- Water Canyon National Park
- Chino Hills State Park
- Kenneth Hahn State Park

Rule 2005. SCAQMD Rule 2005 sets forth preconstruction review requirements for new facilities subject to the requirements of the Regional Clean Air Incentives Market (RECLAIM) program, for modifications to RECLAIM facilities, and for facilities that increase their allocation to a level greater than their starting allocation plus nontradable credits. The existing AGS is currently subject to the RECLAIM requirements, and AEC will also exceed the major NO_2 modification threshold of 1 lb/day. Therefore, an ambient air quality analysis is required to demonstrate that AEC will not cause a significant increase in the air quality concentration of NO_2, as specified in Rule 2005, Appendix A.

Regulation XVII (PSD). SCAQMD Regulation XVII sets forth preconstruction review requirements for stationary sources to ensure that air quality in clean air areas does not significantly deteriorate, while maintaining a margin for future industrial growth. PSD applies to preconstruction review of new or modified stationary sources that emit more than 100 tpy of federal attainment air contaminants. Note that although the project is not expected to emit more than 100 tpy of PM_{10}, PM_{10} impacts were also evaluated against the significant emissions increase thresholds due to Los Angeles County's new designation as an attainment area for PM_{10}. Based on the emission estimates and attainment designations, NO_2, CO, and PM_{10} are the only attainment pollutants from the AEC that will exceed the thresholds for which dispersion modeling is applicable and will be subject to dispersion modeling requirements.

The dispersion modeling approach and settings used to evaluate the project's NO_x, CO, and PM_{10} impacts for comparison to the NAAQS and CAAQS were also used to determine the PSD near field (Class II) impacts. Table 5.1-34 summarizes the Class II Significant Impact Levels (SILs), Class II PSD increment Standards, and the significant monitoring concentration levels.

[19] ISC-ready data, preprocessed with MPRM, contain the wind speed, wind direction, and stability class for each hour of the year. These data are required to create the Joint Frequency Distribution tables used to calculate the Tier II wind speed and stability class for each area analyzed.

TABLE 5.1-34

PSD Air Quality Impact Standards Applicable to the AEC

Averaging Period/ Pollutant	Significant Impact Level (µg/m³)	PSD Class II Increment Standard (µg/m³)	Significant Monitoring Concentrations (µg/m³)
NO_2 (1-hour)	7.52[a]	N/A	N/A
NO_2 (Annual)	1.0	25	14
CO (1-hour)	2,000	N/A	N/A
CO (8-hour)	500	N/A	575
PM_{10} (24-hour)	5.0	30	10
PM_{10} (Annual)	1.0	17	N/A

[a] The SIL for 1-hour NO_2 is based on SCAQMD correspondence.

Note:

N/A = Not applicable (i.e., no standard)

In addition to addressing the AEC's impacts within the near field, a Class I impact analysis was conducted to demonstrate that the AEC will not cause or contribute to an exceedance of the Class I SIL or PSD Class I Increment Standards and will not adversely affect air quality-related values (AQRV). To evaluate the potential impacts on Class I areas near the AEC site, all Class I areas within 300 km of the AEC were identified. Based on this survey, the San Gabriel Wilderness, which is approximately 53 km from the AEC site, was identified as the nearest Class I area. To address PSD Class I Increment Standards, AERMOD was used with a receptor ring at 50 km from the facility. The ring was spaced in 5-degree increments centered on the AEC site location.

Table 5.1-35 summarizes the Class I SIL and allowable PSD increment consumption. If modeled impacts are below the SILs, then the project would be considered to have negligible impact at the more distant Class I areas.

TABLE 5.1-35

Class I SIL and PSD Class I Increment Standards Applicable to the Project

Averaging Period/ Pollutant	Significant Impact Level (µg/m³)	PSD Class I Increment Standard (µg/m³)
NO_2 (Annual)	0.1	2.5
PM_{10} (24-hour)	0.3	2.0
PM_{10} (Annual)	0.2	1.0

To evaluate the potential impacts on visibility and deposition at the nearest Class I area, the federal Class I area air quality guidance (Federal Land Managers [FLM], 2010) allows an emissions/distance (Q/D) factor of 10 to be used as a screening criterion for sources located more than 50 km from a Class I area. This screening criterion includes all AQRVs. Emissions are calculated as the total SO_2, NO_x, PM_{10}, and sulfuric acid (H_2SO_4) annual emissions (in tpy, based on 24-hour maximum allowable emissions). These emissions are divided by the distance (in km) from the Class I area.

The combined AEC annual emissions of NO_x, SO_2, H_2SO_4, and PM_{10}, calculated using the 24-hour maximum allowable emissions, will be approximately 550 tpy. Therefore, the maximum Q/D for the project will be approximately 10.3 ton/km-year. Because the factor is greater than the federal Class I area air quality screening criterion of 10, visibility and deposition modeling is required for all Class I areas which exceed the screening criterion and any additional Class I areas requested by the FLM. Note that as part of the federal review process running in parallel with the CEC and SCAQMD processes, the results of the visibility and deposition modeling were prepared as a separate document and submitted to the appropriate FLM for

review and approval (see Appendix 5.1G). The *Dispersion Modeling Protocol for Air Quality Related Values at Class I Areas Near the Alamitos Energy Center* (see Appendix 5.1F) was also submitted to the appropriate FLM for review and approval.

5.1.6.4 Air Quality Impact Analysis Results

Construction Impacts Analysis. As discussed previously, construction activities associated with the AEC would overlap with operation of the existing AGS units and operation of the AEC CCGT. As the impacts of these overlap scenarios would result in larger modeled impacts than construction-only, an analysis of impacts from construction activities alone was not conducted. Impacts associated with the overlap scenarios are located later in this section.

Commissioning Impacts Analysis.

Combined-Cycle Turbines. The potential impacts on ambient air quality associated with the AEC commissioning activities were assessed based on engineering estimates of schedule and emissions. As previously discussed, it was assumed that the maximum impact would occur while the two combined-cycle turbines were undergoing simultaneous commissioning activities with the highest unabated emissions presented in Table 5.1-29. Note that the analysis excluded a comparison to the federal 1-hour NO_2 and SO_2 standards because the maximum hourly unabated emission rates that result in the highest predicted concentrations would only occur once during the life of the AEC and that the one time unabated commissioning would be less than 48 hours per turbine.[20] The 1-hour NO_2 and SO_2 standards are also based on 98th and 99th percentile statistical standards, respectively. Therefore, the simultaneous one-time unabated emissions event for both combined-cycle turbines contributing to an exceedance of the NAAQS could not occur.

Table 5.1-36 presents the results of the modeling analysis. As indicated, the maximum predicted CO, NO_2, SO_2, and $PM_{2.5}$ commissioning impacts combined with the background concentrations will be below the ambient air quality standards for each averaging period. For PM_{10}, the background concentrations exceed the CAAQS without adding the respective modeled concentrations. As a result, the predicted impacts combined with the background concentrations would be greater than the CAAQS. However, the commissioning activity would be finite, and the Project Owner will limit the hours of operation required to complete commissioning activities. Additionally, as described in Section 5.1.8.2, Operational Mitigation, the AEC emissions will be fully offset consistent with SCAQMD Rule 1303 through the SCAQMD internal offset bank under SCAQMD Rule 1304(a)(2). Therefore, impacts from commissioning will be less than significant.

TABLE 5.1-36

AEC CCGT Commissioning Impacts Analysis – Maximum Modeled Impacts Compared to the Ambient Air Quality Standards

Pollutant	Averaging Time	Maximum Modeled Concentration, µg/m³ [a]	Background Concentration, µg/m³ [b]	Total Predicted Concentration, µg/m³	CAAQS, µg/m³	NAAQS, µg/m³
CO	1-hour	1,231	3,666	4,897	23,000	40,000
	8-hour	835	2,979	3,814	10,000	10,000
NO_2 [c]	1-hour (max)	67.6	170	238	339	—
	Annual	0.26	39.9	40.2	57	100
SO_2	1-hour (max)	2.06	105	107	655	—
	3-hour	1.65	105	107	—	1,300
	24-hour	0.52	15.7	16.2	105	—
PM_{10}	24-hour	1.71	54.0	55.7	50	150
	Annual	0.21	28.7	28.9	20	—

[20] The highest commissioning emission rates occur during turbine testing at full speed with no load; this commissioning event lasts up to 48 hours.

TABLE 5.1-36

AEC CCGT Commissioning Impacts Analysis – Maximum Modeled Impacts Compared to the Ambient Air Quality Standards

Pollutant	Averaging Time	Maximum Modeled Concentration, µg/m³ [a]	Background Concentration, µg/m³ [b]	Total Predicted Concentration, µg/m³	CAAQS, µg/m³	NAAQS, µg/m³
$PM_{2.5}$	24-hour (98th percentile) [d]	1.25	25.4	26.7	—	35
	Annual	0.21	11.0	11.2	12	12

[a] Maximum modeled concentrations include impacts from commissioning of two GE 7FA.05 turbines and operation of the auxiliary boiler.
[b] Unless otherwise noted, background concentrations were the highest concentrations monitored over the three most recent, available years (see Table 5.1-27).
[c] The maximum 1-hour and annual NO_2 concentrations include ambient NO_2 ratios of 0.80 (EPA, 2011) and 0.75 (EPA, 2005), respectively.
[d] The total predicted concentration for the federal 24-hour $PM_{2.5}$ standard is the 5-year average, high-8th-high modeled concentration combined with the 3-year average, 98th percentile background concentration.

Simple Cyle Turbines. The simple-cycle turbines will be commissioned after the combined-cycle turbines are already in operation. Therefore, it was assumed that the maximum impact would occur while the four simple-cycle turbines were simultaneously undergoing commissioning activities with the highest unabated emissions presented in Table 5.1-30 and the two combined-cycle turbines were simultaneously operating with the steady-state emissions presented in Table 5.1-31. The analysis again excluded a comparison to the federal 1-hour NO_2 and SO_2 standards, as explained above.

Table 5.1-37 presents the results of the modeling analysis. As indicated, the maximum predicted CO, NO_2, SO_2, and $PM_{2.5}$ commissioning impacts combined with the background concentrations will be below the ambient air quality standards for each averaging period. For PM_{10}, the background concentrations exceed the CAAQS without adding the respective modeled concentrations. As a result, the predicted impacts combined with the background concentrations would be greater than the CAAQS. However, the commissioning activity would be finite, and the Project Owner will limit the hours of operation required to complete commissioning activities. Additionally, as described in Section 5.1.8.2, Operational Mitigation, the AEC emissions will be fully offset consistent with SCAQMD Rule 1303 through the SCAQMD internal offset bank under SCAQMD Rule 1304(a)(2). Therefore, impacts from commissioning will be less than significant.

TABLE 5.1-37

AEC SCGT Commissioning Impacts Analysis – Maximum Modeled Impacts Compared to the Ambient Air Quality Standards

Pollutant	Averaging Time	Maximum Modeled Concentration, µg/m³ [a]	Background Concentration, µg/m³ [b]	Total Predicted Concentration, µg/m³	CAAQS, µg/m³	NAAQS, µg/m³
CO	1-hour	470	3,666	4,136	23,000	40,000
	8-hour	240	2,979	3,219	10,000	10,000
NO_2 [c]	1-hour (max)	61.9	170	232	339	—
	Annual	0.20	39.9	40.1	57	100
SO_2	1-hour (max)	2.06	105	107	655	—
	3-hour	1.65	105	107	—	1,300
	24-hour	0.52	15.7	16.2	105	—
PM_{10}	24-hour	1.71	54.0	55.7	50	150
	Annual	0.19	28.7	28.9	20	—
$PM_{2.5}$	24-hour (98th percentile) [c]	1.25	25.4	26.7	—	35
	Annual	0.19	11.0	11.6	12	12

[a] Maximum modeled concentrations include impacts from commissioning of four GE LMS-100 turbines and operation of two GE 7FA.05 turbines and the auxiliary boiler.

TABLE 5.1-37

AEC SCGT Commissioning Impacts Analysis – Maximum Modeled Impacts Compared to the Ambient Air Quality Standards

Pollutant	Averaging Time	Maximum Modeled Concentration, µg/m³ [a]	Background Concentration, µg/m³ [b]	Total Predicted Concentration, µg/m³	CAAQS, µg/m³	NAAQS, µg/m³

[b] Unless otherwise noted, background concentrations were the highest concentrations monitored over the three most recent, available years (see Table 5.1-27).

[c] The maximum 1-hour and annual NO_2 concentrations include ambient NO_2 ratios of 0.80 (EPA, 2011) and 0.75 (EPA, 2005), respectively.

[c] The total predicted concentration for the federal 24-hour $PM_{2.5}$ standard is the 5-year average, high-8th-high modeled concentration combined with the 3-year average, 98th percentile background concentration.

Operation Impacts Analysis. To evaluate the worst-case air quality impacts, each technology was assessed at peak, average, and minimum load at low, average, and high ambient temperatures. Table 5.1-38 presents a comparison of the maximum AEC operational impacts to the CAAQS and NAAQS. As indicated, the maximum predicted CO, NO_2, SO_2, and $PM_{2.5}$ operational impacts combined with the background concentrations will be below the ambient air quality standards for each averaging period. The PM_{10} background concentrations exceed the CAAQS without adding the respective modeled concentration. As a result, the predicted impacts combined with the background concentrations will be greater than the CAAQS. However, as described in Section 5.1.8.2, Operational Mitigation, the AEC emissions will be fully offset consistent with SCAQMD Rule 1303 through the SCAQMD internal offset bank under SCAQMD Rule 1304(a)(2). Therefore, impacts from operation will be less than significant.

TABLE 5.1-38

AEC Operation Impacts Analysis – Maximum Modeled Impacts Compared to the Ambient Air Quality Standards

Pollutant	Averaging Time	Maximum Modeled Concentration, µg/m³	Background Concentration, µg/m³ [a]	Total Predicted Concentration, µg/m³	CAAQS, µg/m³	NAAQS, µg/m³
CO	1-hour	186	3,666	3,852	23,000	40,000
	8-hour	36.0	2,979	3,015	10,000	10,000
NO_2 [b]	1-hour (max)	31.3	170	201	339	—
	1-hour (98th percentile) [c]	22.6	140	163	—	188
	Annual	0.19	39.9	40.1	57	100
SO_2	1-hour (max)	2.06	105	107	655	—
	1-hour (99th percentile) [d]	1.54	33.8	35.3	—	196
	3-hour	1.65	105	107	—	1,300
	24-hour	0.52	15.7	16.2	105	—
PM_{10}	24-hour	1.71	54.0	55.7	50	150
	Annual	0.19	28.7	28.9	20	—
$PM_{2.5}$	24-hour (98th percentile) [c]	1.25	25.4	26.7	—	35
	Annual	0.19	11.0	11.2	12	12

[a] Unless otherwise noted, background concentrations were the highest concentrations monitored over the three most recent, available years (see Table 5.1-27).

[b] The maximum 1-hour and annual NO_2 concentrations include ambient NO_2 ratios of 0.80 (EPA, 2011) and 0.75 (EPA, 2005), respectively.

[c] The total predicted concentration for the federal 1-hour NO_2 and 24-hour $PM_{2.5}$ standard are the respective 5-year average, high-8th-high modeled concentrations combined with the 3-year average, 98th percentile background concentrations.

[d] The total predicted concentration for the federal 1-hour SO_2 standard is the 5-year average, high-4th-high modeled concentration combined with the 3-year average, 99th percentile background concentration.

Rule 2005. The maximum modeled NO_2 concentrations are presented in Table 5.1-39 and are compared to the SCAQMD Rule 2005 significance threshold. Although each combustion emission unit was modeled, the results presented in Table 5.1-39 are only for the emission unit causing the highest modeled concentrations, in this case one combined-cycle turbine. The maximum modeled NO_2 concentrations were also added to representative background concentrations and compared to the state and federal ambient air quality standards for NO_2. The NO_2 concentrations per emission unit are less than the SCAQMD Rule 2005 thresholds and the ambient air quality standards. Therefore, the predicted NO_2 impacts from operation will be less than significant compared to SCAQMD Rule 2005.

TABLE 5.1-39
Rule 2005 Air Quality Thresholds and Standards Applicable to the AEC (per emission unit)

Pollutant/Averaging Time	Maximum Modeled Concentration, µg/m³ [a]	Significant Threshold, µg/m³ [b]	Background Concentration, µg/m³ [c]	Total Predicted Concentration, µg/m³	CAAQS, µg/m³	NAAQS, µg/m³
NO_2 (1-hour)	13.8	20	170	184	339	—
NO_2 (Federal 1-hour)	13.8	N/A	140	156	—	188
NO_2 (Annual)	0.081	1.0	39.9	40.0	57	100

[a] The maximum 1-hour and annual NO_2 concentrations include ambient NO_2 ratios of 0.80 (EPA, 2011) and 0.75 (EPA, 2005), respectively.
[b] Allowable change in air quality concentration per emission unit per SCAQMD Rule 2005, Appendix A.
[c] Background concentrations were the highest concentrations monitored over the three most recent, available years (see Table 5.1-27).

Note:

N/A = Not applicable (i.e., no standard)

Rule XVII (PSD). Table 5.1-40 presents a summary of the predicted 1-hour and 8-hour CO, hourly and annual NO_2, and 24-hour and annual PM_{10} impacts from operation of the AEC, compared to the Class II SILs, Class II PSD Increment Standards, and the significant monitoring concentration levels. This modeling was performed consistent with that performed for the operation impacts analysis, presented in Table 5.1-38.

As shown in Table 5.1-40, the maximum predicted 1-hour CO, 8-hour CO, annual NO_2, 24-hour PM_{10}, and annual PM_{10} impacts from operation of the AEC are below the Class II SILs, Class II PSD Increment Standards, and significant monitoring concentrations. Therefore, additional analysis of 1-hour CO, 8-hour CO, annual NO_2, 24-hour PM_{10}, and annual PM_{10} impacts is not required. However, the maximum predicted 1-hour NO_2 impacts from operation of the AEC exceed the Class II SIL, with a radius of impact with predicted concentrations greater than 7.52 µg/m³ of 1.5 km. Therefore, the cumulative impacts of the AEC and competing sources were assessed, per the methodology described in Section 6.3.2, Tier 2 Analysis, of the *Dispersion Modeling Protocol for the Alamitos Energy Center* (see Appendix 5.1F), for all receptors where the AEC impacts alone exceeded the 1-hour NO_2 SIL.

TABLE 5.1-40
AEC Predicted Impacts Compared to the PSD Air Quality Impact Standards

Pollutant/Averaging Time	Maximum Modeled Concentration, µg/m³	Significant Impact Level, µg/m³	PSD Class II Increment Standard, µg/m³	Significant Monitoring Concentration, µg/m³
CO (1-hour)	186	2,000	N/A	N/A
CO (8-hour)	36.0	500	N/A	575
NO_2 (1-hour) [a]	31.3	7.52 [b]	N/A	N/A
NO_2 (Annual) [a]	0.19	1.0	25	14
PM_{10} (24-hour)	1.71	5.0	30	10
PM_{10} (Annual)	0.19	1.0	17	N/A

TABLE 5.1-40
AEC Predicted Impacts Compared to the PSD Air Quality Impact Standards

Pollutant/Averaging Time	Maximum Modeled Concentration, µg/m³	Significant Impact Level, µg/m³	PSD Class II Increment Standard, µg/m³	Significant Monitoring Concentration, µg/m³

[a] The maximum 1-hour and annual NO_2 concentrations include ambient NO_2 ratios of 0.80 (EPA, 2011) and 0.75 (EPA, 2005), respectively.

[b] The SIL for 1-hour NO_2 is based on SCAQMD correspondence.

Note:

N/A = Not applicable (i.e., no standard)

SCAQMD identified two facilities within 10 km of the AEC for inclusion in the cumulative impact assessment:

- Los Angeles Department of Water and Power, Haynes Generating Station (Facility ID 800074): located in Long Beach, California with 10 emission sources
- Beta Offshore (Facility ID 166073): located in Huntington Beach, California with 13 emission sources

The stack locations, stack parameters, and 1-hour NO_2 emission rates for the emission sources at these two facilities were provided by SCAQMD. Per SCAQMD's request, the Beta Offshore emission sources were modeled as rural sources.

In addition to the above facilities, SCAQMD also requested that emissions from shipping lane activity off the California coast be included in the cumulative impact assessment. SCAQMD provided the relevant locations, source parameters, and 1-hour NO_2 emission rates for the shipping lane activity. Per SCAQMD's request, the shipping lane emission sources were also modeled as rural sources.

The cumulative impacts of the AEC and competing sources were assessed for all receptors where the AEC impacts alone exceeded the 1-hour NO_2 SIL of 7.52 µg/m³. Based on a comparison of these results to the 1-hour NO_2 NAAQS of 188 µg/m³, it was determined that there were receptors where the contributions from the AEC combined with those from competing sources and representative background concentrations exceeded the 1-hour NO_2 NAAQS. Therefore, AERMOD-generated output files were reviewed to assess the contribution of the AEC's emissions at each of the receptors where an exceedance of the 1-hour NO_2 NAAQS was modeled. The files show that the maximum contribution from the AEC to any modeled exceedance was less than the 1-hour NO_2 Class II SIL of 7.52 µg/m³. Therefore, the AEC's contribution to each modeled exceedance is less than significant and would not cause or contribute to any modeled exceedance of the 1-hour NO_2 NAAQS.

A summary of the dispersion modeling input files for this analysis, as well as the modeling parameters used, are presented in Appendix 5.1C. The AERMOD input and output files are included with this submission on compact disc.

Table 5.1-41 presents a summary of the predicted annual NO_2, 24-hour PM_{10}, and annual PM_{10} impacts and a comparison to the PSD Class I Increment Standards. As shown, the predicted impacts from operation of the AEC are below the SILs. Therefore, the AEC would have a negligible impact at the more distant Class I areas.

TABLE 5.1-41
AEC Predicted Impacts Compared to the Class I SIL and PSD Class I Increment Standards

Pollutant/Averaging Time	Maximum Modeled Concentration at 50 km, µg/m³	Significant Impact Level, µg/m³	PSD Class I Increment Standard, µg/m³
NO_2 (Annual) [a]	0.0046	0.1	2.5
PM_{10} (24-hour)	0.056	0.3	2.0
PM_{10} (Annual)	0.0046	0.2	1.0

[a] The annual NO_2 concentration includes an ambient NO_2 ratio of 0.75 (EPA, 2005).

Class II Visibility Impacts Analysis. As requested, a visibility analysis for Class II areas within 50 km of the AEC was performed using the VISCREEN plume modeling program per the procedures outlined in the *Workbook for Plume Visual Impact Screening and Analysis* (EPA, 1992). Please note that Tier I and II assessments were conducted using criterion for Class I areas, as no criteria exist for Class II areas. Therefore, the visibility assessment was conducted using overly conservative assumptions for Class II areas. However, even using the conservative approach, the modeled results from the visual assessment demonstrates that AEC would not adversely affect visibility at nearby Class II Areas.

Table 5.1-42 summarizes the VISCREEN Tier I modeled results for each Class II area evaluated.[21] The maximum modeled values for color difference and contrast are presented for inside the area analyzed, regardless of the VISCREEN modeled lines of sight for the observer.

TABLE 5.1-42
AEC Tier I VISCREEN Results

Class II Area	Minimum Distance	Maximum Distance	Variable	Sky	Terrain	Criteria[a]
Crystal Cove State Park	30.3 km	35.5 km	Color Difference	1.001	1.889	2.0
			Contrast	-0.011	0.016	|0.05|
Water Canyon/Chino Hills State Park	29.6 km	42.2 km	Color Difference	1.384	1.946	2.0
			Contrast	-0.014	0.016	|0.05|
Kenneth Hahn State Park	34.6 km	37.3 km	Color Difference	0.809	1.59	2.0
			Contrast	-0.009	0.014	|0.05|

[a] Levels of concern for Class I areas were used because no specific requirements or criteria exist for assessing Class II visibility impacts (FLM, 2010).

As shown in Table 5.1-42, the VISCREEN Tier I assessment for each Class II area did not exceed the criterion for color difference or contrast. Because the modeled results are below the conservative Class I area criterion for both color difference and contrast, the AEC would not adversely affect visibility at nearby Class II areas. The VISCREEN input and output files have been separately prepared and are included on the attached modeling compact disc.

Fumigation Impacts Analysis. A meteorological condition that can produce high concentrations of ground-level pollutants is referred to as shoreline or inversion breakup fumigation. Inversion breakup fumigation occurs when a plume is emitted into a stable layer of air and that layer is then mixed to the ground in a short period of time through convective heating and microscale turbulence. Shoreline fumigation occurs when a plume is emitted into a stable layer of air and is then mixed to the surface as a result of advection of the air mass to less stable surroundings. Under both conditions, an exhaust plume may be drawn to the ground with little diffusion, causing high ground-level pollutant concentrations, although typically for periods less than 1 hour.

In some cases, the fumigation impacts can be greater than impacts predicted with the AERMOD model. To verify that fumigation impacts do not result in higher ambient air quality impacts, fumigation modeling was conducted. The effects of fumigation on the maximum modeled impacts were evaluated using the EPA AERSCREEN model (Version 15181), as requested by the CEC. The results of the fumigation modeling were based on the respective loads and operating scenarios which were identified in the operational ambient air

[21] The Class II areas for evaluation were presented in the *Dispersion Modeling Protocol for the Alamitos Energy Center* (see Appendix 5.1F), submitted to SCAQMD in September 2015.

quality impact analysis as the worst-case impact scenarios for each combination of pollutant and averaging time. Regulatory default mixing heights were selected.

The AEC combined- and simple-cycle turbines are located more than 3,000 meters away from the shoreline. However, for modeling purposes, all emission sources were conservatively assumed to be located at the auxiliary boiler distance of 2,960 meters from the shoreline. These conservative model inputs into AERSCREEN resulted in no fumigation occurrences since the plume heights were below the thermal internal boundary layer (TIBL) heights for the distance to shoreline of 2,960 meters. With no fumigation occurrences, no fumigation impacts are expected from AEC operation. The AERSCREEN fumigation model inputs and outputs are included with this submission on compact disc.

Overlap Impacts Analysis. As discussed previously, construction activities associated with the AEC would overlap with operation of the existing AGS units and operation of the AEC CCGT. Based on the proposed schedule for construction, commissioning, and operation, two scenarios were selected for inclusion in the AEC overlap impacts analysis:

- Combined-Cycle Power Block construction with simultaneous operation of existing AGS Units 1-6.
- Simple-cycle Power Block construction with simultaneous operation of the AEC CCGT and existing AGS Units 3, 4, and 6.

Although other potential overlap scenarios were identified, they were either previously evaluated or were not considered to result in the worst possible air quality impacts. Specifically:

- Operation of the AEC CCGT is expected to overlap with commissioning of the AEC SCGT. However, those impacts were previously addressed through the commissioning impacts analysis.

Overlap Scenario 1. The first overlap scenario is intended to determine modeled impacts from the simultaneous construction of the AEC CCGT and operation of the existing AGS Units 1-6. To evaluate the air quality impacts from this scenario, the maximum short-term and annual emissions rates from construction of the AEC CCGT (see Table 5.1A.19 of Appendix 5.1A) were modeled in combination with the maximum rolling 24-month emissions from 2008 – 2012 from each AGS unit. The AERMOD modeling setup for this scenario is presented in Figure 5.1C-6 of Appendix 5.1C.

Table 5.1-43 presents a comparison of the maximum modeled concentrations to the CAAQS and NAAQS. As indicated, the maximum predicted CO, NO_2, SO_2, and $PM_{2.5}$ operational impacts combined with the background concentrations will be below the ambient air quality standards for each averaging period. The PM_{10} background concentrations exceed the CAAQS without adding the respective modeled concentration. As a result, the predicted impacts combined with the background concentrations will be greater than the CAAQS. However, as described in Section 5.1.8, Mitigation Measures, the AEC emissions will be fully offset and/or reduced through implementation of fugitive dust control measures. Therefore, construction of the AEC CCGT concurrent with operation of the existing AGS Units 1-6 will be less than significant with mitigation.

TABLE 5.1-43

Maximum Modeled Impacts from Combined-cycle Gas Turbine Construction and Operation of Existing AGS Units 1-6

Pollutant	Averaging Time	Maximum Modeled Concentration, µg/m³	Background Concentration, µg/m³ [a]	Total Predicted Concentration, µg/m³	CAAQS, µg/m³	NAAQS, µg/m³
CO	1-hour	277	3,666	3,943	23,000	40,000
	8-hour	183	2,979	3,162	10,000	10,000
NO_2 [b]	1-hour (max)	12.7	170	183	339	—
	1-hour (98th percentile) [c]	12.5	140	152	—	188
	Annual	1.87	39.9	41.8	57	100

TABLE 5.1-43

Maximum Modeled Impacts from Combined-cycle Gas Turbine Construction and Operation of Existing AGS Units 1-6

Pollutant	Averaging Time	Maximum Modeled Concentration, µg/m³	Background Concentration, µg/m³ [a]	Total Predicted Concentration, µg/m³	CAAQS, µg/m³	NAAQS, µg/m³
SO_2	1-hour (max)	1.59	105	1.70	655	—
	1-hour (99th percentile) [d]	1.24	33.8	35.0	—	196
	3-hour	1.24	105	106	—	1,300
	24-hour	0.45	15.7	16.1	105	—
PM_{10}	24-hour	7.31	54.0	61.3	50	150
	Annual	2.08	28.7	30.8	20	—
$PM_{2.5}$	24-hour (98th percentile) [c]	1.60	25.4	27.0	—	35
	Annual	0.67	11.0	11.6	12	12

[a] Unless otherwise noted, background concentrations were the highest concentrations monitored over the three most recent, available years (see Table 5.1-27).

[b] The maximum 1-hour and annual NO_2 concentrations include ambient NO_2 ratios of 0.80 (EPA, 2011) and 0.75 (EPA, 2005), respectively.

[c] The total predicted concentration for the federal 1-hour NO_2 and 24-hour $PM_{2.5}$ standard are the respective 5-year average, high-8th-high modeled concentrations combined with the 3-year average, 98th percentile background concentrations.

[d] The total predicted concentration for the federal 1-hour SO_2 standard is the 5-year average, high-4th-high modeled concentration combined with the 3-year average, 99th percentile background concentration.

Overlap Scenario 2. The second overlap scenario is intended to determine modeled impacts from the construction of the AEC SCGT and simultaneous operation of the AEC CCGT and existing AGS Units 3, 4, and 6. To evaluate the air quality impacts from this scenario, the maximum short-term and annual emissions rates from construction of the AEC SCGT from Table 5.1A.19 of Appendix 5.1A were modeled in combination with the AEC CCGT operating scenarios resulting in maximum predicted impacts and the maximum rolling 24-month emissions from 2008 – 2012 from each AGS unit. The AERMOD modeling setup for this scenario is presented in Figure 5.1C-7 of Appendix 5.1C.

Table 5.1-44 presents a comparison of the maximum modeled concentrations to the CAAQS and NAAQS. As indicated, the maximum predicted CO, NO_2, SO_2, and $PM_{2.5}$ operational impacts combined with the background concentrations will be below the ambient air quality standards for each averaging period. The PM_{10} background concentrations exceed the CAAQS without adding the respective modeled concentration. As a result, the predicted impacts combined with the background concentrations will be greater than the CAAQS. However, as described in Section 5.1.8, Mitigation Measures, the AEC emissions will be fully offset and/or reduced through implementation of fugitive dust control measures. Therefore, construction of the AEC SCGT and operation of the combined-cycle Power Block 2 and existing AGS Units 3, 4, and 6 will be less than significant with mitigation.

TABLE 5.1-44

Maximum Modeled Impacts from AEC SCGT Construction and Operation of AEC CCGT and Existing AGS Units 3, 4, and 6

Pollutant	Averaging Time	Maximum Modeled Concentration, µg/m³	Background Concentration, µg/m³ [a]	Total Predicted Concentration, µg/m³	CAAQS, µg/m³	NAAQS, µg/m³
CO	1-hour	234	3,666	3,900	23,000	40,000
	8-hour	105	2,979	3,084	10,000	10,000
NO_2 [b]	1-hour (max)	31.2	170	201	339	—
	1-hour (98th percentile) [c]	25.6	140	166	—	188
	Annual	0.93	39.9	40.8	57	100

TABLE 5.1-44

Maximum Modeled Impacts from AEC SCGT Construction and Operation of AEC CCGT and Existing AGS Units 3, 4, and 6

Pollutant	Averaging Time	Maximum Modeled Concentration, µg/m³	Background Concentration, µg/m³ [a]	Total Predicted Concentration, µg/m³	CAAQS, µg/m³	NAAQS, µg/m³
SO_2	1-hour (max)	2.29	105	107	655	—
	1-hour (99th percentile) [d]	2.12	33.8	35.9	—	196
	3-hour	2.06	105	107	—	1,300
	24-hour	0.70	15.7	16.4	105	—
PM_{10}	24-hour	12.8	54.0	66.9	50	150
	Annual	2.24	28.7	30.9	20	—
$PM_{2.5}$	24-hour (98th percentile) [c]	4.93	25.4	30.3	—	35
	Annual	0.76	11.0	11.7	12	12

[a] Unless otherwise noted, background concentrations were the highest concentrations monitored over the three most recent, available years (see Table 5.1-27).

[b] The maximum 1-hour and annual NO_2 concentrations include ambient NO_2 ratios of 0.80 (EPA, 2011) and 0.75 (EPA, 2005), respectively.

[c] The total predicted concentration for the federal 1-hour NO_2 and 24-hour $PM_{2.5}$ standard are the respective 5-year average, high-8th-high modeled concentrations combined with the 3-year average, 98th percentile background concentrations.

[d] The total predicted concentration for the federal 1-hour SO_2 standard is the 5-year average, high-4th-high modeled concentration combined with the 3-year average, 99th percentile background concentration.

5.1.7 Cumulative Effects

As of October 23, 2015, the Project Owner has requested an updated list of projects that are within a 6-mile radius of the AEC and are either currently in the permitting process, undergoing CEQA review, or recently received a Permit to Construct (PTC) from the SCAQMD. The Project Owner will work with SCAQMD through the end of 2015 to collect the requested information. The Project Owner will compile a source list based on the information obtained through the end of 2015, making conservative assumptions as necessary, and provide the source list to the CEC for review in January 2016. Specifically, the Project Owner would value the CEC's input on the appropriateness of excluding specific sources (sources with negligible emissions, administrative permit amendments with no increase in air emissions, and VOC sources) and selecting modeled scenarios.[22] Following receipt of CEC comments, the source list will be finalized and a cumulative air quality impact analysis will be prepared using the methodology presented in the *Dispersion Modeling Protocol for the Alamitos Energy Center* (see Appendix 5.1F) within 30 days.

5.1.8 Mitigation Measures

5.1.8.1 Construction Mitigation

SCAQMD Rule 403 requires the implementation of best mitigation practices to control fugitive dust.[23] Construction impacts will be further reduced with the implementation of a construction fugitive dust and diesel-fueled engine control plan. This plan will focus on reducing construction air quality impacts and will include the following construction mitigation measures:

- Watering unpaved roads three times per day
- During construction, watering areas disturbed by grading and bulldozing activities every 3 hours

[22] Emergency equipment is normally permitted for fewer than 50 testing hours per year. It is highly unlikely that these tests would coincide with the simultaneous startup of all six AEC turbines. Therefore, emergency equipment are not expected to be modeled for comparison to any 1-hour state or federal standards. These equipment will, however, be included in the modeling for all other averaging periods.

[23] Best Available Control Measures means fugitive dust control actions that are set forth in Table 1 of Rule 403.

- Limiting onsite vehicle speeds to 10 miles per hour, or other speeds as approved by the CEC's Compliance Project Manager based on site conditions, and posting the approved speed limit
- Sweeping onsite paved roads and entrance roads on an as-needed basis
- Replacing ground cover in disturbed areas as soon as practical
- Covering truck loads when hauling material that could be entrained during transit
- Applying dust suppressants or covers to soil stockpiles and disturbed areas when inactive for more than 2 weeks
- Use of Tier 4 final construction equipment, to the extent feasible
- Maintaining all diesel-fueled equipment per manufacturer's recommendations to reduce tailpipe emissions
- Limiting diesel heavy equipment idling to less than 5 minutes, to the extent practical
- Using electric motors for construction equipment, to the extent feasible

5.1.8.2 Operational Mitigation

During operations, the preferable mitigation measure is to avoid or minimize, to the extent feasible, potential air emissions before they are emitted. This is accomplished by the careful design of the project, including the installation of BACT to minimize air emissions. Air quality impacts will be further mitigated by providing emission offsets in the quantity expected to be emitted. The remainder of this section describes the BACT analysis and the emission offset mitigation.

BACT Analysis

Based on the SCAQMD's BACT definition and major source thresholds (SCAQMD Rules 1302 and 1303), a BACT analysis is required for the uncontrolled emissions of NO_x, VOC, CO, SO_2, PM_{10}, and $PM_{2.5}$. EPA also requires a BACT analysis for the emissions of GHGs as part of the PSD permit application required under the EPA GHG Tailoring Rule.

The AEC relies on the response characteristics of the GE combustion turbines and auxiliary boiler to provide a wide range of efficient, operationally flexible, fast-start, fast-ramping capacity to allow for the efficient integration of renewable energy sources into the California electrical grid. The proposed AEC emission limits are presented in Table 5.1-45.

TABLE 5.1-45
Proposed BACT Emission Limits for the AEC

Pollutant	Emission Limits (at 15% O_2)		
	One GE 7FA.05 [a]	One GE LMS-100PB [b]	One Auxiliary Boiler [c]
VOC	2 ppmv (averaged over 1-hour)	2 ppmv (averaged over 1-hour)	0.28 lb/hr
CO	2 ppmv (averaged over 1-hour)	4 ppmv (averaged over 1-hour)	50 ppmv (averaged over 1-hour)
NO_x	2 ppmv (averaged over 1-hour)	2.5 ppmv (averaged over 1-hour)	5 ppmv (averaged over 1-hour)
SO_x	<0.75 grain of sulfur per 100 dry standard cubic feet of natural gas		0.048 lb/hr
$PM_{10/2.5}$	8.50 lb/hr	6.23 lb/hr	0.30 lb/hr
Ammonia	5 ppmv	5 ppmv	5 ppmv
GHG [d]	784 lb CO_2/MWh (Net)	1,138 lb CO_2/MWh (Net)	N/A

[a] Maximum values are for each turbine at an ambient temperature of 28°F and excludes startups and shutdowns.

[b] Maximum values are for each turbine at an ambient temperature of 65.3°F and excludes startups and shutdowns.

[c] Maximum hourly emission rates assume 100 percent load.

TABLE 5.1-45

Proposed BACT Emission Limits for the AEC

Pollutant	Emission Limits (at 15% O_2)		
	One GE 7FA.05 [a]	One GE LMS-100PB [b]	One Auxiliary Boiler [c]

[d] Includes an 8 percent degradation.

Notes:

N/A = Not applicable (i.e., BACT analysis not required)

lb/MWh = pound(s) per megawatt-hour

As shown in Table 5.1-45, the proposed BACT for NO_x emissions from all three combustion sources will be achieved through the use of dry, low NO_x combustors with SCR. The proposed BACT for CO and VOC emissions from the combined- and simple-cycle turbines will be achieved through best combustion design and the installation of oxidation catalyst systems. The proposed BACT for CO emissions from the auxiliary boiler will be achieved through good combustion design and the use of dry, low NO_x burner. The proposed BACT for $PM_{10}/PM_{2.5}$ emissions from all three combustion sources will be achieved through best combustion practice, use of pipeline-quality natural gas, and use of inlet air filtration (for the combustion turbines). The proposed BACT for SO_2 emissions from all three combustion sources will be achieved through the exclusive use of pipeline-quality natural gas with a fuel sulfur content of less than 0.75 grain per 100 dscf. The top-down BACT assessment for criteria pollutants is included in Appendix 5.1D.

GHG pollutants are emitted during the combustion process when fossil fuels are burned. One of the possible ways to reduce GHG emissions from fossil fuel combustion is to use inherently lower GHG-emitting fuels and to minimize the use of fuel. These objectives are achieved in this case by using thermally efficient CTGs, with well-designed HRSGs and STGs to generate additional power from the heat of the CTG exhaust.

The performance of all CTGs degrades over time. Typically, turbine degradation at the time of recommended routine maintenance is up to 10 percent. Additionally, thermal efficiency can vary significantly with combustion turbine turndown and steam turbine operational combinations. Finally, annual metrics for output-based limits on GHG emissions are affected by startup and shutdown periods because fuel is combusted before useful output of energy or steam. Therefore, the annual average thermal efficiency performance of any turbine will be less than the optimal efficiency of a new turbine operating continuously at peak load over the lifetime of the turbine.

Based on the top-down GHG BACT analysis included in Appendix 5.1D, the only feasible and cost-effective option is the "Thermal Efficiency" option, which therefore was selected as the BACT. The GHG BACT calculation for the AEC was determined in lb CO_2e/MWh of energy output (on a gross basis) and includes the inherent degradation in turbine performance over the lifetime of the AEC. The AEC has concluded that the BACT for GHG emissions is an emission rate of 784 lb CO_2/MWh of net energy output (including startups and shutdowns) for the AEC CCGT, 1,138 lb/CO_2/MWh of net energy output (including startups and shutdowns) for the AEC SCGT, and a facility-wide annual CO_2e emission limit of 1,572,593 metric tons per year (MT/yr).[24] Degradation over time and turndowns, startups, and shutdowns are incorporated into these limits.

Emission Offsets. The project would be required to provide emission offsets for PM_{10}, SO_2, and VOC emissions and RTCs for NO_x emissions under SCAQMD Rules 1303 and 2005. Under SCAQMD Rule 1304(a)(2), the AEC is not required to provide SCAQMD Rule 1303 offsets for emissions from the combined- and simple-cycle turbines because they are considered a replacement for the existing electric utility steam boilers with no increase in energy output rating. Although the requirement to provide offsets for these units is still applicable, it is the responsibility of the SCAQMD to surrender offsets consistent with

[24] CO_2e emission limit includes approximately 14 MT/yr from operation of four generator circuit breakers, five 230-kilovolt transmission breakers, and three 18-kilovolt transmission breakers (see Appendix 5.1B for calculation details).

SCAQMD Rule 1303. AES plans to enable 1,094.7 MW of new generation under SCAQMD Rule 1304(b)(2) by permanently retiring AGS Units 1 and 2 (175 MW each), Unit 3 (320 MWs), and Unit 5 (480 MW each) for a total of 1,150 MWs of retirements.

Unlike the combustion turbines, the AEC's auxiliary boiler is not eligible for offsets exemption under SCAQMD Rule 1304(a)(2). Therefore, the Project Owner has secured sufficient VOC and PM_{10} emission reduction credits to offset the auxiliary boiler's emissions at a 1.2-to-1 ratio, consistent with SCAQMD Rule 1303(b)(2). The auxiliary boiler will require 5 lbs of PM10 and ROG ERCs respectively. The average daily emissions, calculated as the monthly emissions divided by 30, are presented in Table 5.1B.11 of Appendix 5.1B. The SCAQMD Rule 1304 offset exemption does not extend to Regulation XX RTC, and the Project Owner currently has sufficient NO_x RTCs allocations for the various years of operation and commissioning, as outlined in Table 5.1-46.

TABLE 5.1-46

SCAQMD NO_x RECLAIM Requirements

Operation Phase	NO_x Offsets Required
Combined-cycle Power Block Commissioning and Operation [a]	215,840 lb/yr NO_x RTCs
Combined-cycle Power Block Operation [b]	160,646 lb/yr NO_x RTCs
Combined-cycle Power Block Operation and Simple-cycle Power Block Commissioning and Operation [c]	288,510 lb/yr NO_x RTCs
Combined-cycle Power Block and Simple-cycle Power Block Operation [d]	265,621 lb/yr NO_x RTCs

[a] RTCs estimate includes commissioning activities plus 500 startups and shutdowns per year and 4,100 hours of turbine operation at 100 percent load, 65.3°F.

[b] RTCs estimate includes 500 startups and shutdowns per year and 4,100 hours of turbine operation at 100 percent load, 65.3°F.

[c] RTCs estimate includes simple-cycle Power Block commissioning activities plus 500 startups and shutdowns per simple-cycle turbine per year and 2,000 hours of simple-cycle turbine operation at 100 percent load, 65.3°F. RTCs estimate also includes combined-cycle turbine operation per footnote b.

[d] RTCs estimate include only operation activities, per footnotes b and c.

The AEC is also subject to SCAQMD Rule 1304.1, which will require the payment of fees to generate air quality improvements within the project area consistent with the SCAQMD's approved Air Quality Management Plan.

5.1.9 Laws, Ordinances, Regulations, and Standards

The Clean Air Act (CAA), implemented by EPA, requires major new and modified stationary sources of air pollution to obtain a construction permit prior to commencing construction through a program known as the federal New Source Review (NSR) program. The requirements of the NSR program are dependent on whether the air quality in the area where the new source (or modified source) is being located attains the NAAQS. The program that applies in areas that are in attainment of the NAAQS is the PSD. The program that applies to areas where the air does not meet the NAAQS (termed nonattainment areas) is the nonattainment NSR.

EPA implements the NSR program through regional offices. Arizona, California, Hawaii, Nevada, and specific Pacific trust territories are administrated out of the EPA Region IX office in San Francisco. EPA typically delegates its NSR, Title V, and Title IV authority to local air quality agencies that have sufficient regulatory structure to implement these programs consistent with requirements of the CAA and implementing regulations. SCAQMD has been delegated several of these programs, including the authority to administer the PSD program.

ARB was established by the state legislature in 1967 with the purpose of attaining and maintaining healthy air quality, conducting research into causes and solutions to air pollution, and addressing the impacts that motor vehicles have on air quality. To this end, ARB implements the following programs:

- Establish and enforce motor vehicle emission standards, including fuel standards.
- Monitor, evaluate, and set health-based air quality standards.
- Conduct research to solve air pollution problems.
- Establish TAC control measures.
- Oversee and assist local air quality districts.

Air quality management districts and air pollution control districts were established based on meteorological and topographical factors. The districts were established to enforce air pollution regulations for the purpose of attaining and maintaining all state and federal ambient air quality standards. The districts regulate air emissions by issuing air permits to stationary sources of air pollution in compliance with approved regulatory programs. Each district promulgates rules and regulations specific to air quality issues within its jurisdiction. The air emissions sources regulated by each district vary. The types of air pollution sources that might be regulated include manufacturers, power plants, refineries, gasoline service stations, and auto body shops.

The applicable LORS and compliance with these requirements are discussed in more detail in the following sections. Applicable PTC forms have been prepared in conjunction with this AFC and are included in Appendix 5.1E.

5.1.9.1 Federal LORS

EPA promulgates and enforces federal air quality regulations, with Region IX administering the federal air programs in California. The federal CAA provides the legal authority to regulate air pollution from stationary sources. The applicable federal regulations are summarized in Table 5.1-47, along with the agency responsible for administration of the regulation.

TABLE 5.1-47

Applicable Federal Laws, Ordinances, Regulations, and Standards for Protection of Air Quality

LORS	Purpose	Regulating Agency	Applicability/Compliance Strategy
Title 40 CFR Part 50	Establishes ambient air quality standards for criteria pollutants.	EPA Region IX	The Project Owner conducted a dispersion modeling analysis to determine if the project would exceed the state or federal ambient air quality standards. Dispersion modeling indicates that the project will not exceed the state or federal ambient air quality standards for the attainment pollutants during normal operations. Nonattainment pollutant emissions will be mitigated consistent with SCAQMD's State Implementation Plan-Approved NSR program.
Title 40 CFR Part 51, NSR (SCAQMD Regulation XIII)	Requires preconstruction review and permitting of new or modified stationary sources of air pollution to allow industrial growth without interfering with the attainment and maintenance of ambient air quality standards.	SCAQMD with EPA Region IX Oversight	Requires NSR facility permitting for construction or modification of specified stationary sources. NSR applies to pollutants for which ambient concentration levels are higher than NAAQS. The NSR requirements are implemented at the local level with EPA oversight (SCAQMD Regulation XIII). A PTC and Permit to Operate (PTO) application will be obtained from SCAQMD prior to construction of the project. As a result, the compliance requirements of 40 CFR 51 will be met.
Title 40 CFR Part 52, PSD	Allows new sources of air pollution to be constructed, or existing sources to be modified in areas classified as attainment, while preserving the existing ambient air quality levels, protecting public health and welfare, and protecting Class I Areas (e.g., national parks and wilderness areas).	SCAQMD with EPA Region IX Oversight	The PSD requirements apply on a pollutant-specific basis to any project that is a new major stationary source or a major modification to an existing major stationary source. SCAQMD classifies an unlisted source (which is not in the specified 28 source categories) that emits or has the potential to emit 250 tpy of any pollutant regulated by the CAA as a major stationary source. For listed sources, the threshold is 100 tpy. NO_x, VOC, or SO_2 emissions from a modified major source are subject to PSD if the cumulative emission increases for either pollutant exceeds 40 tpy. In addition, a modification at a nonmajor source is subject to PSD if the modification itself would be considered a major source. In May 2010, EPA issued the GHG permitting rule officially known as the "Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule" (GHG Tailoring Rule), in which EPA defined six GHG pollutants (collectively combined and measured as CO_2e) as NSR-regulated pollutants. Under the GHG Tailoring Rule, new projects that emit GHG pollutants above certain threshold levels would be subject to PSD permitting beginning in July 2011. However, in July 2014, the U.S. Supreme Court ruled that EPA could not regulate GHG emissions alone. As a result, new sources with a GHG potential to emit (PTE) equal to or greater than 100,000 tpy of CO_2e are no longer required to obtain a PSD permit specifically for GHG emissions. If the new source would require a PSD permit as a result of criteria pollutant PTE, a BACT analysis to evaluate GHG emissions control would still be required. The AEC is a natural-gas-fired, combined-cycle and simple-cycle, air-cooled electrical generating facility with an auxiliary boiler and would be considered one of the 28 source categories. Therefore, the emission rates were compared to the 100-tpy threshold. As shown in Table 5.1-23, the emission increases in CO and NO_x would exceed the 100-tpy threshold.

TABLE 5.1-47

Applicable Federal Laws, Ordinances, Regulations, and Standards for Protection of Air Quality

LORS	Purpose	Regulating Agency	Applicability/Compliance Strategy
			Therefore, the AEC would be subject to PSD analysis requirements for CO and NO_x. Since the project exceeds the PSD thresholds for several criteria pollutants, a BACT analysis for GHG emissions control is required. A PSD application was submitted to the SCAQMD and EPA as part of the PTA, which included a BACT analysis for GHG emissions control.
Title 40 CFR Part 60 Subpart KKKK (SCAQMD Rule IX)	Establishes national standards of performance for new or modified facilities in specific source categories.	SCAQMD with EPA Region IX Oversight	40 CFR 60 Subpart KKKK—NO_x Emission Limits for New Stationary Combustion Turbines applies to all new combustion turbines that commence construction, modification, or reconstruction after February 18, 2005. The rule requires natural-gas-fired turbines with a heat input greater than 850 MMBtu/hr to meet a NO_x emission limit of 15 ppm at 15 percent O_2, and an SO_2 limit of 0.060 lb/MMBtu. Alternatively, a fuel sulfur limit of 500 part(s) per million by weight (ppmw) could be met. Stationary combustion turbines regulated under this subpart would be exempt from the requirements of Subpart GG. The proposed combined- and simple-cycle turbines will use dry low NO_x combustors along with an SCR system and pipeline-quality natural gas, and will comply with both the NO_x and SO_2 limits. The NO_x emissions from the combined- and simple-cycle turbines will be 2 ppmvd and 2.5 ppmvd at 15 percent O_2, respectively; the SO_2 emissions from the combined- and simple-cycle turbines will be and 0.0021 lb/MMBtu and 0.0018 lb/MMBtu, respectively. The certified NO_x Continuous Emission Monitoring System (CEMS) will ensure compliance with the standard. Records of natural gas use and fuel sulfur content will ensure compliance with the SO_2 limit.
Title 40 CFR Part 60, Subpart Dc (SCAQMD Regulation IX)	Establishes national standards of performance for new or modified facilities in specific source categories.	SCAQMD with EPA Region IX Oversight	40 CFR 60 Subpart Dc – Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units applies to steam generating units with design heat input rates between 10 and 100 MMBtu/hr that were installed after June 9, 1989. Because the AEC's auxiliary boiler will be fired exclusively on natural gas, the Project Owner will only be required to maintain monthly fuel consumption records for a minimum of two years.

TABLE 5.1-47

Applicable Federal Laws, Ordinances, Regulations, and Standards for Protection of Air Quality

LORS	Purpose	Regulating Agency	Applicability/Compliance Strategy
Title 40 CFR Part 60, Subpart TTTT	Establishes a new source performance standard for electrical generating facilities.	SCAQMD with EPA Region IX Oversight	EPA promulgated New Source Performance Standard Subpart TTTT, which includes two potentially applicable GHG emission limits for newly constructed combustion turbines. A newly constructed or reconstructed stationary combustion turbine that supplies more than its design efficiency times its potential electric output as net-electric sales on a 3-year rolling average basis and combusts more than 90 percent natural gas on a heat input basis on a 12-operating-month rolling average basis must meet a limit of 450 kilograms (kg) of CO_2 per MWh of gross energy output (1,000 lb CO_2/MWh), or 470 kg of CO_2 per MWh of net energy output (1,030 lb CO_2/MWh). A newly constructed or reconstructed stationary combustion turbine that supplies its design efficiency times its potential electric output or less as net-electric sales on a 3-year rolling average basis and combusts more than 90 percent natural gas on a heat input basis on a 12-operating-month rolling average basis must meet a limit of 50 kg CO_2 per gigajoule (GJ) of heat input (120 lb CO_2/MMBtu). The applicable emission standard depends on whether a combustion turbine sells more electricity than its potential electrical output, which is calculated by multiplying the design efficiency and the potential electrical output, and combusts more than 90 percent natural gas. Assuming the combined-cycle Power Block will generate more electricity than the potential electrical output, the AEC will need to comply with the 1,000 lb CO_2/MWh emission limit. The AEC is exclusively fueled by natural gas with an AEC CCGT design efficiency of approximately 56 percent. The AEC's combined-cycle GHG efficiency is estimated at 784 lb CO_2/MWh (net), assuming an 8 percent performance degradation, which clearly complies with Subpart TTTT's emission limit of 1,000 lb CO_2/MWh. The AEC SCGT design efficiency is 41 percent and the potential AEC simple-cycle Power Block's electrical output threshold is 1,436,640 MWh-Net (based on the design efficiency of 41 percent and the net electrical output of 400 MW for 8,760 hours per year). The AEC simple-cycle Power Block's potential annual net electric sales are 943,200 MWh-Net, assuming 400 MWs-Net of generation and 2,358 hours per year of operation (2,000 operating hours plus 500 startup and shutdowns). Since the annual net electric sales are less than the electric output threshold, the AEC SCGT must comply with Subpart TTTT emission limit of 50 kg CO_2 per GJ of heat input (120 lb CO_2/MMBtu). As a natural-gas-fired facility, the AEC is expected to emit CO_2 at a rate of 117 lb CO_2/MMBtu, thereby complying with the applicable emission limit in Subpart TTTT.

TABLE 5.1-47

Applicable Federal Laws, Ordinances, Regulations, and Standards for Protection of Air Quality

LORS	Purpose	Regulating Agency	Applicability/Compliance Strategy
Title 40 CFR Part 63	Establishes national emission standards to limit emissions of hazardous air pollutants (HAP) or air pollutants identified by EPA as causing or contributing to the adverse health effects of air pollution but for which NAAQS have not been established from facilities in specific categories.	SCAQMD with EPA Region IX Oversight	40 CFR 63—National Emission Standards for Hazardous Air Pollutants (NESHAP) for Source Categories establishes emission standards to limit emissions of HAPs from specific source categories for Major HAP sources. Sources subject to 40 CFR 63 requirements must either use the maximum achievable control technology (MACT), be exempted under 40 CFR 63, or comply with published emission limitations. The potential NESHAP applicable to the project is Subpart YYYY, which sets a formaldehyde emission limit or an operational limit of 91 parts per billion by volume (ppbv) for turbines. Projects would be subject to the 40 CFR 63 requirements if the HAP PTE is greater or equal to 25 tpy for combined HAPs and 10 tpy for individual HAPs. As shown in Section 5.9 (Public Health), the project would not exceed the major source thresholds for HAPs (10 tpy for any one pollutant or 25 tpy for all HAPs combined). Therefore, the AEC would be less than the 40 CFR 63 applicability threshold.
Title 40 CFR Part 64 (Compliance Assurance Monitoring [CAM] Rule)	Establishes onsite monitoring requirements for emission control systems.	SCAQMD with EPA Region IX Oversight	40 CFR 64—CAM requires facilities to monitor the operation and maintenance of emissions control systems and report any control system malfunctions to the appropriate regulatory agency. If an emission control system is not working properly, the CAM Rule also requires a facility to take action to correct the control system malfunction. The CAM Rule applies to emissions units with uncontrolled PTE levels greater than applicable major source thresholds. Emission control systems governed by Title V operating permits requiring continuous compliance determination methods are generally compliant with the CAM Rule. The AEC's combined- and simple-cycle turbines will have emission control systems for NO_x and CO (SCR and oxidation catalyst) and the AEC's auxiliary boiler will have emission control systems for NO_x (SCR). However, emissions of NO_x and CO would be directly measured by CEMS. Therefore, the AEC is exempt from the CAM provisions based on the exemption in 40 CFR 64.2(b)(vi) and SCAQMD Regulation XX for NO_x.
Title 40 CFR Part 70 (SCAQMD Regulation XXX)	CAA Title V Operating Permit Program	SCAQMD with EPA Region IX Oversight	40 CFR 70—Operating Permits Program requires the issuance of operating permits that identify all applicable federal performance, operating, monitoring, recordkeeping, and reporting requirements. The requirements of 40 CFR 70 apply to facilities that are subject to New Source Performance Standards (NSPS) requirements and are implemented at the local level through SCAQMD Regulation XXX. According to Regulation XXX, Rule 3001, a facility would be required to submit a Title V application if the facility has a PTE greater than 10 tpy NO_x or VOC, 100 tpy of SO_2, 50 tpy of CO, or 70 tpy of PM_{10}, if the HAP PTE is greater or equal to 25 tpy for combined HAPs and 10 tpy for individual HAPs, or if the facility has a PTE greater than 100,000 tpy CO_2e. The AEC will exceed the Title V thresholds listed in SCAQMD Rule 3001. As a result, the AEC has submitted an application to modify the existing Title V permit as part of the permitting process.

TABLE 5.1-47

Applicable Federal Laws, Ordinances, Regulations, and Standards for Protection of Air Quality

LORS	Purpose	Regulating Agency	Applicability/Compliance Strategy
Title 40 CFR Part 72 (SCAQMD Regulation XXXI)	CAA Acid Rain Program	SCAQMD with EPA Region IX Oversight	40 CFR 72—Acid Rain Program establishes emission standards for SO_2 and NO_x emissions from electric generating units through the use of market incentives, requires sources to monitor and report acid gas emissions, and requires the acquisition of SO_2 allowances sufficient to offset SO_2 emissions on an annual basis. An acid rain facility, such as the AEC, must also obtain an acid rain permit as mandated by Title IV of the CAA. A permit application must be submitted to SCAQMD at least 24 months before operation of the new units commences. The application must present all relevant sources at the facility, a compliance plan for each unit, applicable standards, and estimated commencement date of operation. The necessary Title IV applications will be submitted as part of the permitting process.

5.1.9.2 State LORS

ARB's primary responsibilities are to develop, adopt, implement, and enforce the state's motor vehicle pollution control program; to administer and coordinate the state's air pollution research program; to adopt and update, as necessary, the CAAQS; to review the operations of the local air pollution control districts; and to review and coordinate preparation of the State Implementation Plan for achievement of the NAAQS.

The California Health & Safety Code, Section 41700 prohibits the discharge from a facility of air pollutants that cause injury, detriment, nuisance, or annoyance to the public; that endanger the comfort, repose, health, or safety of the public; or that cause, or have a natural tendency to cause, injury or damage business or property. The state has promulgated numerous laws and regulations at the state level (Toxic Air Contaminants and Air Toxic Hot Spots) which are effectuated at the local level by the air districts. A discussion of these state and local LORS is presented in Tables 5.1-48 and 5.1-49, respectively. A discussion of the public health risks posed by emissions of TACs, including ammonia, is presented in Section 5.9, Public Health.

TABLE 5.1-48

Applicable State Laws, Ordinances, Regulations, and Standards for the Protection of Air Quality

LORS	Purpose	Regulating Agency	Applicability/Compliance Strategy
California Health & Safety Code, Section 41700	Prohibits emissions in quantities that adversely affect public health, safety, businesses, or property.	SCAQMD with ARB Oversight	The CEC Conditions of Certification and the air quality management district PTC processes are developed to ensure that no adverse public health effects or public nuisances result from operation of the project.
California Assembly Bill 32 – Global Warming Solutions Act of 2006 (AB 32)	The purpose is to reduce carbon emissions within the state by approximately 25 percent by the year 2020.	SCAQMD with ARB Oversight	Requires ARB to develop regulations to limit and reduce GHG emissions.
California Code of Regulations, Title 17, Article 5	Establishes GHG limitations, reporting requirements, and a Cap and Trade offsetting program.	ARB	ARB has promulgated a Cap and Trade regulation that limits or caps GHG emissions and requires subject facilities to acquire GHG allowances. AEC GHG emissions have been estimated, and the Project Owner will report emissions and acquire allowances and offsets consistent with these regulations.
California Senate Bill 1368 – Emissions Performance Standards (SB 1368)	The law limits long-term investments in base load generation by the state's utilities to power plants that meet an emissions performance standard jointly established by the CEC and the California Public Utilities Commission (CPUC).	CEC with ARB Oversight	SB 1368 does not apply to the AEC because not a baseload facility. (Note: Despite its inapplicability, the AEC's state-of-the-art, efficient combined-cycle and simple-cycle configurations nevertheless satisfy this requirement, emitting 725 lb CO_2/MWh and 1,054 lb CO_2/MWh[25], respectively.)

In August 2006, the California legislature passed AB 32, the California Global Warming Solutions Act of 2006. AB 32 requires California resource agencies to establish a comprehensive program of regulatory and market mechanisms to achieve reductions in GHG emissions (ARB, 2006). The AEC will be subject to AB 32, and will be required to comply with all final rules, regulations, emissions limitations, emission reduction measures,

[25] Excluding performance degradation.

or market-based compliance mechanisms adopted under AB 32. ARB promulgated a Cap and Trade regulation to limit GHG emissions and to develop a market-based compliance mechanism for the creation, sale, and use of GHG allowances.

In addition to AB 32, Senate Bill 1368 (Perata, Chapter 598, Statutes of 2006) was signed into law on September 29, 2006. The law limits long-term investments in base load generation by the state's utilities to power plants that meet an emissions performance standard jointly established by the CEC and the CPUC. In response, the CEC has designed regulations that establish a standard for baseload generation owned by, or under long-term contract to publicly owned utilities, of 1,100 lb CO_2/MWh. A baseload generation is defined as electricity generation from a power plant that is designed and intended to provide electricity at an annualized plant capacity factor of at least 60 percent. The permitted capacity factor for the AEC will be approximately 50 percent. Therefore, as a nonbaseload facility, the AEC is not subject to the emissions performance standard; however, despite its inapplicability, the AEC's state-of-the-art, efficient combined-cycle and simple-cycle configurations nevertheless satisfy this requirement, emitting 725 lb CO_2/MWh and 1,054 lb CO_2/MWh[26], respectively.

5.1.9.3 Local Laws, Ordinances, Regulations, and Standards

When the state's air pollution statutes were reorganized in the mid-1960s, local districts were required to be established in each county of the state. The three different types of districts are county, regional, and unified. In addition, special air quality management districts, with more comprehensive authority over nonvehicular sources as well as transportation and other regional planning responsibilities, have been established by the Legislature for several regions in California, including SCAQMD. Air quality management districts have principal responsibility for developing plans for meeting the NAAQS and CAAQS; for developing control measures for nonvehicular sources of air pollution necessary to achieve and maintain both state and federal ambient air quality standards; for implementing permit programs established for the construction, modification, and operation of sources of air pollution; and for enforcing air pollution statutes and regulations governing nonvehicular sources.

SCAQMD plans define the proposed strategies, including stationary source control measures and NSR rules, whose implementation will attain the CAAQS. The relevant stationary source control measures and NSR requirements are presented in Table 5.1-49 (because of its size, this table is provided at the end of this section).

[26] Excluding performance degradation.

TABLE 5.1-49

Applicable Local Laws, Ordinances, Regulations, Standards, and Permits for Protection of Air Quality

LORS	Purpose	Regulating Agency	Applicability/Compliance Assessment
SCAQMD Rule 201	Establishes an orderly procedure for the review of new and modified sources of air pollution through the issuance of permits.	SCAQMD	Rule 201 specifies that any facility installing nonexempt equipment that causes or controls the emission of air pollutants must first obtain a PTC from the SCAQMD. SCAQMD has three separate preconstruction review programs for new or modified sources of criteria pollutant emissions: Regulation XIII (NSR), Regulation XVII (PSD), and Rule 2005 (NSR for RECLAIM). The air quality analysis includes an assessment of the air quality impacts in accordance with Regulation XIII, Regulation XVII, and Rule 2005. The completed SCAQMD PTC application forms have also been included in Appendix 5.1E.
SCAQMD Rule 201.1	Incorporates the permit conditions in federally issued permits to construct.	SCAQMD	A person constructing and/or operating equipment or an agricultural permit unit, pursuant to a PTC issued by the EPA, shall construct the equipment or agricultural permit unit in accordance with the conditions set forth in that permit, and shall operate the equipment or agricultural permit unit at all times in accordance with such conditions. A federal PSD permit will be obtained for the AEC. The Project Owner will comply with the permit conditions established in the PSD permit.
SCAQMD Rule 212	Establishes standards for approving permits and issuing public notice.	SCAQMD	Rule 212 requires public notification if: a. Any new or modified permit unit, source under Regulation XX, or equipment under Regulation XXX that may emit air contaminants is located within 1,000 feet from the outer boundary of a school; or b. Any new or modified facility has onsite emission increases exceeding any of the daily maximums specified in subdivision (g) of this rule; or c. Any new or modified permit unit, source under Regulation XX, or equipment under Regulation XXX with increases in emissions of TACs, for which the Executive Officer has made a determination that a person may be exposed to a maximum individual cancer risk (MICR) greater than 1 in 1 million (1×10^{-6}), due to a project's proposed construction, modification, or relocation for facilities with more than one permitted equipment unless the applicant can show that the total facility-wide MICR is below 10 in 1 million (10×10^{-6}). The predicted total facility-wide MICR is less than 10 in 1 million. However, the AEC will be located within 1,000 feet from the outer boundary of a school and the onsite emissions will exceed the daily maximums listed in subdivision (g) of this rule. Therefore, a public notice consistent with the requirements outlined in Rule 212 will be issued. The process for public notification and comment will include all of the applicable provisions of 40 CFR 51, Section 51.161(b), and 40 CFR 124, Section 124.10.

TABLE 5.1-49

Applicable Local Laws, Ordinances, Regulations, Standards, and Permits for Protection of Air Quality

LORS	Purpose	Regulating Agency	Applicability/Compliance Assessment
SCAQMD Rule 218	Establishes requirements for a CEMS.	SCAQMD	The owner or operator of any equipment subject to this Rule shall provide, properly install, operate, and maintain in calibration and good working order a certified CEMS to measure the concentration and/or emission rates, as applicable, of air contaminants and diluent gases, flow rates, and other required parameters. Each turbine and the auxiliary boiler will be equipped with a CEMS. These units will comply with all applicable requirements of Rule 218, Rule 212 (NO_x RECLAIM), and Title IV (Acid Rain – 40 CFR 75).
SCAQMD Rule 401	Establishes limits for visible emissions from stationary sources.	SCAQMD	Rule 401 prohibits visible emissions as dark as or darker than Ringlemann No. 1 for periods greater than 3 minutes in any hour. Natural gas will be the only fuel fired in the natural gas turbines and auxiliary boiler. Therefore, the project will not create visible emissions as dark as or darker than Ringlemann No. 1.
SCAQMD Rule 402	Prohibits the discharge from a facility of air pollutants that cause injury, detriment, nuisance, or annoyance to the public, or that damage business or property.	SCAQMD	A person shall not discharge from any source whatsoever such quantities of air contaminants or other material that cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public; or which endanger the comfort, repose, health or safety of any such persons or the public; or which cause, or have a natural tendency to cause, injury or damage to business or property. The CEC Conditions of Certification and the SCAQMD PTC process are designed to ensure that the operation of the project will not cause a public nuisance.
SCAQMD Rule 403	Establishes requirements to reduce the amount of PM entrained in the ambient air as a result of human-made fugitive dust sources.	SCAQMD	Rule 403 requires the implementation of best available control measures to minimize fugitive dust emissions and prohibits visible dust emissions beyond the property line, a 50 $\mu g/m^3$ incremental increase in PM_{10} concentrations across a facility as measured by upwind and downwind concentrations, and track-out of bulk material onto public, paved roadways. The project will implement best available control measures as part of the Stormwater Pollution Prevention Plan to minimize fugitive dust emissions during construction and operation.
SCAQMD Rule 404	Establishes limits for PM emission concentrations.	SCAQMD	A person shall not discharge into the atmosphere from any source PM in excess of the concentration at standard conditions listed in Rule 404. However, per Rule 404.c, this Rule does not apply to emissions resulting from the combustion of liquid or gaseous fuels in steam generators or gas turbines. Because the AEC will combust natural gas only, Rule 404 is not applicable.
SCAQMD Rule 405	Establishes limits for PM mass emission rates.	SCAQMD	Emission rate limits are based upon the process weight (fuel burned) per hour. Natural gas will be the only fuel fired in the natural gas turbines and auxiliary boiler. Therefore, the project will comply with the Rule 405 PM emission limits.

TABLE 5.1-49

Applicable Local Laws, Ordinances, Regulations, Standards, and Permits for Protection of Air Quality

LORS	Purpose	Regulating Agency	Applicability/Compliance Assessment
SCAQMD Rule 407	Establishes limits for CO and SO_x emissions from stationary sources.	SCAQMD	Rule 407 prohibits CO and SO_x emissions in excess of 2,000 and 500 ppm, respectively, from any source. The CO emissions from the combined-cycle turbines, simple-cycle turbines, and auxiliary boiler will be less than 2 ppm, 4 ppm, and 50 ppm, respectively. Therefore, the project meets the CO limit. In addition, equipment that complies with the requirements of Rule 431.1 is exempt from the SO_x limit. Since the facility will comply with Rule 431.1, the SO_x provisions of Rule 407 are not applicable.
SCAQMD Rule 409	Establishes limits for PM emissions from fuel combustion sources.	SCAQMD	Rule 409 prohibits PM emissions in excess of 0.1 grain per cubic foot of gas at 12 percent CO_2 at standard conditions. Natural gas will be the only fuel fired in the natural gas turbines and auxiliary boiler. Therefore, the project is expected to comply with the Rule 409 PM emission limits.
SCAQMD Rule 431.1	Establishes limits for the sulfur content of gaseous fuels to reduce SO_x emissions from stationary combustion sources.	SCAQMD	Rule 431.1 limits the sulfur content of natural gas calculated as H_2S to be less than 16 ppmv. The sulfur content of the natural gas will be less than 0.75 grain of sulfur per 100 dscf of natural gas or 12.6 ppmv. Therefore, the project is expected to comply with the Rule 431.1 requirement.
SCAQMD Rule 474	Establishes limits for emissions of NO_x from stationary combustion sources.	SCAQMD	Per Rule 2001, NO_x RECLAIM facilities are exempt from the provisions of Rule 474. Because the project will be a NO_x RECLAIM facility, Rule 474 is not applicable.
SCAQMD Rule 475	Establishes limits for combustion contaminant (PM) emissions from subject equipment.	SCAQMD	Rule 475 prohibits PM emissions that exceed both 11 lb/hr (per emission unit) and 0.01 grain per dscf at 3 percent O_2. The combined-cycle turbines' PM emission rate will be 8.5 lb/hr and less than 0.01 gr/dscf. Similarly, the simple-cycle turbines' PM emission rate will be 6.23 lb/hr and less than 0.01 gr/dscf.
SCAQMD Rule 476	Establishes limits for NO_x and PM emissions from steam generating equipment with a maximum heat input rating exceeding 50 MMBtu/hr.	SCAQMD	Per Rule 2001, NO_x RECLAIM facilities are exempt from the NO_x requirements for this rule. Therefore, only the PM provisions of this Rule will apply. The combined-cycle turbines' PM emission rate will be 8.5 lb/hr and less than 0.01 grain per dscf. Similarly, the simple-cycle turbines' PM emission rate will be 6.23 lb/hr and less than 0.01 gr/dscf.
SCAQMD Rule 53	Establishes limits for emissions of sulfur compounds (SO_x) from stationary sources in Los Angeles County.	SCAQMD	A person shall not discharge into the atmosphere sulfur compounds, which would exist as a liquid or gas at standard conditions, exceeding in concentration at the point of discharge 0.2 percent by volume calculated as SO_2. The use of low sulfur natural gas will result in SO_2 concentrations significantly less than 0.2 percent by volume.
SCAQMD Regulation IX,	Establishes national standards of performance for new or modified facilities in specific source categories.	SCAQMD with EPA Region IX Oversight	See 40 CFR 60 (Table 5.1-47) to review applicability and the compliance assessment.

TABLE 5.1-49

Applicable Local Laws, Ordinances, Regulations, Standards, and Permits for Protection of Air Quality

LORS	Purpose	Regulating Agency	Applicability/Compliance Assessment
Permits (40 CFR 60)			
SCAQMD Regulation X, Permits (40 CFR 63)	Establishes national emission standards to limit emissions of HAPs (or air pollutants identified by EPA as causing or contributing to the adverse health effects of air pollution but for which NAAQS have not been established) from facilities in specific categories.	SCAQMD with EPA Region IX Oversight	See 40 CFR 63 (Table 5.1-47) to review applicability and the compliance assessment.
SCAQMD Rule 1134	Establishes limits for emissions of NO_x from the stationary gas turbines.	SCAQMD	Per Rule 2001, NO_x RECLAIM facilities are exempt from the provisions of Rule 1134. Therefore, Rule 1134 is not applicable to the project.
SCAQMD Rule 1135	Establishes limits for emissions of NO_x from the electricity generating systems.	SCAQMD	Per Rule 2001, NO_x RECLAIM facilities are exempt from the provisions of Rule 1135. Therefore, Rule 1135 is not applicable to the project.
SCAQMD Rule 1146	Establishes limits for emissions of NO_x from industrial, institutional, and commercial boilers, steam generators, and process heaters.	SCAQMD	Per Rule 2001, NO_x RECLAIM facilities are exempt from the provisions of Rule 1146. Therefore, Rule 1146 is not applicable to the project.
SCAQMD Regulation XIII, Permits (NSR)	Provides for the review of new and modified sources and provide mechanisms, including the use of BACT and emission offsets, by which authorities to construct such sources may be granted for non-RECLAIM pollutants.	SCAQMD	Rule 1303(a) – BACT: BACT shall be applied to any new or modified source which results in an emission increase of any nonattainment air contaminant, any ozone-depleting compound, or ammonia. The BACT requirements of Rule 1303 apply regardless of any modeling or offset exemption in Rule 1304. Therefore, a complete top-down BACT analysis was conducted for emissions of CO, VOC, SO_2, PM_{10}, $PM_{2.5}$, and GHG. The proposed BACT emission limits are presented in Section 5.1.8.2 (see Appendix 5.1D). A BACT analysis for NO_x was conducted as part of compliance with Rule 2005. Rule 1303(b)(1) – Modeling: As part of the NSR permit approval process, an air quality dispersion analysis must be conducted using a mass emissions-based analysis contained in the Rule or an approved dispersion model to evaluate impacts of increased criteria pollutant emissions from any new or modified facility on ambient air quality. The Project Owner conducted air dispersion modeling to demonstrate that the auxiliary boiler will not cause a violation, or make significantly worse an existing violation, of any state or federal ambient air quality standard. The gas turbines are exempt from modeling requirements per Rule 1304(a)(2), with the exception of Regulation XX pollutants.
SCAQMD Regulation XIII,			Rule 1303(b)(2) – Offsets: Unless exempt from offsets requirements pursuant to Rule 1304, emission increases shall be offset by either Emission Reduction Credits approved pursuant to Rule 1309, or by

TABLE 5.1-49

Applicable Local Laws, Ordinances, Regulations, Standards, and Permits for Protection of Air Quality

LORS	Purpose	Regulating Agency	Applicability/Compliance Assessment
Permits (NSR), Cont.			allocations from the Priority Reserve in accordance with the provisions of Rule 1309.1, or allocations from the Offset Budget in accordance with the provisions of Rule 1309.2. Offset ratios shall be 1.2-to-1.0 for Emission Reduction Credits and 1.0-to-1.0 for allocations from the Priority Reserve, except for facilities not located in the SCAB, where the offset ratio for Emission Reduction Credits only shall be 1.2-to-1.0 for VOC, NO_x, SO_2, and PM_{10}, and 1.0-to-1.0 for CO. The Project Owner will provide sufficient VOC and PM10 Emission Reduction Credits to offset the auxiliary boiler's emissions at a 1.2-to-1.0 ratio; NOx emissions will be addressed through Regulation XX. The gas turbines are exempt from offset requirements per Rule 1304(a)(2), with the exception of Regulation XX pollutants. Rule 1303(b)(3) – Sensitive Zone Requirements: Unless credits are obtained from the Priority Reserve, facilities located in the SCAB are subject to the Sensitive Zone requirements specified in California Health & Safety Code Section 40410.5. The AEC is located in Zone 1. Therefore, the Project Owner will obtain Emission Reduction Credits from Zone 1 only to offset emissions from the auxiliary boiler. The gas turbines are exempt from offset requirements per Rule 1304(a)(2), with the exception of Regulation XX pollutants. Rule 1303(b)(4) – Facility-wide Compliance: The project will comply with all applicable rules and regulations of the SCAQMD. Rule 1303(b)(5)(A) – Alternative Analysis: Conduct an analysis of alternative sites, sizes, production processes, and environmental control techniques for such proposed source and demonstrate that the benefits of the proposed project outweigh the environmental and social costs associated with that project. As a matter of law, the AEC is not required to consider offsite alternatives. Public Resources Code Section 25540.6(b) states: "The commission may also accept an application for a noncogeneration project at an existing industrial site without requiring a discussion of site alternatives if the commission finds that the project has a strong relationship to the existing industrial site and that it is therefore reasonable not to analyze alternative sites for the project." The AEC has a strong relationship to the existing industrial site, as a power plant has been located on this site for nearly 60 years. Therefore, in enacting Public Resources Code Section 25540.6, the Legislature determined that it is reasonable not to analyze offsite alternatives for projects with such a strong relationship to an existing industrial site. Although the applicant is not required to consider offsite alternatives, the Project Owner did consider alternative technologies. Alternative equipment technologies were rejected because of their environmental effects or their inability to meet the project objectives. Rule 1303(b)(5)(B) – Statewide Compliance: Demonstrate prior to the issuance of a PTC that all major stationary sources, as defined in the jurisdiction where the facilities are located, that are owned or operated by such person (or by any entity controlling, controlled by, or under common control with such person) in the State of California are subject to emission limitations and are in compliance or on a schedule for compliance with all applicable emission limitations and standards under the CAA.

TABLE 5.1-49

Applicable Local Laws, Ordinances, Regulations, Standards, and Permits for Protection of Air Quality

LORS	Purpose	Regulating Agency	Applicability/Compliance Assessment
SCAQMD Regulation XIII, Permits (NSR), Cont.			The Project Owner has certified in SCAQMD Form 400-A that all major sources under its ownership or control in the State of California are in compliance with all federal, state, and local air quality rules and regulations. Rule 1303(b)(5)(C) – Protection of Visibility: Conduct a modeling analysis for plume visibility in accordance with the procedures specified in Appendix B if the net emission increase from the new or modified source exceeds 15 tpy of PM_{10} or 40 tpy of NO_x; and the location of the source, relative to the closest boundary of a specified federal Class I area, is within 28 km. Emissions of PM_{10} and NO_x will exceed the emissions thresholds; however, the distance to the nearest Class I area is approximately 53 km. Therefore, a visibility analysis is not required. Rule 1303(b)(5)(D) – Compliance through CEQA: Because the CEC certification process is a certified regulatory program that is the functional equivalent of the CEQA process, the applicable CEQA requirements have been addressed in this AFC. Rule 1304.1 – Require the payment of fees to generate air quality improvements within the project area consistent with the SCAQMD's approved Air Quality Management Plan.
SCAQMD Rule 1325, Permits (Federal $PM_{2.5}$ NSR)	Provides for the review of new and modified sources and to provide mechanisms, including the use of lowest achievable emissions rate (LAER) and emission offsets, by which authorities to construct such sources may be granted for $PM_{2.5}$.	SCAQMD	The Executive Officer shall deny the Permit for a new major polluting facility; or major modification to a major polluting facility; or any modification to an existing facility that would constitute a major polluting facility in and of itself (i.e., the PTE 100 tpy or more of $PM_{2.5}$ or its precursors), unless each of the following requirements is met: (A) LAER is employed for the new or relocated source or for the actual modification to an existing source; and (B) Emission increases shall be offset at a ratio of 1.1-to-1.0 for $PM_{2.5}$ and at the ratio required in Regulation XIII or Rule 2005 for NO_x and SO_2, as applicable; and (C) Certification is provided by the owner/operator that all major sources, as defined in the jurisdiction where the facilities are located, that are owned or operated by such person (or by any entity controlling, controlled by, or under common control with such person) in the State of California are subject to emission limitations and are in compliance or on a schedule for compliance with all applicable emission limitations and standards under the CAA; and (D) An analysis is conducted of alternative sites, sizes, production processes, and environmental control techniques for such proposed source and demonstration made that the benefits of the proposed project outweigh the environmental and social costs associated with that project. The AEC will not exceed the 100-tpy threshold for $PM_{2.5}$ (or $PM_{2.5}$ precursors on a per-pollutant basis). Therefore, Rule 1325 is not applicable to AEC.
SCAQMD Rule 1401, Permits	Provides for the review of new and modified sources of TAC emissions to evaluate potential public exposure and health risk, to	SCAQMD	Best Available Control Technology for Toxics (T-BACT) shall be applied to any new or modified source of TACs where the source risk is a cancer risk greater than 1 in 1 million (1×10^{-6}), a chronic hazard

TABLE 5.1-49

Applicable Local Laws, Ordinances, Regulations, Standards, and Permits for Protection of Air Quality

LORS	Purpose	Regulating Agency	Applicability/Compliance Assessment
(Toxics NSR)	mitigate potentially significant health risks resulting from these exposures, and to provide net health risk benefits by improving the level of control when existing sources are modified or replaced.		index greater than 1.0, or an acute hazard index greater than 1.0. Cancer burden must be less than 0.5 for projects with cancer risks greater than 1 in 1 million (1×10^{-6}). The predicted MICR at the maximum exposed individual resident (MEIR) and maximum exposed individual worker (MEIW) for the project are 2.5 and 0.10 in 1 million, respectively. The maximum predicted chronic and acute hazard indices for the project are 0.013 and 0.021, respectively. These values are below the PTC or PTO facility thresholds for cancer risk of 10 in 1 million and the chronic and acute hazard index of 1.0. The predicted MICR at the MEIR and MEIW are 1.1 and 0.043, respectively, for an individual combined-cycle turbine; 0.11 and 0.0034, respectively, for an individual simple-cycle turbine; and 0.12 and 0.018, respectively, for the auxiliary boiler. Although the combined-cycle turbine cancer risks exceed the individual unit threshold of 1 in 1 million, the AEC will employ emission controls considered to be T-BACT. The associated cancer burden for AEC is significantly less than 0.5. Therefore, the AEC will comply with Rule 1401.
SCAQMD Regulation XVII, Permits (PSD)	Allows new sources of air pollution to be constructed, or existing sources to be modified in areas classified as attainment, while preserving the existing ambient air quality levels, protecting public health and welfare, and protecting Class I areas (e.g., national parks and wilderness areas).	SCAQMD with EPA Region IX Oversight	See 40 CFR 52 (Table 5.1-47) to review applicability and the compliance assessment.
SCAQMD Regulation XX, Permits (NO_x RECLAIM)	Provides for the review of new and modified sources and to provide mechanisms, including the use of BACT and emission offsets, by which authorities to construct such sources may be granted for RECLAIM pollutants.	SCAQMD	Rule 2005(b)(1)(A) – BACT: BACT shall be applied to any new or modified source which results in an emission increase of any nonattainment air contaminant, any ozone-depleting compound, or ammonia. A complete top-down BACT analysis was conducted for emissions of NO_x. The proposed BACT emission limits are presented in Section 5.1.8.2 (see Appendix 5.1D). A BACT analysis for CO, VOC, SO_2, PM_{10}, $PM_{2.5}$, and GHG was conducted as part of compliance with Rule 1303. Rule 2005(b)(1)(B) – Modeling: As part of the NSR permit approval process, an air quality dispersion analysis must be conducted for NO_x using a mass emissions-based analysis contained in the Rule or an approved dispersion model, to evaluate impacts of increased NO_x emissions from any new or modified facility on ambient air quality. An air quality dispersion analysis was conducted for NO_x using the AERMOD dispersion model. Rule 2005(b)(2) – Offsets: NO_x emission increases shall be offset using RTCs at a ratio of 1.0-to-1.0. The AEC will participate in the NO_x RECLAIM program and will secure the necessary offsets as outlined in Section 5.1.8.2. Rule 2005(e) – Trading Zone Requirements: Any increase in an annual allocation to a level greater than the facility's starting plus nontradable allocations, and all emissions from a new or relocated facility, must be fully offset by obtaining RTCs originated in one of the two trading zones. A facility in

TABLE 5.1-49

Applicable Local Laws, Ordinances, Regulations, Standards, and Permits for Protection of Air Quality

LORS	Purpose	Regulating Agency	Applicability/Compliance Assessment
			Zone 1 may only obtain RTCs from Zone 1. A facility in Zone 2 may obtain RTCs from either Zone 1 or 2, or both. The AEC is located in Zone 1. Therefore, the Project Owner will obtain RTCs from Zone 1 only. Rule 2005(g)(1) – Statewide Compliance: Demonstrate, prior to the issuance of a PTC, that all major stationary sources, as defined in the jurisdiction where the facilities are located, that are owned or operated by such person (or by any entity controlling, controlled by, or under common control with such person) in the State of California are subject to emission limitations and are in compliance or on a schedule for compliance with all applicable emission limitations and standards under the CAA. The Project Owner has certified in SCAQMD Form 400-A that all major sources under its ownership or control in the State of California are in compliance with all federal, state, and local air quality rules and regulations. Rule 2005(g)(2) – Alternative Analysis: Conduct an analysis of alternative sites, sizes, production processes, and environmental control techniques for such proposed source and demonstrate that the benefits of the proposed project outweigh the environmental and social costs associated with that project.
SCAQMD Regulation XX, Permits (NO_x RECLAIM), Cont.			As a matter of law, the AEC is not required to consider offsite alternatives. Public Resources Code Section 25540.6(b) states: "The commission may also accept an application for a noncogeneration project at an existing industrial site without requiring a discussion of site alternatives if the commission finds that the project has a strong relationship to the existing industrial site and that it is therefore reasonable not to analyze alternative sites for the project." The AEC has a strong relationship to the existing industrial site, as a power plant has been located on this site for nearly 60 years. Therefore, in enacting Public Resources Code Section 25540.6, the Legislature determined that it is reasonable not to analyze offsite alternatives for projects with such a strong relationship to an existing industrial site. Although the Applicant is not required to consider offsite alternatives, the Project Owner did consider alternative technologies. Alternative equipment technologies were rejected because of their environmental effects or their inability to meet the project objectives. Rule 2005(g)(3) – Compliance through CEQA: Because the CEC's certified regulatory program is the functional equivalent of the CEQA process, the applicable CEQA requirements have been addressed in this AFC. Rule 2005(g)(4) – Protection of Visibility: Conduct a modeling analysis for plume visibility in accordance with the procedures specified in Appendix B if the net emission increase from the new or modified source exceeds 40 tpy of NO_x; and the location of the source, relative to the closest boundary of a specified federal Class I area, is within 28 km. Emissions of NO_x will exceed the emissions threshold; however, the distance to the nearest Class I area is approximately 53 km. Therefore, a visibility analysis is not required. Rule 2005(h) – Public Notice: The applicant shall provide public notice, if required, pursuant to Rule 212.

TABLE 5.1-49

Applicable Local Laws, Ordinances, Regulations, Standards, and Permits for Protection of Air Quality

LORS	Purpose	Regulating Agency	Applicability/Compliance Assessment
			The Project Owner will comply with the requirements for Public Notice outlined in Rule 212. Rule 2005(i) – Rule 1401 Compliance: All new or modified sources shall comply with the requirements of Rule 1401. The Project Owner will comply with the requirements of Rule 1401 as demonstrated in Section 5.9, Public Health. Rule 2005(j) – Compliance with State and Federal NSR: The project will comply with all applicable rules and regulations of the SCAQMD.
SCAQMD Regulation XXX, Permits (Title V)	Implements the operating permit requirements of Title V of the CAA as amended in 1990.	SCAQMD with EPA Region IX Oversight	See 40 CFR 70 (Table 5.1-47) to review applicability and the compliance assessment.
SCAQMD Rule 3008, Title V Permits (PTE Limitations)	Exempts low-emitting facilities with actual emissions below a specific threshold from federal Title V permit requirements by limiting the facility's PTE.	SCAQMD	This Rule shall apply to any facility that would, if it did not comply with the limitations set forth in either paragraphs (d)(1) or (d)(2) of Rule 3008, have the PTE air contaminants equal to or in excess of the thresholds specified in Table 2, subdivision (b) of Rule 3001 – Applicability, or, for GHGs, 100,000 or more tpy of CO_2e. The AEC will exceed the Title V thresholds listed in Rule 3001. As a result, AEC has submitted an application to modify the existing Title V permit as part of the permitting process.
SCAQMD Regulation XXXI, Permits (Acid Rain)	Incorporates by reference the provisions of 40 CFR 72 for purposes of implementing an acid rain program that meets the requirements of Title IV of the CAA.	SCAQMD with EPA Region IX Oversight	See 40 CFR 72 (Table 5.1-47) to review applicability and the compliance assessment.

5.1.10 Agencies and Agency Contacts

Each level of government has adopted specific regulations that limit emissions from stationary combustion sources, several of which are applicable to the AEC. The agencies having permitting authority for the AEC, and their contact information, are shown in Table 5.1-50.

TABLE 5.1-50
Agency Contacts for Air Quality

Issue	Agency	Agencies Contacted
Regulatory oversight	EPA Region IX	Gerardo Rios EPA Region IX 75 Hawthorne Street San Francisco, CA 94105 (415) 947-3974
Regulatory oversight	ARB	Michael Tollstrup Project Assessment Branch California Air Resources Board 1001 "I" Street Sacramento, CA 95814 P.O. Box 2815 Sacramento, CA 95812 (916) 322-6026
Permit issuance, enforcement	SCAQMD	Marcel Saulis South Coast Air Quality Management District 21865 Copley Drive Diamond Bar, CA 91765 (909) 396-2662

5.1.11 Permits and Permit Schedule

A PTC application has been submitted to SCAQMD as part of the CEC licensing process. The PTC includes permitting forms for the federal Title IV and Title V permitting programs. SCAQMD is responsible for issuing the required construction permits related to air quality. Consistent with the CEC siting regulations, SCAQMD must issue a preliminary determination of compliance within 180 days after issuing the application completeness determination letter. If all requirements of the SCAQMD rules are met, SCAQMD will issue a determination of compliance to the CEC within 240 days after the acceptance of the application as complete. Upon approval of the project by the CEC, a determination of compliance serves as the SCAQMD PTC. A PTO will be issued by SCAQMD after construction and demonstration of compliance with the PTC. Title IV and Title V permits are also issued by SCAQMD as a federal delegate under the CAA after the final Commission Decision.

5.1.12 References

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South Coast Air Quality Management District (SCAQMD). 1993. *CEQA Air Quality Handbook*. November.

South Coast Air Quality Management District (SCAQMD). 2007. *CEQA Handbook, Table XI-A Mitigation Measure Examples: Fugitive Dust from Construction & Demolition*. April.

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South Coast Air Quality Management District (SCAQMD). 2015b. *Historical Air Quality Data Tables by Year*. Available online at: http://www.aqmd.gov/home/library/air-quality-data-studies/historical-data-by-year. Accessed September 2015.

South Coast Air Quality Management District, Bay Area Air Quality Management District, Sacramento Metropolitan Air Quality Management District, San Joaquin Valley Air Pollution Control District, Santa Barbara County Air Pollution Control District, San Luis Obispo Air Pollution Control District (SCAQMD, et. al.). 2011. *Technical Paper: Methodology Reasoning and Policy Development of the California Emission Estimator Model*. July.

State Water Resources Control Board (SWRCB). 2010. *Water Quality Control Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling*.

The Climate Registry (TCR). 2015. *2015 TCR Default Emission Factors.* April.

U.S. Environmental Protection Agency (EPA). 1985. *Guideline for Determination of Good Engineering Practice Stack Height*. EPA-450/4-80-023R. June.

U.S. Environmental Protection Agency (EPA). 1992. *Workbook for Plume Visual Impact Screening and Analysis*. EPA-454/R-92-023. October.

U.S. Environmental Protection Agency (EPA). 2005. *Guideline on Air Quality Models*, 40 CFR 51, Appendix W. November.

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U.S. Environmental Protection Agency (EPA). 2011. *Additional Clarification Regarding Application of Appendix W Modeling Guidance for the 1-Hour NO_2 National Ambient Air Quality Standard*. EPA Office of Air Quality Planning and Standards. March 1.

U.S. Environmental Protection Agency (EPA). 2015a. *The Green Book Nonattainment Areas for Criteria Pollutants*. Available online at: http://www3.epa.gov/airquality/greenbk/. Accessed October 2015.

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Western Regional Climatic Center (WRCC). 2015. Historical Climate Data Summaries for the Long Beach Daugherty Field Station. Available online at: http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?ca5085. Accessed October 2015.

5.2 Biological Resources

This section describes the potential effects of the construction and operation of the Alamitos Energy Center (AEC) on biological resources. Section 5.2.1 presents the project setting and Section 5.2.2 discusses the affected environment, including an overview of the region, habitats and vegetation communities, and special-status species. Section 5.2.3 presents an environmental analysis of the project, including standards of significance, potential impacts of construction and operation of the AEC facility, and impacts to special-status species. Section 5.2.4 describes cumulative effects. Section 5.2.5 proposes mitigation measures. Section 5.2.6 describes the laws, ordinances, regulations, and standards (LORS) that apply to the project. Section 5.2.7 states that no additional permits are required, and Section 5.2.8 contains the references used to prepare this section.

5.2.1 Setting

AES Alamitos Energy, LLC, will construct, own, and operate the AEC, a natural-gas-fired, air-cooled, combined-cycle and simple-cycle, electrical generating facility in Long Beach, California. The proposed AEC will have a nominal generating capacity of 1,040 megawatts (MW). The AEC will be constructed on the site of the existing AES Alamitos Generating Station (AGS), located on an approximately 21-acre site within a larger, 71.1-acre parcel.

The AEC will feature two gas turbine power blocks. Combined-cycle power block will consist of two natural-gas-fired combustion turbine generators (CTG) in a combined-cycle configuration, two unfired heat recovery steam generators (HRSG), one steam turbine generators, an air-cooled condenser, an auxiliary boiler, and related ancillary equipment. Simple-cycle power block will consist of four simple-cycle LMS-100 CTGs with fin-fan coolers and ancillary facilities.

The AEC will meet the demand for new generation in the Los Angeles basin local electrical reliability area. The demand is caused in large part by the closure of the San Onofre Nuclear Generating Station and the anticipated retirement of the older, natural-gas-fired generation currently using once-through ocean water-cooling (OTC). As a result of the promulgation of the California State Water Resources Control Board's (SWRCB) *Water Quality Control Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling* (SWRCB, 2010), more than 4,000 MW of OTC generation are expected to be retired in the Los Angeles local electrical reliability area by December 31, 2020.

The AEC will use water provided by the City of Long Beach Water Department (LBWD) for construction, operational process, and sanitary uses but at substantially lower volumes than the existing AGS historically has used. This water will be supplied through existing, onsite water lines. The AEC will include a new, 1,000-foot process/sanitary wastewater pipeline to the first point of interconnection with the existing LBWD sewer system, the potential upgrade of an additional 4,000 feet of existing pipeline downstream from the first point of interconnection, and the elimination of the current practice of treatment and discharge of process/sanitary wastewater to the San Gabriel River. Stormwater runoff from the power block areas will be directed to oil/water separators and to an existing retention basin and then ultimately discharged to the Los Cerritos channel via existing stormwater outfalls.

The AEC will interconnect to the existing, Southern California Edison (SCE) 230-kilovolt (kV) switchyard adjacent to the north side of the AGS. Natural gas will be supplied to the AEC via the existing, offsite, 30-inch-diameter pipeline owned and operated by Southern California Gas Company (SoCalGas) that currently serves Units 5 and 6 of the AGS. The AEC will require construction of new natural gas-metering facilities and construction of two new natural gas compressor buildings within the AEC footprint.

The AEC is designed to serve both peak and intermediate loads with the added capabilities of rapid startup, significant turndown capability (ability to turn down to a low load), and fast ramp rates. As California's intermittent renewable energy portfolio continues to grow, operating in either load-following or partial shutdown mode will become necessary to maintain electrical grid reliability, thus placing an increased

importance upon the rapid startup, high turndown, steep ramp rate, and superior heat rate employed at the AEC.

As an in-basin generating asset, the AEC will provide local generating capacity, voltage support, and reactive power that are essential for transmission system reliability in the Western Los Angeles basin subarea and larger Los Angeles basin local reliability area. The AEC will be able to provide system stability by supplying reactive power, voltage support, frequency stability, and rotating mass in the heart of the critical Western Los Angeles local reliability area. By virtue of its location in a transmission constrained load center, the AEC also helps to avoid potential transmission line overloads and can provide reliable local energy supplies when electricity from more distant generating resources is unavailable. In recognition of its critical grid reliability benefits, the AEC combined-cycle CTGs were selected by SCE in its Local Capacity Requirements Request for Offer on November 5, 2014, and the simple-cycle CTGs will meet the capacity needs anticipated to be identified in future California Public Utilities Commission Long-term Procurement Plans.

Owing to the critical need for generating capacity at the AEC site at all times, existing Units 1 through 6 will remain in operation through much of the AEC development and construction. Given that the removal of existing Units 1 through 6 is not required for construction of the AEC, the continued operation of the AGS will not impede AEC construction. Demolition of the retired and decommissioned turbine peaking generating Unit 7 and fuel tank, ancillary equipment, small maintenance shops, and two retention basins will be required for site preparation for the construction of the AEC. Construction and site preparation activities at the AEC site are anticipated to last 56 months, from the first quarter of 2017 until the third quarter of 2021. The project will commence construction with the removal of former Unit 7's building and ancillary equipment, fuel storage tank, tank berms, small maintenance shops, and two wastewater retention basins in January 2017 to make room for construction and laydown area for the AEC CCGT. Construction of the AEC CCGT will commence during the second quarter of 2017 and will be completed by the second quarter of 2020. The AEC CCGT is expected to commence commercial operation before May 1, 2020. Construction of the AEC SCGT is scheduled to proceed from the second quarter of 2020 through the third quarter of 2021, and Power Block 2 is expected to commence commercial operation in the third quarter of 2021. A temporary construction access road may be constructed offsite beginning at the intersection of Studebaker Road and Loynes Drive traveling southeast to the AEC site. Construction of the AEC will require the use of onsite laydown areas (approximately 8 acres dispersed throughout the existing site) and an approximately 10-acre laydown area located adjacent to the existing site.

5.2.2 Affected Environment

This section provides an overview of the region, including discussions of wetlands and other natural resource areas, habitats, designated critical habitat, and special-status plants and animals.[27] The regional overview of the project area includes, but is not limited to, the area within 10 miles of the AEC site.

The AEC site is approximately 10 to 15 feet above mean sea level and can be found on the U.S. Geological Survey (USGS) Los Alamitos, California 7.5-minute series topographic quadrangle within Section 02, Township 05 north, Range 12 west (San Bernardino Meridian). The AEC site is located 0.25 mile south of State Route (SR) 22 and north of Westminster Avenue. Land use in the region primarily includes urban development, industrial areas, undeveloped land, parklands, open space, and wetlands preserves.

A description of regional biogeography, wetlands and other sensitive natural resources was obtained from reference sources including, but not limited to, the *Ecological Subregions of California* (United States Department of Agriculture [USDA], 1997), the California Department of Fish and Wildlife (CDFW) *Biological Information and Observation System* (BIOS, 2015), and the *California Wetlands Information System* (DWR, 2007). The U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) was also

[27] As used in this AFC, the term "special-status" species does not mean listed as threatened, endangered or candidate species under the federal Endangered Species Act or the California Endangered Species Act. Instead, the term "special-status" species is a more expansive term, employed by many agencies. The term special-status has no relationship to the legal status of any particular species.

queried to determine the location of reported wetlands in proximity to the site (USFWS, 2015). These sources, as well as aerial photographs and USGS topographical maps, were consulted to determine the terrestrial and aquatic biological resources with potential to occur within 10 miles of the AEC site.

A list of sensitive biological resources for the region including natural communities and special-status plant and wildlife species was compiled for the project using the CDFW California Natural Diversity Database (CNDDB) RareFind database (CDFW, 2015b) as well as other publicly available studies, information and resources. A list of potentially occurring sensitive biological resources was generated for the region based on the combined results of these reference sources. Appendix 5.2A includes tables listing regional special-status plant and wildlife species, Appendix 5.2B provides a CNDDB RareFind checklist and Appendix 5.2C is a list of observed species during the site reconnaissance survey.

5.2.2.1 Threatened, Endangered, Candidate or Special-Status Species Onsite

Threatened, Endangered, Candidate or Special-status - Plant Species. Based on the previously developed nature of the existing AGS, there are no significant biological resources on the AEC site. No federal or state threatened, endangered or candidate plant species occur on the AEC site. No natural habitats or wetlands are present at the existing AGS property. No special-status plant species occur on the AEC site.

Threatened, Endangered, Candidate, or Special-Status - Wildlife Species. No federal or state listed threatened, endangered or candidate wildlife species occur on the AEC site or AGS property. No special-status wildlife species occur on the AEC site or AGS property. No natural habitats or wetlands are present on the AEC site or AGS property.

5.2.2.2 Threatened, Endangered, Candidate, or Special-Status Species within a 1-Mile Radius

Threatened, Endangered, Candidate, or Special-status Plant Species. The AEC is located entirely within existing developed areas dominated by landscaping plants and sparse patches of ruderal vegetation. There is no natural habitat; therefore, the AEC will not affect any special-status plant species.

Seven special-status plant species have been documented within a 1-mile radius of the AEC site, which include the following:

- **Coast woolly-heads** (*Nemacaulis denudata* var. *denudate*; California Native Plant Society [CNPS] Rare Plant Rank 1B.2) occurs in dunes and coastal habitats (Calflora, 2015).
- **Coulter's goldfields** (*Lasthenia glabrata* ssp. *coulteri*; Rare Plant Rank 1B.1) occurs in coastal salt marshes, playas, and vernal pools (CDFW, 2015b).
- **Estuary seablite** (*Suaeda esteroa*; Rare Plant Rank 1B.2) occurs in coastal salt marshes in clay, silt, and sand substrates (CDFW, 2015b).
- **Mud nama** (*Nama stenocarpa*; Rare Plant Rank 2B.2) occurs in marshes and swamps (CDFW, 2015b).
- **Salt marsh bird's beak** (*Chloropyron maritimum* ssp. *maritimum*; federally- and state-listed endangered, Rare Plant Rank 1B.2) occurs in within the higher zones of salt marshes (CDFW, 2015b).
- **Salt Spring checkerbloom** (*Sidalcea neomexicana*; Rare Plant Rank 2B.2) occurs in playas, chaparral, coastal scrub, lower montane coniferous forest, and Mojavean desert scrub habitats (CDFW, 2015b).
- **San Bernardino aster** (*Symphyotrichum defoliatum*; Rare Plant Rank 1B.2) occurs in meadows and seeps, cismontane woodland, coastal scrub, lower montane coniferous forest, marshes and swamps, valley and foothill grassland habitats (CDFW, 2015b).
- **Southern tarplant** (*Centromadia parryi* ssp. *australis*; Rare Plant Rank 1B.1) typically occurs in seasonally moist (saline) grasslands and in lowlands near the coast (Calflora, 2015).

There is no suitable habitat for these species within the AEC site.

Threatened, Endangered, Candidate, or Special-Status Wildlife Species. Within a 1-mile radius of the AEC site, one federally and state-listed endangered bird species (California least tern [*Sterna antillarum browni*]), one federally threatened reptile species (green sea turtle [*Chelonia mydas*]), and one state-listed endangered bird species (Belding's savannah sparrow [*Passerculus sandwichensis beldingi*]) have been documented (CDFW, 2015b). No state fully protected species have been observed within 1 mile of the AEC site. Three state species of special concern (SSC), including one reptile (coast horned lizard [*Phrynosoma blainvillii*]), one bird species (burrowing owl [*Athene cunicularia*]), and one mammal species, the south coast marsh vole (*Microtus californicus stephensi*) included on the CDFW Special Animals list were reported (CDFW, 2015b). Five invertebrate species (western tidal-flat tiger beetle [*Cicindela gabbii*], sandy beach tiger beetle [*Cicindela hirticollis gravid*], western beach tiger beetle [*Cicindela latesignata latesignata*], senile tiger beetle [*Cicindela senilis frosti*], and monarch butterfly [*Danaus plexippus*]) that are included on the CDFW Special Animals list were documented (CDFW, 2015b). Of these five invertebrate species, the monarch butterfly is also a species of common conservation concern by the United Nations Environment Programme (UNEP) and U.S. Forest Service (USFS) species of special concern. Descriptions of these species are provided in the following sections.

Federal Endangered Species Act Species. One federally listed bird species and one federally listed reptile species have been documented within 1 mile of the AEC site. There is no suitable forage or nesting habitat for these species on the AEC site.

- **California Least Tern –** California least tern is a federally and state-listed endangered species. This species has long narrow wings and a broad forked tail. The body is white with pale gray and it has black tipped wings. The head is black capped with a white streak across the forehead and the bill is yellow with a black tip. This species forages for fish in open water habitats including near-shore ocean waters, tidal channels, and estuaries. This species breeds along the California coast from the San Francisco Bay into Northern Baja California. Nest sites include open sandy areas, dirt, and dry mud near suitable foraging habitat. Two acres have been established at the Los Cerritos Wetlands as a California least tern nesting site (City of Long Beach, 2006), but nesting has not been observed at this location (CDFW, 2015b).
- **Green Sea Turtle** – Green sea turtle is a federally threatened species throughout its Pacific range. The geographic range of the green sea turtle population in the Pacific Ocean is hard to define because this species is highly migratory; therefore, the western coasts of the United States, Canada, and Mexico constitute shared habitat for Pacific green sea turtles (National Marine Fisheries Service and USFWS, 1998).This species is the largest of the cheloniids and adults can exceed 1-meter carapace length and 100 kg in weight. They are common as far north as San Quintin Bay in Baja California, but uncommon along the California coast (CaliforniaHerps, 2013). No nesting habitat has been identified within the west coast of the United States. This species has been documented regularly in San Diego Bay because of warm water effluent from a power generating station (National Marine Fisheries Service and USFWS, 1998). Another small colony has taken up residence where warm water is discharged into the brackish mouth of the San Gabriel River from the existing Long Beach power plants (the Los Angeles Department of Water and Power's Haynes Generating Station and AES AGS) (CaliforniaHerps, 2013). A green sea turtle was observed in the area within the San Gabriel River Channel in 2010 between East 2nd Street and East 7th Street (CDFW, 2015b).

California Endangered Species Act Species. One bird species listed under the California Endangered Species Act (CESA) has been observed west of the AEC site, within the same general area as the Los Cerritos Wetlands.

- **Belding's Savannah Sparrow –** Belding's savanna sparrow is a state-listed endangered species. This subspecies is distinguished from the more common northern subspecies by a longer and thicker bill, darker and thicker streaks on the underside, darker and coarser streaks on the upper side, and darker marks on the face. Belding's savanna sparrows occur in coastal salt marshes from Santa Barbara south to

San Diego. This species forages on the ground for insects, snails and other invertebrates, and seeds. Breeding appears to begin in early March. Nests are constructed on the ground in areas of dense vegetation including pickleweed and salt grass. Belding's savannah sparrows have been documented in the Bolsa Chica wetlands and the Seal Beach National Wildlife Refuge and in the same general area as the Los Cerritos Wetlands (CDFW, 2015b).

State Fully Protected Species. No state fully protected species have been observed within 1 mile of the AEC site.

CDFW Species of Concern. Three CDFW species of special concern, the coast horned lizard, burrowing owl, and South coast marsh vole, have been reported within 1 mile of the AEC site (CDFW, 2015b). Coast horned lizard occurs in valley-foothill hardwood, conifer and riparian habitats, pine-cypress, juniper, and annual grassland habitats throughout the central and southern California coast. They inhabit open country, especially sandy areas, washes, flood plains, and wind-blown deposits (Zeiner et al., 1990). Two historical occurrences of this this species were documented (1952 and 1961) in the project vicinity, but both are assumed to be extirpated because of development (CDFW, 2015b). Burrowing owl was documented in 1980–1981 in the general vicinity of Seal Beach (CDFW, 2015b). This species occurs in annual and perennial grasslands, deserts, and shrublands with low-growing vegetation (Zarn, 1974). The project area lacks suitable habitat for these species and they are not expected to occur within the project area. South coast marsh vole was documented in the vicinity of the Seal Beach Naval Weapons Station in 1968 (CDFW, 2015b).

CDFW Special Animals. Five invertebrate species included on the CDFW Special Animals list were documented within 1 mile of the AEC site: western tidal-flat tiger beetle, sandy beach tiger beetle, western beach tiger beetle, senile tiger beetle, and monarch butterfly (CDFW, 2015b). According to CDFW (2015b), western tidal-flat tiger beetle inhabits estuaries and mudflats along the southern California coast and this species was last observed in 1998. Sandy beach tiger beetle inhabits areas adjacent to nonbrackish water along the California coastline and this species is presumed to be extirpated from the historical location sampled in Naples in 1979 (CDFW, 2015b). Western beach tiger beetle is also presumed to be extirpated from its historical occurrence recorded from 1945; this species has similar habitat requirements as the sandy beach tiger beetle (CDFW, 2015b). Senile tiger beetle occurs in mudflats and beaches of coastal southern California; it is presumed to be extirpated from its recorded occurrence location (CDFW, 2015b). Monarch butterfly is a USFS species of special concern and a UNEP species of common conservation concern (USFS, 2012; UNEP, 2004). Because suitable habitat does not exist in the project vicinity and most of the recorded occurrences are presumed to be extirpated, these species are not expected to occur within the project area.

5.2.2.3 Regional Overview

The AEC site lies within the Los Angeles Plain subsection of the Southern California Coast Section (USDA, 1997). This subsection is characterized by flat floodplains and terraces and very gently sloped alluvial fans with small areas of marine terraces. Steep hills and mountains including parts of the Santa Monica and San Gabriel mountains are found in the northern part of this subsection; parts of the San Jose and Puente hills are found along the eastern edge of the subsection. Historically, the predominant natural plant communities in the Los Angeles Plain included grasslands, shrub lands, salt marshes, dunes, and woodlands (USDA, 1997). Extensive urban development throughout the region has replaced most of the natural communities with urban development, and natural areas are restricted to scattered open space preserves and other protected areas. Current land use within the region is predominantly urban development including the communities of Long Beach, Seal Beach, Los Alamitos, Westminster, Cypress, Hawaiian Gardens, La Palma, Lockwood, and Bellflower. These areas are characterized by a mixture of commercial, industrial, and residential development interspersed with landscaped parks (Figure 5.2-1).

The regional climate is moderated by marine influences with a mean annual temperatures ranging from about 53 to 72°F. The mean annual precipitation is about 13 inches, with most of the rainfall occurring between November and March.

The AEC site is approximately 1.9 miles inland from the Pacific Ocean. The San Gabriel River is located immediately along the eastern boundary of the AEC site. In this area, the river has been channelized between levees that are maintained by the Los Angeles Department of Power and Water. The Los Cerritos Channel is located immediately along the west side of the site. Two side channels from the Los Cerritos Channel are used as cooling water intakes for the AGS; these channels will not be used for the AEC because the AEC does not utilize once-through cooling. The AEC site is located within the San Gabriel Watershed in the South Coast Hydrologic Region (BIOS, 2015).

5.2.2.4 Regional Wetlands and Other Resource Areas within a 10-Mile Radius

Several ecological reserves, wetland preservation sites, and designated open spaces occur in the regional vicinity. These areas provide important habitat for migratory birds along the Pacific Flyway as well as habitat for several special-status plants and animals. The locations of these areas in relation to the AEC are shown in Figure 5.2-1. NWI-listed aquatic and wetland habitats in the project area, including any potential jurisdictional and nonjurisdictional wetlands, are shown in Figures 5.2-2a through 5.2-2e. For purposes of these figures, wetlands as defined by the Coastal Act are included, which encompass "lands within the coastal zone which may be covered periodically or permanently with shallow water and include saltwater marshes, freshwater marshes, open or closed brackish water marshes, swamps, mudflats, and fens" (Coastal Act Section 30121).

The closest offsite habitat, the Los Cerritos Wetlands, is approximately 2,400 feet west of the AEC. Other habitats within a 10-mile radius of the AEC site are approximately 1 to 6 miles away from the site. Each of these areas is briefly described below.

- **Los Cerritos Wetlands –** The Los Cerritos Wetlands complex is an approximately 500-acre site that is located approximately 2,400 feet west of the AEC site. Approximately 2 acres of this site have been established as a California least tern nesting site (City of Long Beach, 2006). This site also has the potential to support other wildlife species.
- **Jack Dunster Marine Biological Reserve –** The Jack Dunster Marine Biological Reserve, located approximately 1 mile west of the AEC site, is a 2.7-acre site that contains 1.5 acres of land and 1.2 acres of shallow water that was been constructed on the northwestern side of the Los Cerritos Channel. Habitats that are represented in this small reserve include coastal sage scrub, coastal marsh, intertidal mudflats, and rocky intertidal (City of Long Beach, 2012a). The reserve provides habitat for waterfowl and fish.
- **Seal Beach National Wildlife Refuge –** The Seal Beach National Wildlife Refuge is located approximately 1.8 miles south of the AEC site within the boundaries of the Seal Beach Naval Weapons Station. The refuge includes 911 acres of remnant saltwater marsh in the Anaheim Bay estuary. The refuge provides important habitat for a number of migratory birds as well as three endangered species including the light-footed clapper rail (*Rallus longirostris levipes*), California least tern, and Belding's savanna sparrow.
- **Bolsa Chica Ecological Reserve –** The Bolsa Chica Ecological Reserve are located approximately 4.7 miles southeast of the AEC site. This coastal estuary encompasses approximately 1,300 acres, one-third of which is owned by the State and managed as the Bolsa Chica Ecological Reserve. Approximately 80 percent of the wetland is composed of a mixture of salt marsh and open mudflats with the remaining 20 percent consisting of open water. The Huntington Harbor is the only area fully open to tidal flows. Tidal flows to the inner parts of Bolsa Bay, including the ecological reserve, are controlled by floodgates operated by the CDFW. Over 300 species of birds have been observed at these wetlands including 32 special-status birds such as the California least tern, western snowy plover (*Charadrius alexandrinus nivosus*), Belding's savanna sparrow, and light-footed clapper rail. Several special-status plants, amphibians, reptiles, and mammals are also known to occur in this area including southern tarplant, Coulter's goldfields (*Lasthenia glabrata* ssp. *coulteri*), San Diego horned lizard (*Phrynosoma coronatum*

blainvillii), western pond turtle (*Emys marmorata*), silvery legless lizard (*Anniella pulchra*), and the southern California salt marsh shrew (*Sorex ornatus salicornicus*).

- **Golden Shore Marine Biological Reserve Park –** In 1997, the City of Long Beach's Golden Shore Marine Biological Reserve Park, located approximately 5.9 miles west of the AEC site, was originally a launch ramp and parking lot that was converted into 6.4 acres of intertidal and subtidal wetlands habitat as mitigation for the conversion of 20 acres of Shoreline Park into the Aquarium of the Pacific and the Rainbow Harbor commercial/recreation attraction (City of Long Beach, 2012b). This reserve park has salt marsh vegetation, which provides habitat for waterfowl and fish.

5.2.2.5 Regional Sensitive Habitat Types Identified in the CNDDB and Critical Habitat within a 10-Mile Radius

Habitats types identified within 10 miles of the AEC site include natural communities identified by the CNDDB, including southern coastal salt marsh, southern foredunes, and southern dune scrub. Critical habitat for western snowy plover is also present in the project region. Regional habitat types and critical habitat areas within 10 miles of the AEC site are shown in Figure 5.2-3. Descriptions of these areas are provided below.

Regional Habitat Types within a 10-Mile Radius.

- **Southern Coastal Salt Marsh –** Southern coastal salt marsh habitat occurs approximately 1.6 miles from the AEC site. This habitat type occurs in areas subject to regular tidal flooding by salt water such as sheltered inland bays, estuaries, and lagoons. The distribution of plant species within the salt marsh is often in distinct zones based on the frequency and duration of tidal flooding. Typically, California cordgrass (*Spartina folosia*) occurs at the lowest elevations adjacent to open water that are subject to regular, prolonged tidal inundation. The mid-elevation areas of the marsh are typically characterized by pickleweed (*Salicornia virginica*) and are generally subject to cyclical inundation during high tides and drying during low tides. The upper marsh zone is generally subject to flooding for short durations and only during higher high tides. It supports a more diverse mixture of plant species including pickleweed, saltgrass (*Distichlis spicata*), alkali heath (*Frankenia salina*), alkali weed (*Cressa truxillensis*), California seablite (*Suaeda californica*), and marsh jaumea (*Jaumea carnosa*).

  The historical extent of salt marsh habitat throughout the south coast region has been dramatically reduced as a result of urban coastal development. Today, this community is restricted to isolated patches surrounded by development or in designated protected areas. In the regional vicinity of the AEC site, southern coastal salt marsh habitat is found in the Jack Dunster Marine Biological Reserve located approximately 1 mile from the AEC site, Seal Beach National Wildlife Refuge located approximately 1.8 miles from the AEC site, Bolsa Chica Ecological Reserve located approximately 4.7 miles from the AEC site, and the Golden Shore Marine Biological Reserve Park located approximately 5.9 miles from the AEC site (Figure 5.2-3).

- **Southern Foredunes –** Southern foredunes habitat is similar to active sand dunes but is subject to less wind, has more stable sand, and greater availability to groundwater; therefore, the area supports the establishment of plant species that further stabilize the dunes. As with other natural habitats, the historical extent of foredunes in southern California has been dramatically reduced as a result of urban coastal development. Native plant species commonly found in this habitat include beach morning glory (*Calystegia soldanella*), beach bur (*Ambrosia chamissonis*), and common eucrypta (*Eucrypta chrysanthemifolia*). Southern foredune habitat has been mapped approximately 4.7 miles southeast of the AEC site within the Bolsa Chica Ecological Reserve (Figure 5.2-3).

- **Southern Dune Scrub –** Southern dune scrub is characterized as a dense coastal scrub community of scattered shrubs, subshrubs, and herbs that are typically less than 1 meter tall, often associated with a high percentage of cover. This habitat type is drier, fairly warmer, and experiences less onshore wind compared to central and northern dune scrub habitats. Native plants commonly found in this habitat

include beach saltbush (*Atriplex leucophylla*), California croton (*Croton californicus*), California ephedra (*Ephedra californica*), mock heather (*Ericameria ericoides*), dune lupine (*Lupinus chamissonis*), desert thorn (*Lycium brevipes*), prickly pear (*Opuntia* sp.), lemonade berry (*Rhus integrifolia*), and jojoba (*Simmondsia chinensis*) (Holland, 1986). This habitat type occurs approximately 5 miles southeast of the AEC (Figure 5.2-3).

Critical Habitat within a 10-Mile Radius.

- **Western Snowy Plover** – Critical habitat for the federally listed snowy plover occurs approximately 4.7 miles from the AEC site in the Bolsa Chica Ecological Reserve (Figure 5.2-3) (USFWS, 2012).

5.2.2.6 Regional Threatened, Endangered, or Candidate Species; Regional Special-status Species

Regional and local species information was compiled from a variety of sources and is provided in Appendix 5.2A. The appendix lists all species historically found or with the potential to occur in the project region as well as regional species listed as threatened, endangered or candidate species under the federal Endangered Species Act (ESA) and the CESA (Fish and Wildlife Code, Sections 2050 et seq.).

Appendix 5.2A also includes data on other special-status species including CNPS List 1-4 species, CDFW Species of Special Concern, CDFW Fully Protected Species, and other CDFW Special Animals and bird species. A CNDDB RareFind Checklist is provided in Appendix 5.2B. Appendix 5.2A includes the status designation for each species, habitat types that may support these species in the project region, a determination of potential for these species to occur within the AEC 1-mile survey area, and a rationale for the occurrence determination. Species that were observed during the site visit are discussed in subsequent subsections, and photographs of the AEC site are provided in Appendix 5.2D. A copy of biological resources staff resumes is provided in Appendix 5.2E. The known locations of special-status species identified in the CNDDB records within a 10-mile range of the AEC site are shown in Figure 5.2-4a, and special-status species that occur within 1-mile of the AEC site are provided in Figure 5.2-4b.

Plants were considered to be special-status if one or more of the following criteria were met:

- State Special Plant as defined by the CNDDB (CDFW, 2015b)
- Designated by the CNPS in its Inventory of Rare and Endangered Plants of California (CNPS, 2015)

Animals were considered to be special-status if one or more of the following criteria were met:

- California State Species of Concern as defined by the CNDDB (CDFW, 2015b)
- California State Fully Protected Species (CDFW, 2015a)
- State Special Animal as defined by the CNDDB (CDFW, 2015b)

Special-status species with habitat(s) and/or known distribution within the AEC 1-mile survey area were evaluated for potential impacts from project construction and operation. The results of the evaluation are discussed in Sections 5.2.3.2 and 5.2.3.3. Special-status species with habitats or known distribution that do not occur within 1 mile of the AEC site were not evaluated beyond the information listed in Appendix 5.2A.

Observed Plant Species. The AEC site and the proposed wastewater pipeline alignment are entirely developed and no natural habitats are present. Vegetation observed during the April 2015 site reconnaissance survey was limited to landscaping trees and shrubs and a few scattered weedy plants. Protocol rare plant surveys following *Protocols for Surveying and Evaluating Impacts to Special Status Native Plant Populations and Natural Communities* (CDFW, 2009) were not indicated for this site because the reconnaissance surveys confirmed that no natural habitats are present within the AEC site and the proposed wastewater pipeline alignment.

Observed Wildlife Species. Species observed within 1 mile the site included great egret (*Ardea alba*), cormorant (*Phalacrocorax* spp.), western gull (*Larus occidentalis*), great blue heron (*Ardea erodias*), green sea turtle, killdeer (*Charadrius vociferous*), green heron (*Butorides virescens*), red-tailed hawk (*Buteo*

jamaicensis), black phoebe (*Sayornis nigricans*), and western fence lizard (*Sceloporus occidentalis*). Because there is no natural habitat on the site or along the proposed wastewater pipeline alignment, special-status wildlife species are not expected to occur onsite. Some wildlife species may use areas along the wastewater pipeline because some ruderal vegetation and a golf course with manmade water features occur within the proposed alignment. According to an article in the September 3, 2008, *Long Beach Press-Telegram*, several federally listed green sea turtles have been observed in the Los Cerritos Channel. No nesting habitat has been identified within the west coast of the United States; however, this species has been documented regularly in San Diego Bay because of warm water effluent from a power generating station (National Marine Fisheries Service and USFWS, 1998), but not further up the coastline likely because of declining water temperatures. Green sea turtles have been observed in the area (CDFW, 2015b) and a small colony is believed to reside in the brackish mouth of the San Gabriel River (CaliforniaHerps, 2013). Wetland habitats approximately 1,570 feet/0.30 mile to the southwest and approximately 5,000 feet/1 mile southeast of the AEC site have the potential to support special-status wildlife species.

5.2.2.7 Land Uses and Vegetation Communities within a 1-Mile Radius of the AEC

Land use and vegetation communities identified within a 1-mile radius of the AEC site are shown in Figures 5.2-5a through 5.2-5h (provided at the end of this section). Urban development collectively represents the largest land uses in the survey area. Other land uses and natural vegetation communities identified include industrial areas, parks and open space, and a wetland preserve. The Pacific Ocean is approximately 1.9 miles southwest of the AEC site.

- **Urban Development –** Urban developed areas include residential, commercial, and light industrial uses, as well as public schools and other municipal facilities. The majority of the land uses to the north, northeast, southwest, south, and northwest of the AEC site consist of urban development.
- **Industrial –** Industrial areas include the existing AGS, SCE 230-kV switchyard, and former fuel oil tank farm. Additional industrial areas are located across the San Gabriel River flood control channel to the east and include the Los Angeles Department of Water and Power Haynes Generating Station.
- **Parks and Open Space –** Parks and open space include natural and landscaped areas that have been designated for recreational uses or provide undeveloped green space. Parks and open space are located west and south of the AEC site and along a portion of the proposed wastewater pipeline alignment.
- **Wetland Preserve –** The Los Cerritos Wetlands are located approximately 2,400 feet west of the AEC site (Figure 5.2-1). Vegetation in this area is characterized by pickleweed with other salt-tolerant species such as salt grass, alkali heath, and saltwort (*Batis maritima*). Open unvegetated salt pannes and tidal channels are also present in some areas (some photographs are provided in Appendix 5.2D).

5.2.3 Environmental Analysis

Potential direct and indirect impacts to biological resources were evaluated to determine the potential permanent and temporary effects of AEC construction, demolition/site preparation, and operation. Results from the field surveys, habitat evaluations, literature review, and aerial imagery interpretation were used to evaluate the potential for presence of biological resources in the immediate vicinity of the AEC site. There is no suitable habitat for threatened, endangered, candidate and special-status species that can potentially occur within the project area due to the industrial nature of the AEC site.

No natural vegetation or habitat is present on the AEC site or within the wastewater pipeline alignment. There are no AEC features that would support special-status plants, and the AEC site does not provide suitable habitat for any potentially occurring special-status wildlife species.

This section identifies biological resources that may be affected either directly or indirectly by the AEC. Direct and indirect impacts may be either permanent or temporary. These impact categories are defined below and are applied as part of the environmental analysis.

- **Direct –** The California Environmental Quality Act (CEQA) defines direct or primary impacts as those which are caused by the project and occur at the same time and place (14 California Code of Regulations [CCR] Section 15358(a)). Examples include loss of habitat resulting from clearing vegetation, encroaching into wetlands, diverting natural surface water flows, and the loss of individual species.
- **Indirect –** CEQA defines indirect or secondary effects which are caused by the project and are later in time or farther removed in distance, but are still reasonably foreseeable. Indirect or secondary effects may include growth-inducing effects and other effects related to induced changes in the pattern of land use, population density, or growth rate, and related effects on air and water and other natural systems, including ecosystems (14 CCR Section 15358(a)).
- The CEQA Guidelines further provide that "Effects analyzed under CEQA must be related to a physical change." (14 CCR Section 15358(b)). Cumulative impacts are discussed in Section 5.2.4.

Potential direct, indirect, and cumulative impacts to biological resources were evaluated to determine the permanent and temporary effects of AEC construction, operation, and maintenance of the AEC.

5.2.3.1 Significance Criteria

Appendix G of CEQA is a screening tool, not a method for setting thresholds of significance. Appendix G is typically used in the Initial Study phase of the CEQA process, asking a series of questions. The purpose of these questions is to make a determination as to whether a project requires an Environmental Impact Report, a Mitigated Negative Declaration, or a Negative Declaration. As the Governor's Office of Planning and Research stated, "Appendix G of the Guidelines lists a variety of potentially significant effects, but does not provide a means of judging whether they are indeed significant in a given set of circumstances." The answers to the Appendix G questions are not determinative of whether an impact is significant or less than significant. Nevertheless, the questions presented in CEQA Appendix G are instructive.

In terms of Biological Resources, Appendix G, asks, in part, whether the project would:

- Have a substantial adverse effect, either directly or through habitat modifications, on any species identified as endangered, threatened, candidate, sensitive, or special-status in local or regional plans, policies, or regulations, or by CDFW or USFWS. (CEQA Guidelines, Appendix G, Section IV(a))
- Have a substantial adverse effect on any wetland, riparian habitat or other sensitive natural community or critical habitat identified in local or regional plans, policies, or regulations, or by CDFW or USFWS. (CEQA Guidelines, Appendix G, Section IV(b))
- Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means? (CEQA Guidelines, Appendix G, Section IV(c))
- Interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory native wildlife corridors, or impede the use of wildlife nursery sites. (CEQA Guidelines, Appendix G, Section IV(d))
- Conflict with any local policies or ordinances protecting biological resources, such as a tree preservation policy or ordinance. (CEQA Guidelines, Appendix G, Section IV(e))
- Conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan. (CEQA Guidelines, Appendix G, Section IV(f))

5.2.3.2 Potential Impacts of Construction

Project activities will be located within the AEC site or along the proposed sanitary/process water pipeline alignment (Figure 1.1-3) in existing developed areas where no additional clearing or grading of natural vegetation will be required. If the existing LBWD sewer system is upgraded, then a golf course and

manmade water features have the potential to be affected. No other offsite linear features are needed for the project; therefore, there will be no construction-related disturbances to the offsite natural vegetation or habitats. As a modern, combined-cycle and simple-cycle facility, the AEC will also have lower emissions, especially on a kilowatt-hour production basis, with greater thermal efficiency, lower greenhouse gas emissions, and lower criteria pollutant emissions. The AEC will also operate more quietly, reducing potential noise impacts. In general, as a brownfield site devoid of significant biological resources, the AEC avoids and minimizes a host of potential environmental impacts in nearly every discipline analyzed in this AFC.

AEC Facility. Activities related to AEC construction will require site preparation, including demolition and removal of existing retired and decommissioned power generation equipment and ancillary at the site. AEC construction will not result in permanent loss of any natural vegetation or habitats that could be used by special-status species. AEC construction activities will result in temporary noise impacts that may potentially affect wildlife species offsite. With the implementation of mitigation measures proposed by the Project Owner, any potentially significant impacts to biological resources resulting from AEC construction activities will be reduced to less-than-significant levels.

Laydown and Parking Areas. Construction of the AEC will require the use of onsite laydown areas (approximately 8 acres dispersed throughout the existing site) and an approximately 10-acre laydown area located adjacent to the existing site. Because the project will be constructed entirely within the existing approximately 71-acre AGS site and along the proposed wastewater pipeline alignment, no loss of natural vegetation or significant habitats will occur.

Proposed Wastewater Pipeline. The AEC will include a new 1,000-foot-long process/sanitary wastewater pipeline to the first point of interconnection with the existing LBWD sewer system. Because the project may also require upgrading of approximately 4,000 feet of the existing offsite LBWD sewer line downstream of the first point of interconnection, this possible offsite improvement to the LBWD system is also analyzed in this AFC. The total length of the new pipeline (1,000 feet) and the upgraded pipeline (4,000 feet) is approximately 5,000 feet.

Process/sanitary wastewater will be conveyed to the Los Angeles County Sanitation District via a new proposed wastewater pipeline interconnection to the Long Beach Water District. The new, off-site pipeline will commence at the west side of the site near the intersection of Studebaker Road and the northern intake channel. The pipeline will cross under Studebaker Road then turn south to the intersection with Loynes Drive. The line will then turn west, cross over the Los Cerritos Channel. and be affixed to the bridge. After crossing the channel, the pipeline will turn north on East Vista Street to connect into the existing LBWD sanitary system in the residential subdivision. The wastewater pipeline alignment will avoid wetland habitats, but some ruderal vegetation will be temporarily disturbed by construction. If the existing LBWD sewer system is upgraded, then a golf course and some manmade water features, which have the potential to support protected wildlife species, might be affected. For example, there are numerous birds species protected under the Migratory Bird Treaty Act (MBTA) that use golf courses and manmade water sources. Site photographs are provided in Appendix 5.2D.

Construction Impacts to Special-Status Plant Species. There are no sensitive or special-status plants with potential to occur within the AEC site and proposed wastewater pipeline alignment; therefore, the project will not result in significant impacts to sensitive or special-status plant species.

Construction Impacts to Threatened, Endangered, Candidate and Special-Status Wildlife Species. There are no threatened, endangered, candidate or special-status animals with potential to occur within the AEC site; therefore, construction activities will not result in any potentially significant impacts to such species. The AEC will not result in the removal of any natural vegetation or sensitive wildlife habitat and will not result in any additional regional habitat fragmentation. With respect to potential offsite impacts, construction activities may result in temporary noise and increased traffic.

Potential effects on special-status species from construction and operation of the AEC are discussed in the following sections.

- **Foraging Habitat –** The AEC site does not provide foraging habitat for sensitive and special-status species. Offsite, approximately 2,400 feet west of the AEC site, the Los Cerritos Wetlands provide potential nesting and foraging habitat for California least tern. Special-status bat species including western mastiff bat (*Eumops perotis*) and big free-tailed bat (*Nyctinomops macrotis*) may also use these areas for foraging. The project will not result in the loss of any potential foraging habitat. Potential temporary impacts from construction activities on foraging birds could primarily occur due to noise generated by these activities. Mitigation measures described in Section 5.7, Noise; Section 5.13, Visual Resources; and below will reduce potential impacts to foraging birds and bats to a less-than-significant level.

- **Nesting Birds –** With the exception of onsite landscaping (trees and shrubs) and ruderal vegetation located away from power generating equipment and activities, there is no suitable nesting habitat on the AEC site. Offsite, the salt marsh wetlands, pannes, and beaches located within a 10-mile radius of AEC provide suitable nesting habitat for special-status birds including, Belding's savanna sparrow and California least tern as well as a number of other bird species. Any potential impact to nesting habitat resulting from AEC construction activities would be reduced to less-than-significant levels with implementation of mitigation measures described in Section 5.7, Noise; Section 5.13, Visual Resources; and below.

  The project will not result in the permanent loss of nesting habitat for any migratory or resident birds. Temporary impacts to nesting birds could occur as a result of increased noise and construction activities. Noise and activity associated with project construction has the potential to disturb nesting birds, causing them to locate outside the vicinity of the construction area. Certain bird species could abandon nesting attempts close to the project site if disturbed during the breeding season during construction. This could be a significant impact, without mitigation; however, prior to construction, a preconstruction survey will be conducted to identify any active nests within 100 feet of the AEC site. Monitoring of active nests during construction activities will be performed if it is determined that active nests will be significantly disturbed by AEC activities. These measures will reduce potentially significant impacts to nesting birds to less-than-significant levels.

- **Wildlife Corridors –** The project is within the Pacific Flyway, a common route of bird migration that extends along the west coast of North America that spans an area from the pelagic regions of the Eastern Pacific to the Great Basin. No terrestrial wildlife corridors are currently present in the project area. Construction activities are not expected to impede migration along the flyway. Terrestrial wildlife habitat in the project area, as well as along the offsite pipeline alignment, has been significantly fragmented by urban development. In addition, the project site is located in developed areas; therefore, there would be no significant impacts resulting from habitat loss and fragmentation.

- **Pacific Green Sea Turtles –** Regarding onsite construction, erosion control and sediment control best management practices (BMP) will be implemented to protect surrounding water quality.

Wetlands and Waters of the United States. Based on the previously developed nature of the existing AGS, no significant biological resources or wetlands exist on the AEC site. Therefore, AEC construction and the installation of the proposed wastewater pipeline would not cause loss or fill of any wetlands or waters of the United States.

Offsite, although the manmade water features within the golf course are labeled as freshwater emergent wetlands and freshwater pond, these are artificial features that were constructed for the golf course and have no apparent connection to a traditional navigable water. These golf course water features are not expected to be considered jurisdictional waters. The AEC site is located approximately 2,400 feet west of the Los Cerritos Wetlands, which provide estuarine habitat; however, this wetland will not be directly affected

by the AEC (Figures 5.2-2a and 5.2-2b). Erosion and sediment control BMPs will be implemented during construction in accordance with the Stormwater Pollution Prevention Plan (SWPPP) required by the State's General Construction Permit for construction projects over 1 acre in size. Additionally, the California Energy Commission (CEC) requires that project owners develop and implement a Drainage, Erosion, and Sedimentation Control Plan to reduce the impact of runoff from the construction site.

Appropriate BMPs and existing onsite stormwater pollution prevention controls will be used to avoid any adverse effects to the Los Cerritos Wetlands. Thus, AEC construction or the installation of the proposed wastewater pipeline would not adversely affect these offsite wetlands or waters of the United States.

5.2.3.3 Potential Impacts of Operation

During operation, the AEC will produce combustion turbine emissions, water discharged to the existing sewer system, noise, and light. The potential for AEC operation to adversely affect sensitive biological resources at the AEC site is discussed in the following sections.

Combustion Turbine Emissions. Air emissions from the combustion turbine exhaust stacks include, but are not limited to, nitrogen oxides (NO_x) and particulates (PM_{10}). Nitrogen oxide gases (NO and NO_2) convert to nitrate particulates in a form that is suitable for uptake by most plants and could promote plant growth and primary productivity. Coastal salt marshes are the most common natural habitats in the vicinity of the AEC where nitrogen deposition may occur. The critical load for atmospheric nitrogen deposition into coastal wetlands is difficult to establish because wetlands subject to tidal exchange have open nutrient cycles. In addition, nitrogen loading in wetlands is often affected by sources other than atmospheric deposition (Morris, 1991). Various studies that have examined nitrogen loading in intertidal salt marsh wetlands have found critical loads to range from between 63 and 400 kg N ha^{-1} yr^{-1} (Caffrey et al., 2007; Wigand et al., 2003). The wet and dry nitrogen deposition resulting directly from depositional nitrogen emissions from AEC were evaluated using the air dispersion model AERMOD (version 15181). AERMOD is considered a conservative model for this analysis as it is a steady-state Gaussian plume dispersion model and does not calculate the complex chemical transformations and equilibria associated with nitrogen deposition.

Several additional conservative assumptions were used in the modeling with regard to nitrogen formation and deposition:

- 100 percent conversion of nitrogen oxides (NOx) and ammonia (NH_3) into atmospherically derived nitrogen (ADN) within the turbine stacks rather than allowing for the conversion of NOx and NH_3 to occur over distance and time within the atmosphere, which would be more realistic.
- Depositional rates and parameters based upon nitric acid (HNO_3) which, of all the depositing species, has the highest affinity for impacts to soils and vegetation and tendency to stick to what it is deposited on
- Maximum settling velocities were selected to produce conservative deposition rates
- Maximum potential emissions for the AEC facility were assumed to occur each year.

Emissions of depositional nitrogen were conservatively calculated as a complete conversion of in-stack NO_x and ammonia (NH_3) from each of the combustion sources. This was done by multiplying the nitrogen mass fraction of each of the pollutants by the respective average annual emissions.

The dry deposition algorithms in AERMOD include land use characteristics and some dry gas deposition resistance terms based on five seasonal categories and nine land use categories. The seasonal categories used for each month of modeling are as follows:

- Midsummer: April, May, June, and July
- Autumn: August, September, and October
- Late Autumn/Winter without snow: November, December, and January
- Transitional Spring: February and March

Land use categories are used within AERMOD to calculate dry deposition of the emitted nitrogen compounds. For example, in areas of lush vegetation, the gaseous nitrogen compounds would have a higher uptake and therefore dry deposition than would be higher at these areas than in bodies of water or urban areas with fewer trees. A determination for land use categories to be used in the analysis was conducted for each 10-degree increment within a 3-kilometer radius area surrounding the AEC, with all sectors designated as Suburban areas, grassy.

AERMOD also requires the input of wet and dry depositional parameters based on the nitrogen-containing species being emitted. For this analysis, it was conservatively assumed that all nitrogen emitted was in the form of nitric acid, as nitric acid is the most depositionally aggressive species. Based on the above modeling approach, the maximum modeled annual deposition averaged over five years was 3.62 kilograms per hectare per year, which occur on the eastern fence line of the AEC site. The AEC nitrogen deposition impacts are not expected to significantly contribute to nitrogen loading on coastal salt marshes because of several factors, including the high level of NO_x emission controls applied to the AEC combustion sources, air quality mitigation regulations that require offsets (in the form of RECLAIM Trading Credits) to be surrendered for actual NO_x emissions, the fact that depositional nitrogen formation requires time for the chemical reaction to occur, and the predominate wind patterns (west to east), among other factors, will result in a majority of the potential air quality impacts occurring away from the AEC site where time and distance will reduce ground-level concentrations. Finally, once AEC is operational, nitrogen emissions from the existing AGS units will be retired, resulting in a reduction in nitrogen emissions from the site.

Particulate emissions will be controlled by inlet air filtration of the turbine air intakes and the exclusive use of low sulfur natural gas. The deposition of PM_{10} can affect vegetation through either physical or chemical mechanisms. Physical mechanisms include the blocking of stomata so that normal gas exchange is impaired, as well as potential effects on leaf adsorption and reflectance of solar radiation. Information on physical effects is limited, presumably in part because such effects are slight or not obvious except under extreme situations (Lodge et al., 1981).

Therefore, given the emission controls and monitoring incorporated into the AEC design and the requirement to offset emissions of nitrogen oxides, sulfur oxides, and particulate matter emissions, no additional mitigation measures are required.

Stormwater and Process Water Discharge. During construction and operations, the existing stormwater collection system will still be used, which includes two recontoured retention basins and the existing San Gabriel River outfalls. Stormwater collected onsite with the potential to contain oils or lubricants will be routed to one of three oil/water separators before being sent to the retention ponds and discharged via an existing NPDES-permitted outfall. The Project Owner will prepare a SWPPP for AEC operations that specifies BMPs to be implemented during all project activities to avoid stormwater discharges that would cause water quality degradation. Process wastewater will be conveyed to the LA County Sanitation District via a new proposed wastewater pipeline interconnection to the LBWD.

Because the AEC will draw process water from an existing water supply system and then discharge wastewater to the LBWD's sanitary system, there will be no mechanism for entrainment or impingement of aquatic species during plant operation. The discharge of stormwater via the existing permitted outfall will not result in a significant effect to aquatic resources and species during AEC operations.

Noise and Light from Plant Operations. The AEC site is designated in the City of Long Beach General Plan for industrial land uses. The site is adjacent to other industrial land uses and major transportation corridors including the Pacific Coast Highway. Coastal salt marsh habitats occur in the project vicinity. The existing AGS, urban development, and roadways in the area result in several sources of lighting and noise emissions. Noise associated with AEC operation is described in more detail in Section 5.7, Noise. Noise from site preparation and construction could temporarily affect wildlife foraging and nesting in the coastal wetland habitat approximately 2,400 feet west of the AEC site; however, the existing conditions already include noise associated with existing industrial uses, including the existing AGS operation and highway traffic. It is

expected that noise from AEC construction and operation would not adversely affect wildlife, as wildlife usually become accustomed to routine background noise.

Although a 60-dBA threshold is often commonly used for avian species, this threshold is outdated and does not take into account several aspects of avian ecology, such as hearing physiology and behavioral strategies species can utilize in noisy environments. Several studies summarized by Golden et al. (1980) indicate no impacts from aircraft noise at 75 dBA for several wildlife species. Western burrowing owls, for example, have been noted to reside within 100 to 200 feet of an active railway with measured noise levels of approximately 90 dBA at a distance of 50 feet from the railway (Golden et al., 1980). There is also interspecific variation is how bird species tolerate noise. Although birds primarily communicate with one another through vocalizations and auditory cues, some species will adjust their vocalizations to prevent masking by low frequency noise in an urban setting (Slabbekoorn and Peet, 2003). In addition, waterfowl behaviors are associated with shoreline development in urban habitats and interspecific variation exists in how species respond to urbanization (Donaldson et al., 2007 and references therein). Many species habituate to urban noise, while other species will move out of an area or prevent suitable nesting habitat from being used, if that species is noise-sensitive. High levels of background or intermittent noise may potentially interfere with reproduction, warning and distress calls, feeding behavior, protection of offspring, which can results in energy loss and physiological stress, particularly in noise-sensitive species. However, there are differences among species with how they respond to different levels of ambient noise and noise disturbances and most urban-adapted species are noise tolerant. According to Francis et al. (2009), noise-tolerant species indirectly benefited from decreased predation, which enhanced reproduction success.

Although a typical noise threshold of 60 dBA is broadly applied to many bird species in various environmental settings, this threshold is not appropriate. This commonly used threshold was developed in a laboratory setting that specifically analyzed the effects of highway noise on vocal communications of avian species (see Dooling and Popper, 2007 for a critique). Dooling and Popper (2007) state the 60-dBA threshold is outdated and higher levels may be readily acceptable in noisy urban areas where ambient noise levels can reach 70 dBA. Furthermore, the 60-dBA noise guideline does not consider strategies that a bird may use in its natural environment, such as scanning, changing their height or position in a landscape, increasing and/or adjusting the timing of vocalization. Utilizing any one of these strategies can enhance communication in urban environments by 10 to 15 dB, which equals over a hundred meters in transmission distance of the bird's song or call (Dooling and Popper, 2007). Furthermore, Dooling and Popper (2007) explain that the 60-dBA threshold is "quite conservative since it is based on continuous noise in a controlled, artificial (i.e., laboratory) setting – a situation that is unlikely to occur in the real world" and conclude that higher sound levels may be readily accommodated. In the evidentiary hearing for the Huntington Beach Energy Project (2014), Dr. Robert Dooling presented expert witness testimony regarding noise impacts and avian hearing and stated "birds hear much less well at low frequencies than humans do. And most of the energy in construction noises and traffic noises is at low frequencies as opposed to mid or high frequencies where birds vocalize." This is an important aspect of avian hearing that needs to be understood. Because construction noise typically is dominant at low frequencies, noise restrictions/guidelines for humans work well as thresholds for avian species.

The expected loudest composite noise levels from the AEC are approximately 70 dBA[28] at the AEC eastern fenceline, which will result in a noise level of 60 dBA at 400 feet from the eastern fenceline and 57 dBA at the Los Cerritos Wetlands approximately 2,400 feet west of the AEC site. The following reasons are why noise impacts on avian species are not expected to be significant:

- The distance from the AEC power blocks to any potentially sensitive receptors, such as the Los Cerritos Wetlands, is approximately 2,400 feet. Noise levels would greatly decrease at that distance.

[28] Noise estimates are conservative, do not take into account the effect of blocking from structures, and assume a non-sound-absorbing ground surface.

- Bird species hear less well than humans at low frequencies.
  - This is particularly important considering the fact that of the majority of construction noise occurs at low frequencies.
  - Avian species that occur in urban environments, such as within the vicinity of AEC, are noise tolerant compared to other noise-sensitive species, particularly those that will move away from noise sources and nest in more remote, undisturbed locations.

Avian species employ a variety of behavioral adaptations in noisy environments. Therefore, noise-related impacts are expected to be less-than-significant.

Bright night lighting could disturb wildlife that occurs adjacent to the project site (such as nesting birds and foraging mammals). Night lighting is also suspected to attract migratory birds to the area; lights on tall towers or structures could result in collisions. The AEC lighting will meet the requirements for security, operations and maintenance, and safety, and will be shielded and pointed downward to minimize potential impacts and to reduce the potential for avian and bat attraction and collision. Further, night lighting will have switches to allow them to be turned off when not in use consistent with plant safety operations.

Potential for Avian Collisions. Direct and indirect impacts to birds including potential for collision with structures are expected to be less than significant given the project location and existing tall structures and facilities on the site. The AEC will be electrically interconnected to the existing SCE switchyard via short onsite transmission lines. These transmission lines will be onsite among the existing onsite electrical lines that connect into the SCE switchyard. It is expected that resident and migrating wildlife in the area would be accustomed to maneuvering around structures and other features and the potential for avian collisions is expected to be less than significant.

Effects of Operation on Threatened, Endangered, Candidate and Special-status Species.

Threatened, Endangered, Candidate and Special-status Plants. No federal or state listed threatened, endangered, or candidate plant species occur at the AEC site or along the offsite pipeline alignment. No suitable habitat for special-status plants exists at the AEC site or along the offsite pipeline alignment. Potential indirect impacts from facility operation on coastal saltmarsh wetland habitats, the closest being approximately 2,400 feet west of the AEC site, will be less than significant.

Threatened, Endangered, Candidate and Special-status Wildlife Species. No federal or state listed threatened, endangered, or candidate wildlife species occur at the AEC site or along the offsite pipeline alignment. No sensitive or special-status wildlife have been observed within the AEC site. The project is not expected to result in significant impacts on sensitive and special-status wildlife species.

Foraging Birds and Bats. No potential impacts from operational activities on foraging birds and bats are expected to occur because suitable foraging habitat does not exist within the AEC site. The AEC would operate within the existing AGS boundary, and operations and maintenance activities would be similar. Operation-related impacts are not expected to be significant.

Nesting Birds. Limited nesting habitat for bird species is available at the AEC site and along the proposed wastewater pipeline alignment. Trees that could be planted as visual screening around the site have the potential to attract raptors, such as barn owls and American kestrels, which could increase predation on shorebirds in the wetlands areas offsite. Bird species that would use the landscaping trees would build nests while the AEC is operating and would not be disturbed by facility operations.

Operation Phase Impacts to Wetlands and Waters of the United States. The Los Cerritos Wetlands are approximately 2,400 feet west of the AEC site. There will be no direct impacts on the Los Cerritos Wetlands. There is a minimal potential for indirect effects. As stated in Section 2.0, Project Description, and in this section, the AEC nitrogen deposition impacts are not expected to significantly contribute to nitrogen loading on coastal salt marshes due to several factors, including the high level of NO_x emission controls; air quality

mitigation regulations that require offsets (in the form of RECLAIM Trading Credits) to be surrendered for actual NO_x emissions; and the fact that elevated stack release heights, the time required for the chemical reaction required for secondary nitrogen formation, and the predominate wind patterns (west to east), among other factors, will result in a majority of the potential air quality impacts occurring away from the AEC site where time and distance will reduce ground-level concentrations. With appropriate design and monitoring measures, there will be no direct impacts and the potential indirect impacts will be less than significant.

5.2.4 Cumulative Effects

Section 15355 of the CEQA Guidelines defines "cumulative impacts" as "two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts." Subsection b of Section 15355 states, in part, that "The cumulative impact *from several projects* is the change in the environment which results from *the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects*." (Emphasis added.) Thus, cumulative impacts under CEQA involve the potential interrelationships of two or more projects, not the impacts from a single project. Specifically, under Section 15130 of the CEQA Guidelines, an Environmental Impact Report is required to discuss cumulative impacts when the project's incremental effect is "cumulatively considerable." Section 15065(a)(3) then defines "cumulatively considerable" as meaning "that the incremental effects of an individual project are significant when viewed in connection with the effects of *other* closely related past projects, the effects of *other* current projects and the effects of probable *future* projects." (Emphasis added.)

Potential cumulative impacts to biological resources from construction and operation of the AEC project are not expected. The project will have a less-than-significant impact on biological resources in the immediate vicinity of the project site. Projects that could result in a cumulative impact would also be required to comply with applicable federal, state, and local LORS. The proposed project is unlikely, therefore, to result in cumulative impacts to biological resources in combination with other closely related past, present, and reasonably foreseeable future projects.

5.2.5 Mitigation Measures

Mitigation measures are intended to avoid or minimize potentially significant effects of a project on biological resources. Potential significant effects that may result from AEC include disturbance to nesting and foraging bird species in habitats adjacent to the AEC, the closest of which is the Los Cerritos Wetlands complex, an approximately 500-acre site that is approximately 2,400 feet west of the AEC site. Potentially significant effects are unlikely given that there are no onsite resources and given the distance to any off-site resources. The project owner will conduct a preconstruction active nest survey within 100 feet of the AEC site, and, if determined necessary, monitor active nests during construction activities.

5.2.6 Laws, Ordinances, Regulations, and Standards

The following sections describe the primary LORS that apply to potential impacts on biological resources in the project area, and list the agencies that would be responsible for enforcing the regulations but for the CEC's exclusive jurisdiction. A summary of the LORS is provided in Table 5.2-1.

5.2.6.1 Federal LORS

Federal Endangered Species Act (16 United States Code [USC] Section 153 et seq.). The ESA defines endangered species as "any species which is in danger of extinction throughout all or a significant portion of its range," and threatened species as "any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range." The ESA prohibits the "take" of endangered fish and wildlife and prohibits the removal or destruction of endangered plants on federal lands. "Take" is defined in the ESA as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." The ESA allows an agency to authorize a taking that is incidental to an otherwise lawful activity if certain conditions are met and impacts are mitigated. The federal ESA

provides two processes that may authorize an incidental take, known commonly as the Section 7 and Section 10 processes. Under the Section 7 process, any agency responsible for approving a project must consult with USFWS or the National Marine Fisheries Service on the potential impacts to endangered or threatened species. The Services may then issue an Incidental Take Statement (ITS) authorizing the take with conditions. An ITS authorizes the taking subject to the Service's terms and conditions. The reasonable and prudent measures must actually minimize the amount or extent of the anticipated take but cannot alter the basic design, location, scope, duration, or timing of the action and can only make minor changes.

Migratory Bird Treaty Act (16 USC Sections 703 to 711). Protects all migratory birds, including nests and eggs. In terms of species not covered by the MBTA, the USFWS states: "The MBTA does not apply to species that fall into any of the following categories: (1) Nonnative species introduced into the United States or its territories by means of intentional or unintentional human assistance. See 70 FR 12710 (March 15, 2005) for a partial list of nonnative human-introduced bird species in this category. (2) Species that are native and belong to families not covered by any of the conventions implemented by the MBTA. These species are managed by the states within which they reside."[29] CEC Staff also opined that "While the [solar thermal] project would kill birds, such kill is incidental to a legal commercial activity, and would not likely be considered a violation of the Act if unintentional and consistent with all agency mitigation requirements and recommendations."[30]

Bald and Golden Eagle Protection Act (16 USC Section 668). Specifically protects bald and golden eagles from harm or trade in parts of these species.

5.2.6.2 State LORS

California Endangered Species Act (Fish and Wildlife Code Section 2050 et seq.). While there are some differences in terminology, there are few substantive differences between the federal ESA and the CESA. The CESA contains similar definitions of endangered species, threatened species, and take. Under the CESA, a native species is considered endangered when it "is in serious danger of becoming extinct throughout all, or a significant portion, of its range, due to one or more causes, including loss of habitat, change in habitat, overexploitation, predation, competition, or disease," and threatened when it "is likely to become an endangered species in the foreseeable future in the absence of the special protection and management efforts required by the CESA." "Take" is defined in the CESA as to "hunt, pursue, catch, capture, or kill, or attempt" to do any of these activities. Similar to the ESA, the CESA allows an agency to authorize an incidental taking provided impacts are mitigated. CESA prohibits the take of listed threatened and endangered species except if authorized pursuant to an incidental take permit (ITP) so long as the take is "incidental" to an otherwise lawful activity.

Fish and Wildlife Code Section 3511. Describes bird species, primarily raptors, that are "fully protected." Fully protected birds may not be taken or possessed, except under specific permit requirements.

Fish and Wildlife Code Section 3503. States that it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird, except as otherwise provided by this **code** or any regulation made pursuant thereto.

Fish and Wildlife Code Section 3503.5. Protects all birds of prey and their eggs and nests.

Fish and Wildlife Code Section 3513. Makes it unlawful to take, possess, or destroy any birds of prey or to take, possess, or destroy the nest or eggs of any such bird.

Fish and Wildlife Code Sections 4700, 5050, and 5515. Lists mammal, amphibian, and reptile species that are fully protected in California.

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[29] USFWS "Migratory Bird Management Information: List of Protected Birds (10.13) Questions and Answers," available at: http://www.fws.gov/migratorybirds/RegulationsPolicies/mbta/43603%20QA%201013%20rule.pdf.

[30] Hidden Hills Final Staff Assessment, December 2012, p. 4.2-215.

Fish and Wildlife Code Sections 1900 et seq. The Native Plant Protection Act lists threatened, endangered, and rare plants listed by the state.

Title 14, California Code of Regulations, Sections 670.2 and 670.5. Lists animals designated as threatened or endangered in California. Species of Special Concern (CSC) is a category conferred by CDFW on those species that are indicators of regional habitat changes or are considered potential future protected species. CSC do not have any special legal status, but are intended by CDFW for use as a management tool to take these species into special consideration when decisions are made concerning the future of any land parcel.

California Fish and Wildlife Code (Sections 1601 through 1607). Prohibits alteration of any stream, including intermittent and seasonal channels and many artificial channels, without a permit from CDFW. CDFW jurisdiction is limited to areas within the 100-year floodplain. Within this zone, CDFW jurisdiction is subject to the judgment of the department. This applies to any channel modifications that would be required to meet drainage, transportation, or flood control objectives of a project.

California Environmental Quality Act (Public Resources Code Section 15380). Defines "rare" in a broader sense than the definitions of threatened, endangered, or species of special concern. Under this definition, CDFW can request additional consideration of species not otherwise protected. CEQA requires that the effects of a project on environmental resources must be analyzed and assessed using criteria determined by the lead agency.

Warren Alquist Act (Public Resources Code Section 25000, et seq.). The legislation that created and gives statutory authority to the CEC. The issuance of a certificate by the CEC shall be in lieu of any permit, certificate or similar document required by any state, local or regional agency. Accordingly, local permits that would be required but for the CEC's jurisdiction are not required for the project.

California Coastal Act (for those portions of the project located in the Coastal Zone).

5.2.6.3 Local and Other Jurisdictions' LORS

City of Long Beach – General Plan/Southeast Area Development and Improvement Plan (SEADIP); Local Coastal Program (LCP). The City of Long Beach regulates new development through design review and permit issuance to ensure consistency with Coastal Act requirements and minimize adverse impacts to identified environmentally sensitive habitats and wetland areas. New development projects that are contiguous to wetlands or environmentally sensitive habitat areas must include a buffer from the edge of the wetland.

TABLE 5.2-1

Laws, Ordinances, Regulations, and Standards for Biological Resources

LORS	Requirements/Applicability	Administering Agency	AFC Section Explaining Conformance
Federal			
Federal Endangered Species Act (Federal ESA, 16 USC Section 1531 et seq.)	Designates and protects federally threatened and endangered plants and animals and their critical habitat. The ESA allows an agency to authorize a taking that is incidental to an otherwise lawful activity if certain conditions are met and impacts are mitigated.	USFWS	No such species occur on the AEC site. The AEC is not likely to adversely affect the federally endangered California least tern. Informal discussions and coordination with USFWS will determine measures the AEC will undertake to avoid adverse effects to nesting habitat for these species in the vicinity of the project habitat, the closest of which is approximately 2,400 feet west of the AEC Project area.
Migratory Bird Treaty Act (16 USC Sections 703 to 711)	Protects native migratory birds, including nests and eggs, with certain limited exceptions.	USFWS	The AEC will include mitigation measures to reduce potential impacts to resident and migratory birds to a less-than-significant level (Section 5.2.5).
Bald and Golden Eagle Protection Act (16 USC Section 668)	Specifically protects bald and golden eagles from harm or trade in parts of these species.	USFWS	No such species occur on the AEC site. Bald and golden eagles were not found in the project area. The AEC is not likely to adversely affect eagles.
State			
California Endangered Species Act (Fish and Wildlife Code Section 2050 et seq.).	Species listed under this act cannot be “taken” or harmed, except under specific permit.	CEC	No such species occur on the AEC site. The AEC will include mitigation measures to reduce impacts to State listed species including the California least tern and Belding’s savannah sparrow to a less-than-significant level, given that the closest offsite habitat is approximately 2,400 feet west of the AEC site (Section 5.2.5).
Fish and Wildlife Code Section 3511	Describes species, primarily birds, which are “fully protected.” Fully protected species may not be taken or possessed, except under specific permit requirements.	CDFW	No such species occur on the AEC site. The AEC will include mitigation measures to reduce impacts to fully protected species to a less-than-significant level (Section 5.2.5).
Fish and Wildlife Code Section 3503	States that it is unlawful to take, possess, or needlessly destroy the nest or eggs of any bird, except as otherwise provided by this code or any regulation made pursuant thereto.	CDFW	The AEC will include mitigation measures to reduce impacts to bird nests and eggs to a less-than-significant level (Section 5.2.5).
Fish and Wildlife Code Section 3503.5	Protects all birds of prey and their eggs and nests.	CDFW	The AEC will include mitigation measures to reduce impacts to bird nests and eggs to a less-than-significant level (Section 5.2.5).

TABLE 5.2-1

Laws, Ordinances, Regulations, and Standards for Biological Resources

LORS	Requirements/Applicability	Administering Agency	AFC Section Explaining Conformance
Fish and Wildlife Code Section 3513	Makes it unlawful to take, possess, or destroy any birds of prey or to take, possess, or destroy the nest or eggs of any such bird.	CDFW	The AEC will include mitigation measures to reduce impacts to birds of prey to a less-than-significant level (Section 5.2.5).
Fish and Wildlife Code Sections 4700, 5050, and 5515	Lists mammal, amphibian, and reptile species that are fully protected in California.	CDFW	No such species occur on the AEC site. The AEC will include mitigation measures to reduce impacts to fully protected mammal, amphibian, or reptile species to a less-than-significant level (Section 5.2.5).
Fish and Wildlife Code Sections 1900 et seq.,	The Native Plant Protection Act lists threatened, endangered, and rare plants listed by the State.	CDFW	No such species occur on the AEC site. No state threatened, endangered or rare plants will be affected by the AEC (Section 5.2.5).
Title 14, California Code of Regulations, Sections 670.2 and 670.5	Lists animals designated as threatened or endangered in California.	CDFW	No such species occur on the AEC site. The AEC will include mitigation measures to reduce impacts to threatened and endangered animals to a less-than-significant level (Section 5.2.5).
California Fish and Wildlife Code (Sections 1601 through 1607)	Prohibits alteration of any stream, including intermittent and seasonal channels and many artificial channels, without a permit from CDFW.	CDFW	No streams, including intermittent and seasonal channels will be affected by the AEC (Section 5.2.5).
CEQA (Public Resources Code Section 15380)	CEQA requires that the effects of a project on environmental resources must be analyzed and assessed using criteria determined by the lead agency.	CEC	The AFC analysis and process is CEQA equivalent. All requirements under CEQA are met with the analysis in the AEC AFC (Section 5.2.6.2).
Warren Alquist Act (Public Resources Code Section 25000, et seq.)	Warren-Alquist Act provides for the CEQA-equivalent process implemented by the CEC.	CEC	The CEC certification process is a certified regulatory program under CEQA and is thus CEQA equivalent. (Section 5.2.6.2)
Local			
City of Long Beach – General Plan/Southeast Area Development and Improvement Plan (SEADIP), Local Coastal Program	But for the CEC's exclusive jurisdiction over State law matters, the City would regulate new development through design review and permit issuance to ensure consistency with Coastal Act requirements and minimize adverse impacts to identified environmentally sensitive habitats and wetland areas.	City of Long Beach	The AEC, located entirely within an existing developed area that has been designated for industrial uses in the Long Beach General Plan/Southeast Area Development and Improvement Plan (SEADIP), will be consistent with the SEADIP.

5.2.7 Permits and Permit Schedule

No federal or state listed or other special-status species will be significantly affected by AEC construction or operation. No additional permits are required. Accordingly, a schedule indicating when permits outside the authority of the CEC will be obtained and the steps the Project Owner has taken or plans to take to obtain such permits is not applicable in this case.

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Legend

- AGS Boundary
- AEC Site
- Parking/Laydown Construction Area
- Proposed New Process/Sanitary Wastewater Pipeline to First Point of Interconnection
- Potential Sewer Upgrade
- 10 Mile Project Buffer
- Bolsa Chica Ecological Reserve
- Golden Shore Marine Biological Reserve Park
- Jack Dunster Marine Biological Reserve
- Los Cerritos Wetland Complex and Privately-Owned Lands
- Seal Beach National Wildlife Refuge

Source: Esri World Imagery
California Protected Areas Database (CPAD) – www.calands.org (March 2013), Los Cerritos Wetlands Authority (June 2010), U.S. Fish and Wildlife Service (June 2013).

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FIGURE 5.2-1
Significant Regional Wetlands and Protected Areas
Alamitos Energy Center
Long Beach, California
October 2015

CH2MHILL

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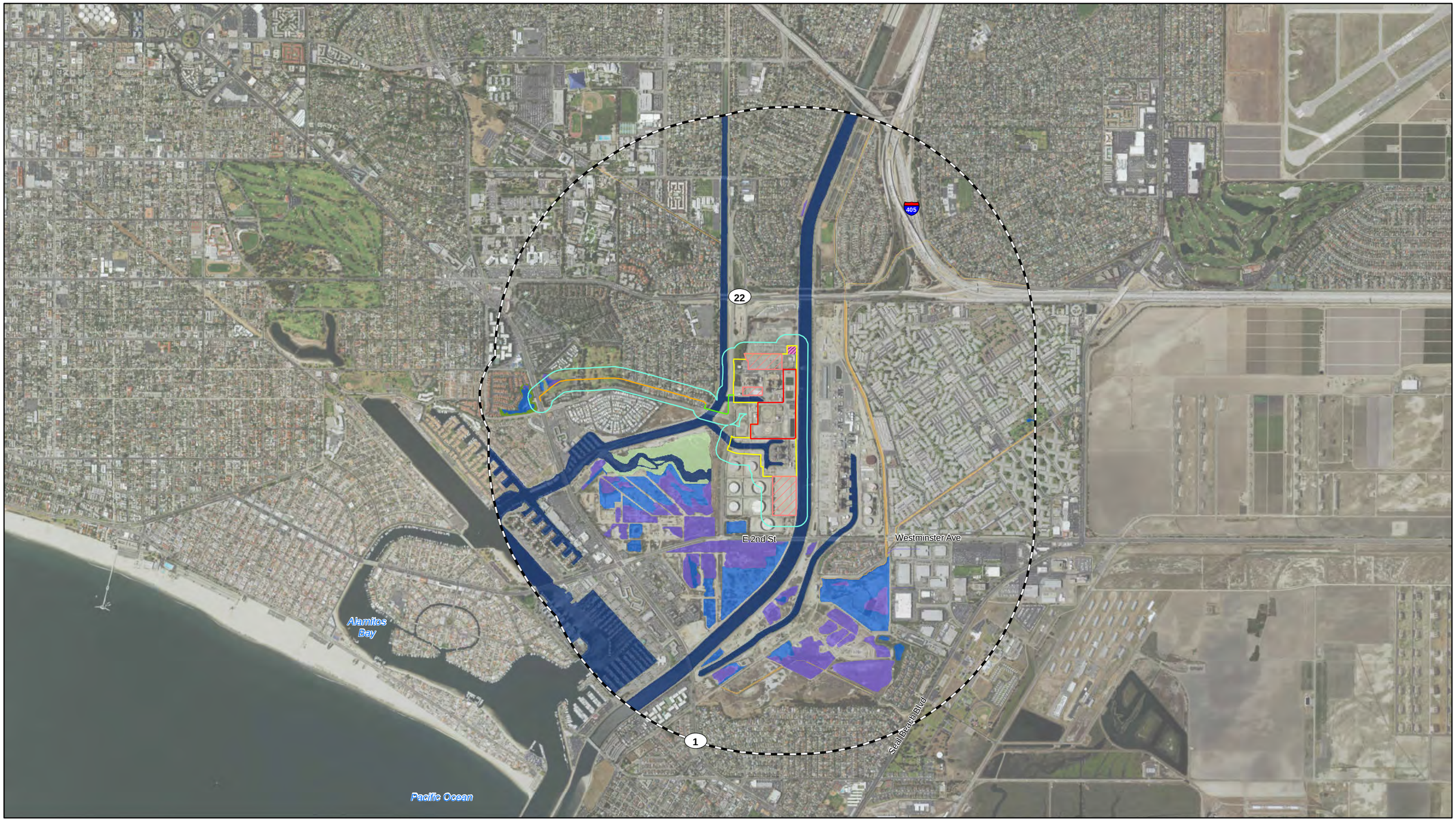

Legend

- AGS Boundary
- AEC Site
- Parking/Laydown Construction Area
- Natural Gas Metering Station
- 1 Mile Project Buffer/0.25 Mile Sewer Line Buffer
- 250 Foot Buffer
- Proposed New Process/Sanitary Wastewater Pipeline to First Point of Interconnection
- Potential Sewer Upgrade

National Wetlands Inventory

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Riverine

Note:
NWI data is accurate to produce medium resolution information at a scale of 1:12,000.
Larger scales will not contain the same level of accuracy.

Source: Esri World Imagery,
National Wetlands Inventory, U.S. Fish and Wildlife Service (2015).

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FIGURE 5.2-2a
National Wetland Inventory

Alamitos Energy Center
Long Beach, California
October 2015

CH2MHILL

Legend

- AGS Boundary
- AEC Site
- Parking/Laydown Construction Area
- Natural Gas Metering Station
- 250 Foot Buffer
- Proposed New Process/Sanitary Wastewater Pipeline to First Point of Interconnection
- Potential Sewer Upgrade

National Wetlands Inventory

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Riverine

Note:
NWI data is accurate to produce medium resolution information at a scale of 1:12,000.
Larger scales will not contain the same level of accuracy.

Source: Esri World Imagery,
National Wetlands Inventory, U.S. Fish and Wildlife Service (2015).

0 200 400 Feet

N

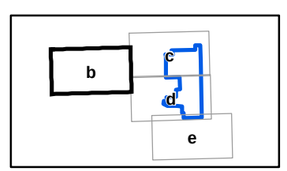


FIGURE 5.2-2b
National Wetland Inventory (within 250 feet)

Alamitos Energy Center
Long Beach, California
October 2015

CH2MHILL

Legend

- AGS Boundary
- AEC Site
- Parking/Laydown Construction Area
- Natural Gas Metering Station
- 250 Foot Buffer
- Proposed New Process/Sanitary Wastewater Pipeline to First Point of Interconnection
- Potential Sewer Upgrade

National Wetlands Inventory

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Riverine

Note:
NWI data is accurate to produce medium resolution information at a scale of 1:12,000.
Larger scales will not contain the same level of accuracy.

Source: Esri World Imagery,
National Wetlands Inventory, U.S. Fish and Wildlife Service (2015).

0 200 400 Feet

N

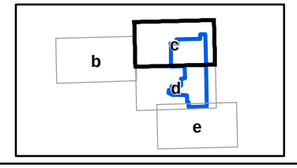
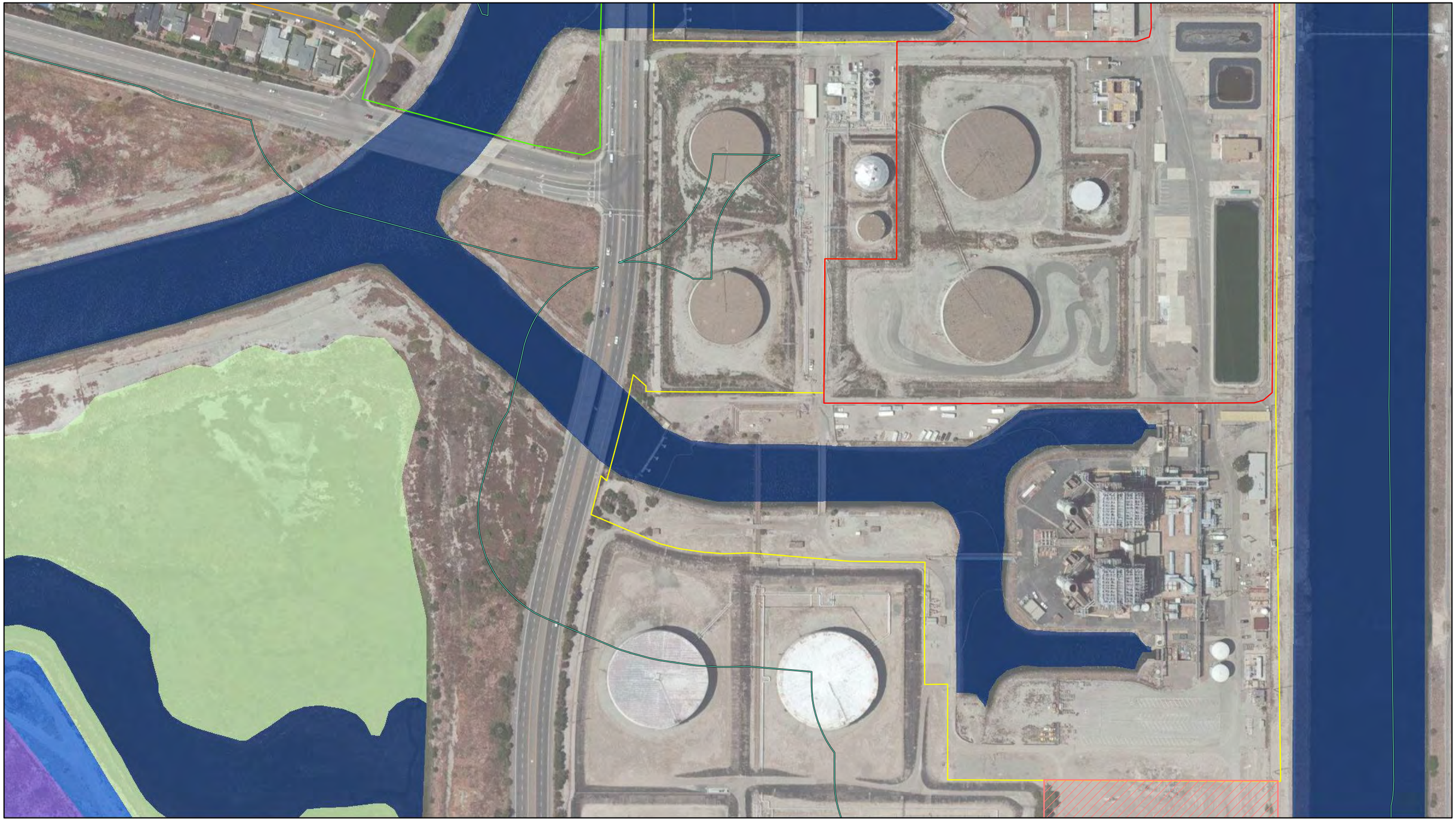


FIGURE 5.2-2c
National Wetland Inventory (within 250 feet)

Alamitos Energy Center
Long Beach, California
October 2015

CH2MHILL



Legend

- AGS Boundary
- AEC Site
- Parking/Laydown Construction Area
- Natural Gas Metering Station
- 250 Foot Buffer
- Proposed New Process/Sanitary Wastewater Pipeline to First Point of Interconnection
- Potential Sewer Upgrade

National Wetlands Inventory

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Riverine

Note:
NWI data is accurate to produce medium resolution information at a scale of 1:12,000.
Larger scales will not contain the same level of accuracy.

Source: Esri World Imagery,
National Wetlands Inventory, U.S. Fish and Wildlife Service (2015).

0 200 400 Feet

N

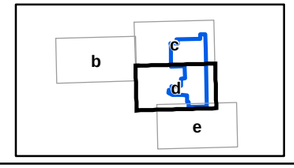


FIGURE 5.2-2d
National Wetland Inventory (within 250 feet)

Alamitos Energy Center
Long Beach, California
October 2015

CH2MHILL

Legend

- AGS Boundary
- AEC Site
- Parking/Laydown Construction Area
- Natural Gas Metering Station
- 250 Foot Buffer
- Proposed New Process/Sanitary Wastewater Pipeline to First Point of Interconnection
- Potential Sewer Upgrade

National Wetlands Inventory

- Estuarine and Marine Deepwater
- Estuarine and Marine Wetland
- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Freshwater Pond
- Riverine

Note:
NWI data is accurate to produce medium resolution information at a scale of 1:12,000.
Larger scales will not contain the same level of accuracy.

Source: Esri World Imagery,
National Wetlands Inventory, U.S. Fish and Wildlife Service (2015).

0 200 400 Feet

N

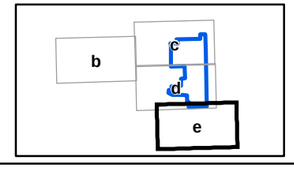
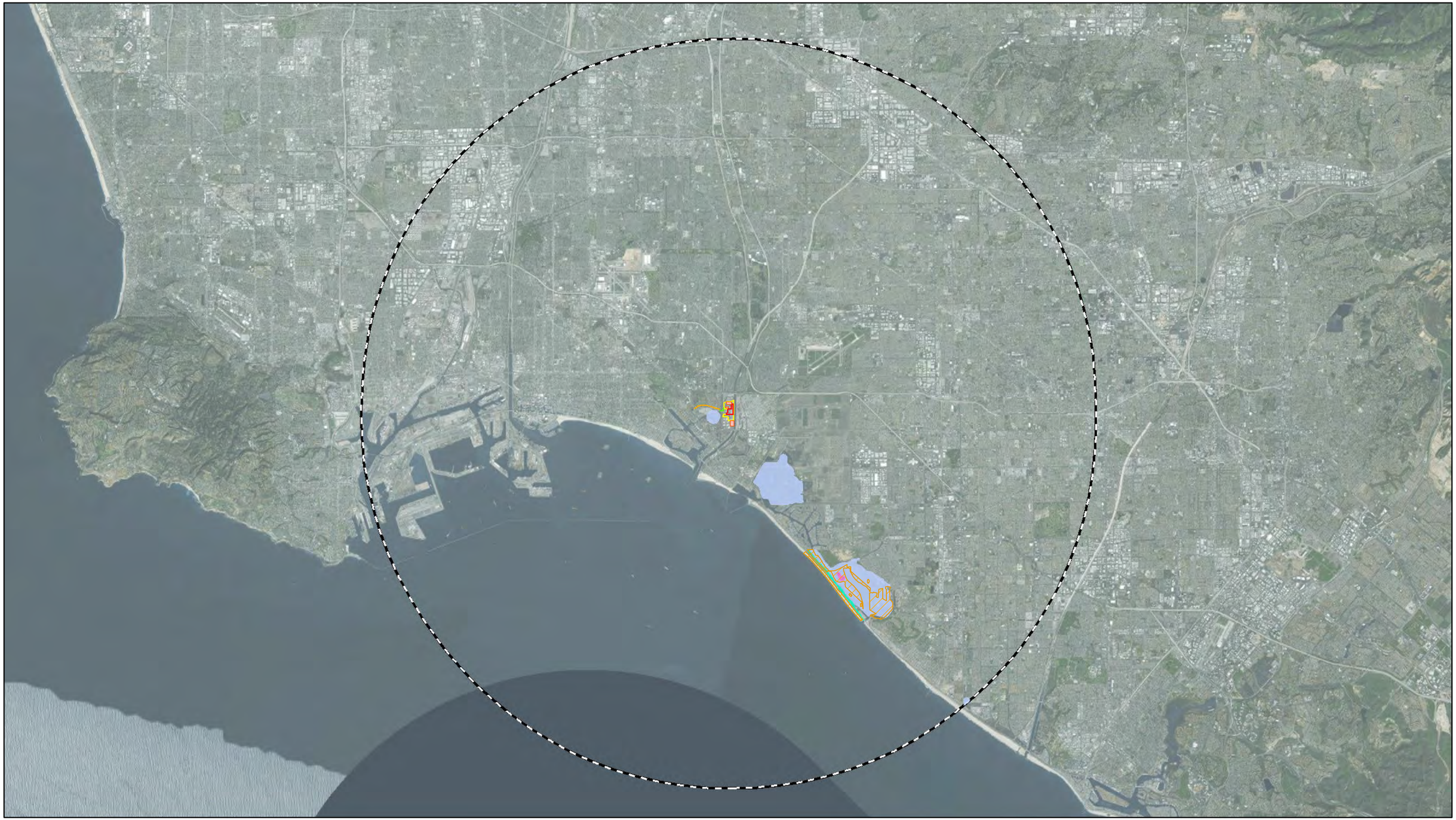


FIGURE 5.2-2e
National Wetland Inventory (within 250 feet)

Alamitos Energy Center
Long Beach, California
October 2015

CH2MHILL

Y:\AESCORP\491232DISCPHASEREP\AFC_ARCHIVE\AEC\GIS\ALAMITOS\MAPFILES\BIOLOGY\FIG5_2-2B-D_AEC_NWI_250FT_20151014.MXD MD013761 10/20/2015 5:15:20 PM



Legend

- AGS Boundary
- AEC Site
- Parking/Laydown Construction Area
- 10 Mile Project Buffer
- Proposed New Process/Sanitary Wastewater Pipeline to First Point of Interconnection
- Potential Sewer Upgrade

Sensitive Communities

- Southern Coastal Salt Marsh
- Southern Dune Scrub
- Southern Foredunes

Critical Habitat

- Western snowy plover

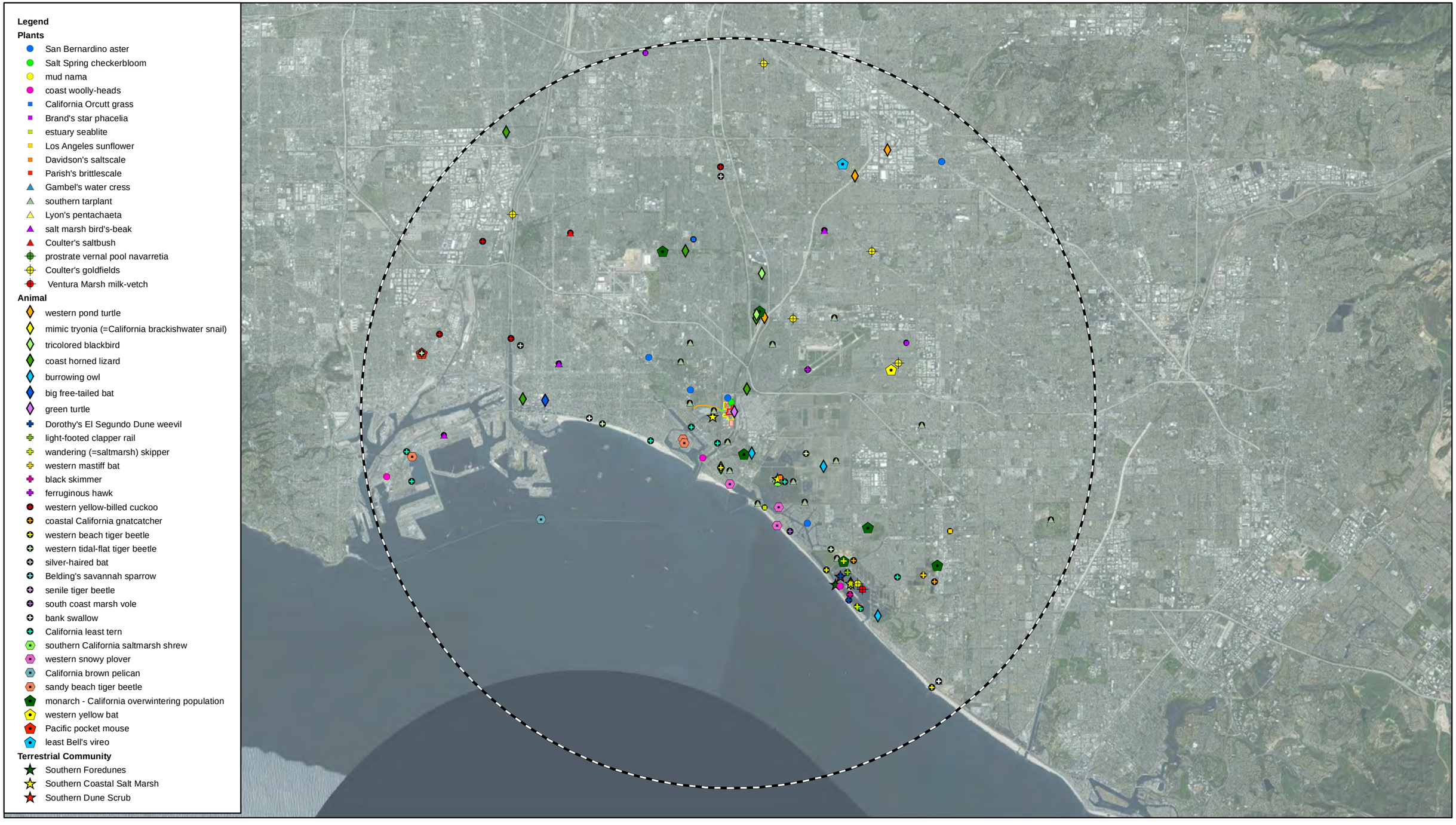
Source: Esri World Imagery, CNDDB (Sep 2015), USFWS (2015).

0 2.5 5 Miles N

FIGURE 5.2-3
Sensitive Natural Communities and Critical Habitat
Alamitos Energy Center
Long Beach, California
October 2015

CH2MHILL

Y:\AESCORP\491232DISCPHASEREP\AFC_ARCHIVE\AEC\GIS\ALAMITOS\MAPFILES\BIOLOGY\FIG5_2-3_AEC_CRIT_HAB_10MI_20151014.MXD MD013761 10/20/2015 5:21:50 PM



Legend

- AGS Boundary
- AEC Site
- Parking/Laydown Construction Area
- 10 Mile Project Buffer
- Proposed New Process/Sanitary Wastewater Pipeline to First Point of Interconnection
- Potential Sewer Upgrade

Source: Esri World Imagery, CNDDB, Sep 2015.

Note:
The occurrences shown on this map represent the known locations of the species listed here as of the date of this version. There may be additional occurrences or additional species within this area which have not yet been surveyed and/or mapped. Lack of information in the CNDDB about a species or an area can never be used as proof that no special status species occur in an area.

0 2.5 5 Miles

N

FIGURE 5.2-4a
Special-Status Species (within 10 miles)
Alamitos Energy Center
Long Beach, California
October 2015

CH2MHILL

Y:\AESCORP\491232DISCPHASEREP\AFC_ARCHIVE\AEC\GIS\ALAMITOS\MAPFILES\BIOLOGY\FIG5_2-4A_AEC_CNDDB_10MI_20151014.MXD MD013761 10/20/2015 5:25:10 PM

San Bernardino aster
coast horned lizard
San Bernardino aster
Salt Spring checkerbloom
western tidal-flat tiger beetle
southern tarplant
green turtle
Belding's savannah sparrow
Southern Coastal Salt Marsh
California least tern
E 2nd St
Westminster Ave
sandy beach tiger beetle
sandy beach tiger beetle
Alamitos Bay
coast woolly-heads
burrowing owl
Southern California saltmarsh shrew
mud nama
salt marsh bird's-beak
senile tiger beetle
coast horned lizard
western beach tiger beetle
monarch - California overwintering population
Seal Beach Blvd
South Coast marsh vole
Coulter's goldfields
estuary seablite
Pacific Ocean
405
22
1

Legend

- AGS Boundary
- AEC Site
- Parking/Laydown Construction Area
- 1 Mile Project Buffer/0.25 Mile Sewer Line Buffer
- Proposed New Process/Sanitary Wastewater Pipeline to First Point of Interconnection
- Potential Sewer Upgrade
- Animal (1,000m)
- Animal (1 mile)
- Animal (specific area)
- Animal (nonspecific area)
- Plant (1,000m)
- Plant (specific area)
- Plant (nonspecific area)
- Terr. Comm. (300m)

Note:
1. The occurrences shown on this map represent the known locations of the species listed here as of the date of this version. There may be additional occurrences or additional species within this area which have not yet been surveyed and/or mapped. Lack of information in the CNDDB about a species or an area can never be used
2. CNDDB databases are updated every month, therefore locations identified are approximations, and may be updated and/or relocated in future versions.

Source: Esri World Imagery, CNDDB, Sep 2015.

0 2,000 4,000 Feet

N

FIGURE 5.2-4b
Special-Status Species (within 1 mile)

Alamitos Energy Center
Long Beach, California
October 2015

CH2MHILL

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Legend

- AGS Boundary
- AEC Site
- Parking/Laydown Construction Area
- 250 Feet Buffer
- 1 Mile Project Buffer/0.25 Mile Sewer Line Buffer
- Proposed New Process/Sanitary Wastewater Pipeline to First Point of Interconnection
- Potential Sewer Upgrade
- Urban Development
- Industrial
- Parks and Open Space
- Privately-Owned Land/Los Cerritos Wetlands Area

Note: Urban Development also includes roads, landscaping and ruderal vegetation areas.

a	b
c	d
e	f
g	h

0 500 1,000 Feet

N

FIGURE 5.2-5a
Land Cover and Natural Community Types

Alamitos Energy Center
Long Beach, California
October 2015

CH2MHILL

Y:\AESCORP\491232DISCPHASEREP\AFC_ARCHIVE\AEC\GIS\ALAMITOS\MAPFILES\BIOLOGY\FIG5_2-5_AEC_VEG_20151016.MXD MD013761 10/20/2015 5:29:36 PM

Long Beach
Los Alamitos

Los Alamitos
Rossmoor

Long Beach
Seal Beach

Seal Beach
Rossmoor

Legend

- AGS Boundary
- AEC Site
- Parking/Laydown Construction Area
- 250 Feet Buffer
- 1 Mile Project Buffer/0.25 Mile Sewer Line Buffer
- Proposed New Process/Sanitary Wastewater Pipeline to First Point of Interconnection
- Potential Sewer Upgrade
- Urban Development
- Industrial
- Parks and Open Space
- Privately-Owned Land/Los Cerritos Wetlands Area

Note: Urban Development also includes roads, landscaping and ruderal vegetation areas.

a	b
c	d
e	f
g	h

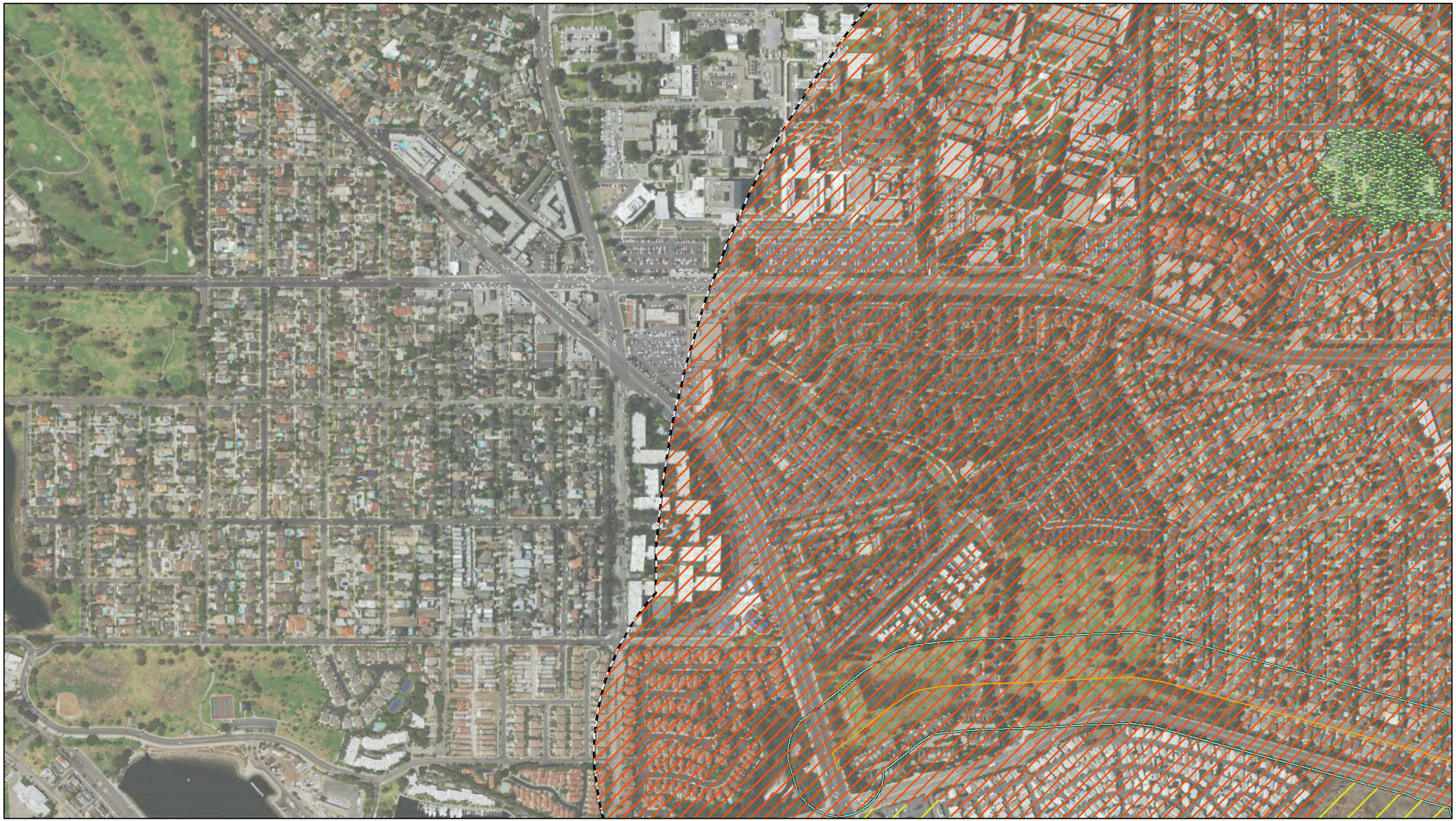
0 500 1,000 Feet

N

FIGURE 5.2-5b
Land Cover and Natural Community Types
Alamitos Energy Center
Long Beach, California
October 2015

CH2MHILL

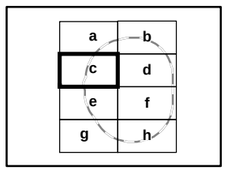
Y:\AESCORP\491232DISCPHASEREP\AFC_ARCHIVE\AEC\GIS\ALAMITOS\MAPFILES\BIOLOGY\FIG5_2-5_AEC_VEG_20151016.MXD MD013761 10/20/2015 5:29:36 PM



Legend

- AGS Boundary
- AEC Site
- Parking/Laydown Construction Area
- 250 Feet Buffer
- 1 Mile Project Buffer/0.25 Mile Sewer Line Buffer
- Proposed New Process/Sanitary Wastewater Pipeline to First Point of Interconnection
- Potential Sewer Upgrade
- Urban Development
- Industrial
- Parks and Open Space
- Privately-Owned Land/Los Cerritos Wetlands Area

Note: Urban Development also includes roads, landscaping and ruderal vegetation areas.

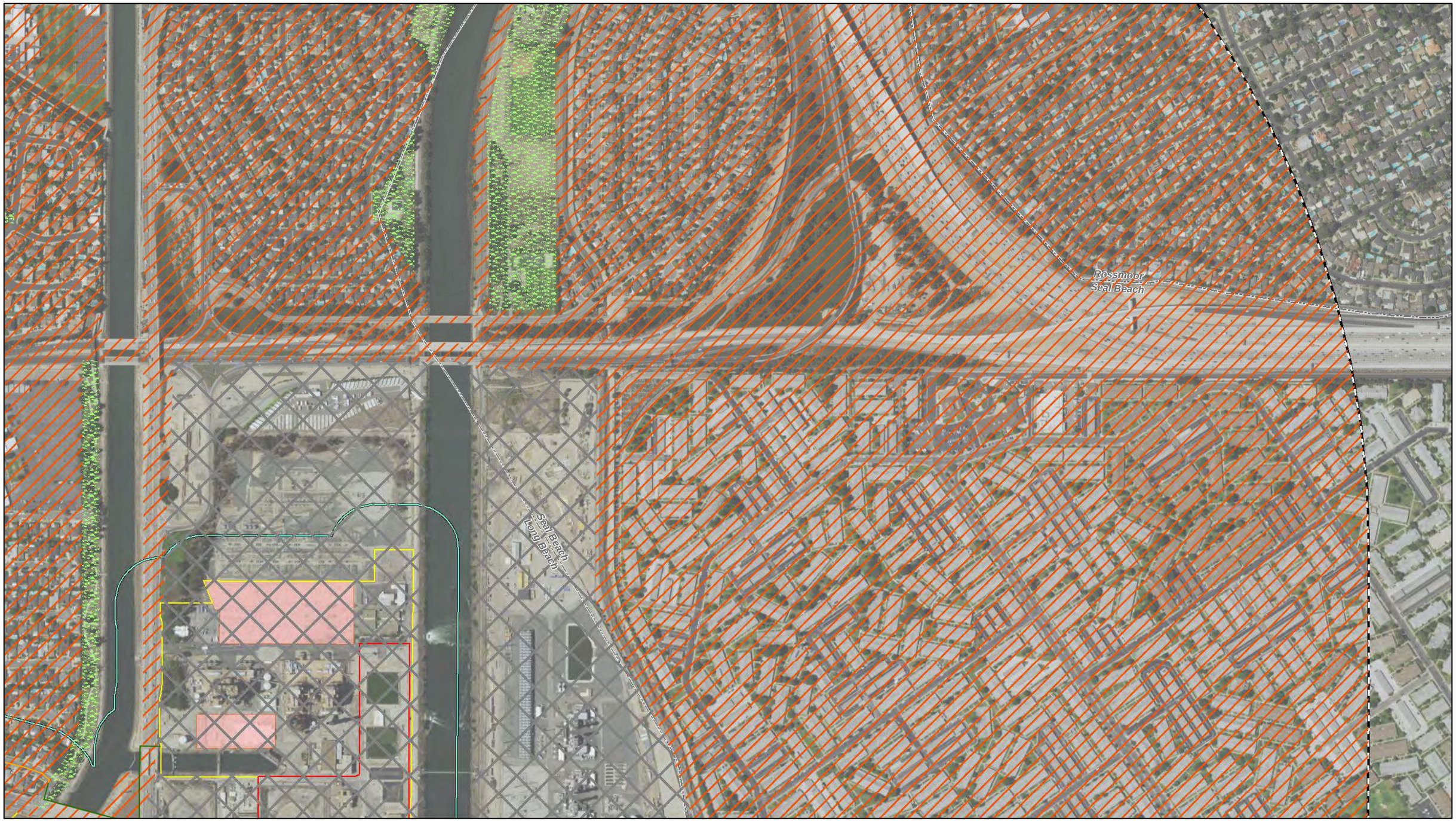


0 500 1,000 Feet N

FIGURE 5.2-5c
Land Cover and Natural Community Types
Alamitos Energy Center
Long Beach, California
October 2015

CH2MHILL

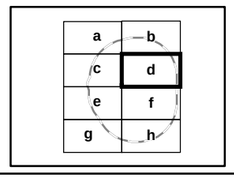
Y:\AESCORP\491232DISCPHASEREP\AFC_ARCHIVE\AEC\GIS\ALAMITOS\MAPFILES\BIOLOGY\FIG5_2-5_AEC_VEG_20151016.MXD MD013761 10/20/2015 5:29:36 PM



Legend

- AGS Boundary
- AEC Site
- Parking/Laydown Construction Area
- 250 Feet Buffer
- 1 Mile Project Buffer/0.25 Mile Sewer Line Buffer
- Proposed New Process/Sanitary Wastewater Pipeline to First Point of Interconnection
- Potential Sewer Upgrade
- Urban Development
- Industrial
- Parks and Open Space
- Privately-Owned Land/Los Cerritos Wetlands Area

Note: Urban Development also includes roads, landscaping and ruderal vegetation areas.



0 500 1,000 Feet

N

FIGURE 5.2-5d
Land Cover and Natural Community Types
Alamitos Energy Center
Long Beach, California
October 2015

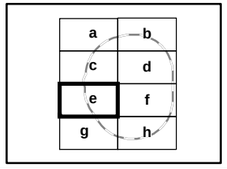
CH2MHILL



Legend

- AGS Boundary
- AEC Site
- Parking/Laydown Construction Area
- 250 Feet Buffer
- 1 Mile Project Buffer/0.25 Mile Sewer Line Buffer
- Proposed New Process/Sanitary Wastewater Pipeline to First Point of Interconnection
- Potential Sewer Upgrade
- Urban Development
- Industrial
- Parks and Open Space
- Privately-Owned Land/Los Cerritos Wetlands Area

Note: Urban Development also includes roads, landscaping and ruderal vegetation areas.



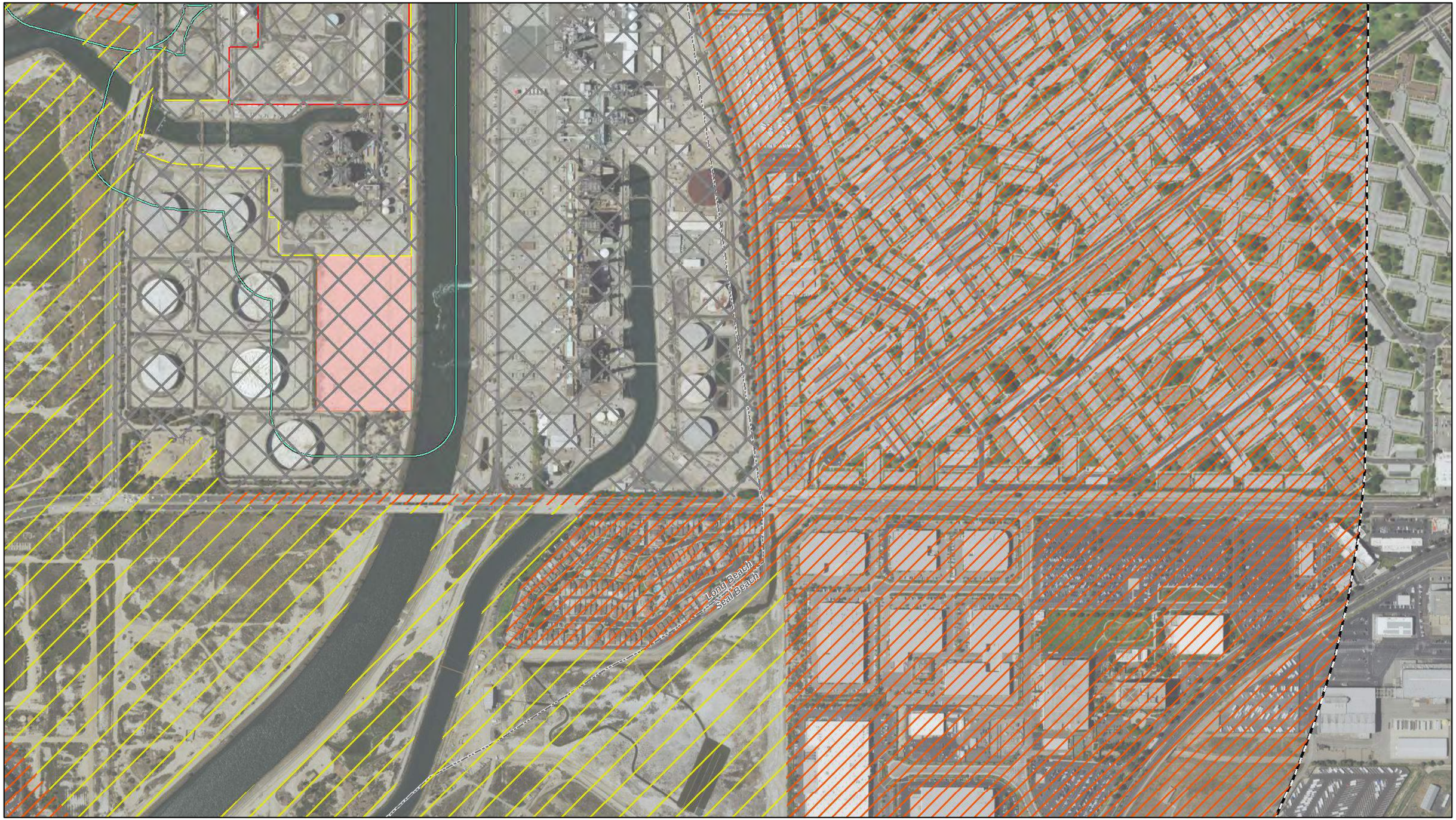
0 500 1,000 Feet

N

FIGURE 5.2-5e
Land Cover and Natural Community Types
Alamitos Energy Center
Long Beach, California
October 2015

CH2MHILL

Y:\AESCORP\491232DISCPHASEREP\AFC_ARCHIVE\AEC\GIS\ALAMITOS\MAPFILES\BIOLOGY\FIG5_2-5_AEC_VEG_20151016.MXD MD013761 10/20/2015 5:29:36 PM



Legend

- AGS Boundary
- AEC Site
- Parking/Laydown Construction Area
- 250 Feet Buffer
- 1 Mile Project Buffer/0.25 Mile Sewer Line Buffer
- Proposed New Process/Sanitary Wastewater Pipeline to First Point of Interconnection
- Potential Sewer Upgrade
- Urban Development
- Industrial
- Parks and Open Space
- Privately-Owned Land/Los Cerritos Wetlands Area

Note: Urban Development also includes roads, landscaping and ruderal vegetation areas.

a b c d e f g h

0 500 1,000 Feet

N

FIGURE 5.2-5f
Land Cover and Natural Community Types
Alamitos Energy Center
Long Beach, California
October 2015

CH2MHILL

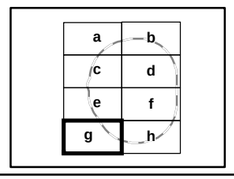
Y:\AESCORP\491232DISCPHASEREP\AFC_ARCHIVE\AEC\GIS\ALAMITOS\MAPFILES\BIOLOGY\FIG5_2-5_AEC_VEG_20151016.MXD MD013761 10/20/2015 5:29:36 PM



Legend

- AGS Boundary
- AEC Site
- Parking/Laydown Construction Area
- 250 Feet Buffer
- 1 Mile Project Buffer/0.25 Mile Sewer Line Buffer
- Proposed New Process/Sanitary Wastewater Pipeline to First Point of Interconnection
- Potential Sewer Upgrade
- Urban Development
- Industrial
- Parks and Open Space
- Privately-Owned Land/Los Cerritos Wetlands Area

Note: Urban Development also includes roads, landscaping and ruderal vegetation areas.



0 500 1,000 Feet

N

FIGURE 5.2-5g
Land Cover and Natural Community Types
Alamitos Energy Center
Long Beach, California
October 2015

CH2MHILL

Y:\AESCORP\491232DISCPHASEREP\AFC_ARCHIVE\AEC\GIS\ALAMITOS\MAPFILES\BIOLOGY\FIG5_2-5_AEC_VEG_20151016.MXD MD013761 10/20/2015 5:29:36 PM



Legend

- AGS Boundary
- AEC Site
- Parking/Laydown Construction Area
- 250 Feet Buffer
- 1 Mile Project Buffer/0.25 Mile Sewer Line Buffer
- Proposed New Process/Sanitary Wastewater Pipeline to First Point of Interconnection
- Potential Sewer Upgrade
- Urban Development
- Industrial
- Parks and Open Space
- Privately-Owned Land/Los Cerritos Wetlands Area

Note: Urban Development also includes roads, landscaping and ruderal vegetation areas.

a	b
c	d
e	f
g	h

0 500 1,000 Feet

N

FIGURE 5.2-5h
Land Cover and Natural Community Types
Alamitos Energy Center
Long Beach, California
October 2015

CH2MHILL

Y:\AESCORP\491232DISCPHASEREP\AFC_ARCHIVE\AEC\GIS\ALAMITOS\MAPFILES\BIOLOGY\FIG5_2-5_AEC_VEG_20151016.MXD MD013761 10/20/2015 5:29:36 PM

5.3 Cultural Resources

This section discusses the potential effects of the Alamitos Energy Center (AEC) on cultural resources. Section 5.3.1 describes the project setting and Section 5.3.2 describes the cultural resources environment that might be affected by the AEC. Section 5.3.3 provides a discussion of the research design of the cultural resources inventory, and Section 5.3.4 summarizes the inventory results. Section 5.3.5 presents an environmental analysis of project construction and operation. Section 5.3.6 discusses cumulative effects, and Section 5.3.7 presents mitigation measures that will be implemented to avoid project-related impacts. The AEC is not expected to require mitigation measures for cultural resources once it is operational. Section 5.3.8 discusses the laws, ordinances, regulations, and standards (LORS) applicable to the protection of cultural resources. Section 5.3.9 lists the agencies involved and agency contacts, and Section 5.3.10 discusses permits. Section 5.3.11 lists reference materials used in preparing this section.

This section is consistent with state regulatory requirements for cultural resources pursuant to the California Environmental Quality Act (CEQA). Cultural resources include prehistoric and historic archaeological sites;[31] districts and objects; standing historic structures, buildings, districts, and objects; locations of important historic events; and sites of traditional/cultural importance to various groups.[32] The study scope was developed according to the California Energy Commission's (CEC) cultural resources guidelines and complies with *Instructions to the California Energy Commission Staff for the Review of and Information Requirements for an Application for Certification* (CEC, 1992) and *Rules of Practice and Procedure & Power Plant Site Certification Regulations* (CEC, 2007). This study was conducted by Registered Professional Archaeologist Gloriella Cardenas, M.A., RPA; Natalie Lawson, M.A., RPA; and Clint Helton, M.A., RPA, Cultural Resource Specialists who meet the qualifications for Principal Investigator stated in the Secretary of the Interior's standards and guidelines for archaeology and historic preservation (National Park Service [NPS], 1995). Lori Durio-Price, M.A., Architectural Historian qualified by the Secretary of the Interior, conducted all research related to historic architecture.

Appendix 5.3A provides copies of agency consultation letters. Appendix 5.3B provides the Cultural Resources Inventory Report, including California Department of Parks and Recreation (DPR) 523 forms for newly recorded resources. Appendix 5.3C provides archival research material, including copies of historic maps and aerial photographs of the project vicinity and a complete copy of the California Historical Resources Information System literature search results, which include copies of previous technical reports occurring within 0.25 mile of the AEC and DPR 523 forms for previously recorded resources occurring within 1 mile of the AEC. As required by applicable law, Appendix 5.3B and Appendix 5.3C will be submitted separately to the CEC under a request for confidentiality. Appendix 5.3D provides names and qualifications of personnel who contributed to this study. Appendix 5.3E contains a map of all resources recorded during the cultural resources assessment and will be submitted separately to the CEC under a request for confidentiality.

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[31] Site is defined as "The location of a significant event, a prehistoric or historic occupation or activity, or a building or structure… where the location itself possesses historic, cultural, or archeological value." (National Park Service [NPS], 1995).

[32] The federal definitions of cultural resource, historic property or historic resource, traditional use area, and sacred resources are reviewed below and are typically applied to non-federal projects.

A **cultural resource** may be defined as a phenomenon associated with prehistory, historical events, or individuals or extant cultural systems. These include archaeological sites, districts, and objects; standing historic structures, districts, and objects; locations of important historic events; and places, objects, and living or non-living things that are important to the practice and continuity of traditional cultures. Cultural resources may involve historic properties, traditional use areas, and sacred resource areas.

Historic property or **historic resource** means any prehistoric district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places (NRHP). The definition also includes artifacts, records, and remains that are related to such a district, site, building, structure, or object.

Traditional use area refers to an area or physical landscape identified by a cultural group to be necessary for the perpetuation of the traditional culture. The concept can include areas for the collection of food and non-food resources, occupation sites, and ceremonial and/or sacred areas.

Sacred resources are traditional sites, places, or objects that Native American tribes or groups, or their members, perceive as having religious significance.

The AEC study area referred to in this section includes the survey areas for both archaeological and architectural resources (Figure 5.3-1). The archaeological survey area includes the proposed 71-acre AEC site, 8 acres of onsite construction laydown and parking, 10 acres for offsite parking and laydown, a 200-foot wide buffer comprising approximately 58 acres, and the wastewater line corridor, which is approximately 12 acres. Approximately 1 acre of overlap occurs between the AEC and the wastewater line corridor; thus, the total survey area is 158 acres. Most AEC improvements will be built at or near existing site grade with little excavation. Trench excavations for pipelines and utilities are expected to reach depths of approximately 10 feet below the surface. Excavations for the wastewater line upgrades would average 10 feet deep and are expected to reach maximum depths of approximately 15 feet below the surface.

The architectural survey area includes the existing Alamitos Generating Station (AGS), including the recently acquired tank farm within the AGS site, as well as a buffer around the site consisting of at least one additional parcel deep on all sides, as per CEC requirements for a project in an urban setting. Offsite, the AEC will include 10 acres of construction parking and laydown adjacent to the AGS, and a new 1,000-foot-long process/sanitary wastewater pipeline to the first point of interconnection with the existing Long Beach Water Department (LBWD) wastewater system. Because the AEC may also require upgrading approximately 4,000 feet of the existing offsite LBWD wastewater line downstream of the first point of interconnection, this possible offsite improvement to the LBWD system is also analyzed in this Application for Certification (AFC). The total length of the new pipeline (1,000 feet) and the upgraded pipeline (4,000 feet) is approximately 5,000 feet and was included in the architectural survey area.

5.3.1 Setting

AES Alamitos Energy, LLC, will construct, own, and operate the AEC, a natural- gas-fired, air-cooled, combined-cycle and simple-cycle, electrical generating facility in Long Beach, California. The proposed AEC will have a nominal generating capacity of 1,040 megawatts (MW). The AEC will be constructed on the site of the existing AES Alamitos Generating Station (AGS), located on an approximately 21-acre site within a larger, 71.1-acre parcel.

The AEC will feature two gas turbine power blocks. Combined-cycle power block will consist of two natural-gas-fired combustion turbine generators (CTG) in a combined-cycle configuration, two unfired heat recovery steam generators (HRSG), one steam turbine generators, an air-cooled condenser, an auxiliary boiler, and related ancillary equipment. Simple-cycle power block will consist of four simple-cycle LMS-100 CTGs with fin-fan coolers and ancillary facilities.

The AEC will meet the demand for new generation in the Los Angeles basin local electrical reliability area. The demand is caused in large part by the closure of the San Onofre Nuclear Generating Station and the anticipated retirement of the older, natural-gas-fired generation currently using once-through ocean water-cooling (OTC). As a result of the promulgation of the California State Water Resources Control Board's (SWRCB) *Water Quality Control Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling* (SWRCB, 2010), more than 4,000 MW of OTC generation are expected to be retired in the Los Angeles local electrical reliability area by December 31, 2020.

The AEC will use water provided by the City of Long Beach Water Department (LBWD) for construction, operational process, and sanitary uses but at substantially lower volumes than the existing AGS historically has used. This water will be supplied through existing, onsite water lines. The AEC will include a new, 1,000-foot process/sanitary wastewater pipeline to the first point of interconnection with the existing LBWD sewer system, the potential upgrade of an additional 4,000 feet of existing pipeline downstream from the first point of interconnection, and the elimination of the current practice of treatment and discharge of process/sanitary wastewater to the San Gabriel River. Stormwater runoff from the power block areas will be directed to oil/water separators and to an existing retention basin and then ultimately discharged to the Los Cerritos channel via existing stormwater outfalls.

The AEC will interconnect to the existing, Southern California Edison (SCE) 230-kilovolt (kV) switchyard adjacent to the north side of the AGS. Natural gas will be supplied to the AEC via the existing, offsite, 30-inch-diameter pipeline owned and operated by Southern California Gas Company (SoCalGas) that currently serves Units 5 and 6 of the AGS. The AEC will require construction of new natural gas-metering facilities and construction of two new natural gas compressor buildings within the AEC footprint.

The AEC is designed to serve both peak and intermediate loads with the added capabilities of rapid startup, significant turndown capability (ability to turn down to a low load), and fast ramp rates. As California's intermittent renewable energy portfolio continues to grow, operating in either load-following or partial shutdown mode will become necessary to maintain electrical grid reliability, thus placing an increased importance upon the rapid startup, high turndown, steep ramp rate, and superior heat rate employed at the AEC.

As an in-basin generating asset, the AEC will provide local generating capacity, voltage support, and reactive power that are essential for transmission system reliability in the Western Los Angeles basin subarea and larger Los Angeles basin local reliability area. The AEC will be able to provide system stability by supplying reactive power, voltage support, frequency stability, and rotating mass in the heart of the critical Western Los Angeles local reliability area. By virtue of its location in a transmission constrained load center, the AEC also helps to avoid potential transmission line overloads and can provide reliable local energy supplies when electricity from more distant generating resources is unavailable. In recognition of its critical grid reliability benefits, the AEC combined-cycle CTGs were selected by SCE in its Local Capacity Requirements Request for Offer on November 5, 2014, and the simple-cycle CTGs will meet the capacity needs anticipated to be identified in future California Public Utilities Commission Long-term Procurement Plans.

Owing to the critical need for generating capacity at the AEC site at all times, existing Units 1 through 6 will remain in operation through much of the AEC development and construction. Given that the removal of existing Units 1 through 6 is not required for construction of the AEC, the continued operation of the AGS will not impede AEC construction. Demolition of the retired and decommissioned turbine peaking generating Unit 7 and fuel tank, ancillary equipment, small maintenance shops, and two retention basins will be required for site preparation for the construction of the AEC. Construction and site preparation activities at the AEC site are anticipated to last 56 months, from the first quarter of 2017 until the third quarter of 2021. The project will commence construction with the removal of former Unit 7's building and ancillary equipment, fuel storage tank, tank berms, small maintenance shops, and two wastewater retention basins in January 2017 to make room for construction and laydown area for the AEC CCGT. Construction of the AEC CCGT will commence during the second quarter of 2017 and will be completed by the second quarter of 2020. The AEC CCGT is expected to commence commercial operation before May 1, 2020. Construction of the AEC SCGT is scheduled to proceed from the second quarter of 2020 through the third quarter of 2021, and Power Block 2 is expected to commence commercial operation in the third quarter of 2021. A temporary construction access road may be constructed offsite beginning at the intersection of Studebaker Road and Loynes Drive traveling southeast to the AEC site. Construction of the AEC will require the use of onsite laydown areas (approximately 8 acres dispersed throughout the existing site) and an approximately 10-acre laydown area located adjacent to the existing site.

5.3.2 Affected Environment

The climate in the AEC area is defined by warm, dry summers with average highs of 75°F and mild winters with average temperatures of 55°F. Rainfall averages 13 inches annually (U.S. Climate Data, 2013). Precipitation usually occurs in the form of winter rain.

Long Beach is situated on a coastal floodplain in southern Los Angeles County. The sediments are primarily from San Gabriel River Quaternary deposits from the Holocene period. The San Gabriel River has been channelized, as has been the previously natural inlet to the Alamitos Bay, the Los Cerritos Channel. The AEC area is located in a reclaimed salt marsh environment, an area that previously contained a marshland ecological community called the Alamitos Saltwater Marsh. Historically, the groundwater at the AEC has

been quite shallow at 10 feet below ground surface (bgs) or higher (Ninyo & Moore, 2011). Land reclamation and development in the early 1900s allowed for agriculture in the area, despite the marshland environment and high groundwater.

Historical aerial photographs from 1952 indicate that prior to the construction of the site, the area, particularly in the northern portion of the AGS, was largely used for agriculture (Ninyo & Moore, 2011). Primary disturbances to the area were the construction of the existing six operating generating units (Units 1–6); retired former Unit 7; administration, maintenance, and certain warehouse buildings; two existing SoCalGas natural gas pipelines; LBWD potable water connections; the existing SCE switchyard; and the Los Cerritos Channel. Other disturbances and facilities in the AEC study area include various pipelines, transmission lines, residential housing, and roads.

A subsurface geotechnical survey conducted by Ninyo & Moore in 2011 reported that the AGS was constructed on artificial fill. The survey results showed that the AEC study area is underlain by artificial fill, younger dune sand deposits, marsh deposits, and older dune sand deposits. Artificial fill was encountered at depths ranging from approximately 6 to 9 feet bgs. Alluvial sediment deposits primarily consisting of interbedded layers of silty to clayey sand were encountered below the fill. These deposits were observed up to 63 feet bgs (Ninyo & Moore, 2011).

5.3.2.1 Local Paleoenvironment

At the start of the Holocene Epoch and during the earliest known occupations of the southern California coast, the coastline looked very different than it does today. Seas were lower, and the coastline extended out a few miles farther than now. The off-coast islands were larger, and a few more spits of land were extant. Many of the embayments found along the coast today did not exist at the start of the Holocene. Many of the bays that dot the California coastline in the present did not exist either. San Pedro Bay, for example, the closest natural bay to the AEC, did not exist near the start of the Holocene. Land extended to within 15 miles of Santa Catalina Island, rather than the 26 to 32 miles of today (Porcasi et al., 1999). At the start of the Holocene, the AEC site would have been much farther from the sea, both to the east and the south.

California's seasonal wet and dry periods (winters having the most annual rainfall, followed by dry, hot, mostly rainless summers) appear to have been a pattern that occurred throughout the Holocene (West et al., 2007). However, the overall climate of the southern California coastline has changed throughout the Holocene, exhibiting periods with radical differences in temperature and precipitation. Evidence indicates that some of these swings were not only quick, but also involved more dramatic drought or flood events than those recorded in the modern era (Boxt et al., 1999). Pollen analysis from sites along the San Diego coastline, approximately 100 miles south of the AEC, indicate that the early Holocene exhibited frequent and heavy coastal fog, the middle Holocene was characterized by a stable and mild climate, and the late Holocene climate varied widely. Yearly El Niño conditions with heavy winter rains and warmer temperatures alternated with years of drought in this later period (West et al., 2007). Pollen analysis of samples taken from the San Joaquin Marsh near Newport Bay, Orange County, approximately 20 miles south of the AEC site, exhibit indications of extreme drought identified inland between 900 and 1300 AD. Although located well outside of the AEC site, these findings have implications for the entire coastline. The drought, which lasted centuries, is associated with, and is likely a driver for, changes in settlement patterns, subsistence strategies, trade networks, and other cultural behaviors throughout California. The pollen analyses conducted at San Joaquin Marsh also revealed a period of increased freshwater runoff around 1600 AD, at the start of the Little Ice Age. This period of increased precipitation influenced yet another round of cultural changes and adaptations (Boxt et al., 1999). These changes between drought and increased precipitation would have affected deposition at the AEC site. Periods of high runoff would result in more rapid deposition of sediment, particularly in areas near where streams or rivers emptied into the ocean, whereas periods of drought would result in more stable and less frequent depositional activities.

In addition to the climate changes, surface sea temperatures also appeared to have fluctuated on a millennial period, from cold to warm waters. Surface temperatures in the Early and Middle Holocene were more stable than those from the Late Holocene (West et al., 2007). Changes in the surface temperatures of the sea would have affected local sea life and the resources available to human settlements near the ocean.

Specific written records and accounts of climate change for southern California are not readily available before the mid to late 1800s. During the latter half of the nineteenth century, southern California was rapidly settled by Euro-Americans, and by the start of the twentieth century, it looked very different than it had in its more natural state in the early 1800s. Differences in pre-settled coastal California weather indicated that winter winds were stronger and storm waves were larger and more destructive than at present. Erosion from these large waves along the shore was more extreme. Southeasters, storms likened by nineteenth century sailors to hurricanes, decreased in frequency as the nineteenth century came to a close and the Little Ice Age ended (Engstrom, 2006).

At the start of the Holocene, the familiar plant communities of southern California—chaparral, oak woodland, and coastal sage scrub—rapidly increased throughout the region (West et al., 2007). These communities grew and replaced the pines, which the pollen record show inhabited the now pine-less areas of southern California at the Pleistocene-Holocene transition approximately 11,700 years ago. The pollen record at Daisy Cave on San Miguel Island shows the presence of pine trees on the island at the start of the Holocene. There are no pine trees on San Miguel Island now (West et al., 2007). Many of the observed landforms along the shoreline in southern California in the nineteenth century consisted of low hillock dunes, generally less than 5 feet in height, which ran along the beaches. Vegetation generally consisted of red sand verbena and occasional salt bush and silver beach weed. Written historical accounts agree that shellfish was very abundant along the shore at this time, more so than at present. Estuaries were common on the land side of the small barrier spits along the coasts. Salt marshes and grass-covered areas surrounded these estuaries (Engstrom, 2006).

As late as the mid-1800s, estuaries along the coast connected to the ocean via inlets. These inlets could be seasonal; in winter, they would be open and useable, frequently due to rain, while in summer, heavy waves would create dams, which blocked ocean access. Heavy deposition of sediment during winter could also block inlet access. Once access was blocked, the evaporation of the water would result in alkali flats and high salinity in the water (Engstrom, 2006).

5.3.2.2 Regional Setting

The AEC is located within the existing AGS site in a developed area of Long Beach comprising residential, industrial, and commercial developments. The AGS is a natural-gas-fired steam electric generating facility located in the city of Long Beach, Los Angeles County. The facility occupies approximately 120 acres of a 230-acre industrial site along the west bank of the San Gabriel River, 2 miles northeast of the entrance to Alamitos Bay and the Long Beach Marina.

The AEC site lies within a region characterized by flat floodplains and terraces and very gently sloped alluvial fans with small areas of marine terraces (Ninyo & Moore, 2011). Historically, the predominant natural plant community of the area was salt marsh, the Alamitos Saltwater Marsh. Before the modern era, the area would have offered habitat for the various land animals and plants associated with the southern coastal salt marsh environment.

Southern coastal salt marsh occurs in areas subject to regular tidal flooding by salt water, such as sheltered inland bays, estuaries, and lagoons. The distribution of plant species within the salt marsh is often in distinct zones based on the frequency and duration of tidal flooding. Vegetation in these areas is characterized by pickleweed (*Salicornia virginica*) along with other salt-tolerant species such as saltgrass (*Distichlis spicata*), alkali heath (*Frankenia salina*), alkali weed (*Cressa truxilensis*), California seablite (*Suaeda californica*), marsh jaumea (*Jaumea carinosa*), and saltwort (*Batis maritima*). Open, unvegetated salt pannes and tidal channels are present in some areas. Several avian species use salt marsh, including the Belding's savanna sparrows (*Passerculus sandwichensis beldingi*), western snowy plover (*Charadrius alexandrinus nivosus*), the California

least tern (*Sternula antillarum browni*), the California brown pelican (*Pelecanus occidentalis californicus*), and other various water fowl. Harvest mice and shrews are also found in coastal salt marsh environments.

The development of a regional chronology marking the major stages of cultural evolution in the southern California area has been an important topic of archaeological research. In general, cultural developments in southern California have occurred gradually and have shown long-term stability; consequently, developing chronologies and applying them to specific locales has often been problematic. The following chronology is based on Byrd and Raab's (2007) updated synthesis of the southern bight cultures, an area that encompasses the California coast from Point Conception in the north to the Mexican border in the south.

Abundant evidence exists that humans were present in North America for at least the past 11,500 years. Fragmentary, but growing, evidence also shows that humans were present long before that date. Linguistic and genetic studies suggest that human colonization of North America may have occurred 20,000 to 40,000 years ago. Evidence of this earlier occupation is not yet conclusive but is beginning to be accepted by archaeologists. For example, the Meadowcroft Rockshelter in Pennsylvania, Saltville and Cactus Hill in Virginia, and the Topper site in South Carolina are sites that have produced apparently reliable dates as early as 12,500 years before present (Goodyear, 2005).

Ancient sites are known in southern California. In January 1936, Work Progress Administration workers digging a storm drain along the Los Angeles River (north of Baldwin Hills) recovered human bones from an ancient streambed (Moratto, 1984). In March 1936, imperial mammoth teeth were exposed at the same depth as the human remains (Moratto, 1984). The next oldest site in southern California where both human skeletal remains and artifacts occur is the La Brea Tar Pits (CA-LAN-159). The Arlington Spring site on Santa Rosa Island has provided occupation dates as early as 13,000 years old; the discovery of Arlington Spring Man is the second find in North America that has dated to this period (Johnson, 2008). Evidence for Paleo-Indian occupation in California exists, particularly along the coast of southern California, but remains scant (Byrd and Raab, 2007).

Early Holocene (9600 cal B.C. to 5600 cal B.C.). The first groups to inhabit California (for which there is significant evidence) are described as hunters and gatherers who used specialized bifacial projectile points, well-made scrapers, knives, and many other tools designed for subsistence-related tasks (food processing). They adapted to a number of environments and developed a variety of secondary subsistence strategies that enabled them to live in a changing environment (Pleistocene to Holocene). As the (Wisconsin) Ice Age ended, previously stable water sources began to dry up in inland California, prompting migrations to the coast. California's islands were occupied as early as 9600 to 9000 cal B.C., as indicated by the oldest levels at Daisy Cave on San Miguel Island. Southern California dwellers exploited a wide range of plants and animals, and the archaeological record shows that a greater emphasis was placed on gathering wild grasses and seeds, rather than on hunting large mammals. Coastal groups, including those living on the islands off of California's coast, used marine resources such as shellfish, fish, sea lions, and dolphins. Shell midden sites of the early Holocene are characterized by cobble tools, basin metates, manos, discoids, and flexed burials (Byrd and Raab, 2007).

Middle Holocene (6000 cal B.C. to cal A.D. 500). At the start of the Middle Holocene, millingstone cultures appeared throughout central and southern California. The Millingstone Horizon represents an adaptive subsistence shift indicated by the first occurrence of millingstones (mano and metate), which were used to process hard seeds like *Salvia* sp. (sages) and *Eriogonum fasciculatum*. Sites from this period are characterized by the majority of artifacts being manos and metates, suggesting the importance of vegetal resources. Most of these sites are located in grassland and sagebrush communities where these hard seeds could support small populations on a yearly basis. Late fall and winter were difficult seasons when vegetal foods were scarce and their diet had to be supplemented with deer and small mammal hunting and shellfish collecting (Byrd and Raab, 2007).

Middle Holocene cultures are quite diverse. Large middle Holocene sites have been well documented along the coast as well as inland. Archaeological evidence of extensive trade networks between southern

California and the Southwest has been found. Rare artifact types, including the marine purple olive shell, indicate trade networks that extend from Catalina Island through the Mojave Desert and into Oregon extant in the Middle Holocene (Byrd and Raab, 2007).

Temporary settlements for a few nuclear families (10 to 25 individuals) have been recorded. These sites were seasonal campsites for exploiting yucca and acorns from April through September. The seasonal pattern has been documented as regional variations in the Millingstone Horizon sites in southern California (King, 1971). These sites are characterized by plant-processing tools (scraper planes, an absence of hunting implements, millingstones, and earth ovens—necessary to prepare yucca). Peoples intensively exploited their environment with reliance on no particular food resource. Characteristic features of this period include crude chopping tools, large projectile points, manos and metates, *Olivella* shell beads, quartz crystals and cog stones, few ornaments, earth roasting pits, extended posture burials, reburials (secondary interment), and rock cairns (Wallace, 1955:). The first evidence of cemeteries is recorded during this period, and the relative absence of non-utilitarian artifacts indicates that an egalitarian social system was likely in place. Recent evidence indicates that the first permanent villages may have been erected during the Middle Holocene on San Clemente Island (Byrd and Raab, 2007). The presence of daub, the archaeological remains of a wattle-and-daub dwelling, at Middle Holocene coastal sites indicates that at least some of the villages along the coast may have had permanent structures. Wattle-and-daub structures were constructed of bundles of woven sticks or reeds, called wattle, that were placed on a circular, domed-shaped frame, and packed with clay or mud, called daub. When these structures burned, the clay was fired, much like pottery, and can be identified in the archaeological record (Strudwick, 2005).

Late Holocene (cal A.D. 500 to Historic Contact). The Late Holocene is characterized by a larger number of more specialized and diversified sites. Population increased substantially and is reflected in a greater number of sites recorded during this time period. This period is characterized by large village sites, tightly flexed burials, bows and arrows, arrowshaft straighteners, *ollas* (jars) and *comals* (cooking flats), personal ornaments, pottery vessels, circular shell fishhooks, an extensive trade network, a wide variety of ritual objects, and large stone bowls (Wallace, 1955). Elaborate mortuary artifacts are recovered from sites of this period.

Villages occurred in the same general locations as they did in earlier time periods, but they increased in size and decreased in their frequency; base camps were often associated with villages. There was also an increase in the number of specialized and/or diversified sites. Trade was extensive during this period, and long distances are reflected in artifacts recovered from the American Southwest (pottery) in California sites, while steatite objects and Pacific Coast seashells occur in American Southwest sites. During the Late Period, many more classes of artifacts are found in the archaeological record, and they reveal a higher order of workmanship. Larger and more extensive settlement systems are evident, likely a byproduct of a more intensive subsistence base exploiting all of the available food resources. The bow and arrow were introduced, and other aspects of culture expanded, including population growth and more complex social systems and trade networks.

New studies indicate that culture change in southern California may have been rapid rather than gradual. Overexploitation of resources may have caused shifts to new resources that occurred in greater amounts (Byrd and Raab, 2007). On the coast, intensified fishing and small sea mammal hunting replaced hunting of large sea mammals and shellfish collection. Fish resources were concentrated on smaller near-shore species rather than on deep sea resources. Vegetal resources focused on grasses rather than acorns, and direct evidence of acorn use is minimal at Late Holocene sites. Changes in subsistence strategies in prehistoric California appear to be related to overexploitation of preferred resources, leading to a shortage of the desired resource, followed by shifts to more costly resources (Byrd and Raab, 2007).

In southern California, coastal village sites that have yielded important information about this period include the four village sites recorded at Goleta Slough near Santa Barbara: Helo, Saxpilil, Geliec, and Alcas. Within a

5-mile radius of the AEC site, important coastal village sites include the Palmer-Redondo site (CA-LAN-127) and the Old Salt Lake village site, also known as Engva.

5.3.2.3 Ethnohistory

The Native Americans living in what is now Long Beach, and specifically within the AEC study area, were the Gabrieleño, or Tongva. The AEC study area is located near the prehistoric location of the Gabrieleño village, *Povuu'nga,* which was situated less than 1 mile northwest within present day California State University, Long Beach.

Gabrieleño. The Gabrieleño language belongs to the Takic sub-family of the Uto-Aztecan language stock. The territory of the Gabrieleño comprised inland valleys and coastal plains, and spanned from Topanga Canyon (Los Angeles County) in the north to El Toro (Orange County) in the south, and included Catalina, San Clemente, and San Nicolas Islands in the Channel Islands, and the San Gabriel and San Bernardino inland valleys in the east (McCawley, 1996).

Pre-European contact population numbers are difficult to assess because of discrepancies in the record; in 1852, Scottish-born Los Angeles resident Hugo Reid published letters about the Gabrieleño life, and he believed there were some 68 villages, 28 of which he identified in Los Angeles County (McCawley, 1996). Each village was reported to have contained an average of 100 people, and McCawley (1996) estimates more than 5,000 Gabrieleños at the time of contact.

The pre-contact Gabrieleño practiced a patrilineal system. Members of the lineage were given access to diverse resources held by the families within their lineage, allowing the Gabrieleño to exploit multiple ecologies. The heavily hierarchical Gabrieleño social system comprised elites, commoners, middle-class, poor, and slaves. The elites were the only ones to possess access to religious items, and the middle-class supported the elites.

Distribution of settlements did not follow a consistent pattern throughout the Gabrieleño territory largely because of the diverse ecological zones within Gabrieleño territory, which comprised the coast, islands, valleys, and foothills. Their settlement pattern appears to be centered upon a central village, with satellite villages used for resource acquisition. They built large, circular houses with thatched, domed roofs that were large enough to house several families. Ceremonial buildings were often found scattered throughout the village, each with specialized uses, such as sweatlodges, menstrual huts, or meeting rooms. The level of use of these satellite campsites was in direct response to population and village size as well as distance from the main village to the campsite (Earle and O'Neal, 1994).

The Gabrieleño's subsistence strategies incorporated seasonal procurement of resources, both terrestrial and marine. Throughout the year, individual Gabrieleño families would move to temporary encampments for hunting, harvesting, and collecting. Depending on the season and resources that could be harvested, travel would occur through various ecological zones. In the interior, where primary habitation was thought to take place in the summers, hunting of deer and rabbit was a significant resource for the Gabrieleño, who were expert hunters (McCawley, 1996). In spring and summer, temporary camps would be established in order to gather roots, seeds, and bulbs; in the fall, acorns and other wild seeds were gathered as staples in their diet. In coastal areas that were less exposed, such as in the AEC area, wintertime villages were occupied, and satellite or temporary campsites would be erected near the shore to collect shellfish and other marine resources. In addition to being expert terrestrial hunters, the Gabrieleño were adept at maritime subsistence and procurement, building planked canoes that were sealed with pine pitch or asphalt, and hunting sea otters and other marine mammals with harpoons, as evidenced in the archaeological record from sites such as CA-LAN-2616 (Langenwalter et al., 2001).

Ethnographies have not consistently documented the indigenous groups of southern California. Various tribes, such as the Chumash, Gabrieleño, Juaneño, and Luiseño, often have been intertwined so that it becomes difficult for the researcher to distinguish one from the other in the written record. Due to this discrepancy, architecture for the southern groups and the documentation of the use of space is virtually

unknown (Ciolek-Torrelo, 1998). What is known is that domestic structures for southern California groups were constructed of reeds, grass, and tule. The Gabrieleño houses were semi-subterranean structures built by erecting a pole at the center of an approximately 2.5-foot-deep circular pit. Postholes would have been dug around its circumference where willow reeds would be placed and leaned toward the center and secured, then covered in tule and grasses. Although neighboring groups covered their houses in daub, it is reported that the Gabrieleño did not; however, their sweatlodges were covered in daub after construction (Bean, 1974; Ciolek-Torrelo, 1998; McCawley, 1996).

Bean (1974) writes of the Gabrieleño as "The most powerful of the Shoshonean groups and were probably very influential in the diffusion of ideas to inland peoples. The powerful military competency of the Gabrieleño undoubtedly limited territorial expansion of the Cahuilla."

Neighbors of the Gabrieleño were the Chumash to the north, the Serrano to the east, the Cahuilla to the southeast, and the Luiseño and Juaneño to the south.

Approximately 1 mile northwest of the AEC is the location of the prehistoric Gabrieleño village *Povuu'nga*, also spelled *Pubug-na, Puvunga*, and *Punvungna*. The land on which the village stood was considered sacred land, an important center of power for the Gabrieleño. The village was a large habitation area with associated cemeteries, ceremonial sites, and sister campsites (Boxt and Raab, 2000). *Povuu'nga* has also been identified as the place of origin of *Chingishnish,* also spelled *Chengiichngech* or *Chinigchinich*, an important creation deity for the Gabrieleño (Boscana, 1814; Boxt and Raab, 2000; McCawley, 1996; Strudwick et al., 1996).

According to the ethnographic account of Father Boscana (1814), a Franciscan priest from Mission San Juan Capistrano, the name *Chingishnish* translates to "all powerful" or "all mighty." Boscana writes "And this was the God Chinigchinich, so feared, venerated, and respected by the Indians, who taught first in the town of Pubuna, and afterwards in all the neighboring parts, explaining the laws, and establishing the rites and ceremonies necessary to the preservation of life" (Boscana, 1814).

Boscana documented oral accounts about the cosmology and traditions of the indigenous and titled the historical account *Chinigchinich*. Boscana's informants were the neophytes at San Juan Capistrano, which included Serrano, Luiseño, Juaneño, and Gabrieleño Indians. In his account, Boscana documents several great chiefs, good and bad, associated with *Povuu'nga* (alternately spelled *Pubuna* in the account); "out of the confines of a Rancheria, called *Pubuna*, distant from St. Juan Capistrano north east about eight leagues, came the monster *Ouiot*, and the Indians, at the present time, preserve the account in their annals" (Boscana, 1814).

Mission San Gabriel contains baptismal records dating between 1785 and 1805 for 35 individuals from the Puvunga Rancheria (Heizer, 1968). In 1790, *Povuu'nga* was part of a large land grant, the Rancho Los Alamitos, which was given to Spanish soldier Jose Manuel Nieto. After his death in 1804, the Los Nietos property was portioned off into smaller ranchos by his heirs. The following year, the last baptisms for any *Povuu'nga* Gabrieleño occurred at both the Mission San Juan Capistrano and the Mission San Gabriel (Boxt and Raab, 2000; Heizer, 1968; Strudwick et al., 1996). In 1852, local rancher Hugo Reid identified the village site of *Pubug-na* within the Rancho Los Alamitos. At this time, the property belonged to Abel Stearns (Boxt and Raab, 2000; Heizer, 1968).

The village of *Povuu'nga* has been archaeologically recorded to some extent, although it is impossible to accurately determine its pre-contact size due to the destruction of much of its landscape. The village now comprises sites CA-LAN-234/235 and CA-LAN-306. *Povuu'nga* was listed on the National Register of Historic Places (NRHP) in 1974 with a recorded period of significance in the Late Holocene. The site is described on the NRHP listings as a complex Gabrieleño site that functioned as a ceremonial site, a burial site, and habitation site dating from the prehistoric era into the historic period (NRHP, 2012).

5.3.2.4 Historic Setting

Generally, a historic period begins with the first documented entrance by a European into a specific region; however, due to known contact in other parts of California by Russians, Chinese, Spanish, and Portuguese, some chronologies terminate the late prehistoric for all California in 1542, when the first documented European entered the territory now known as California. This period is termed the Protohistoric Period. In 1542, Juan Rodriguez Cabrillo explored the California coast by ship, entering San Diego Bay and claiming Alta California for Spain. Cabrillo landed near Point Mugu in the same year. Sixty years later, Sebastian Vizcaino sailed into San Diego Bay. Exploration of the land was slower to come. Don Gaspar de Portola searched Alta California for suitable mission sites in 1769.

In California, the historic era is generally divided into three periods: the Spanish or Mission Period (1769 to 1834), the Mexican or Rancho Period (1821 to 1848), and the American Period (1848 to present).

Spanish/Mission Period (1769 to 1834). Gaspar de Portola was appointed as the first governor of California in 1767, and the first command given to him by the Viceroy of Mexico was to expel the Jesuits from Baja California. This prompted the launch of military and Franciscan expeditions from Baja California into the region, and with it, the official start of the historic period in California. Following the expulsion of the Jesuits from Baja California, Spanish Colonial military outposts were established in Alta California, the first of which was El Presidio Real de San Diego in 1769, with Pedro Fages as its commander. Military outposts continued to be built as expeditions travelled north. The Portola expedition of 1769 reached Orange County on July 22, was in the San Gabriel Valley by August 2, and was passing through what would become Ventura County by the end of that month (Beebe and Senkewicz, 2001).

The following is a summary of local missions based on information from the California Missions Resource Center (2011) and the California Missions Foundation (2008). During the Spanish/Mission Period, 21 missions were built in California, connected by the El Camino Real. The first was San Diego de Alcala, founded by Father Junipero Serra. Three missions were located in Orange and Los Angeles counties, the first of which was Mission San Gabriel Arcángel, established by Father Pedro Cambon and Father Angel Somera in the San Gabriel Valley on September 8, 1771. It was the fourth mission founded in southern California. In 1776, Santa Ana River floods destroyed much of the mission, and it was relocated from Montebello, California, to what is now the city of San Gabriel, California. When the mission was rebuilt, 27 outlying *estancias* (ranchos) were established to supply this mission with meat, hay, grain, vegetables, and fruits. Mission San Juan Capistrano, in present-day Orange County, was founded on November 1, 1776, by Father Junipero Serra. Mission San Fernando Rey de España, the third of the region's missions, was constructed in Los Angeles County in 1797.

The construction of the first mission in what is now the Los Angeles–Orange County region introduced the era of missionization, a period of forced conversion of the Native Americans who occupied the region. Captured and removed from their villages, the indigenous peoples were brought to the missions and into servitude. Many perished due to ill treatment, and many more died from the introduction of European diseases, ultimately decimating the Native American populations.

The Spanish government was awarding *ranchos* (land grants) to soldiers and other Spanish Californios by the 1790s; vast tracts of land were used for livestock and farming. In 1784, Governor Pedro Fages awarded one of his soldiers, Jose Manuel Nieto, a 300,000-acre land grant that spanned from what is today known as Long Beach in the north, south into Huntington Beach, and east into San Bernardino County. A short time later, the land grant was retracted and regranted, resulting in a reduction of Nieto's acreage by roughly half (Rancho Los Alamitos, 2012). At the time of Nieto's death in 1804, the Los Coyotes grant, as the land was named, included 167,000 acres within the modern cities of Long Beach, Huntington Beach, and Los Alamitos, among others.

The last mission to be founded in this period was San Francisco Solano in 1823. Further attempts to construct additional missions were thwarted by Spain itself due to the costs each new mission posed. Later,

as Spain lost its rule over New Spain and secularization was sought by the new government, the mission system was disbanded in 1834 (Weber, 2006).

Mexican/Rancho Period (1821 to 1848). Mexico became independent of Spain in 1821, and the Decree of Secularization, passed in 1834, effectively ended the Mission Period in California. The following years were marked by the proliferation of cattle ranching throughout the region as the Mexican governor, Pio Pico, granted vast tracts of land to Mexican (and some American) settlers. The former mission lands were then opened for grants by the Mexican government to citizens who would colonize the area and develop the land, generally for grazing cattle and sheep (Lech, 2004).

The newly appointed Mexican government demanded that all who had received land grants from Spain show proof of land ownership. The AEC is located within the original 1790 grant of the Rancho Los Alamitos given to Spanish soldier Manuel Perez Nieto. By 1833, however, land disputes had greatly reduced the holdings of Nieto's original 1790 land grant. A total of 21 square miles of an area called Rancho Las Bolsas were deeded to Catarina Ruiz, which in turn later became known as Huntington Beach, Garden Grove, Westminster, and Fountain Valley (City of Huntington Beach, 1996).

Nieto's heirs further subdivided the remaining land into smaller ranches. In the Long Beach area, the Nieto land was divided into Rancho Los Alamitos and Rancho Los Cerritos. The latter ranch was inherited by Nieto's daughter, Manuela Cota (Rancho Los Cerritos, 2003). In 1843 it was acquired by John Temple (Rancho Los Cerritos, 2003). Rancho Los Alamitos, which means "Ranch of the Little Cottonwoods," was sold to Governor Figueroa in 1834. Following his death in 1835, it was inherited by his brother Francisco. In 1842 Don Abel Stearns bought the Alamitos Ranch (Rancho Los Alamitos, 2012).

In 1846, in response to the Mexican-American War, the United States Navy posted a naval base in what is today San Pedro; the base was abandoned after the war (California State Military Museum, 2012).

American Period (1848 to Present). Gold was discovered in California in 1848, and by 1849 the Gold Rush brought many speculators from the eastern United States and European countries flocking to California to make their fortune. The rapid growth of the region was substantial, and it is estimated that as many as 300,000 people arrived in the region during this period, heralding the start of industry, transportation, and changes in legislature.

Following the signing of the Treaty of Guadalupe Hidalgo in 1848, the United States took possession of California. The treaty bound the United States to honor the legitimate land claims of Mexican citizens residing in captured territories. On September 9, 1850, California became the thirty-first state in the Union. The Land Act of 1851 established a board of Land Commissioners to review and adjudicate land claims, and charged the Surveyor General with surveying confirmed land grants. In order to investigate and confirm titles of California, American officials acquired the provincial records of the Spanish and Mexican governments that were located in Monterey. Those records, most of which were transferred to the U.S. Surveyor General's Office in San Francisco, included land deeds and sketch maps (Gutierrez and Orsi, 1998).

From 1852 to 1856, a board of Land Commissioners determined the validity of grant claims. In 1858, Manuel Dominguez received a land patent, securing the ownership of the Rancho Dominguez and becoming the first land patent to be granted in California by the U.S. government (Dominguez Rancho Adobe Museum, 2012).

At the start of this period, ranching was a lucrative enterprise and interest in this industry brought many from other parts of the county to stake a claim in the cattle boom. Near the project area, agricultural crops of barley, potatoes, and corn were grown (Strudwick et al., 1996). The drought of the early 1860s and the subsequent loss of cattle caused Abel Stearns to lose the Alamitos Ranch, which later was acquired through lease by John Bixby in 1878. Through a partnership with Jotham Bixby and Isaias W. Hellman, John Bixby purchased the property in 1881 (Rancho Los Alamitos, 2012). Jotham Bixby, meanwhile, acquired the neighboring Rancho Los Cerritos. John Bixby and his partners, under the Alamitos Land Company, had interests in city development and creating oceanfront property; consequently, the Alamitos Land Company

began designing and engineering city infrastructure such as streets, parks, and living communities. These communities would include the areas of Belmont Heights, Belmont Shore, and Naples.

In 1887, John Bixby died and Rancho Los Alamitos was subdivided and distributed among Bixby's partners and family. John Bixby's family retained the land that included the AEC study area and occupied it until 1961 (Rancho Los Alamitos, 2012). The Bixby heirs deeded a 7.5-acre area that contained the ranch house and associated facilities to the City of Long Beach in 1968. The ranch is listed on the NRHP and currently operates as a historical site, significant for both its prehistoric importance as a sacred village site of the Gabrieleños and for its continuous historic landscape (Rancho Los Alamitos, 2012).

Upon Jotham Bixby's death in 1916, his ranch was parceled into the communities of Bixby Knolls, California Heights, North Long Beach, and portions of Signal Hill (Rancho Los Alamitos, 2012).

Long Beach. The area now known as Long Beach was originally planned as Willmore City in a commercial venture by William Willmore in 1882, but because of financial difficulties, Willmore was not able to promote the area and built only 12 houses. The Long Beach Land and Water Company acquired the land from Willmore in 1884 and renamed the town Long Beach (Rancho Los Cerritos, 2003). Long Beach was incorporated in 1887. In 1888, there was one school and fewer than 50 residences covering less than 3 square miles (Long Beach Planning, 2013).

In the early 1900s, Long Beach became one of the premier resort beach towns and boasted many attractions such as the Pike, an amusement park located at the end of the "red car" electric streetcar line along the coast. The Pike contained games; rides such as the Cyclone Racer, a wooden two-track rollercoaster, the Plunge, originally a bathhouse, and an original Looff's Carousel; eight movie theatres; and ballrooms. The Pike opened in 1902 and operated under various names until 1979.

Charles H. Windham, the mayor of Long Beach, established the Los Angeles Dock and Terminal Company and purchased an area of mudflats with the intent of developing a commercial harbor. On June 24, 1911, the Port of Long Beach officially opened and shortly thereafter, steamship operators, such as the North Pacific Steamship Company, scheduled regular routes between Long Beach and San Francisco. In 1916, the Los Angeles Dock and Terminal Company went bankrupt, and the City of Long Beach was forced to take over the construction of the additional harbor developments (Port of Long Beach, 2011). The City established the Harbor Commission as the governing body for the port (Port of Long Beach, n.d.).

The Navy came to Long Beach in 1917 to establish a training facility for submarines, and this evolved into a Navy auxiliary servicing station for its ships (California State Military Museum, n.d.). A long period of naval base construction began in 1939, initiated by the onset of World War II.

Oil was produced in Los Angeles County for minimal commercial use since about the late 1850s; however, the industry did not become fully developed until the introduction of the railway system in the late 1800s. With the ease of transportation and access, oil in the form of kerosene and other refined oils quickly began to replace other types of fuel, prompting an oil boom. Oil was discovered in Long Beach in 1921, and this set off a population boom that resulted in millions of dollars in development (Long Beach Planning, 2013). In 1936, there was a second major discovery of oil in Long Beach (California Department of Conservation, 2005). During this time, Long Beach was the fastest-growing city in the nation, spurred by the oil boom, the growing port, and tourism (Downtown Long Beach, 2012). From the first major discovery in the late 1800s through the next hundred years, oil was Los Angeles County's main export (Paleontological Research Institution, 2012).

A magnitude 6.4 earthquake struck Long Beach in 1933, causing the death of 120 residents and over $50 million in damage (Long Beach Planning, 2013). The city rebuilt, embracing the Art Deco style for many of its new downtown buildings. The earthquake served as an impetus to pass the Field Act of 1933, which required earthquake-resistant design and construction for all public schools (Long Beach Planning, 2013).

Before World War II, Japanese-Americans had a significant presence in the area, specifically on Terminal Island in east San Pedro, but this changed as a result of the war (NPS, 2004). Terminal Island was viewed as a Japanese fishing village with a population of 3,000 residents who worked primarily as fishermen for the canneries. In 1942, Japanese-Americans were removed from Long Beach and transferred to inland internment camps under the orders of Lieutenant General John De Witt of the Army's Western Defense Command (NPS, 2004). By the end of the war, there would be over 120,000 Japanese-Americans in internment camps. Even after their release from the camps, none of the families returned to Terminal Island, and to date, Japanese-Americans do not have a large presence in the Long Beach area (NPS, 2004).

In the 1950s, Long Beach experienced a population boom of ex-servicemen and their families, which altered the landscape from resort town to suburb. In addition, many military servicemen from the nearby naval base patronized Long Beach, and adult entertainment services began to proliferate downtown to serve them. Like many urban centers in the 1960s, downtown Long Beach experienced a decline as the interstate highway system allowed suburbs to thrive, and suburban malls drew away major retailers and their patrons.

In 1967, the Long Beach City Council purchased the decommissioned ship *Queen Mary* and brought her to Long Beach to serve as a luxury hotel complete with restaurants and shops. The city began to plan for the revitalization of downtown, drafting a Downtown Plan and beginning construction on the Long Beach Plaza Mall, the Promenade, and the Long Beach Convention and Entertainment Center (Downtown Long Beach, 2012).

Since the 1970s, downtown Long Beach has prospered and the city of Long Beach has continued to grow. It has many industries including electronics manufacturing, aerospace, energy, and oil. Long Beach continues to be an important port city and is the second busiest shipping port in the United States.

Steam Generation Plants in California. The first commercial electrical central generating stations in the world were the Pearl Street Station in New York and the Holborn Viaduct power station in London, both of which opened in 1882 (Parsons, 1940). Both of these stations used reciprocating steam engines, but the development of the steam turbine allowed larger and more efficient central generating stations to be built. Turbines offered higher speeds, more compact machinery, and stable speed regulation. British designer Sir Charles Parsons built the first multi-stage reaction steam turbine in 1884 and patented it in 1885 (Cambridge University Engineering Department, 2000). Almost immediately, he and others began making improvements upon his original concept. By 1893, Parsons had a 300-kilowatt turbine generator (Skrabec, 2007). George Westinghouse, Jr., bought the U.S. rights to the Parsons turbine in 1896 and improved the Parsons technology and increased its scale (Skrabec, 2007). In 1903, Aegidius Elling of Norway built the first successful experimental gas turbine that was able to produce more power than needed to run its own components. It used both rotary compressors and turbines, and is recognized as the first applied method of injecting steam into the combustion chambers of a gas turbine engine (Encyclopedia Britannica, 1995). By the beginning of the twentieth century, power plants with steam turbines began to replace the original steam engine power plants, and turbines entirely replaced reciprocating engines in large central stations after about 1905 (Parsons, 1940). In less than 30 years, the technology of engines capable of supplying power and electricity had improved greatly.

In the early stages of steam turbine power plant development, the materials needed to withstand the high temperatures of modern turbines were not yet available. Technology and improvements for steam turbine engines continued to advance throughout the 1920s and 1930s, leading to a generation of more efficient turbine power plants in the 1950s.

In 1920, hydroelectric power accounted for 69 percent of all electrical power generated in California. By 1930, that figure had risen to 76 percent; by 1940 it was up to 89 percent (Williams, 1997; Herbert and Brookshear, 2006). But after 1941, new thermal or steam-electric generating units accounted for most of the new power capacity in the state. By 1950, hydroelectricity accounted for only 59 percent of the total, falling to 27 percent in 1960 (Williams, 1997; Herbert and Brookshear, 2006).

Pacific Gas and Electric Company (PG&E) and Southern California Edison (SCE), California's largest electrical utility providers, made efforts to build large-scale steam generation plants as early as the 1920s. James Williams, a historian of energy policies and practices in California, noted that the decision by PG&E and SCE to build steam plants in the 1920s may be attributed to three things. First, a persistent drought in California from 1924 through the mid-1930s caused the major utilities to question the viability of systems that relied heavily on hydroelectricity. Second, new steam generation power plants on the East Coast were achieving far greater efficiencies than had previously been possible. Between 1900 and 1930, for example, the fuel efficiency of steam plants, measured in kilowatts per barrel of oil, increased more than nine-fold. Third, new natural gas lines were completed in the late 1920s that could bring new gas supplies to both northern and southern California from the San Joaquin Valley (Williams, 1997).

SCE began constructing its steam generation plant at Long Beach on Terminal Island in 1911. The Los Angeles Department of Water and Power (LADWP) constructed a steam station at Seal Beach consisting of two units installed in 1925 and 1928. PG&E built a steam plant in Oakland in 1928. In 1929, the Great Western Power Company (which was absorbed by PG&E in 1930) built a large steam plant on San Francisco Bay, near the Hunters Point shipyard (Herbert and Brookshear, 2006).

The years following World War II were a time of expansive growth in southern California. The population swelled in response to business and industrial development. Housing expanded into formerly agricultural areas, creating suburbs around Los Angeles and San Diego. The increased population and industry made greater power generation crucial, and California's utility providers expanded their capacity to meet the demand. At this point, most of the more favorable hydroelectric sites in California had already been developed, and as previously noted, the viability of hydroelectricity had been called into question during the drought of the 1920s and 1930s. The technology of steam generation had progressed, and abundant natural gas resources to help run them were now available. "Steam turbine power plants were cheaper and quicker to build than hydroelectric plants, so utilities companies moved away from hydroelectricity, establishing steam turbine power as the generator of choice" (Herbert and Brookshear, 2006). The "momentum for steam had been established by war, by drought, and by a positive history of increased thermal power plant development" (Williams, 1997).

Starting in the 1950s, dozens of new steam generation plants were built throughout California. In a detailed article in 1950 in C*ivil Engineering*, I.C. Steele, chief engineer for PG&E, summarized the design criteria of four major steam plants the company had under construction at that time, Moss Landing, Contra Costa, Kern, and Hunters Point in San Francisco. The criteria were the same in all cases: build the facility close to load centers to reduce transmission costs, close to fuel supplies, near a water supply, and on a site where land was inexpensive and could support a good foundation (Steele, 1950; Herbert and Brookshear, 2006).

Between 1950 and 1970, steam generating capacity in California saw its greatest expansion. During this period, SCE built a series of similar steam plants in the Los Angeles basin and in San Bernardino County. In 1952, the company began work on Redondo No. 2, which was adjacent to an earlier plant at Redondo Beach. In 1953, the Etiwanda plant went online, followed in 1955 by El Segundo, Alamitos in 1956, and Huntington Beach and Mandalay in 1958. By 1960, all SCE plants had either multiple units or additional units in the planning stages. In 1950, PG&E operated 15 steam electric plants in California. Between 1950 and 1960, it added several new plants and expanded older ones. Chief among these were Contra Costa (1951–53), Moss Landing (1950–52), Morro Bay (1955), Hunters Point (addition 1958), Humboldt Bay (1956–58), and Pittsburg (1959–60) (Herbert and Brookshear, 2006).

Although SCE and PG&E were the major players, smaller utility companies also expanded their facilities. The LADWP system consisted of five steam electric power plants by 1962: Seal Beach Plant (1925–28), Harbor Plant on Los Angeles Harbor (1943), Valley Plant in the San Fernando Valley (1954), Scattergood (1958), and Haynes (1961). San Diego Gas & Electric Company had three steam electric power plants by 1960: Silver Gate (1943), Encina (1954), and South Bay (1960). By the late 1970s, there were more than 20 fossil fuel thermal plants in California, clustered around San Francisco Bay, Santa Monica Bay, and in San Diego

County, along with a few interior plants in San Bernardino, Riverside, and Imperial counties, as well as a few plants on the Central Coast (Herbert and Brookshear, 2006).

Southern California Edison Company. The history of SCE dates to 1886, when a company called Holt and Knupps illuminated Visalia, California, with street lights. They became known as Visalia Electric Light & Gas Company, the earliest of several companies that became SCE (Edison International, 2012). In 1896 a group of investors, including Elmer Peck and George Baker, established the West Side Lighting Company to provide electricity to Los Angeles and bought the franchise to operate the city's power system (Edison International, 2012; Myers, 1983). But that same year the City passed an ordinance prohibiting most overhead line construction because the city streets had become a maze of overhead lines (Lundsten and Flick, 2012). The ordinance established the "conduit district" in which new wiring had to be laid underground (Myers, 1983). West Side Lighting decided that the best technology available was the Edison three-wire conduit technology, and that they needed this technology to continue to grow their business. Los Angeles Edison Electric, formed in 1894, owned the rights to the Edison name and patents (Lundsten and Flick, 2012). The two companies came together and formed Edison Electric Company of Los Angeles in 1897 (Slade et al., 2012). Edison Electric then purchased several smaller utility companies, including Visalia Electric Light & Gas Company, San Bernardino Electric Company, Santa Barbara Electric Light Company, and Ventura Land & Power. It also began to build new plants and transmission lines, and became the first company to install Edison-type DC-power underground conduits in the Southwest. It opened the Los Angeles No. 2 substation in 1898, distributing power throughout the city of Los Angeles via the new conduit system (Myers, 1983). Continuing to expand, it purchased the Southern California Power Company that same year (Myers, 1983).

In 1899 Edison Electric's Santa Ana River No. 1 hydroelectric plant began operation, transmitting power to Los Angeles over the Santa Ana River Line, at the time the world's longest power line at 83 miles (Edison International, 2012). The power line was the first to use "transposition" technology, which has been used ever since for long-distance transmission lines (Myers, 1983). In 1907 the company surpassed this achievement when its Kern River–Los Angeles Transmission Line began operation. At 118 miles and 75 kV, it was the world's longest and highest-voltage power line and the first transmission line in the nation to be supported entirely by steel towers (Edison International, 2012). The company continued to expand, and on July 6, 1909, changed its name from Edison Electric Company of Los Angeles to Southern California Edison to reflect its expanded service area (Edison International, 2012).

In 1917, SCE purchased the Pacific Light & Power Corporation, the Ventura County Power Company, and the Mount Whitney Power & Electric Company, making it the fifth-largest central-station power company in the United States (Slade et al., 2012). The acquisition of Pacific Light & Power gave SCE the Big Creek Project, at the time the world's largest hydroelectric plant, energized in 1913 (Edison International, 2012). By 1929, the eight powerhouses at Big Creek generated a total of 360,000 kilowatts, half of SCE's total power capacity (Slade et al., 2012).

In 1912 the City of Los Angeles decided to develop its own power distribution system, the LADWP. It was created via the Charter of the City of Los Angeles in 1925, and by 1939 had become the sole general distributor of electric energy in Los Angeles (Lundsten and Flick, 2012). SCE had to sell its Los Angeles distribution system to the Los Angeles City Council in 1922 (Slade et al., 2012). But SCE continued to grow outside of the city limits, expanding its steam plants in Long Beach during the 1930s to include eleven new generators (Slade et al., 2012).

After World War II, SCE grew substantially and installed its one millionth electricity meter in 1951 (Slade et al., 2012). By the early 1950s, SCE was the fifth-largest investor-owned power company in the United States. Its service area covered 18,500 square miles and contained about 225 communities with a combined population of almost three million. SCE built 11 fossil-fuel powered stations between 1948 and 1973. It also expanded into nuclear power. In July 1957, at the Santa Susana Experimental Station, SCE became the first investor-owned utility to generate non-military nuclear power (Slade et al., 2012). It broke ground on the San Onofre Nuclear Generating Station in 1963, which began operation in 1968 (Edison International, 2012).

In January 1964, the California Electric Power Company, which served 450,000 people, merged with SCE (Slade et al., 2012).

In 1988 SCE formed a parent holding company, which became known as Edison International in 1996. SCE sold Alamitos Generating Station to the AES Corporation in 1998.

Founded in 1981, AES Corporation built its first power plant in 1985 in Texas. AES Corporation now operates on five continents and in 27 countries. It generates and distributes power and also operates utility companies. The Applicant, AES Alamitos Energy, LLC, is a subsidiary of AES Corporation and owns and operates three generating stations: AES Huntington Beach, AES Redondo Beach, and AES Alamitos. AES Alamitos Energy, LLC is an independent power generator and sells all of its power for distribution in California.

Alamitos Generating Station. SCE built the Alamitos Generating Station between 1955 and 1969. The first unit began commercial operation in September 1956; Unit 2 in February 1957; Unit 3 in December 1961; Unit 4 in June 1962; Unit 5 in March 1966; Unit 6 in September 1966; and Unit 7 in July 1969 (AES Corporation, 2010). Unit 7 was decommissioned and removed in 2003. The facility was designed to be dual-source, powered by either oil or natural gas, and had four large fuel tanks to hold oil. In the 1970s, all dual-source-fueled plants were required to convert to natural gas only. By the 1980s, the Alamitos Generating Station was converted to natural gas only, and the fuel oil tanks were removed in 2010.

AES Alamitos Energy acquired the Alamitos Generating Station plant from SCE on May 18, 1998. SCE owns the electrical transmission lines and a portion of the switchyard facilities.

5.3.3 Research Design for the Cultural Resources Inventory

5.3.3.1 Research Objective

This section describes the research design used by CH2M HILL to guide the records and archival search and subsequent fieldwork phase of the cultural resource inventory for the AEC. Property types and survey expectations for this project were defined based on the themes identified in Section 5.3.2.2, Regional Setting. The methods used both during the records and archival search and the fieldwork phase were planned to meet or exceed the CEC requirements according to the *Rules of Practice and Procedure & Power Plant Site Certification Regulations* (CEC, 2007), as well as California Archaeological Resource Management reporting and CEQA requirements for analyzing potential impacts to historical resources.

The initial goal was to identify any cultural resources located onsite and within the study area so that potential effects of the AEC could be assessed. To accomplish this goal, background information was examined and assessed, the study area was defined, and a field survey was conducted to identify cultural remains. Reviews of the records search results, previous work in the study area and vicinity, and historical maps indicated that cultural resources within the study area were likely to be mostly prehistoric or historic remains related to salt collection and refinement, and historic structures related to the 1950s-era Alamitos Generating Station.

The field survey entailed a pedestrian survey of the study area. The fundamental goals of an intensive pedestrian survey are to identify and document previously unrecorded cultural resources and analyze cultural materials, not only to better characterize potential effects, but also to attempt to confirm or elaborate on our current understanding of the prehistory and history of the region. From a management perspective, the ability of specific resources to address research questions provides a basis to evaluate California Register of Historic Resources (CRHR) and NRHP eligibility. Methods for conducting the field survey and inventory are described below.

5.3.3.2 Research Questions

The literature review and search results suggest that the study area has a low archaeological sensitivity. Although there are known prehistoric sites near the AEC, none is located within the study area. In addition,

although historic period sites tend to be associated with historic linear features such as roads, railroads, and transmission lines, all of which are or have been in the area, the area is built up.

Pertinent research questions that are applicable to the AEC site are discussed below:

1. The AEC is located adjacent to or near various historical water resources, including the San Gabriel River and the Pacific Ocean, and is close to a complex Gabrieleño village site (1 mile northwest of the AEC). Therefore, it is possible that the AEC area was a locale for prehistoric resource procurement and satellite campsites.

   Research Question: Are there any remaining areas around the plant site or within the 200-foot buffer that remain intact enough to contain archaeological remains? Is there evidence of prehistoric resource procurement, processing, or habitation?

2. The AEC study area is located within the historic Rancho Los Alamitos. If any cultural remains are identified in the study area, they would most likely be historic trash dumps or scatters related to ranching or agricultural activities.

   Research Question: Is there any evidence of these historic activities in the study area? If so, do any of these remains offer evidence of any different ethnic groups who may have been involved in the ranching or agricultural activities?

3. Starting in the 1950s, dozens of steam generation plants were built throughout California. The Alamitos Generating Station is one among several of these plants constructed in the greater Los Angeles area during the years following World War II and the subsequent expansive growth in southern California.

   Research Question: Does the plant have any unique features or employ any different technologies than other steam generation plants constructed at the same time in the greater Los Angeles area?

4. After World War II, the population in southern California swelled in response to business and industrial development. Housing expanded into formerly agricultural areas, creating suburbs around Los Angeles and San Diego. The increased population and industry made greater power generation crucial, and California's utility providers expanded their capacity to meet the demand.

   Research Question: Are there any extant buildings directly adjacent to the study area that appear to be related to the construction of the plant? If so, are these buildings commercial or residential? Do the commercial buildings directly relate to the Alamitos Generating Station?

5.3.3.3 Survey Expectations

Based on the high degree of surface disturbance at the Alamitos Generating Station, the potential presence of archaeological resources within the study area was considered low. Although unlikely, prehistoric archaeological sites that could theoretically be found in undisturbed or open areas at or near the AEC, including the 200-foot buffer area, include shell middens, lithic scatters, or habitation sites. Historic period sites could include trash dumps.

The Alamitos Generating Station was constructed in the 1950s and it was expected that at least some of the buildings on the site would date to the 1950s.

The archaeological sensitivity of the study area was expected to be low; however, the likelihood of identifying historic buildings within the study area is expected to be high.

Many of the archaeological sites previously documented in the vicinity of the AEC are no longer extant. Although specific site dimensions are not known, general site descriptions are included in several reports reviewed during the literature search. These site descriptions were reviewed to determine potential site types in the AEC study area. This review found descriptions for both small and large prehistoric sites in the study area.

Because at least some of the prehistoric site descriptions found in various reports described smaller sites, transect spacing and observation strategies allowed for the detection of small sites (fewer than five artifacts or features). The survey methodology for prehistoric and historic archaeological resources included using pedestrian transects spaced at 10- to 15-meter intervals throughout the surveyed area. Previous surveys in the area also utilized a 10-meter interval methodology; therefore, a 10- to 15-meter interval was determined sufficient for the AEC archaeological survey.

5.3.3.4 Resources Inventory

CH2M HILL cultural resource specialists conducted a cultural resources inventory, which included archival research, architectural reconnaissance, and a surface pedestrian survey, for the AEC. The AEC study area was determined in accordance with the latest CEC *Rules of Practice and Procedure & Power Plant Site Certification Regulations* (CEC, 2007) for assessing potential impacts on archaeological and architectural resources. The results of the resource inventory are presented in the following sections. Figure 5.3-1 shows the AEC site and the archaeological and architectural survey areas. The archaeological survey area includes the existing Alamitos Generating Station site, associated linear features, and the 200-foot buffer around the site. The architectural survey area includes the existing Alamitos Generating Station site and a buffer area at least one additional parcel deep on all sides of the site as well as the offsite linear alignment of the process/sanitary wastewater pipeline.

5.3.3.5 Archival Research

On August 30, 2011, CH2M HILL requested a literature search from California Historical Resources Information System (CHRIS) staff, South Central Coastal Information Center (SCCIC), searching within a 1-mile buffer zone around the AEC site and laydown areas. This search radius encompasses the entire research area required by the CEC for archaeological and architectural resources. An additional literature search for the process/sanitary wastewater pipeline corridor was completed by CH2M HILL at the SCCIC on July 2, 2013. Because the recently purchased tank farm is located within the original literature search area, a one-mile buffer around this additional acreage was completed as part of the 2011 and 2013 searches.

The CHRIS literature and records review included all recorded archaeological sites and all known cultural resource survey and excavation reports. Other sources examined included the NHRP, the CRHR, California Historical Landmarks, and California Points of Historical Interest. Historical maps consulted included 1896 Los Alamitos, California, and the 1942 and 1943 Downey, California, 15-minute U.S. Geological Survey (USGS) topographic quadrangle map. State and local listings were consulted for the presence of historic buildings, structures, landmarks, points of historical interest, and other cultural resources via the California State Parks Office of Historic Preservation (OHP) website, http://ohp.parks.ca.gov/.

CH2M HILL contacted the Los Angeles County Department of Regional Planning and the City of Long Beach Development Services by telephone on August 29, 2011, and contacted the City of Long Beach Department of Regional Planning on August 30, 2011.

AES Alamitos Energy provided specific information on the history, design, and construction of the Alamitos Generating Station facilities. CH2M HILL also obtained historical photographs of the site before, during, and after construction from the Huntington Digital Library.

According to information available in the CHRIS files, three previous cultural resource surveys have been completed within the AEC study area, including one survey that included the process/sanitary wastewater pipeline corridor (Table 5.3-1). An additional 71 studies have been prepared within a 1-mile radius of the AEC site, laydown area, and offsite linear facilities. Approximately 10 percent of the study area has been previously subject to cultural resources studies. A complete copy of the CHRIS records search is provided as Appendix 5.3C, which has been provided under a request for confidentiality.

TABLE 5.3-1

Cultural Resources Studies Conducted in the Project Vicinity

Report Authors and Date	National Archaeological Database Number
Studies within the Study Area	
Cooley, 1979	LA-522
McKenna, 2001	LA-5215
Strudwick, 2004	LA-8487
Studies within a 1-Mile Radius	
Nelson, 1974	LA-57
Dixon, 1977	LA-491
Dixon, 1974	LA-503
Allen, 1980	LA-939
Van Horn and Brock, 1981	LA-987
McKenna, 1990	LA-2114
Winman and Stickel, 1978	LA-2399
Dixon and Rosenthal, 1981	LA-2792
Dixon, 1972	LA-2794
Desautels, Dixon, and Rosen, 1979	LA-2795
Dixon, 1993	LA-2864
Bonner, 1994	LA-3114
Bucknam, 1974	LA-3583
Milliken and Hildebrandt, 1998	LA-4091
McLean, Strudwick, and McCawley, 1997	LA-4157
Brooks, 1960	LA-4266
Zahnister, 1974	LA-4269
Underwood, 1993	LA-4270
Underwood, 1993	LA-4274
Underwood, 1993	LA-4275
Underwood, 1993	LA-4276
Underwood, 1993	LA-4277
Widell, 1994	LA-4355
Zahnister, 1974	LA-5315
Cottrell, 1974	LA-5727
Strudwick et al., 1996	LA-5890
McCormick and Ferraro, 2002	LA-6089
Shepard, 2003	LA-6107
Baksh et al., 1994	LA-6160
Cottrell, 1975	LA-6163
Billat, 2003	LA-6909
Shepard, 2004	LA-8494
URS Corporation, 2003	LA-8495
Raab and Boxt, 1993	LA-8497

TABLE 5.3-1

Cultural Resources Studies Conducted in the Project Vicinity

Report Authors and Date	National Archaeological Database Number
Raab and Boxt, 1994	LA-8498
Taniguchi, 2006	LA-9839
Will, 2006	LA-9840
Fulton, 2009	LA-10483
Archaeological Associates, Ltd., 1980	OR-493
Scientific Resource Surveys, Inc., 1981	OR-639
Redwine, 1958	OR-1049
Stickel, 1991	OR-1272
Whitney-Desautels, 1997	OR-1581
Clevenger, Crawford, and Pigniolo, 1993	OR-1599
Stickel, 1996	OR-1608
York, Cleland, and Baksh, 1997	OR-1609
Stickel, 1996	OR-1610
York, Cleland, and Baksh, 1997	OR-1643
York, Cleland, and Baksh, 1997	OR-1644
Stickel, 1996	OR-1816
York and Cleland, 1997	OR-1858
Ogden Environmental and Energy Services, 1997	OR-1897
Davy, 1997	OR-1931
Clevenger and Crawford, 1995	OR-1958
Mason and Cerreto, 1995	OR-1960
Clevenger and Crawford, 1997	OR-1969
Berryman and Pettus, 1995	OR-1989
Mason, 1987	OR-2033
Romani, 1981	OR-2161
Duke, 2000	OR-2164
Shepard, 2003	OR-2774
Ogden Environmental and Energy Services, 1995	OR-3174
JRP Historical Consulting Services, 1999	OR-3175
Ritchie, 2000	OR-3371
York et al., 2003	OR-3391
Wlodarski, 2006	OR-3402
Ehringer, 2009	OR-3762
Cleland, York, and Willey, 2007	OR-3828
Mason, 2009	OR-3870
Slauson, 2000	OR-3890
Bucknam, 1974	OR-4034

Source: SCCIC.

A total of 56 recorded sites are located within the literature search area (Table 5.3-2). Of these resources, only one is located within the AEC study area, site number P-19-186880, which is the Alamitos Generating Station Fuel Oil Tank Farm. This resource was previously recommended as not eligible for the NRHP or CRHR by other consultants (Strudwick, 2004). Fifty-five prehistoric and historic sites are located outside of the study area but within the 1-mile radius. Brief site descriptions and evaluation status are provided in Table 5.3-2.

TABLE 5.3-2

Cultural Sites within the AEC Literature Search Area

Site Number	Site Type	Site Description	Evaluation - Year
Sites within the Study Area			
P-19-186880	Historic	Fuel tank farm	NRHP/CRHR Not eligible 2004
Sites within 1-mile Radius			
P-19-000102	Prehistoric	Shell midden	Not evaluated
P-19-000232	Prehistoric	Shell midden	Not evaluated
P-19-000233	Prehistoric	Shell midden	Not evaluated
P-19-000271	Prehistoric	Shell midden	Not evaluated
P-19-000273	Prehistoric	Midden	Not evaluated
P-19-000274	Prehistoric	Shell fragments	Not evaluated
P-19-000275	Prehistoric	Shell fragments	Not evaluated
P-19-000278	Prehistoric	Campsite	Not evaluated
P-19-000306	Prehistoric	Puvunga Indian Village	NRHP Listed - 1974
P-19-000702	Prehistoric	Midden	Not evaluated
P-19-001006	Prehistoric	Midden	Not evaluated
P-19-001007	Prehistoric	Midden	Not evaluated
P-19-001821	Prehistoric	Shell midden	Not evaluated
P-19-002616	Prehistoric	Campsite	Not evaluated
P-19-003040	Historic	Oil tank farm	Not evaluated
P-19-120038	Prehistoric	Midden	Not evaluated
P-19-120039	Prehistoric	Midden	Not evaluated
P-19-120040	Prehistoric	Midden	Not evaluated
P-19-120045	Prehistoric	Midden	Not evaluated
P-19-120046	Prehistoric	Midden	Not evaluated
P-19-120047	Prehistoric	Midden	Not evaluated
P-19-120048	Prehistoric	Midden	Not evaluated
P-19-120049	Prehistoric	Midden	Not evaluated
P-19-120050	Prehistoric	Midden	Not evaluated
P-19-120038	Prehistoric	Midden	Not evaluated
P-19-120053	Prehistoric	Midden	Not evaluated
P-19-178684	Historic	Rancho Los Alamitos	NRHP/CRHR Listed 1981
P-19-186115	Historic	Long Beach Marine Stadium	CRHR Listed 1995 NRHP Not Eligible 1990
P-19-186926	Historic	Los Alamitos Retarding Basin Pump Station	Not evaluated
P-19-187656	Historic	Long Beach Veterans Medical Center	NHRP Not eligible 2003

TABLE 5.3-2

Cultural Sites within the AEC Literature Search Area

Site Number	Site Type	Site Description	Evaluation - Year
P-19-187657	Historic	Bixby Ranch Field Office	Not evaluated
P-30-000143	Prehistoric	Midden/possible burials	Not evaluated
P-30-000256	Prehistoric	Midden	Not evaluated
P-30-000257	Prehistoric	Site	Not evaluated
P-30-000258	Prehistoric	Campsite	Not evaluated
P-30-000259	Prehistoric	Campsite	Not evaluated
P-30-000260	Prehistoric	Campsite	Not evaluated
P-30-000262	Prehistoric	Campsite	Not evaluated
P-30-000263	Prehistoric	Midden	Not evaluated
P-30-000264	Prehistoric	Occupation site with human remains	Not evaluated
P-30-000265	Prehistoric	Campsite	Not evaluated
P-30-000850	Prehistoric	Shell scatter	Not evaluated
P-30-000851	Prehistoric	Shell scatter	Not evaluated
P-30-000852	Prehistoric	Shell scatter	Not evaluated
P-30-001473	Prehistoric	Shell midden	Eligible/1996
P-30-001539	Prehistoric	Shell scatter	Not evaluated
P-30-001540	Prehistoric	Shell scatter	Not evaluated
P-30-001541	Prehistoric	Shell scatter	Not evaluated
P-30-001542	Multicomponent	Shell midden, glass shards	Not evaluated
P-30-001543	Historic	Refuse deposit	Not evaluated
P-30-001544	Prehistoric	Midden	Not evaluated
P-30-001545	Prehistoric	Shell scatter	Not evaluated
P-30-001546	Prehistoric	Lithic scatter	Not evaluated
P-30-001644	Prehistoric	Shell midden	Not evaluated
P-30-176840	Historic	Naval Weapons Station	NRHP Not eligible 1998

Source: SCCIC.

Two of the sites within the 1-mile radius are listed on both the CRHR and the NRHP. These two sites are the Puvunga Indian Village, site number P-19-000306, and the Rancho Los Alamitos, also known as the Bixby House, site number P-178684. Both listed properties are outside of the study area. One additional resource is listed on the CRHR. This resource, the Long Beach Marine Stadium, site number P-19-186115, is also outside of the study area but located within the 1-mile literature search radius. Brief information about these three resources is provided below.

A review of historical maps (1896 Los Alamitos, California, and the 1942 and 1943 Downey, California, 15-minute USGS topographic quadrangle map) did not identify any additional resources or historic features. Review of the historic 1896 map did show, however, unnamed roads and bridges that crossed the San Gabriel River north of the AEC site. Review of the historical 1942 and 1943 maps identifies the channeled and concrete-lined San Gabriel River and the Los Cerritos Channel. Within the AEC site, an unnamed fuel tank farm and associated facilities are depicted. Several roads in a grid pattern were also noted. The Alamitos Bay is shown as fully developed and the marshland having been filled.

5.3.1.1.1 Sites within the AEC Study Area

Site forms and specific locational information for the resource discussed below can be found in confidential Appendix 5.3C.

Site P-19-186880, Alamitos Generating Station Fuel Oil Tank Farm

The Alamitos Generating Station Fuel Oil Tank Farm is an historic period built resource. The tank farm is a large-capacity petroleum storage tank farm, first recorded by Ivan Strudwick in 2004. The tank farm was part of the original SCE Alamitos Generating Station built in 1955 and consisted of four large-capacity petroleum fuel storage tanks, each measuring 40 feet high and 60 feet in diameter (Strudwick, 2004). This site was evaluated as not eligible for the NRHP or CRHR, and the fuel tanks were removed in 2010 (Gazettes, 2010).

Sites within the 1-Mile Buffer. Site forms and specific locational information for all of the resources discussed below can be found in confidential Appendix 5.3C.

Site P-19-000306 (includes P-19-000234 and P-19-000235), Puvunga Indian Village. This previously recorded resource is the location of the prehistoric and historic period Gabrieleño village site of *Povuu'nga*. Part of the site was likely destroyed by construction of buildings at California State University, Long Beach (CSULB). The site boundary includes the southern portion of CSULB and a portion of the Rancho Los Alamitos property, which operates as a historic site that is open to the public. During the Spanish period, the village, termed a *Rancheria* in mission records, was part of the Nieto land grant. The village occupants had been removed from the village to the missions by circa 1790. More specific boundaries of the village and its land use elements have not been determined due to disturbances from historic era ranching and farming and the urbanization and industrialization of the area after World War II. Previous work at the site includes a surface collection by William Lockett of the Historical Society of Long Beach between 1963 and 1965 and an excavation by Robert Pence and Gerald Williams, students at CSULB, in 1964. In 1974, Keith Dixon provided a detailed analysis of the village site (Dixon, 1972).

This site is a complex habitation that includes middens and artifacts, including manos, metates, mortars, pestles, stone bowls, bifaces, asphaltum, projectile points, scrapers, Tizon Brown Wear ceramics, and faunal material. Several ethnohistoric accounts of this village exist, and several of its residents can be traced through mission records (Boscana, 1814; Dixon, 1972; Milliken, 1997). Section 2.4.2 contains a detailed description of the village, *Povuu'nga*. This site, which is located outside of the study area, was listed on the NRHP and the CRHP in 1974.

Site P-19-178684, Rancho Los Alamitos, Also Known as the Bixby House. This site is the location of a part of the Rancho Los Alamitos. Rancho Los Alamitos was first recorded as a cultural resource in 1981, when it was nominated for listing in the NRHP by Nancy J. Sanquist on behalf of the Bixby Ranch Company. The property was once a part of the original 300,000-acre Spanish land grant given to Jose Manuel Nieto in 1790. Over the years, the property decreased to approximately 27,000 acres until it was purchased by Bixby in 1881. The Bixbys were one of the largest cattle ranching families in California at that time, and with their partnership in the Alamitos Land Company, the family became one of the founders of the City of Long Beach. The Bixbys occupied the property until the death of Fred Bixby. In 1968 the Bixby heirs deeded Rancho Los Alamitos to the City of Long Beach. Today, the property consists of 7.5 acres and contains a U-shaped ranch house that sits atop the original eighteenth-century adobe structure. Other features of the site include gardens, a tennis court, a Spanish fountain, seven outbuildings associated with the Bixby Ranch and its operations, the foreman's house, other utilitarian structures, and a kitchen midden (Sanquist, 1981). The property was listed in the NRHP in 1981 and is therefore also listed in the CRHR. The site is outside of the AEC study area.

Site P-19-186115, Long Beach Marine Stadium. This site is a historic period site, the Long Beach Marine Stadium. This site was first recorded in 1992 by Laurence Goodhue as part of the application for a California Point of Historical Interest. The Long Beach Marine Stadium was designed and built in 1930 as the rowing venue for the 1932 Olympics. This was the first manmade rowing course in the United States. The stadium was selected six times as the official U.S. Olympic rowing training center and hosted the 1968 Olympic trials

(Goodhue, 1992). Marine Stadium is one of only two remaining facilities built and used in the 1932 Olympics. The Los Angeles Coliseum is the other facility. The stadium was listed as a California Historic Landmark in 1995 and is also listed in the CRHR. The integrity of the site has been compromised and it has been recommended not eligible for listing in the NRHP by other consultants (Fulton and McLean, 2009). This resource is located outside of the study area.

5.3.3.6 Archaeological Field Survey

A cultural resources field survey of the AEC study area was conducted on September 28, 2011, and September 29, 2011, by Gloriella Cardenas, M.A., RPA, a Cultural Resource Specialist (CRS) who meets the qualifications for Principal Investigator stated in the Secretary of the Interior's standards and guidelines for archaeology and historic preservation (NPS, 1995). This field survey included the AEC site and laydown areas. An additional survey was completed on July 2, 2012, by Natalie Lawson, M.A., RPA, for the offsite process/sanitary wastewater pipeline. Ms. Lawson also meets the qualifications for Principal Investigator. The additional tank farm acreage was surveyed on April 15, 2015, by Ms. Cardenas and on October 5, 2015, by Ms. Lawson.

As per the latest CEC *Rules of Practice and Procedure & Power Plant Site Certification Regulations* (CEC, 2007), in addition to the AEC site and the construction laydown and/or parking area, a 200-foot minimum buffer area around this facility was surveyed for cultural resources. A 50-foot buffer on either side of the offsite linear corridor was surveyed for cultural resources as well. A total of 125 acres was included in the archaeological survey.

The AEC site is located within the Alamitos Generating Station boundaries and is composed of facilities, structures, roads, and paved areas. Ground visibility throughout the plant boundaries was generally zero except where eroded asphalt or ungravelled patches had exposed soils or where fuel tanks had been removed. Within the 200-foot buffer outside the plant boundaries, the survey area included streets, sidewalks, a concrete-lined canal, a small open area in the southeastern corner, another open area in the northwest, and exposed soils where fuel tanks were removed. These open areas were completely surveyed in 10-meter transects. The open areas were opportunistically assessed and it was observed that open spaces were either landscaped with grass and other vegetation or were entirely covered with fill. The offsite linear corridor is primarily located within a residential neighborhood, entirely outside the Alamitos Generating Station boundary. The corridor crosses a canal, a golf course, a parking lot, and two streets. The majority of the linear route is paved; however, upgrades that may be required for the existing LBWD sanitary line would occur within areas heavily disturbed by the installation of the existing line. Disturbances to the survey area have affected 100 percent of the horizontal and an unknown percentage of the vertical. The 10-acre offsite laydown area is located within Plains All American Tank Farm site and is immediately adjacent to the AEC boundary. The unpaved area appears to have been graded and is devoid of any vegetation. The tank farm area is open and largely unpaved. The entire area is completely disturbed by this grading and no native soils are visible on the surface.

No archaeological resources were observed during the investigation. No areas within the study area were left undisturbed by the construction of the Alamitos Generating Station or other modern construction. Current AES Alamitos Energy staff indicated that the present Alamitos Generating Station was constructed on fill. This is supported by the findings of a subsurface geotechnical survey that was completed by Ninyo & Moore in 2011. Ninyo & Moore (2011) encountered artificial fill at depths ranging from approximately 6 to 9 feet below ground surface (bgs) throughout the plant site. Excavations, which are proposed up to 10 feet bgs, will exceed this fill by 1 to 4 feet, and therefore, it is possible that excavations could extend beyond the fill into potentially undisturbed deposits below the fill. The study area was originally located in a tidal flats environment, the Alamitos Saltwater Marsh, before extensive land development occurred in the area during the early 1900s. Prior to the construction of the AEC, the land was used for agriculture (Ninyo & Moore, 2011). According to Ninyo & Moore (2011), historically, groundwater levels have been very high in this area at approximately 10 feet bgs or less. Since historically, the groundwater is quite shallow in the area, the

likelihood of intact archaeological deposits below the artificial fill is considered low. Pile driving could reach approximately 50 feet below the surface. The process/sanitary wastewater pipeline would involve excavations within an existing sanitary line corridor, in soils previously disturbed by the installation of the original sanitary line. Given the scope of previous ground disturbance in the area, the depth of the artificial fill at the site, historically high groundwater levels, and the proposed depths of the excavations for the AEC, archaeological sensitivity of the surface soils of the AEC study area is considered low.

5.3.3.7 Architectural Survey

The historic architecture survey of the AEC was conducted on September 28, 2011, by Lori Price, who meets the Secretary of the Interior's Professional Standards for architectural history. The survey was inclusive of the AEC site and adjacent parcels, extending no less than one parcel from the Alamitos Generating Station, as per the CEC *Rules of Practice and Procedure & Power Plant Site Certification Regulations* (CEC, 2007). The recent additional tank farm acreage, surrounded on three sides by the AGS, and the proposed linear features on the fourth side, have no additional adjacent parcels that were not previously included in the architectural survey. All parcels adjacent to the Alamitos Generating Station were reviewed for structures older than 45 years of age or structures that were considered exceptionally significant. Construction dates were obtained from the Los Angeles County Assessor's Office. Based on the assessor's information, review of historical aerial photographs, and the field survey, only the Alamitos Generating Station plant site contained properties that met those criteria. As per CEC requirements, the built environment bordering the alignment of the process/sanitary wastewater pipeline was subject to architectural field reconnaissance on July 2, 2013. Photographs are included in Attachment B to Appendix 5.3B.

Following the guidance provided in the OHP's *Instructions for Recording Historical Resources* (1995), the Alamitos Generating Station, as a large and complex landscape, was recorded as a district due to its concentration of buildings and structures united historically and functionally by plan and physical development. DPR forms, including a Primary Record, Location Map, and District Record, were prepared to document the district as a whole. Each component of the district was documented separately on a Primary Record. All DPR forms prepared are included in Attachment A to Appendix 5.3B.

The present built environment is primarily a mix of industrial, commercial, and residential. The Alamitos Generating Station is flanked by the San Gabriel River to the east and Los Cerritos Channel to the west. A large tank farm is to the south, and the SCE electrical switchyard is to the north. LADWP's Haynes Generating Station is located directly opposite the facility on the east bank of the San Gabriel River. West of Los Cerritos Channel is a residential subdivision, University Park Estates, dating from 1960. This neighborhood is characterized by one-story, single family, ranch-style houses on typical suburban lots. One street in this neighborhood is proposed for the wastewater pipeline.

Within AEC Study Area.

Alamitos Generating Station. The Alamitos Generating Station, which began operating in 1955, was evaluated as a district. Other individual components were evaluated to determine if they could be individually eligible. The district is irregularly shaped and encompasses the Alamitos Generating Station property, approximately 120 acres. The district boundaries are the parcel boundaries that make up the Alamitos Generating Station property. It is roughly bounded by the San Gabriel River on the east, Los Cerritos Channel and North Studebaker Road on the west, East 7th Street on the north, and Westminster Boulevard on the south. The boundaries include all of the relevant features of the Alamitos Generating Station.

Alamitos Generating Station is composed of three pairs of power-generating units, the original administration building now used as a school, a group of newer administration buildings, a separate Unit 5/6 administration building, various warehouses and maintenance facilities, a bag house, transformers, and numerous support facilities such as a circulating water system, retention basins, a compressor house, and storage tanks.

Alamitos Generating Station is not recommended as a historic resource for the purposes of CEQA. Based on available research, the generating station is not significant in the context of the history of SCE, the history of steam generation of electricity, or the history of post-World War II steam generation plants (Criterion A and 1).

As discussed above, Alamitos Generating Station was one of several steam generating plants built by SCE in the mid-twentieth century. It was part of a trend for all electric companies in California to build steam generation plants to keep up with growing demand from new development and higher customer usage. The short timeframe for construction of these plants, and their similar technologies and designs, suggests that they were all being planned and designed at about the same time. These plants and their steam generation technology were the result of the exhaustion of available hydroelectric sites coinciding with a growing need for electricity. Together, the plants impacted the nature of power generation in southern California, overshadowing the importance of any single plant. As of 2008, 21 once-through-cooling steam generation units remained in southern California, including Alamitos Generating Station, all dating from the same general time period, with an average age of 40 years. More than 1,200 steam generating units use this cooling method in the United States (Tetra Tech, 2008). Placed in the context of the time and of other power plants, Alamitos Generating Station is not unique. Available research does not provide any evidence of Alamitos Generating Station being associated with the life of a historically significant person (Criterion B and 2), and it is not significant under Criterion D and 4 as a potential source of data on human history. This property is well-documented through company records and construction documents and is not a principal source of important information. The plant has had minor alterations, yet as a whole it retains integrity of location, design, setting, materials, workmanship, feeling, and association.

This property has been evaluated in accordance with Section 15064.5(a)(2)-(3) of the CEQA Guidelines, using the criteria outlined in Section 5024.1 of the California Public Resources Code, and is not recommended as a historical resource for the purposes of CEQA.

Site P-19-186880, Alamitos Generating Station Fuel Oil Tank Farm. This site was evaluated as not eligible for the NRHP or CRHR in 2001 (Strudwick, 2004). Since the site was recommended not eligible in 2004, the tanks have been removed, and the site retains no integrity of setting, association, feel, workmanship, or materials. It is not recommended as a historical resource for the purposes of CEQA.

University Park Estates Neighborhood. University Park Estates was developed in 1960 by S&S Construction and was originally known as College Park Estates for its proximity to Long Beach State College (now California State University at Long Beach) (Neighborhood Link, 2013). The great majority of the houses along East Vista Street, where the offsite process/wastewater pipeline is proposed, were built in 1960. Forty-one houses along the alignment are 45 years or older, all dating from 1960 to 1962.

This area of the neighborhood was composed primarily of one-story, single-family houses on typical suburban lots. Many have mature landscaping. They typically have hipped roofs and stucco siding with stone veneer accents. A slightly smaller number have gable roofs and vertical wood siding. Many of the buildings have been modified through the construction of additions and the installation of modern windows and doors, new roofing, and other modifications. A number have had large-scale renovations, including second stories, which have removed or covered any trace of the original building.

The process/sanitary wastewater pipeline alignment is mostly paved with concrete or highly disturbed. The pipeline would be buried within existing disturbed rights-of-way and then re-covered consistent with existing cover material as applicable. Buildings are outside the area of direct impact and will not be impacted by installation of the pipeline.

5.3.3.8 Discussion of Survey Expectations and Research Questions

The purpose of this section is to relate the findings of the investigation to the research questions posed above. No areas within the study area were left undisturbed by the construction of the Alamitos Generating Station or other modern construction. No archaeological sites of any type were found. Because excavations

will occur almost entirely within previously disturbed fill, the potential to affect buried intact archaeological resources is very low. Therefore, the two research questions pertaining to archaeological resources are not addressed, and the questions regarding the built environment, questions 3 and 4, are discussed below.

Research Question 3: **Does the plant have any unique features or employ any different technologies than other steam generation plants constructed at the same time in the greater Los Angeles area?** The Alamitos Generating Station is one among several similar power plants constructed in the greater Los Angeles area during the years following World War II and the subsequent expansive growth in southern California. Alamitos Generating Station was one of many plants that constituted a trend for all electric companies in California to construct steam generation plants to provide power for the rapid post World War II development in the state. These facilities were constructed at approximately the same time and were likely developed and designed at about the same time. Alamitos Generating Station was one of more than 1,000 similar power plants built in the United States, one of 1,200 plants using once-through cooling, and does not have any unique features or employ any unique technologies that were not used at any of these numerous other plants.

Research Question 4: **Are there any extant buildings directly adjacent to the study area that appear to be related to the construction of the plant? If so, are these buildings commercial or residential? Do the commercial buildings directly relate to the Alamitos Generating Station?** No extant buildings related to the construction of the Alamitos Generating Station were found, and the four fuel tanks adjacent to the site that originally contained fuel for the plant have been removed.

5.3.3.9 Native American Consultation

The Native American Heritage Commission (NAHC) was contacted by CH2M HILL on August 26, 2011, to request a Sacred Lands File Search that includes information about traditional cultural properties such as cemeteries and sacred places in the project area. The NAHC responded on August 31, 2011, with a list of Native Americans interested in consulting on development projects. Each of these individuals/groups was contacted by letter on September 2, 2011, and follow-up telephone calls were made on March 16, 2012. Also, a detailed summary table of the results of consultations with the individual Native American organizations on the NAHC contact list is included in Appendix 5.3A.

Mr. Anthony Morales, Chairman for the Gabrieleño Band of Mission Indians, telephoned on September 21, 2011, to request additional information about the AEC's proposed actions. A return phone call was made on September 23, 2011, to Mr. Morales, but he was occupied and did not have time to go over his data needs. It was suggested that Mr. Morales email his requests at his earliest convenience; no further responses have been received to date.

Individuals or groups that had not responded were called on March 16, 2012, as a follow-up. Mr. Sam Dunlap, Chairperson of the Gabrieliño Tongva Nation, requested that the letter be re-sent to his email address; this was done on the same date. Mr. Andrew Salas, Chairperson for the Gabrieliño Band of Mission Indians, requested for the letter to be re-sent to his email address; this was done on the same date. For all other contacts, in addition to the letter correspondence, voicemail messages were left because there was no answer. No other responses have been received as of the date of this report. Copies of the letters are provided in Appendix 5.3A.

The NAHC record search of the Sacred Lands file did not indicate the presence of Native American cultural resources in the AEC survey area. The record search conducted at the SCCIC also did not indicate the presence of Native American traditional cultural properties.

5.3.3.10 Local Historical Societies

CH2M HILL contacted the Los Alamitos Museum Association, Historical Society of Long Beach, Long Beach Heritage Coalition, and the Historical Society of Southern California on August 25 and 26, 2011. The Los Angeles County Department of Regional Planning and the City of Long Beach Development Services were

contacted by telephone on August 29, 2011, as was the City of Long Beach Department of Regional Planning on August 30, 2011.

The Historical Society of Long Beach website, accessed on August 30, 2011, contains several historical documents, including maps, newspapers, photos, and biographies, but does not contain a listing of historic properties.

The City of Long Beach Development Services maintains an online list of historic landmarks and districts for the City of Long Beach and the Historic Preservation Element of the General Plan. One historic property was located within the AEC study area. This property is the Rancho Los Alamitos, which is also recorded with the SCCIC and is located outside of the study area. The City of Long Beach Department of Regional Planning does not maintain a Historic Properties or resources listing.

No other responses have been received as of the date of this report. A summary of these contacts is provided in Appendix 5.3A.

5.3.4 Environmental Analysis

This section describes the environmental impacts of AEC construction and operation on cultural resources. CH2M HILL conducted a cultural survey of the AEC study area, described above.

5.3.4.1 Significance Criteria

Appendix G of CEQA is a screening tool; it does not provide a method for setting thresholds of significance. Appendix G is typically used during the Initial Study phase of the CEQA process, asking a series of questions. The purpose of these questions is to make a determination as to whether a project requires an Environmental Impact Report, a Mitigated Negative Declaration, or a Negative Declaration. As the Governor's Office of Planning and Research stated, "Appendix G of the Guidelines lists a variety of potentially significant effects, but does not provide a means of judging whether they are indeed significant in a given set of circumstances." The answers to the Appendix G questions are not determinative of whether an impact is significant or less than significant. Nevertheless, the questions presented in CEQA Appendix G are instructive.

In terms of Cultural Resources, Appendix G, Section V asks whether the project would:

- Cause a substantial adverse change in the significance of a historical resource as defined in § 15064.5 (Appendix G, V.(a).)
- Cause a substantial adverse change in the significance of an archaeological resource pursuant to § 5064.5 (Appendix G, V.(b).)
- Disturb any human remains, including those interred outside of formal cemeteries (Appendix G, V.(d).)

Project investigations included archival research; review of all cultural resource investigation reports within the AEC study area; contacts with other interested agencies, Native American groups, and historic societies; and a field survey. These investigations indicated no significant prehistoric or historic archaeological remains, or traditional cultural properties in the AEC study area. Therefore, no impacts on cultural resources are expected.

5.3.4.2 Construction Impacts

The literature search and pedestrian survey did not locate any significant prehistoric or historic sites within the existing Alamitos Generating Station site.

The literature search and pedestrian survey have shown no significant prehistoric or historic sites located within the AEC study area. One resource was recorded during the survey of the built environment, the Alamitos Generating Station Historic District, which is located within the AEC study area. This district, however, is not considered eligible for the CRHR and is not a historical resource.

No areas within the study area were left undisturbed by the construction of the Alamitos Generating Station or other modern construction. The results of a geotechnical survey indicate the present Alamitos Generating Station is constructed on fill (Ninyo & Moore, 2011), and historically, groundwater in the area is at shallow depths (Ninyo & Moore, 2011). Although it is possible that excavations could extend beyond the fill into potentially undisturbed deposits below the fill, these areas were at or below the groundwater surface, and intact archaeological deposits are unlikely. Given the extensive disturbance to the study area from decades of commercial development, the previously documented depth of the artificial fill at the site, and the proposed relative depths of the excavations for the AEC, it is anticipated that AEC construction impacts have a low to moderate potential to impact buried cultural resources that have not previously been disturbed or destroyed.

Proposed construction of the process/sanitary wastewater pipeline would involve excavations within the existing linear corridor and within soils previously disturbed by the installation of the original sanitary pipeline. With the incorporation of mitigation measures described in Section 5.3.7, construction impacts on cultural resources will be less than significant.

5.3.4.3 Operation Impacts

No ground-disturbing activities are anticipated during AEC operations or maintenance activities; therefore, the AEC would have no operation impacts to cultural resources. Maintenance of AEC facilities will not cause any effects outside the initial construction area of impact. No significant impacts on cultural resources will result from operations or maintenance.

5.3.5 Cumulative Effects

Section 15355 of the CEQA Guidelines defines "cumulative impacts" as "two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts." Subsection b of Section 15355 states, in part, that "The cumulative impact *from several projects* is the change in the environment which results from *the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects*" (emphasis added). Thus, cumulative impacts under CEQA involve the potential interrelationships of two or more projects, not the impacts from a single project. Specifically, under Section 15130 of the CEQA Guidelines, an Environmental Impact Report is required to discuss cumulative impacts when the project's incremental effect is "cumulatively considerable." Section 15065(a)(3) then defines "cumulatively considerable" as meaning "that the incremental effects of an individual project are significant when viewed in connection with the effects of *other* closely related past projects, the effects of *other* current projects and the effects of probable *future* projects" (emphasis added).

Potential cumulative impacts to cultural resources from construction and/or operation of the AEC are not expected. The AEC will have a less than significant effect on cultural resources in the immediate vicinity of the project site. Projects that could result in a cumulative impact would also be required to comply with applicable federal, state, and local LORS. The AEC is unlikely, therefore, to result in cumulative impacts to cultural resources in combination with other closely related past, present, and reasonably foreseeable future projects.

5.3.6 Mitigation Measures

No significant archaeological and historical sites were found during the survey of the AEC site, offsite linear features, or laydown areas. The potential for subsurface construction activities to encounter buried archaeological remains is low. The AEC will include measures to mitigate any potential adverse impacts that could occur if there were an inadvertent discovery of buried cultural resources. This section describes nine mitigation measures proposed by the Project Owner. The primary measures discussed below include, but are not limited to: (1) designation of a CRS to investigate any cultural resource finds made during construction, (2) implementation of a construction worker training program, (3) procedures for halting construction in the event that there is an inadvertent discovery of archaeological deposits or human

remains, (4) procedures for evaluating an inadvertent archaeological discovery, and (5) procedures to mitigate adverse impacts on any inadvertent archaeological discovery determined significant.

Once the AEC is operational, it is anticipated that no additional ground disturbance will occur at the AEC site because no additional excavations are anticipated once construction activities are concluded; therefore, no mitigation measures are required for AEC operations or maintenance.

5.3.6.1 Designated Cultural Resources Specialist

AES Alamitos Energy, LLC will retain a designated CRS who will be available during the earth-disturbing portion of the AEC construction periods to inspect and evaluate any finds of buried archaeological resources that might occur during the construction phase. If archaeological remains are discovered during construction, the CRS, in conjunction with the construction superintendent and environmental compliance manager, will make certain that construction activity stops in the immediate vicinity of the find until the find can be evaluated. The CRS will inspect the find and evaluate its potential significance in consultation with CEC staff and the CEC compliance project manager (CPM). The CRS will make a recommendation as to the significance of the find and any measures that would mitigate adverse impacts of construction on a significant find.

The CRS will meet the minimum qualifications for Principal Investigator on federal projects under the Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation. The CRS will be qualified to detect archaeological resource sites, to evaluate the significance of the deposits, to consult with regulatory agencies, and to plan site evaluation and mitigation activities.

5.3.6.2 Construction Worker Training

AES Alamitos Energy, LLC will prepare a construction worker sensitivity training program to ensure implementation of procedures to be followed if cultural resources are discovered during construction. This training will be provided to all construction workers as part of their environmental, health, and safety training. The training will include photographs of various types of historic and prehistoric artifacts and will describe the specific steps to be taken in the event of an unanticipated discovery of cultural material, including human remains. The live training and the videotaped training will both explain the importance of, and legal basis for, the protection of significant archaeological resources. The training also will be presented in the form of a written brochure.

5.3.6.3 Monitoring

Excavations at the AEC site are expected to reach depths of up to 10 feet for building foundations. Major structures would require piles, and pile driving is expected to reach depths of up to 50 feet.

No areas within the study area were left undisturbed by the construction of the Alamitos Generating Station or other modern construction. The present Alamitos Generating Station was constructed on fill, as shown by the findings of a subsurface geotechnical survey that was completed by Ninyo & Moore in 2011. Ninyo & Moore encountered artificial fill at depths ranging from approximately 6 to 9 feet bgs throughout the plant site. Excavations, which are proposed up to 10 feet bgs, could exceed this fill by 1 to 4 feet, and therefore it is possible that excavations could extend beyond the fill into potentially undisturbed deposits below the fill. The study area was originally located in a tidal flats environment, the Alamitos Saltwater Marsh, before extensive land development in the area during the early 1900s. Prior to the construction of the AEC, the land was used for agriculture (Ninyo & Moore, 2011). According to Ninyo & Moore, historically, groundwater levels have been very high in this area at approximately 10 feet bgs or less. Because the groundwater level is historically quite high in the area, intact archaeological deposits below the artificial fill are considered unlikely. Pile driving could reach approximately 50 feet below the surface. The proposed process/sanitary wastewater pipeline would involve excavations within the existing sanitary pipeline corridor and within soils previously disturbed by the installation of the original pipeline. Given the scope of previous ground disturbance in the area, the depth of the artificial fill at the site, historically high groundwater levels, and the

proposed depths of the excavations for the AEC, archaeological sensitivity of the surface soils of the AEC study area is considered low, and monitoring of the excavations at the AEC is not recommended.

Pile driving is expected to reach below the fill and into native soil; however, pile driving would not require monitoring, even though it could reach into native soil, because the pile driving process does not allow for the observation of the soils.

5.3.6.4 Emergency Discovery

If the construction staff or others identify archaeological resources during construction, they will immediately notify the CRS and the site superintendent, who will halt construction in the immediate vicinity of the find, if necessary. The CRS will use flagging tape, rope, or other means as necessary to delineate the area of the find within which construction will halt. This area will include the excavation trench from which the archaeological finds came and any piles of dirt or rock spoil from that area. Construction will not occur within the delineated find area until the CRS, in consultation with the CEC staff and CEC CPM, can inspect and evaluate the find.

5.3.6.5 Site Recording and Evaluation

The CRS will follow accepted professional standards in recording any find and will submit the standard Form DPR 523 and location information to the CHRIS SCCIC.

If the CRS determines that the find is not significant and the CEC CPM concurs, construction will proceed without further delay. If the CRS determines that further information is needed to determine whether the find is significant, construction will remain suspended in the immediate vicinity of the find, and the designated CRS will, in consultation with the CEC, prepare a plan and a timetable for evaluating the find.

5.3.6.6 Mitigation Plan

If the CRS and CPM determine that the find is significant, the CRS will prepare and conduct a mitigation plan in accordance with state guidelines. This plan will emphasize the avoidance, if possible, of significant archaeological resources. If avoidance is not possible, recovery of a sample of the deposit from which archaeologists can define scientific data to address archaeological research questions will be considered an effective mitigation measure for damage to or destruction of the deposit.

The mitigation program, if necessary, will be carried out as soon as possible to avoid construction delays. Construction will resume at the site as soon as the field data collection phase of any data recovery efforts is completed. The CRS will verify the completion of field data collection by letter to the project owner and the CPM so that they can authorize construction to resume.

5.3.6.7 Curation

The CRS will arrange for curation of archaeological materials collected during an archaeological data recovery mitigation program. Curation will be performed at a qualified curation facility meeting the standards of the California OHP. The CRS will submit field notes, stratigraphic drawings, and other materials developed as part of the data recovery/mitigation program to the curation facility along with the archaeological collection, in accordance with the mitigation plan.

5.3.6.8 Report of Findings

If a data recovery program is planned and implemented during construction as a mitigation measure, the CRS will prepare a detailed scientific report summarizing results of the excavations to recover data from an archaeological site. This report will describe the site soils and stratigraphy, describe and analyze artifacts and other materials recovered, and draw scientific conclusions regarding the results of the excavations. This report will be submitted to the curation facility with the collection.

5.3.6.9 Inadvertent Discovery of Human Burials

If human remains are found during construction, project officials are required by the California Health and Safety Code (Section 7050.5) to contact the Los Angeles County Coroner. If the coroner determines that the

find is Native American, he or she must contact the NAHC. The NAHC, as required by the Public Resources Code (Section 5097.98), determines and notifies the Most Likely Descendant with a request to inspect the burial and make recommendations for treatment or disposal.

5.3.7 Laws, Ordinances, Regulations, and Standards

Among the local LORS discussed in this section are certain ordinances, plans, or policies of the City of Long Beach and the State of California. Federal LORS are also discussed below. A summary of applicable LORS is provided in Table 5.3-3.

TABLE 5.3-3
Laws, Ordinances, Regulations, and Standards for Cultural Resources

LORS	Requirements/Applicability	Administering Agency	AFC Section Explaining Conformance
Federal			
Section 106, National Historic Preservation Act	Federal agencies or state delegates issuing federal permits will determine applicability and compliance.	California Office of Historic Preservation/ U.S. Environmental Protection Agency	Section 5.3.8.1
State			
CEQA Guidelines	Project construction may encounter archaeological and/or historical resources.	CEC	Section 5.3.8.2
Health and Safety Code Section 7050.5	Construction may encounter Native American graves; coroner calls the NAHC.	State of California	Section 5.3.8.2
Public Resources Code Section 5097.98	Construction may encounter Native American graves; NAHC assigns Most Likely Descendant.	State of California	Section 5.3.8.2
Public Resources Code Section 5097.5/5097.9	Would apply only if some project land were acquired by the State (currently no state land).	State of California	Section 5.3.8.2
Local			
Long Beach General Plan	Contains a Historic Preservation Element specifically designed to address the management of cultural resources. Delineates the City's goal to "better integrate historic preservation into City procedures and interdepartmental decisions." Outlines the program's vision, goals, policies, and implementation measures for upholding historic preservation plans. Outlines the City's policies/actions regarding cultural resources and procedures. Requirements are usually effected by placing conditions on a project during the environmental review process.	City of Long Beach	Section 5.3.8.3

AFC = Application for Certification

5.3.7.1 Federal LORS

The National Historic Preservation Act (NHPA) requires federal agencies or their delegates to consider the effects of their undertakings on historic properties, defined as properties (buildings, districts, sites, structures, objects) that meet the criteria for listing in the NRHP (36 Code of Federal Regulations Part 60). The agencies' responsibilities under the NHPA are described in Section 106 of the Act and in federal regulations at 36 Code of Federal Regulations Part 800. Federal agencies are enjoined to (1) determine an undertaking's study area for historic properties, (2) inventory potential historic properties within the study

area, (3) evaluate properties identified to determine their eligibility for listing in the NRHP, (4) assess the potential effects of the undertaking on properties determined to meet NRHP criteria, and (5) if the effects would be adverse, avoid or mitigate those effects.

5.3.7.2 State LORS

CEQA requires review to determine whether a project will have a significant effect on archaeological sites or a property of historic or cultural significance to a community or ethnic group eligible for inclusion in the CRHR (CEQA Guidelines). CEQA equates a substantial adverse change in the significance of a historical resource with a significant effect on the environment (Section 21084.1 of the Public Resources Code) and defines substantial adverse change as demolition, destruction, relocation, or alteration that would impair historical significance (Section 5020.1). Section 21084.1 states that any resource listed in, or eligible for listing in, the CRHR[33] is presumed to be historically or culturally significant.[34]

Resources listed in a local historic register or deemed significant in a historical resource survey (as provided under Section 5024.1g) are presumed historically or culturally significant unless the preponderance of evidence demonstrates they are not.

A resource that is not listed in or determined to be eligible for listing in the CRHR, that is not included in a local register of historic resources, or that is not deemed significant in a historical resource survey may nonetheless be historically significant (Section 21084.1; see Section 21098.1).

CEQA requires a lead agency to identify and examine environmental effects that may result in significant adverse effects. Where a project may adversely affect a unique archaeological resource,[35] Section 21083.2 requires the lead agency to treat that effect as a significant environmental effect and prepare an environmental impact report. The CEC's certified regulatory program satisfies this requirement. When an archaeological resource is listed in or is eligible to be listed in the CRHR, Section 21084.1 requires that any substantial adverse effect to that resource be considered a significant environmental effect. Sections 21083.2 and 21084.1 operate independently to ensure that potential effects on archaeological resources are considered as part of a project's environmental analysis. Either of these benchmarks may indicate that a project may have a potential adverse effect on archaeological resources.

Other state-level requirements for cultural resources management appear in the California Public Resources Code Chapter 1.7, Section 5097.5 (Archaeological, Paleontological, and Historical Sites), and Chapter 1.75, beginning at Section 5097.9 (Native American Historical, Cultural, and Sacred Sites) for lands owned by the State or a state agency.

The disposition of Native American burials is governed by Section 7050.5 of the California Health and Safety Code and Sections 5097.94 and 5097.98 of the Public Resources Code, and falls within the jurisdiction of the NAHC.

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[33] The CRHR is a listing of "…those properties which are to be protected from substantial adverse change." Any resource eligible for listing in the CRHR is also to be considered under CEQA.

[34] A historical resource may be listed in the CRHR if it meets one or more of the following criteria: "(1) is associated with events that have made a significant contribution to the broad patterns of local or regional history, or the cultural heritage of California or the United States; (2) is associated with the lives of persons important to local, California, or national history; (3) embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of a master or possesses high artistic values; or (4) has yielded or has the potential to yield information important in prehistory or history (…of the local area, California, or the nation)" (Public Resources Code §5024.1, Title 14 California Code of Regulations, Section 4852). Automatic CRHR listings include NRHP-listed and determined eligible historic properties (either by the Keeper of the NRHP or through a consensus determination on a project review), State Historical Landmarks from number 770 onward, and Points of Historical Interest nominated from January 1998 onward. Landmarks prior to 770 and Points of Historical Interest may be listed through an action of the State Historical Resources Commission.

[35] Public Resources Code 21083.2 (g) defines a unique archaeological resource to be: An archaeological artifact, object, or site, about which it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is a high probability that it meets any of the following criteria: (1) contains information needed to answer important scientific research questions and there is a demonstrable public interest in that information; (2) has a special and particular quality such as being the oldest of its type or the best available example of its type; or (3) is directly associated with a scientifically recognized important prehistoric or historic event or person.

If human remains are discovered, the county coroner must be notified within 48 hours, and there should be no further disturbance to the site where the remains were found. If the coroner determines the remains to be Native American, the coroner is responsible for contacting the NAHC within 24 hours. The NAHC, pursuant to Section 5097.98, will immediately notify those persons it believes to be most likely descended from the deceased Native American so they can inspect the burial site and make recommendations for treatment or disposal. The AEC will comply with these requirements related to cultural resources through the implementation of the mitigation measures described in Section 5.3.7.

5.3.7.3 Local LORS

Long Beach General Plan. The City of Long Beach's General Plan contains a Historic Preservation Element specifically designed to address the management of cultural resources. The Historic Preservation Element delineates the City's goal to "better integrate historic preservation into City procedures and interdepartmental decisions." Part Two of the element outlines the program's vision, goals, policies, and implementation measures for upholding historic preservation plans. The element outlines the City's policies/actions regarding cultural resources and procedures to be followed to implement the County's goals.

5.3.8 Agencies and Agency Contacts

Table 5.3-4 lists the state agencies involved in cultural resources management for the AEC and a contact person at each agency. These agencies include the NAHC and, for federal undertakings, the California OHP.

TABLE 5.3-4
Agency Contacts for Cultural Resources

Issue	Agency	Persons Contacted
Native American Traditional Cultural Properties	Native American Heritage Commission	Dave Singleton Associate Governmental Program Analyst Native American Heritage Commission 915 Capitol Mall, Room 364 Sacramento, CA 95814 (916) 653-4082
NHPA Section 106 Compliance	California Department of Parks and Recreation Office of Historic Preservation	Milford Wayne Donaldson State Historic Preservation Officer 1416 9th Street, Room 1442 Sacramento, CA 95814 (916) 653-6624
Archival Research, Local Register Listings for Historical Resources	Long Beach Development Services	Mark Hungerford 333 W. Ocean Blvd., 4th Floor Long Beach, CA 90802 Phone: (562) 570-5237
Archival Research, Local Register Listings for Historical Resources	Department of Regional Planning, County of Los Angeles	Connie Chung 320 W. Temple Street Los Angeles, CA 90012 Phone: (213) 974-6411

5.3.9 Permits and Permit Schedule

Other than certification by the CEC, no state, federal, or local permits are required by the AEC for the management of cultural resources. Consultation with the State Historic Preservation Officer would be required under Section 106 of the NHPA.

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5.4 Geological Hazards and Resources

This section presents an evaluation of the Alamitos Energy Center (AEC) in terms of potential exposure to geological hazards and potential to affect geologic resources of commercial, recreational, or scientific value. Section 5.4.1 describes the existing environment that could be affected, including regional and local geology and geological hazards. Section 5.4.2 identifies potential environmental effects from project development. Section 5.4.3 discusses potential cumulative effects. Section 5.4.4 discusses possible mitigation measures. Section 5.4.5 presents the laws, ordinances, regulations, and standards (LORS) applicable to geological hazards and resources. Section 5.4.6 identifies regulatory agencies and agency contacts and Section 5.4.7 describes the required permits. Section 5.4.8 provides the references used to develop this section.

5.4.1 Setting and Affected Environment

AES Alamitos Energy, LLC, will construct, own, and operate the Alamitos Energy Center (AEC), a natural- gas-fired, air-cooled, combined-cycle and simple-cycle, electrical generating facility in Long Beach, California. The proposed AEC will have a nominal generating capacity of 1,040 megawatts (MW). The AEC will be constructed on the site of the existing AES Alamitos Generating Station (AGS), located on an approximately 21-acre site within a larger, 71.1-acre parcel.

The AEC will feature two gas turbine power blocks. Combined-cycle power block will consist of two natural-gas-fired combustion turbine generators (CTG) in a combined-cycle configuration, two unfired heat recovery steam generators (HRSG), one steam turbine generators, an air-cooled condenser, an auxiliary boiler, and related ancillary equipment. Simple-cycle power block will consist of four simple-cycle LMS-100 CTGs with fin-fan coolers and ancillary facilities.

The AEC will meet the demand for new generation in the Los Angeles basin local electrical reliability area. The demand is caused in large part by the closure of the San Onofre Nuclear Generating Station and the anticipated retirement of the older, natural-gas-fired generation currently using once-through ocean water-cooling (OTC). As a result of the promulgation of the California State Water Resources Control Board's (SWRCB) *Water Quality Control Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling* (SWRCB, 2010), more than 4,000 MW of OTC generation are expected to be retired in the Los Angeles local electrical reliability area by December 31, 2020.

The AEC will use water provided by the City of Long Beach Water Department (LBWD) for construction, operational process, and sanitary uses but at substantially lower volumes than the existing AGS historically has used. This water will be supplied through existing, onsite water lines. The AEC will include a new, 1,000-foot process/sanitary wastewater pipeline to the first point of interconnection with the existing LBWD sewer system, the potential upgrade of an additional 4,000 feet of existing pipeline downstream from the first point of interconnection, and the elimination of the current practice of treatment and discharge of process/sanitary wastewater to the San Gabriel River. Stormwater runoff from the power block areas will be directed to oil/water separators and to an existing retention basin and then ultimately discharged to the Los Cerritos channel via existing stormwater outfalls.

The AEC will interconnect to the existing, Southern California Edison (SCE) 230-kilovolt (kV) switchyard adjacent to the north side of the AGS. Natural gas will be supplied to the AEC via the existing, offsite, 30-inch-diameter pipeline owned and operated by Southern California Gas Company (SoCalGas) that currently serves Units 5 and 6 of the AGS. The AEC will require construction of new natural gas-metering facilities and construction of two new natural gas compressor buildings within the AEC footprint.

The AEC is designed to serve both peak and intermediate loads with the added capabilities of rapid startup, significant turndown capability (ability to turn down to a low load), and fast ramp rates. As California's intermittent renewable energy portfolio continues to grow, operating in either load-following or partial shutdown mode will become necessary to maintain electrical grid reliability, thus placing an increased importance upon the rapid startup, high turndown, steep ramp rate, and superior heat rate employed at the AEC.

As an in-basin generating asset, the AEC will provide local generating capacity, voltage support, and reactive power that are essential for transmission system reliability in the Western Los Angeles basin subarea and larger Los Angeles basin local reliability area. The AEC will be able to provide system stability by supplying reactive power, voltage support, frequency stability, and rotating mass in the heart of the critical Western Los Angeles local reliability area. By virtue of its location in a transmission constrained load center, the AEC also helps to avoid potential transmission line overloads and can provide reliable local energy supplies when electricity from more distant generating resources is unavailable. In recognition of its critical grid reliability benefits, the AEC combined-cycle CTGs were selected by SCE in its Local Capacity Requirements Request for Offer on November 5, 2014, and the simple-cycle CTGs will meet the capacity needs anticipated to be identified in future California Public Utilities Commission Long-term Procurement Plans.

Owing to the critical need for generating capacity at the AEC site at all times, existing Units 1 through 6 will remain in operation through much of the AEC development and construction. Given that the removal of existing Units 1 through 6 is not required for construction of the AEC, the continued operation of the AGS will not impede AEC construction. Demolition of the retired and decommissioned turbine peaking generating Unit 7 and fuel tank, ancillary equipment, small maintenance shops, and two retention basins will be required for site preparation for the construction of the AEC. Construction and site preparation activities at the AEC site are anticipated to last 56 months, from the first quarter of 2017 until the third quarter of 2021. The project will commence construction with the removal of former Unit 7's building and ancillary equipment, fuel storage tank, tank berms, small maintenance shops and two waste water retention basins in January 2017 to make room for construction and laydown area for the AEC CCGT. Construction of the AEC CCGT will commence during the second quarter of 2017 and will be completed by the second quarter of 2020. The AEC CCGT is expected to commence commercial operation before May 1, 2020. Construction of the AEC SCGT is scheduled to proceed from the second quarter of 2020 through the third quarter of 2021, and Power Block 2 is expected to commence commercial operation in the third quarter of 2021. A temporary construction access road may be constructed offsite beginning at the intersection of Studebaker Road and Loynes Drive traveling southeast to the AEC site. Construction of the AEC will require the use of onsite laydown areas (approximately 8 acres dispersed throughout the existing site) and an approximately 10-acre laydown area located adjacent to the existing site.

5.4.1.1 Regional Geology

The AEC site is located along the San Gabriel River drainage on a gently sloping coastal plain northeast of Alamitos Bay in the southeast part of the city of Long Beach. The topography of the site ranges from approximately 8 to 15 feet above mean sea level. The AEC site is situated in the Los Angeles Basin at the northwest end of the Peninsular Ranges geomorphic province of southern California. Geologically, the Los Angeles Basin and vicinity is a region divided into four structural blocks that include uplifted zones and synclinal depressions. The structural blocks are generally bounded by north-northwest-trending faults with both strike-slip and reverse motions. The project site is positioned near the southwestern edge of the Central block, which is largely a synclinal depression. The Central block is bounded to the southwest by the Newport-Inglewood Fault Zone (NIFZ) which is mapped near the southwest corner of the existing AGS property (Ninyo & Moore, 2011).

5.4.1.2 Local Geology and Stratigraphy

Available geologic mapping indicates that the project site is underlain by artificial fill and paralic and alluvial fan deposits (Figures 5.4-1a and 5.4-1b). Paralic deposits comprised of unconsolidated silt are mapped along the northwestern edge of the project site. Alluvial fan and valley deposits comprised of unconsolidated silt and clay are mapped within the northern and eastern portion of the project site. Artificial fill is mapped within the southern portion of the project site. Locally, paralic deposits extend to the west and southeast of the project site, and alluvial deposits extend to the north and east. Beach sediments are mapped to the south of the project site and form the shoreline of the Pacific Ocean from Seal Beach southward to Dana Point. Artificial fill is mapped south of the project site in the vicinity of Alamitos Bay (Saucedo et al., 2003).

A subsurface geotechnical survey was conducted by Ninyo & Moore in 2011 (see Appendix 5.4A). Ninyo & Moore (2011) indicate that the project site is underlain by fill and alluvial deposits. Fill generally consisting of loose to medium dense, sandy silt and clayey sand and firm, clayey silt was encountered to depths of approximately 6 to 9 feet below ground surface (bgs). Alluvial sediments consisting of interbedded layers of loose to very dense, sand, silty sand, sandy silt, clayey sand and sand with silt and very soft to stiff, clayey silt, silty clay, and silt were encountered below the fill to the depths explored of approximately 63.5 feet (Ninyo & Moore, 2011). Pliocene and Miocene rocks and sediments extend several thousand feet below these upper units and are important for oil and natural gas production (Troxel, 1954). Beneath these units and extending to unknown depths lies the crystalline basement rock of presumed Jurassic age (California Department of Natural Resources, Division of Oil and Gas, 1956).

The California Geologic Survey (CGS) Seismic Hazard Zone report for the area indicates that the historical high groundwater in the vicinity of the site is approximately 10 feet bgs (Ninyo & Moore, 2011). Groundwater was observed during the 2011 subsurface geotechnical survey at depths ranging from approximately 8 to 14 feet below the existing site grades.

The 2011 Ninyo & Moore report is provided in Appendix 5.4A, and has been used as a primary source of information to support this geologic hazards and resources analysis.

5.4.1.3 Seismic Setting

Based on background review and site reconnaissance conducted by Ninyo & Moore (2011), the project site is not transected by known active or potentially active faults. The project site is not within a State of California Earthquake Fault Zone (EFZ). The nearest mapped EFZ is the NIFZ which is approximately 200 feet southwest of the southwest corner of the site property. (See Figure 5.4-2) The mapped buried trace of the NIFZ is approximately 0.5 mile southwest of the proposed project limits (Ninyo & Moore, 2011).

Mapped surface faults are shown on Figure 5.4-2. Blind thrust faults such as the San Joaquin Hills, Puente Hills, and Upper Elysian Park are not mapped. Blind thrust faults are low-angle faults at depth that do not break the surface and are, therefore, not shown on the map. Table 5.4-1 lists selected principal known active faults that may affect the project site. Although blind thrust faults do not have a surface trace, they can be capable of generating damaging earthquakes and are included in Table 5.4-1. These fault zones represent a significant potential seismic hazard to the project site, and the seismicity of the project area can be characterized as seismically active, with potentially large-magnitude earthquakes.

TABLE 5.4-1
Regional Principal Active Faults

Fault	Approximate Fault to Site Distance Miles (km)	Maximum Moment Magnitude (Mmax)	Significant Historical Earthquakes
Newport-Inglewood (L.A. Basin)	0.3 (0.4)	7.1	M6.4 Long Beach, 3/10/1933
Palos Verdes	8.6 (13.8)	7.3	—
San Joaquin Hills (Blind Thrust)	10.9 (17.5)	6.6	—
Puente Hills (Blind Thrust)	12.2 (19.6)	7.1	—
Whittier	16.2 (26.0)	6.8	M5.9 Wittier Narrows, 10/1/1987 (Workman Hill fault extension)
Upper Elysian Park (Blind Thrust)	20.7 (33.3)	6.4	—
San Jose	23.1 (37.1)	6.4	M4.7 Upland, 6/28/1988 M5.4 Upland, 2/28/1990
Raymond	24.6 (39.6)	6.5	—
Verdugo	25.6 (41.2)	6.9	—
Hollywood	25.7 (41.3)	6.4	—

TABLE 5.4-1

Regional Principal Active Faults

Fault	Approximate Fault to Site Distance Miles (km)	Maximum Moment Magnitude (Mmax)	Significant Historical Earthquakes
Santa Monica	27.4 (44.1)	6.6	—
Elsinore (Glen Ivy)	27.5 (44.3)	6.8	M6 Elsinore, 5/15/1910
Sierra Madre	28.3 (45.6)	7.2	—
Clamshell–Sawpit Canyon	29.3 (47.1)	6.5	M5.8 Sierra Madre, 6/28/1991
Malibu Coast	30.8 (49.6)	6.7	—
Cucamonga	33.1 (53.2)	6.9	—
Coronado Bank	35.6 (57.3)	7.6	—
Anacapa-Dume	37.2 (59.9)	7.5	—
Northridge (East Oak Ridge)	34.6 (55.6)	7.0	M6.7 Northridge, 1/7/1994
San Gabriel	39.7 (63.8)	7.2	—
Santa Susana	44.7 (72.0)	6.7	—
San Jacinto – San Bernardino	47.8 (76.9)	6.7	M6.3 Loma Linda, 7/22/1923
San Andreas – Mojave/1857 Rupture	48.7 (78.3)	7.4	M7.9 Fort Tejon, 1/9/1857

Modified from Ninyo & Moore, 2011.

5.4.1.4 Potential Geological Hazards

The following subsections discuss the potential geological hazards that might occur in the project area.

Ground Rupture. Ground rupture is caused when an earthquake event along a fault creates rupture at the surface. As discussed above, the project site is not transected by known active or potentially active faults. The site is not within a State of California EFZ (CGS, 2007). As mentioned earlier, the nearest mapped EFZ is the NIFZ, which is approximately 200 feet from the southwest corner of the project site. The mapped projection of the fault zone is located approximately 0.5 mile southwest of the proposed project limits (Ninyo & Moore, 2011). Thus, the potential for surface fault rupture affecting the project is relatively low (Ninyo & Moore, 2011).

Seismic Shaking. The project area has experienced seismic activity with strong ground motion during past earthquakes, and it is likely that strong earthquakes causing seismic shaking will occur in the future. Ground shaking from a magnitude 7.6 earthquake could occur within an approximately 50-mile radius of the project site (Ninyo & Moore, 2011). Thus, the significant geological hazard at the project site is strong ground-shaking from an earthquake.

To evaluate the level of ground shaking that might be anticipated at the project site, a site-specific analysis was performed by Ninyo & Moore. The 2013 California Building Code (CBC) recommends that the design of structures be based on the horizontal peak ground acceleration (PGA) having a 2 percent probability of exceedance in 50 years, which is defined as the Maximum Considered Earthquake (MCE).

Using the U.S. Geological Survey (USGS) ground motion calculator, the probabilistic horizontal peak ground acceleration Maximum Considered Earthquake (PGA_{MCE}) for the project site was estimated to be 0.67g. The design peak ground acceleration design basis earthquake (PGA_{DBE}) was estimated to be 0.45g using the USGS ground motion calculator. These estimates of ground motion do not include near-source factors that may be applicable to the design of structures onsite. The guidelines of the governing jurisdictions and the 2013 CBC

will be considered in the project design. These potential levels of ground shaking could affect the AEC without appropriate design mitigation as discussed in later sections.

Liquefaction. During strong ground shaking, loose, saturated, cohesionless soils can experience a temporary loss of shear strength and act as a fluid. This phenomenon is known as liquefaction. Liquefaction depends on the depth to water, grain size distribution, relative soil density, degree of saturation, and intensity and duration of the earthquake. The potential hazard associated with liquefaction is seismically induced settlement.

The project site is mapped in a State of California Seismic Hazard Zone as potentially liquefiable. The evaluation of the potential for liquefaction included the results of cone penetration test (CPT) soundings, exploratory borings, and laboratory test results of representative soil samples. The liquefaction analysis was based on the National Center for Earthquake Engineering Research (NCEER) procedure developed from the methods originally recommended by Seed and Idriss using the computer program LiquefyPro. A depth to groundwater of 5 feet was used in the analysis. A PGA_{DBE} of 0.45g was used in the analysis for a design earthquake magnitude of 7.5. The analysis of soil profiles at the four CPT locations indicated that scattered saturated sandy alluvial layers located between depths of approximately 7 and 56 feet are potentially liquefiable during the design basis earthquake (DBE) event (Ninyo & Moore, 2011).

To evaluate the potential impact from liquefaction, an analysis to estimate the magnitude of dynamic settlement because of liquefaction was performed. Analyses indicate that liquefaction-induced settlement at the project site would be generally less than 1 inch (Ninyo & Moore, 2011).

Lateral spreading of the ground surface during an earthquake usually takes place along weak shear zones that have formed within a liquefiable soil layer. Lateral spread has generally been observed to take place in the direction of a free-face (such as a retaining wall, slope, or channel) but also has been observed to a lesser extent on ground surfaces with gentle slopes. Although the project site includes free-face slopes along the San Gabriel River and Los Cerritos channels, analysis of the sampler blow counts and generally discontinuous nature of the underlying soil layers indicate that the project site is not considered susceptible to significant seismically induced lateral spread (Ninyo & Moore, 2011).

Compressible/Collapsible Soils. Compressible soils generally consist of soils that undergo consolidation when exposed to new loading, such as fill or foundation loads. Soil collapse is a phenomenon where the soils undergo a significant decrease in volume upon increase in moisture content, with or without an increase in external loads. Buildings, structures, and other improvements may be subject to excessive settlement-related distress when compressible or collapsible soils are present. Subsurface exploration and background review conducted by Ninyo & Moore during geotechnical investigations indicate that the project site is underlain by existing fill soils and interbedded alluvial sediments. Older, undocumented fill soils are considered potentially compressible (Ninyo & Moore, 2011). Additionally, some very soft to soft clayey silt and silty clay alluvial layers that are considered potentially compressible were encountered at variable depths to approximately 50 feet. Because of the high groundwater levels encountered at the site and the reported historically high groundwater, Ninyo & Moore (2011) concluded that the site soils are not susceptible to hydro-collapse.

Mass Wasting. Mass wasting is an erosional process by which soil or earth material is loosened or dissolved and removed from its original location. Mass wasting depends on steepness of the slope, underlying geology, surface soil strength, and moisture in the soil. Significant excavating, grading, or fill work during construction might introduce mass wasting hazards at the project site. Ground surface disruption will occur during demolition, construction, excavation, grading, and trenching, which create the potential for erosion to occur. To address these issues, a Storm Water Pollution Prevention Plan incorporating best management practices for erosion control will be prepared prior to the start of construction. Additionally, the topographic gradients at the project site are relatively gentle, which would tend to reduce the potential for offsite runoff and erosion. During AEC operation, surface drainage design provisions and site maintenance will manage

soil erosion at the site. Therefore, the potential impacts from mass wasting and erosion are considered to be relatively low (Ninyo & Moore, 2011).

Subsidence. Subsidence can be caused by natural phenomena during tectonic movement, consolidation, hydrocompaction, or rapid sedimentation. Subsidence also can occur from human activities, such as withdrawal of water or hydrocarbons in the subsurface soils. Historical oil and gas withdrawal has resulted in significant ground subsidence in some areas of Long Beach. The City of Long Beach Seismic Safety Element includes information and maps regarding regional subsidence associated with oil and gas withdrawal, including the locations and magnitude of known subsidence (City of Long Beach, 1988). The project site is not in an area of mapped subsidence. Therefore, the potential for subsidence is relatively low. (Ninyo & Moore, 2011).

Expansive Soils. Expansive soils shrink and swell with wetting and drying. The shrink-swell capacity of expansive soils can result in differential movement beneath foundations. Based on subsurface exploration conducted by Ninyo & Moore (2011), the near-surface soils at the project site predominantly consist of sandy silt and fine-grained sand with silt and clay, which typically have a low to moderate expansion potential.

Groundwater. Based on the background review conducted by Ninyo & Moore (2011), historical high groundwater levels near the project site have been measured at approximately 10 feet bgs. During subsurface exploration conducted by Ninyo & Moore (2011), groundwater was encountered at depths ranging from 8 to 14 feet bgs during the 2011 geotechnical investigation. This variable depth to groundwater is likely influenced by several factors, including tidal fluctuations, precipitation, irrigation, and groundwater pumping. Based on the groundwater levels encountered by Ninyo & Moore (2011) and the reported historical groundwater levels, groundwater may be encountered during excavation activities to these depths at the site (Ninyo & Moore, 2011). Groundwater, if encountered, would be managed to minimize any potential impacts on project-related excavations and construction activities.

Seiches and Tsunamis. Tsunamis are seismically induced ocean waves with very long periods. Tsunamis may be manifested in the form of wave bores or a gradual upwelling of sea level and can be caused by landslides or earthquakes. Water surge caused by tsunamis is measured by distance of run-up on the shore. Tsunamis are relatively uncommon hazards in California. Seven tsunamis have been recorded in the state. In southern California, a significant tsunami was associated with the 1960 Chile Earthquake. Damage occurred in the Long Beach–Los Angeles harbor, where 5-foot-high waves surged back and forth in channels, causing damage to small boats and yachts. A tsunami tidal surge occurred in the Long Beach Harbor because of the magnitude 8.8 Chile earthquake in February 2010. Minor effects were reported at King Harbor in Redondo Beach and in Long Beach Harbor because of the March 2011 Japan tsunami.

Seiches are defined as oscillations in confined or semi-confined bodies of water because of earthquake shaking. Of most concern are seiches that are caused by tsunamis captured and reflected within the enclosed area of an inner harbor, such as those that occurred in Los Angeles–Long Beach following the 1964 Alaskan earthquake. Seiche area damage would be most severe in the same areas as tsunami hazards.

The project site is located in a State of California Tsunami Inundation Area mapped for susceptibility to tsunami inundation (Ninyo & Moore, 2011). The County of Los Angeles Safety Element, City of Long Beach Seismic Safety Element, and California Emergency Management Agency Tsunami Inundation Map also designate the project site as located in an area that is susceptible to a tsunami run-up hazard. Mitigation of tsunami run-up hazards is discussed in Section 5.4.2.2 below.

Dam Failure Inundation. Based on review of the County of Los Angeles Safety Element and the City of Long Beach Seismic Safety Element, the project site is mapped in an area subject to flooding from a failure of the Whittier Narrows Dam or the Prado Dam (Ninyo & Moore, 2011). Inundation from dam failure could cause damage to the project site. However, dams in California are monitored by various governmental agencies (such as the State of California Division of Safety of Dams and the U.S. Army Corps of Engineers) to guard

against the threat of dam failure. Current design and construction practices, and ongoing programs of review, modification, seismic retrofitting, or total reconstruction of existing dams (including recent reconstruction of the Prado Dam) are intended to see that dams are capable of withstanding the maximum credible earthquake for the site. The Whittier Narrows Dam is approximately 20 miles from the project site, and the Prado Dam is approximately 30 miles from the site. Additionally, drainage channel systems for the San Gabriel River and Los Cerritos Channel are provided in the site vicinity to alleviate flooding conditions. Because of the regulatory monitoring of dams, nearby drainage channels, and the site distances from these dams, the potential for inundation due to dam failure is considered low (Ninyo & Moore, 2011).

5.4.1.5 Geologic Resources of Recreational, Commercial, or Scientific Value

The CGS and the State Mining and Geology Board (SMGB) classify the regional significance of mineral resources in accordance with the California Surface Mining and Reclamation Act of 1975. The SMGB uses a classification system that divides land into four mineral resource zones (MRZ) that have been designated based on quality and significance of mineral resources. According to the State of California, the AEC site is located in an area classified as MRZ-3, which is defined as "areas containing mineral deposits, the significance of which cannot be evaluated from available data." Based on the background review and subsurface exploration conducted by Ninyo & Moore (2011), the project site is underlain by alluvial sediments comprised of sand, silt, and clay, which are not considered to have significant recreational, commercial, or scientific value.

Significant mineral deposits are not present in the project area, as identified in the Los Angeles County General Plan (Mineral and Energy Resources) (Los Angeles County, 2011). Based on the Los Angeles County General Plan (Los Angeles County, 2011) there are no known active areas of mining for mineral resources near the project site.

The project site lies within the Seal Beach oil field, with major oil field developments outside the limits of the project site to the west, south, and southeast. There are no active oil, gas, or geothermal wells within the project site boundary. According to online maps of the California Division of Oil, Gas and Geothermal Resources (2012), many oil wells within the Seal Beach oil field, particularly those west of the project site, have been plugged and are no longer active. The proximity of the project site to active and inactive oil wells within the Seal Beach oil field is shown on Figure 5.4-3.

There are no known geologic resources of recreational, commercial, or scientific value present at the project site, thus, project construction would have no effect on oil and gas production or on other geologic resources of commercial value or on the availability of such resources.

5.4.2 Environmental Analysis

The potential effects from construction and operation of the AEC, and the demolition former Unit 7's remaining components at the AGS on geologic resources and risks to life and property from geological hazards are presented in the following sections. With the implementation of the mitigation measures presented in Section 5.4.4, the AEC will not result in significant direct, indirect, or cumulative impacts from or on geologic resources.

5.4.2.1 Significance Criteria

Appendix G of the California Environmental Quality Act (CEQA) is a screening tool, not a method for setting thresholds of significance. Appendix G is typically used in the Initial Study phase of the CEQA process, asking a series of questions. The purpose of these questions is determine whether a project requires an environmental impact report, a Mitigated Negative Declaration or a Negative Declaration. As the Governor's Office of Planning and Research stated, "Appendix G of the Guidelines lists a variety of potentially significant effects, but does not provide a means of judging whether they are indeed significant in a given set of circumstances." The answers to the Appendix G questions are not determinative of whether an impact is significant or less than significant. Nevertheless, the questions presented in CEQA Appendix G are instructive.

With Respect to "Geology and Soils," CEQA Appendix G asks whether the project would:

a. Expose people or structures to potential substantial adverse effects, including the risk of loss, injury, or death involving:

   i. Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.

   ii. Strong seismic ground shaking?

   iii. Seismic-related ground failure, including liquefaction?

   iv. Landslides?

b. Result in substantial soil erosion or the loss of topsoil?

c. Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project, and potentially result in on- or offsite landslide, lateral spreading, subsidence, liquefaction or collapse?

d. Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial risks to life or property?

e. Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?

With respect to "Mineral Resources," Appendix G asks, would the project:

a. Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?

b. Result in the loss of availability of a locally important mineral resource recovery site delineated on a local plan, specific plan, or other land use plan?

5.4.2.2 Geological Hazards

There is significant potential for seismic ground shaking to affect the project site in the event of a large-magnitude earthquake occurring on fault segments nearby. The project site, however, is not within a State of California EFZ or within the trace of any known active fault. The project would, therefore, not be likely to cause direct human exposure to ground rupture. Seismic hazards will be minimized by conformance with the recommended seismic design criteria of the 2013 CBC. Liquefaction potential, potential for consolidation settlement, potential for expansive soils, and elevated groundwater levels present at the project site will be considered during project design. If, during project design, it is determined that the above-mentioned geologic hazards are present at the project site, then the following mitigation alternatives could be implemented to reduce the potential risk to a less-than-significant level.

Mitigation alternatives for potential dynamic settlement related to liquefaction include supporting structures on deep pile foundations that extend through the liquefiable zones into competent material. Alternatively, densification of the liquefiable soils using in situ ground improvement techniques (such as vibro-replacement stone columns, rammed aggregate piers, or compaction grouting) would mitigate the liquefaction hazard, and the new structures could then be supported on shallow foundation systems (Ninyo & Moore, 2011).

To mitigate potential settlement at the site, the major power generating structures will be supported on deep pile foundations or on mat foundations when combined with in situ ground improvement. For preliminary planning purposes, 14-inch-diameter piles extending to approximately 50 feet deep with an axial capacity of 90 thousand pounds (or kilopounds [kips]) can be considered (Ninyo & Moore, 2011). Relatively

light minor structures, new pavements, and hardscape areas may be supported on suitable compacted fill, placed in accordance with detailed geotechnical recommendations. (Ninyo & Moore, 2011).

During the design phase of the project, additional evaluation of groundwater and fluctuations in groundwater levels will be performed. The near-term impacts associated with groundwater are anticipated to involve construction excavations and possible below-grade structures. Excavations that extend below groundwater would involve construction dewatering to maintain excavations in a relatively dry condition. Below-grade structures that extend below groundwater, including pipelines, vaults, and retention basins, would be designed to resist hydrostatic uplift pressures from groundwater and would involve waterproofing, as appropriate. Long-term groundwater impacts may involve rising groundwater levels associated with predicted sea level rises.

Mitigation of tsunami run-up hazards includes structural and civil engineering evaluation, strengthening of seafront structures, and providing emergency warning systems. Tsunami warning systems include the seismic Sea-Wave Warning System for the Pacific Ocean operated by a cooperative program of nations around the Pacific Rim and the Alaska Tsunami Warning Center operated by the National Weather Service. Structural reinforcement at the site also could be considered for tsunami protection, as determined during detailed design.

The probability of mass wasting, subsidence, and flooding by dam failure at the project site is low to negligible.

In summary, compliance with the 2013 CBC requirements will reduce the exposure of people to the risks associated with large seismic events, liquefaction potential, expansive soils, and compressive soils to less-than-significant levels. Additionally, major structures will be designed to withstand the strong ground motion of a DBE, as defined by the 2013 CBC. Through compliance with CBC standards, impacts associated with geological hazards will be less than significant.

5.4.2.3 Mineral Resources

Construction and operation of the AEC will not result in a loss of availability of a known mineral resource that would be of value to the region and the residents of the state. Additionally, the AEC will not result in a loss of availability of a locally important mineral resource recovery site delineated on a local plan, specific plan, or other land use plan. There are no such resources that have been identified on or near the site, so there will be no adverse impacts on mineral resources.

5.4.3 Cumulative Effects

A cumulative impact refers to a proposed project's incremental effect together with other closely related past, present, and reasonably foreseeable future projects whose impacts may compound or increase the incremental effect of the proposed project (Public Resources Code Section 21083; California Code of Regulations, Title 14, Sections 15064(h), 15065(c), 15130, and 15355).

Potential cumulative impacts on geologic hazards and resources from construction and operation of the AEC are not expected. Because structures will be designed to meet seismic requirements of the 2013 CBC, the project will not cause an exposure of people or property to geological hazards. Therefore, the AEC will have a less-than-significant effect on geologic hazards and resources in the immediate vicinity of the project site. Projects that could result in a cumulative impact also would be required to comply with applicable federal, state, and local LORS. Accordingly, the AEC will not result in cumulative impacts on geologic hazards and resources in combination with other closely related past, present, and reasonably foreseeable future projects.

5.4.4 Mitigation Measures

To address potential impacts related to geological hazards, the following mitigation measures are proposed for the AEC:

- Structures will be designed to meet seismic requirements of the 2013 CBC. Moreover, the design of plant structures and equipment will be in accordance with 2013 CBC earthquake design requirements to withstand the ground motion of a DBE.
- A geotechnical engineer will be assigned to the project to carry out the duties required by the CBC to assess geologic conditions during construction and approve actual measures used to protect the facility from the geological hazards discussed in Section 5.4.2.2.

With the implementation of these mitigation measures, the AEC will not result in significant direct, indirect, or cumulative impacts from or on geologic resources.

5.4.5 Laws, Ordinances, Regulations, and Standards

The LORS that may apply to AEC related to geologic resources and hazards are summarized in Table 5.4-2. The local LORS discussed in this section are ordinances, plans, or policies of the City of Long Beach. There are no federal LORS that apply to geological hazards and resources.

5.4.5.1 State LORS

California Building Code. The CBC provides specific and acceptable design criteria for excavations and structures for static and dynamic loading conditions. The CBC is based on the Federal Uniform Building Code. The project will comply with the CBC by ensuring that AEC design and construction meet the criteria for the seismic design and load-bearing capacity (see Section 5.4.2).

Alquist-Priolo Earthquake Fault Zoning Act. The main purpose of the Alquist-Priolo Earthquake Fault Zoning Act is to prevent the construction of buildings used for human occupancy on the surface trace of active faults. Although the project is subject to the Alquist-Priolo Earthquake Fault Zoning Act, the project features are not within areas identified as subject to surface rupture from active faults (see Section 5.4.2).

Seismic Hazards Mapping Act. The purpose of the Seismic Hazards Mapping Act is to ensure public safety from the effects of strong ground shaking, liquefaction, landslides, or other ground failure, and other hazards caused by earthquakes. The project will conform to this act by conducting analysis for potential seismic hazards at the project site (see Section 5.4.2).

5.4.5.2 Local LORS

Except as otherwise provided for in the Public Resources Code, building and construction within the city of Long Beach are subject to the regulations of the City of Long Beach Municipal Code (2013). Municipal Code Chapter 18.24, Building Codes, adopts and incorporates by reference the CBC. Additionally, the Seismic Safety Element and Public Safety Element of the City of Long Beach General Plan are intended to protect the public from the effects of natural geologic hazards. According to the General Plan, new construction must comply with the Uniform Building Code to withstand geologic hazards including groundshaking and liquefaction. The project will conform to this element of the General Plan (see Section 5.4.2).

TABLE 5.4-2

Laws, Ordinances, Regulations, and Standards for Geological Hazards and Resources

LORS	Requirements/ Applicability	Administering Agency	AFC Section Explaining Conformance
State			
2013 CBC	Acceptable design criteria for structures with respect to seismic design and load-bearing capacity	California Code, State of California, and City of Long Beach	Section 5.4.2.2
Alquist-Priolo Earthquake Fault Zoning Act (Title 14, Division 2, Chapter 8,	Identifies areas subject to surface rupture from active faults	California Building Standards Commission, State of	Section 5.4.2.2

TABLE 5.4-2

Laws, Ordinances, Regulations, and Standards for Geological Hazards and Resources

LORS	Requirements/ Applicability	Administering Agency	AFC Section Explaining Conformance
Subchapter 1, Article 3, California Code of Regulations)		California, and City of Long Beach	
The Seismic Hazards Mapping Act (Title 14, Division 2, Chapter 8, Subchapter 1, Article 10, California Code of Regulations)	Identifies nonsurface fault rupture earthquake hazards, including liquefaction and seismically induced landslides	California Building Standards Commission, State of California, and City of Long Beach	Section 5.4.2.2
Local			
City of Long Beach Public Safety Element (City of Long Beach, 1975), Section V, Geologic Hazards	Requires compliance with Chapter 70 of the Uniform Building Code	City of Long Beach	Section 5.4.2.2
City of Long Beach Municipal Code (City of Long Beach, 2013), Title 18, Buildings and Construction	Requires compliance with 2013 CBC	City of Long Beach	Section 5.4.2.2

5.4.6 Agencies and Agency Contacts

There are no agencies or contacts associated with geologic hazards and resources.

5.4.7 Permits and Permit Schedule

Because the project falls under the exclusive jurisdiction of the California Energy Commission and the Commission certification is issued in lieu of any permit, certificate, or similar document required by any state, local, or regional agency, no state or local permits are required. There are no federal LORS that apply to geological hazards and resources.

5.4.8 References

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California Department of Conservation, Division of Mines and Geology (CDMG). 1997. Guidelines for Evaluating and Mitigating Seismic Hazards in California: Special Publication 117, 74 p.

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Los Angeles County Department of Regional Planning. 2011. Los Angeles County Draft General Plan 2035. Available online at: http://planning.lacounty.gov/generalplan/draft

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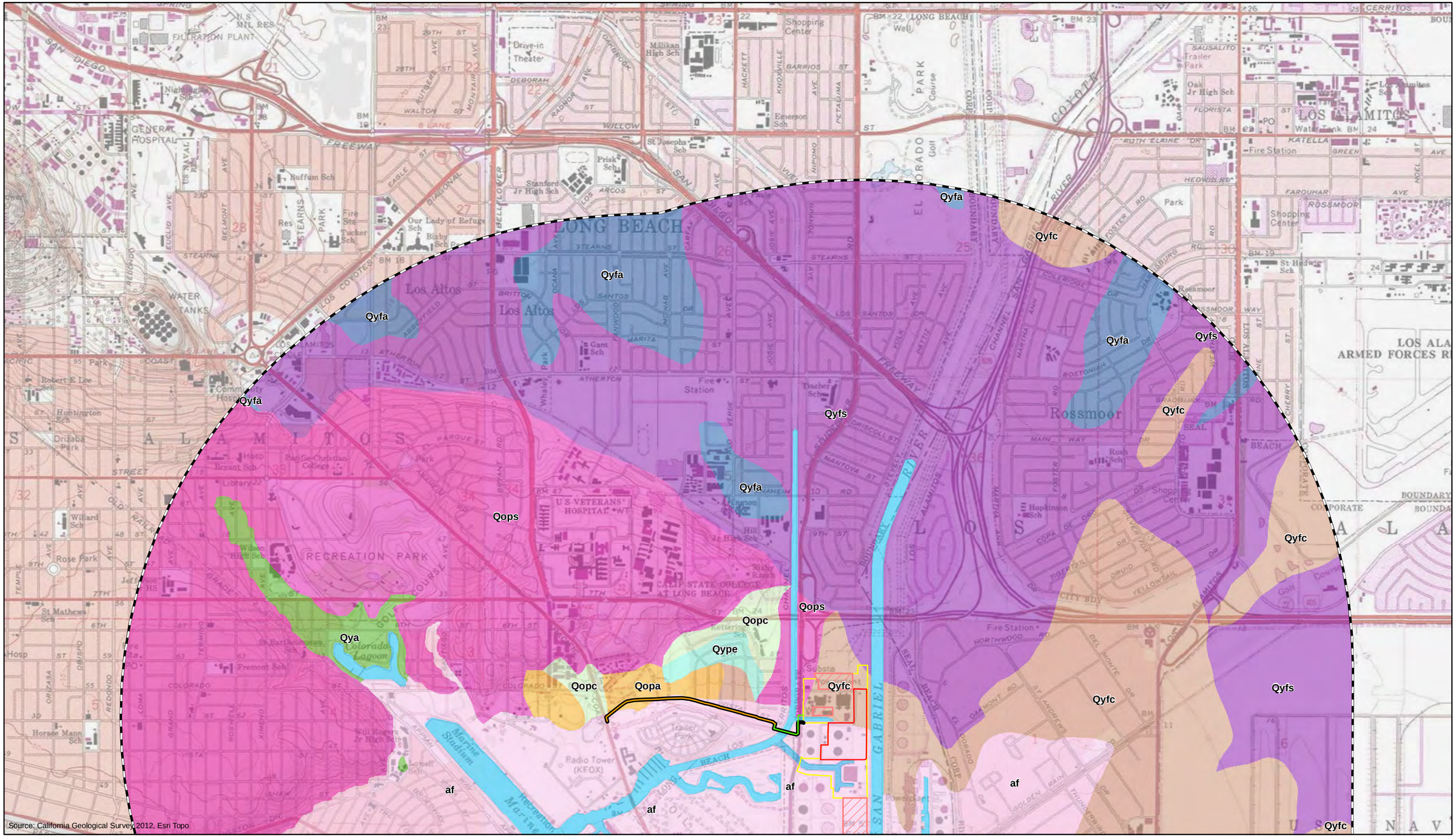
Troxel, B. W. 1954. Geologic guide for the Los Angeles Basin, Southern California, *in* Jahns, R. H. (editor), Geology of Southern California: California Division of Mines Bulletin 170, Geologic Guide no. 3; 46p.



Legend

- AGS Boundary
- AEC Site
- Parking/Laydown Construction Area
- 2 Mile Project Buffer
- Proposed New Process/Sanitary Wastewater Pipeline to First Point of Interconnection
- Potential Sewer Upgrade

Geology

Qb	Qopc	Qya	Qype
Qms	Qops	Qyfa	af
Qopa	Qp	Qyfc	water
	Qpe	Qyfs	

0 2,000 Feet

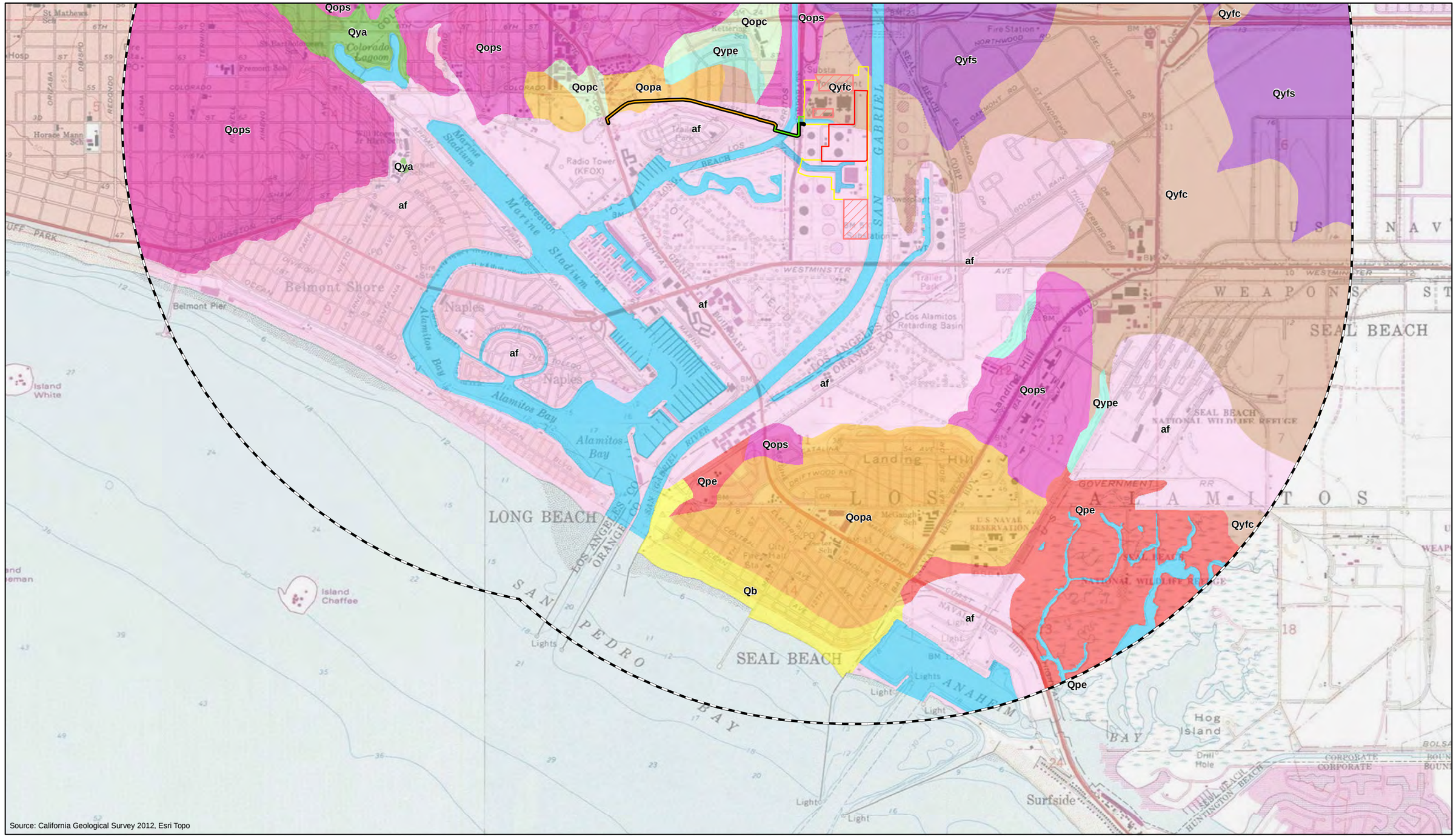
N

A
B

FIGURE 5.4-1A
Surficial Geology Within Two Miles of Project Site
Alamitos Energy Center
Long Beach, California
October 2015

CH2MHILL

Y:\AESCORP\491232DISCPHASEREP\AFC_ARCHIVE\AEC\GIS\ALAMITOS\MAPFILES\GEOLOGY\AEC_GEOLOGY_11X17_20151019.MXD MD013761 10/19/2015 11:34:40 AM



Legend

- AGS Boundary
- AEC Site
- Parking/Laydown Construction Area
- 2 Mile Project Buffer
- Proposed New Process/Sanitary Wastewater Pipeline to First Point of Interconnection
- Potential Sewer Upgrade

Geology

Qb, Qms, Qopa, Qopc, Qops, Qp, Qpe, Qya, Qyfa, Qyfc, Qyfs, Qype, af, water

0 2,000 Feet

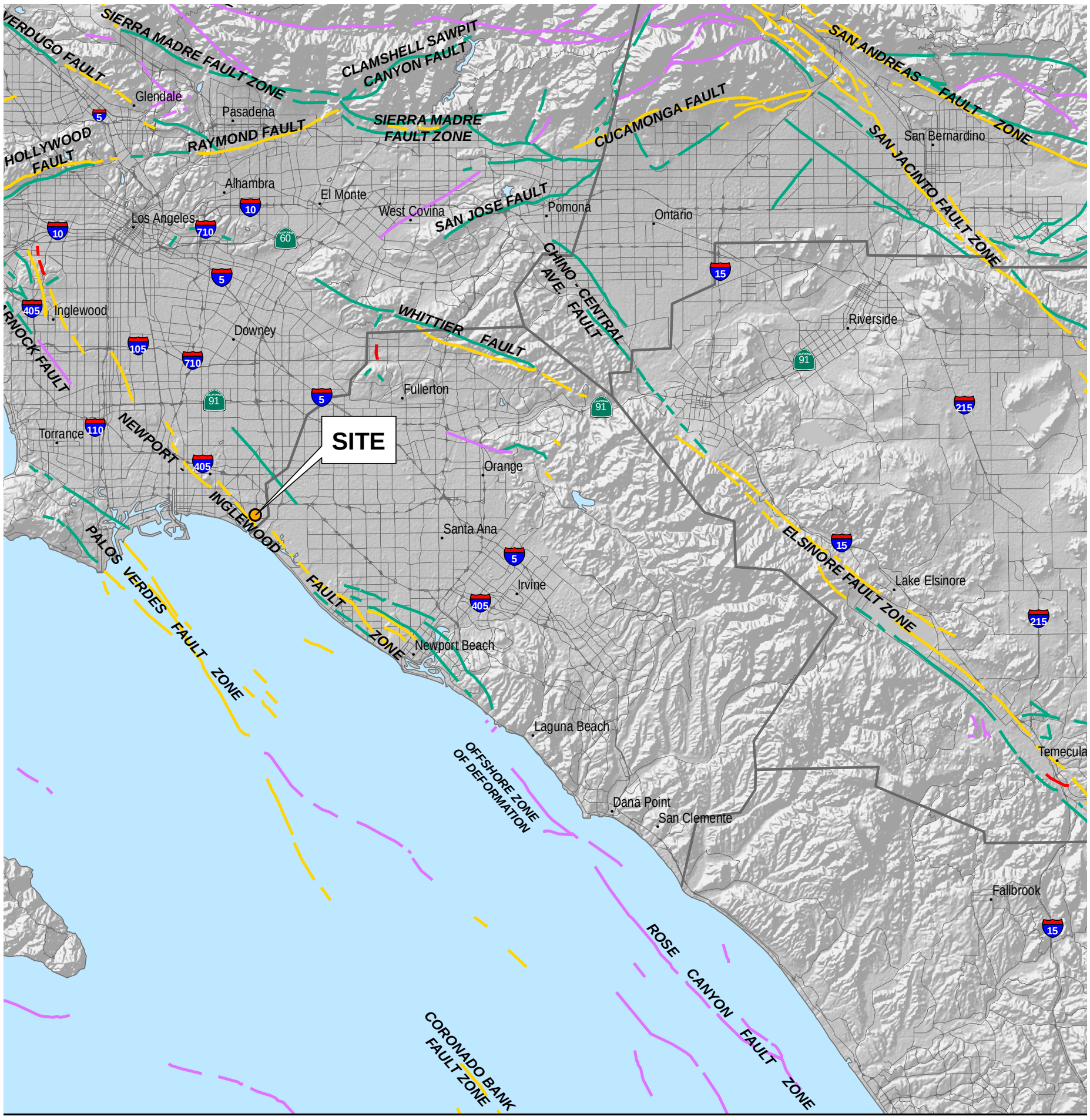
N

A / B

FIGURE 5.4-1B
Surficial Geology Within Two Miles of Project Site
Alamitos Energy Center
Long Beach, California
October 2015

CH2MHILL

Y:\AESCORP\491232DISCPHASEREP\AFC_ARCHIVE\AEC\GIS\ALAMITOS\MAPFILES\GEOLOGY\AEC_GEOLOGY_11X17_20151019.MXD MD013761 10/19/2015 11:34:40 AM



GIS DATA SOURCE: CALIFORNIA GEOLOGICAL SURVEY (CGS); ENVIRONMENTAL SYSTEMS RESEARCH INSTITUTE (ESRI)
REFERENCE: JENNINGS, 1994, FAULT ACTIVITY MAP OF CALIFORNIA AND ADJACENT AREAS

LEGEND

FAULT ACTIVITY:

- HISTORICALLY ACTIVE
- HOLOCENE ACTIVE
- COUNTY BOUNDARIES
- LATE QUATERNARY (POTENTIALLY ACTIVE)
- QUATERNARY (POTENTIALLY ACTIVE)

N

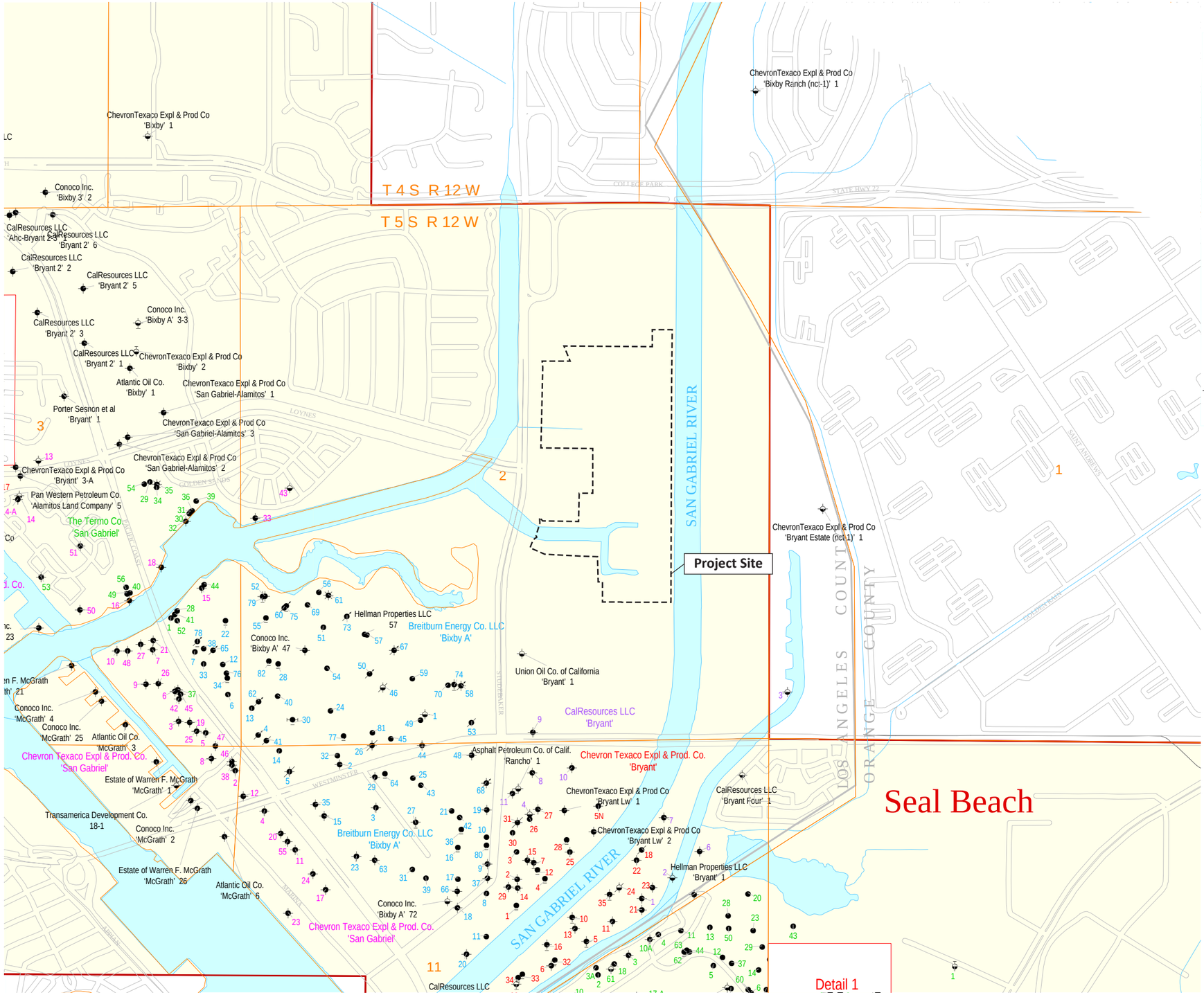
10 0 10

Miles

NOTE: ALL DIMENSIONS, DIRECTIONS, AND LOCATIONS ARE APPROXIMATE

FIGURE 5.4-2
Fault Locations
Alamitos Energy Center
Long Beach, California
October 2015

CH2MHILL



State of California - Department of Conservation

Division of Oil, Gas, and Geothermal Resources

NOTE: Wells with directional surveys on file with the division are indicated with a short line under the well symbol.
Current well status should be confirmed at the appropriate division office.

LEGEND

- Drilling
- Drilling - idle
- Plugged and abandoned - dry hole
- Completed - oil
- Idle - oil
- Plugged and abandoned - oil
- Completed - gas
- Idle - gas
- Plugged and abandoned - gas
- Completed - water disposal
- Completed - waterflood
- Surveyed section
- Projected section
- Buried idle
- Abandoned - conductor
- Gas injection
- Gas - open to oil zone
- Water source
- Plugged & abandoned - oil & gas
- Gas storage
- Observation
- Gas - converted to gas storage
- Abandoned oil - converted to water disposal
- Field boundary

The Department of Conservation makes no warranties as to the suitability of this product for any particular purpose.

FIGURE 5.4-3
Oil and Gas Resources
Alamitos Energy Center
Long Beach, California
October 2015

5.5 Hazardous Materials Handling

This section discusses the potential effects on human health and the environment from the storage and use of hazardous materials in conjunction with the Alamitos Energy Center (AEC). Section 5.5.1 describes the project setting, and Section 5.5.2 describes the existing environment that may be affected. Section 5.5.3 identifies potential impacts on the environment and on human health from site development. Section 5.5.4 addresses potential cumulative effects, Section 5.5.5 presents proposed mitigation measures, and Section 5.5.6 presents the laws, ordinances, regulations, and standards (LORS) applicable to hazardous materials. Section 5.5.7 describes the agencies involved and provides agency contacts. Section 5.5.8 describes permits required and the permit schedule. Section 5.5.9 provides the references used to develop this section. Hazardous waste management, including handling of potentially contaminated soil and groundwater, is addressed in Section 5.14, Waste Management.

5.5.1 Setting

AES Alamitos Energy, LLC, will construct, own, and operate the Alamitos Energy Center (AEC), a natural- gas-fired, air-cooled, combined-cycle and simple-cycle, electrical generating facility in Long Beach, California. The proposed AEC will have a nominal generating capacity of 1,040 megawatts (MW). The AEC will be constructed on the site of the existing AES Alamitos Generating Station (AGS), located on an approximately 21-acre site within a larger, 71.1-acre parcel.

The AEC will feature two gas turbine power blocks. Combined-cycle power block will consist of two natural-gas-fired combustion turbine generators (CTG) in a combined-cycle configuration, two unfired heat recovery steam generators (HRSG), one steam turbine generators, an air-cooled condenser, an auxiliary boiler, and related ancillary equipment. Simple-cycle power block will consist of four simple-cycle LMS-100 CTGs with fin-fan coolers and ancillary facilities.

The AEC will meet the demand for new generation in the Los Angeles basin local electrical reliability area. The demand is caused in large part by the closure of the San Onofre Nuclear Generating Station and the anticipated retirement of the older, natural-gas-fired generation currently using once-through ocean water-cooling (OTC). As a result of the promulgation of the California State Water Resources Control Board's (SWRCB) *Water Quality Control Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling* (SWRCB, 2010), more than 4,000 MW of OTC generation are expected to be retired in the Los Angeles local electrical reliability area by December 31, 2020.

The AEC will use water provided by the City of Long Beach Water Department (LBWD) for construction, operational process, and sanitary uses but at substantially lower volumes than the existing AGS historically has used. This water will be supplied through existing, onsite water lines. The AEC will include a new, 1,000-foot process/sanitary wastewater pipeline to the first point of interconnection with the existing LBWD sewer system, the potential upgrade of an additional 4,000 feet of existing pipeline downstream from the first point of interconnection, and the elimination of the current practice of treatment and discharge of process/sanitary wastewater to the San Gabriel River. Stormwater runoff from the power block areas will be directed to oil/water separators and to an existing retention basin and then ultimately discharged to the Los Cerritos channel via existing stormwater outfalls.

The AEC will interconnect to the existing, Southern California Edison (SCE) 230-kilovolt (kV) switchyard adjacent to the north side of the AGS. Natural gas will be supplied to the AEC via the existing, offsite, 30-inch-diameter pipeline owned and operated by Southern California Gas Company (SoCalGas) that currently serves Units 5 and 6 of the AGS. The AEC will require construction of new natural gas-metering facilities and construction of two new natural gas compressor buildings within the AEC footprint.

The AEC is designed to serve both peak and intermediate loads with the added capabilities of rapid startup, significant turndown capability (ability to turn down to a low load), and fast ramp rates. As California's intermittent renewable energy portfolio continues to grow, operating in either load-following or partial shutdown mode will become necessary to maintain electrical grid reliability, thus placing an increased

importance upon the rapid startup, high turndown, steep ramp rate, and superior heat rate employed at the AEC.

As an in-basin generating asset, the AEC will provide local generating capacity, voltage support, and reactive power that are essential for transmission system reliability in the Western Los Angeles basin subarea and larger Los Angeles basin local reliability area. The AEC will be able to provide system stability by supplying reactive power, voltage support, frequency stability, and rotating mass in the heart of the critical Western Los Angeles local reliability area. By virtue of its location in a transmission constrained load center, the AEC also helps to avoid potential transmission line overloads and can provide reliable local energy supplies when electricity from more distant generating resources is unavailable. In recognition of its critical grid reliability benefits, the AEC combined-cycle CTGs were selected by SCE in its Local Capacity Requirements Request for Offer on November 5, 2014, and the simple-cycle CTGs will meet the capacity needs anticipated to be identified in future California Public Utilities Commission Long-term Procurement Plans.

Owing to the critical need for generating capacity at the AEC site at all times, existing Units 1 through 6 will remain in operation through much of the AEC development and construction. Given that the removal of existing Units 1 through 6 is not required for construction of the AEC, the continued operation of the AGS will not impede AEC construction. Demolition of the retired and decommissioned turbine peaking generating Unit 7 and fuel tank, ancillary equipment, small maintenance shops, and two retention basins will be required for site preparation for the construction of the AEC. Construction and site preparation activities at the AEC site are anticipated to last 56 months, from the first quarter of 2017 until the third quarter of 2021. The project will commence construction with the removal of former Unit 7's building and ancillary equipment, fuel storage tank, tank berms, small maintenance shops and two waste water retention basins in January 2017 to make room for construction and laydown area for the AEC CCGT. Construction of the AEC CCGT will commence during the second quarter of 2017 and will be completed by the second quarter of 2020. The AEC CCGT is expected to commence commercial operation before May 1, 2020. Construction of the AEC SCGT is scheduled to proceed from the second quarter of 2020 through the third quarter of 2021, and Power Block 2 is expected to commence commercial operation in the third quarter of 2021. A temporary construction access road may be constructed offsite beginning at the intersection of Studebaker Road and Loynes Drive traveling southeast to the AEC site. Construction of the AEC will require the use of onsite laydown areas (approximately 8 acres dispersed throughout the existing site) and an approximately 10-acre laydown area located adjacent to the existing site.

5.5.2 Affected Environment

The AEC site is located in an industrial-zoned area designated in the *City of Long Beach Southeast Area Development and Improvement Specific Plan* (City of Long Beach, 2006). Land use in the vicinity of the AEC site (discussed in Section 5.6, Land Use) is a mix of industrial, commercial, residential, and recreational development. The AEC site is bounded to the north by the existing AGS, SCE switchyard and State Route 22 (East 7th Street); to the east by the San Gabriel River and, beyond that, the Los Angeles Department of Water and Power's Haynes Generating Station; to the south by the Plains West Coast Terminals petroleum storage facility and undeveloped property; and to the west by the Los Cerritos Channel.

The existing AGS has six operating generating units (Units 1 through 6) that are projected to be retired by the end of 2020, once all regulatory approvals are received. However, demolition of the existing AGS units is not required for construction and operation of the AEC. As such, demolition of the existing AGS units 1 through 6 is not included in this assessment. Demolition and removal of a retired and decommissioned turbine generator peaking unit and fuel tank, ancillary equipment, and two retention basins will be completed as part of the site preparation of the new CCGT and SCGT power blocks. The existing plant has various ancillary facilities that will be used to support the AEC, such as maintenance and warehouse buildings, existing SoCalGas natural gas pipeline, City of Long Beach Department of Water water connections, and the existing SCE switchyard. Other existing infrastructure at the AGS, such as the fire water

distribution, including two emergency electric-driven fire water pumps, and process water distribution and storage systems, will be reused to the greatest extent possible.

Primary access to the AEC site will be provided via an existing entrance off North Studebaker Road, just north of the intersection of Westminster Avenue and North Studebaker Road. A temporary construction access road, located at the intersection of Loynes Drive and Studebaker Road may be used during AEC construction.

A total of 1,642 potentially sensitive receptors have been identified within 6 miles of the site, including 650 daycare facilities; 808 hospitals, doctors' offices, and long-term/senior care facilities; 181 schools and colleges; 2 prisons; and 1 arena. These receptors are listed in Appendixes 5.9A and 5.9B. The nearest residence to the site is approximately 1,200 feet west, across Studebaker Road and Los Cerritos Channel in the University Park Estates. The residential Leisure World Retirement Community of Seal Beach is approximately 1 mile east-northeast of the site across the San Gabriel River and the Los Angeles Department of Water and Power's Haynes Generating Station. The nearest school to the AEC site is Rosie the Riveter Charter High, located at the entrance to the AGS property at 690 North Studebaker Road, Long Beach.

The nearest hospital is the Veterans Administration Long Beach Healthcare System at 5901 E 7th Street, Long Beach, approximately 1 mile northwest of the AEC site. Saint Mary Medical Center, 1050 Linden Avenue, Long Beach, is the closest Level 1 Trauma Center and is approximately 5 miles west of the AEC site. The two nearest long-term health care facilities/senior facilities are the Retirement Housing Foundation, approximately 1 mile north of the AEC site, at 911 North Studebaker Road, Long Beach, and the Sweetest Homes for Seniors, approximately 0.90 mile northeast of the AEC site, at 2812 Tigertail Drive, Los Alamitos.

5.5.3 Environmental Analysis

Construction/demolition and operation of the project will involve the use of hazardous materials and one regulated substance. The use of these materials and their potential to cause adverse environmental and human health effects are discussed in this section.

5.5.3.1 Significance Criteria

Appendix G of the California Environmental Quality Act (CEQA) is a screening tool, not a method for setting thresholds of significance. Appendix G is typically used in the Initial Study phase of the CEQA process, asking a series of questions. The purpose of these questions is to make a determination as to whether a project requires an Environmental Impact Report, a Mitigated Negative Declaration, or a Negative Declaration. As the Governor's Office of Planning and Research stated, "Appendix G of the Guidelines lists a variety of potentially significant effects, but does not provide a means of judging whether they are indeed significant in a given set of circumstances." The answers to the Appendix G questions are not determinative of whether an impact is significant or less than significant. Nevertheless, the questions presented in CEQA Appendix G are instructive.

With Respect to "Hazards and Hazardous Materials," CEQA Appendix G asks, in part, whether the project would:

- Create a significant hazard to the public or the environment through the routine transport or use of hazardous materials;
- Create a significant hazard to the public or the environment through reasonably foreseeable upset and accident conditions involving the release of hazardous materials into the environment; or
- Emit hazardous emissions or handle hazardous materials, substances, or waste within 0.25 mile of an existing or proposed school.[36]

[36] With Respect to "Hazards and Hazardous Materials," CEQA Appendix G also asks would the project:

5.5.3.2 AEC Hazardous Materials Use

The AEC will use hazardous materials during project construction, demolition, and operation activities. The project will comply with applicable laws and regulations for the storage of these materials to minimize the potential for a release of hazardous materials and will conduct emergency response planning to address public health concerns regarding hazardous materials storage and use. The following sections describe this use, followed by tables detailing the hazardous materials used, their characteristics, the quantities to be used, and use locations.

Construction and Demolition Phases. Relatively small quantities of hazardous materials will be onsite during AEC construction and demolition of the AGS equipment and facilities located within the footprint of the AEC and will be limited to gasoline, diesel fuel, motor oil, hydraulic fluid, solvents, cleaners, sealants, welding flux, lubricants, paint, and paint thinner. There are no feasible alternatives to vehicle fuels and oils for operating construction equipment. The types of paint required are dictated by the types of equipment and structures that must be coated and by the service conditions and environment. Best management practices (BMP) described in Section 5.5.5.1 will be implemented by contractor personnel for these small quantities. Therefore, the potential for environmental effects will be less than significant.

No regulated substances, as defined in California's Health and Safety Code, Section 25531, will be used during demolition or AEC construction activities. Therefore, discussion of the storage or handling of regulated substances during construction is not necessary.

Operations Phase. Storage locations for the hazardous materials that will be used during project operations are listed in Table 5.5-1 (AEC SCGT) and Table 5.5-2 (AEC CCGT). Table 5.5-3 presents information about these materials, including trade names, chemical names, Chemical Abstract Service (CAS) numbers, maximum quantities onsite, reportable quantities (RQ), California Accidental Release Program (CalARP) threshold planning quantities (TPQ), and status as Proposition 65 chemicals (chemicals known to be carcinogenic or cause reproductive problems in humans). Health hazards and flammability data are summarized for these materials in Table 5.5-4, which also contains information on incompatible chemicals (e.g., sodium hypochlorite and ammonia).

Hazardous substances used by the project will be contained within designated hazardous materials storage areas, and their use will be prescribed in terms of hazardous materials handling plans, facility Health and Safety Plans, and the Hazardous Materials Business Plan (HMBP). For the non-CalARP-regulated materials, the risk of public exposure and serious hazard is low and will not be significant.

d) Be located on a site which is included on a list of hazardous materials sites compiled pursuant to Government Code Section 65962.5 and, as a result, would it create a significant hazard to the public or the environment?"

e) For a project located within an airport land use plan or, where such a plan has not been adopted, within two miles of a public airport or public use airport, would the project result in a safety hazard for people residing or working in the project area?

f) For a project within the vicinity of a private airstrip, would the project result in a safety hazard for people residing or working in the project area?

g) Impair implementation of or physically interfere with an adopted emergency response plan or emergency evacuation plan?

h) Expose people or structures to a significant risk of loss, injury, or death involving wildland fires, including where wildlands are adjacent to urbanized areas or where residences are intermixed with wildlands?

TABLE 5.5-1

Use and Location of Hazardous Materials AEC SCGT

Chemical	Estimated Delivery Schedule	Use	Quantity	Storage Location	State	Type of Storage
Aqueous ammonia (19% NH_3 by weight)	3 tanker trucks (7,000 gallons each) per month	Control NO_x emissions through selective catalytic reduction	30,000 gallons	Onsite storage tanks (one 30,000-gallon tank)	Liquid	Continuously onsite
Battery electrolyte	Complete change out every 10 years	UPS and emergency shutdown battery array	400 gallons	Battery rooms	Liquid	Continuously onsite
Cleaning chemicals/detergents	One drum (50 gallons) every 2 years	Periodic cleaning of combustion turbine	25 gallons	Chemical storage tote or drums in onsite warehouse	Liquid	Continuously onsite
Laboratory reagents (if required)	Replenish bimonthly	Water/wastewater laboratory analysis	10 gallons	Chemical storage cabinets (stored in original chemical storage containers/ bags) in lab areas located in water treatment building	Liquid and granular solid	Continuously onsite
Lubrication oil	55 gallons every year (makeup for losses during filter changes)	Lubricate rotating equipment (e.g., combustion turbine bearings)	12,000 gallons	Lubricating oil reservoirs adjacent to the combustion turbines and drum storage in lubricant storage shed	Liquid	Continuously onsite
Mineral insulating oil	Never	Transformers	35,000 gallons	Contained within transformers and drum storage in lubricant storage shed	Liquid	Continuously onsite
Waste oil	Pick up every 90 days	Vehicle and small equipment oil changes	250 gallons	Waste oil storage tank in warehouse	Liquid	Continuously onsite but drained every 90 days
Sodium nitrite	One tote per year	Closed loop cooling corrosion inhibitor	300 pounds	Water treatment building	Solid	Continuously onsite (used intermittently)
Proprietary corrosion/scale inhibitor (e.g., NALCO TRAC107)	One drum per year	Closed loop cooling corrosion/scale inhibitor	55 gallons	Water treatment building	Liquid	Continuously onsite (used intermittently)

TABLE 5.5-1

Use and Location of Hazardous Materials AEC SCGT

Chemical	Estimated Delivery Schedule	Use	Quantity	Storage Location	State	Type of Storage
Propylene glycol	One drum per year	Closed loop wetting agent/antifreeze	3,000 gallons	Cooling loop and intercoolers	Liquid	Continuously onsite
Sulfur hexafluoride	Estimate one tank every 5 years	Circuit breakers	320 pounds	Generator circuit breakers	Gas	Continuously onsite
EPA Protocol gases	15 bottles per month	Calibration gases	2,000 cubic feet	CEMS enclosures	Gas	Continuously onsite
Cleaning chemicals	As needed in very small quantities	Cleaning	Varies (less than 25 gallons of liquids or 100 pounds of solids for each chemical)	Admin/control building, maintenance/warehouse building	Liquid or solid	Continuously onsite
Paint	As needed in very small quantities	Touchup of painted surfaces	Varies (less than 25 gallons of liquids or 100 pounds of solids for each chemical)	Maintenance/warehouse building	Liquid	Continuously onsite

Notes:

CEMS = continuous emissions monitoring system

NO_x = oxides of nitrogen

TABLE 5.5-2

Use and Location of Hazardous Materials AEC CCGT

Chemical	Estimated Delivery Schedule	Use	Quantity	Storage Location	State	Type of Storage
Aqueous ammonia (19% NH_3 by weight)	4 tanker trucks (7,000 gallons each) per month	Control NO_x emissions through selective catalytic reduction	40,000 gallons	Onsite storage tanks (one 40,000-gallon tank)	Liquid	Continuously onsite
Aqueous ammonia (19 to 29.4%)	1 tote per month	Condensate/feedwater/ boiler water and steam pH control, i.e. cycle pH control	500 gallons	Water treatment building	Liquid	Continuously onsite
Citric acid	2 pallets for commissioning, then 2 pallets every 10 years	Cleaning of heat-recovery steam generator and reverse osmosis microfiltration membrane cleaning	1000 pounds	Pallet-supported chemical storage bags in onsite warehouse	Solid powder	Initial startup and periodically onsite
Cleaning chemicals/detergents	5 drums (250 gallons) per year	Periodic cleaning of combustion turbine	550 gallons	Chemical storage tote or drums in onsite warehouse	Liquid	Continuously onsite
Diesel -Construction	Mob to CO	Fuel Equipment	250,000 Gallons	Entire Site		Continuously onsite
Diesel No. 2	Top off fuel tank once per month	Fuel for onsite equipment	500 gallons	Double-walled tank in appropriate location	Liquid	Continuously onsite
Hydraulic fluid	As needed in very small quantities	Portable equipment in shop	55 gallons	Shop	Liquid	Continuously onsite
Fire resistive hydraulic fluid (e.g., Akzo Chemicals Fyrquel®)	1 drum every 1 years	Steam turbine control valve actuators	550 gallons	Hydraulic oil reservoir beneath the steam turbine pedestal and drum storage in lubricant storage shed	Liquid	Continuously onsite
Lubrication oil	55 gallons every 3 to 6 months (makeup for losses during filter changes)	Lubricate rotating equipment (e.g., combustion turbine and steam turbine bearings)	22,000 gallons	Lubricating oil reservoirs adjacent to the combustion turbines and steam turbine and drum storage in lubricant storage shed	Liquid	Continuously onsite
Mineral insulating oil	Never	Transformers	35,000 gallons	Contained within transformers and drum storage in lubricant storage shed	Liquid	Continuously onsite

TABLE 5.5-2

Use and Location of Hazardous Materials AEC CCGT

Chemical	Estimated Delivery Schedule	Use	Quantity	Storage Location	State	Type of Storage
Waste oil	Pick up every 90 days	Vehicle and small equipment oil changes	550 gallons	Waste oil storage tank in warehouse	Liquid	Continuously onsite but drained every 90 days
Trisodium phosphate (Na_3PO_4) or phosphate/sodium hydroxide blend (e.g., NALCO BT-3400 or NALCO BT-4000)	1 tote every 1 months	Boiler water pH and corrosion control	500 gallons	Phosphate chemical feed area in water treatment building	Liquid	Continuously onsite
Sulfur hexafluoride	Estimate one tank every 5 years	Circuit breakers	1,307 pounds	Switchyards	Gas	Continuously onsite
Acetylene/Argon	Mob to CO	Welding Gas	615,000 Cubic Feet	Entire Site	Gas	Continuously onsite
Oxygen	Mob to CO	Welding Gas	8,000,000 Cubic Feet	Entire Site	Gas	Continuously onsite
Propane	Mob to CO	Heating	10,000 Cubic Feet	Entire Site	Gas	Continuously onsite
EPA Protocol gases	4 bottles per month	Calibration gases	50 cubic feet	CEMS enclosures	Gas	Continuously onsite
Cleaning chemicals	As needed in very small quantities	Cleaning	Varies (less than 25 gallons of liquids or 100 pounds of solids for each chemical)	Admin/control building, maintenance/ warehouse building	Liquid or solid	Continuously onsite
Paint	As needed in very small quantities	Touchup of painted surfaces	Varies (less than 25 gallons of liquids or 100 pounds of solids for each chemical)	Maintenance/warehouse building	Liquid	Continuously onsite

[a] Water treatment system is a combination of reverse osmosis and deionization equipment.

Notes:

CEMS = continuous emissions monitoring system
NO_x = oxides of nitrogen

XX indicates that no quantity of the chemical is required.

TABLE 5.5-3

Chemical Inventory, Description of Hazardous Materials Stored Onsite, and Reportable Quantities

Trade Name	Chemical Name	CAS Number	Maximum Quantity Onsite	CERCLA SARA RQ[a]	RQ of Material as Used Onsite[b]	EHS TPQ[c]	Regulated Substance TQ[d]	Prop 65
Aqueous ammonia (19% NH_3 by weight)	Aqueous ammonia	7664-41-7	70,000 gallons [g]	100 pounds	526 pounds	500 pounds	500 pounds	No
Anti-scalant (e.g., NALCO PermaTreat® PC-191T)	Antiscalant	Various	400 gallons	[e]	[e]	[e]	[e]	No
Battery electrolyte	Sulfuric acid	7664-93-9	400 gallons	1,000 pounds	2,632 pounds	1,000 pounds	1,000 pounds	Yes
Citric acid	Citric acid	77-92-9	625 pounds	[e]	[e]	[e]	[e]	No
Cleaning chemicals/detergents	Various	None	25 gallons	[e]	[e]	[e]	[e]	No
Cleaning chemicals/detergents for membrane-based water treatment systems (e.g., NALCO PermaClean® PC-77, NALCO PermaClean® PC-40, and NALCO PermaClean® PC-98)	Various	None	55 gallons	[e]	[e]	[e]	[e]	No
Sanitizing chemicals for membrane-based (MF/RO/EDI) water treatment systems (e.g., NALCO PermaClean® PC-11)	Dibromoacetonitrile 2,2-dibromo-3-nitrilopropionamide Polyethylene glycol	3252-43-5 10222-01-2 25322-68-3	400 gallons	[e]	[e]	[e]	[e]	No No No
Diesel No. 2	Diesel No. 2	68476-34-6	200 gallons	[e]	[e]	[e]	[e]	No
Hydraulic fluid	Phosphate ester	None	50 gallons	42 gallons[f]	42 gallons[f]	[e]	[e]	No
Laboratory reagents	Various	Various	10 gallons	[e]	[e]	[e]	[e]	No
Lubrication oil	Oil	None	12,000 gallons	42 gallons[f]	42 gallons[f]			No
Mineral insulating oil	Oil	8012-95-1	35,000 gallons	42 gallons[f]	42 gallons[f]			No
Waste oil	Oil	None	250 gallons	[e]	[e]	[e]	[e]	No
Amine solution	Amine	2008-39-1	400 gallons	[e]	[e]	[e]	[e]	No
Sodium bisulfite ($NaHSO_3$)	Sodium bisulfite	7631-90-5	500 gallons	5,000 pounds	5,000 pounds	[e]	[e]	No

TABLE 5.5-3

Chemical Inventory, Description of Hazardous Materials Stored Onsite, and Reportable Quantities

Trade Name	Chemical Name	CAS Number	Maximum Quantity Onsite	CERCLA SARA RQ[a]	RQ of Material as Used Onsite[b]	EHS TPQ[c]	Regulated Substance TQ[d]	Prop 65
Sulfuric acid (93%)	Sulfuric acid	7664-93-9	600 gallons	1,000 pounds	1,075 pounds	1,000 pounds	1,000 pounds	Yes
Sodium hydroxide (NaOH) (20 to 50%)	Sodium hydroxide	1310-73-2	400 gallons	1,000 pounds	2,000 pounds	[e]	[e]	No
Sodium hypochlorite (12.5%)	Sodium hypochlorite	7681-52-9	200 gallons	100 pounds	800 pounds	[e]	[e]	No
Hydrochloric acid	Hydrochloric acid	7647-01-0	25 gallons	5,000 pounds	5,000 pounds	[e]	15,000 pounds	No
Sodium nitrite	Sodium nitrite	7632-00-0	300 pounds	100 pounds	100 pounds	[e]	[e]	No
Proprietary corrosion/scale inhibitor (e.g., NALCO TRAC107)	Inorganic salt Sodium hydroxide	Proprietary 1310-73-2	55 gallons	[e] [e]	[e] [e]	[e] [e]	[e] [e]	No No
Proprietary nonoxidizing biocide (e.g., NALCO 7330)	5-chloro-2-methyl-4-isothiazolin-3-one (1.1%)	26172-55-4	400 gallons	[e]	[e]	[e]	[e]	No
	2-methyl-4-isothiazolin-3-one (0.3%)	2682-20-4						No
Propylene glycol	Propylene glycol	57-55-6	3,000 gallons	[e]	[e]	[e]	[e]	Yes
Trisodium phosphate (Na_3PO_4) or phosphate/sodium hydroxide blend (e.g., NALCO BT-3400 or NALCO BT-4000)	Trisodium phosphate	7601-54-9	400 gallons	[e]	[e]	[e]	[e]	No
Sulfur hexafluoride	Sulfur hexafluoride	2551-62-4	320 pounds	[e]	[e]	[e]	[e]	No
Acetylene	Acetylene	47-86-2	500 cubic feet	[e]	[e]	[e]	[e]	No
Oxygen	Oxygen	7782-44-7	500 cubic feet	[e]	[e]	[e]	[e]	No
Propane	Propane	74-98-6	200 cubic feet	[e]	[e]	[e]	[e]	No
EPA Protocol gases	Various	Various	2,000 cubic feet	[e]	[e]	[e]	[e]	No
Cleaning chemicals	Various	Various	Varies (less than 25 gallons of liquids or 100 pounds solids for each chemical)	[e]	[e]	[e]	[e]	No

TABLE 5.5-3

Chemical Inventory, Description of Hazardous Materials Stored Onsite, and Reportable Quantities

Trade Name	Chemical Name	CAS Number	Maximum Quantity Onsite	CERCLA SARA RQ[a]	RQ of Material as Used Onsite[b]	EHS TPQ[c]	Regulated Substance TQ[d]	Prop 65
Paint	Various	Various	Varies (less than 25 gallons of liquids or 100 pounds solids for each type)	[e]	[e]	[e]	[e]	No

[a] RQ for a pure chemical, per the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Superfund Amendments and Reauthorization Act (SARA) (Ref. 40 Code of Federal Regulations [CFR] Section 302, Table 302.4). Release equal to or greater than RQ must be reported. Under California law, any amount that has a realistic potential to adversely affect the environment or human health or safety must be reported.

[b] RQ for materials as used onsite. Since some of the hazardous materials are mixtures that contain only a percentage of an RQ, the RQ of the mixture can be different than for a pure chemical. For example, if a material only contains 10 percent of a reportable chemical and the RQ is 100 pounds, the RQ for that material will be (100 pounds)/(10%) = 1,000 pounds.

[c] Extremely Hazardous Substance (EHS) TPQ (Ref. 40 CFR Part 355, Appendix A). If quantities of extremely hazardous materials equal to or greater than the TPQ are handled or stored, they must be registered with the local Administering Agency.

[d] TQ is from Title 19 of the California Code of Regulations (CCR) Section 2770.5 (state) or Title 40 of the CFR, Section 68.130 (federal).

[e] No reporting requirement. Chemical has no listed threshold under this requirement.

[f] State RQ for oil spills that will reach California state waters [Ref. CA Water Code Section 13272(f)].

[g] The CCGT has a 40,000-gallon ammonia tank and the SCGT has a 30,000-gallon ammonia tank.

TABLE 5.5-4

Toxicity, Reactivity, and Flammability of Hazardous Substances Stored Onsite

Hazardous Materials	Physical Description	Health Hazard	Reactive and Incompatibles	Flammability[a]
Aqueous ammonia	Colorless liquid with pungent odor	Corrosive; irritation to permanent damage from inhalation, ingestion, and skin contact.	Acids, halogens (e.g., chlorine), strong oxidizers, salts of silver and zinc.	Liquid is incombustible; vapor is combustible, but difficult to burn
Anti-scalant	Amber liquid	May cause slight irritation to the skin and moderate irritation to the eyes.	None.	Nonflammable
Battery electrolyte (sulfuric acid)	Oily, colorless to slightly yellow, clear to turbid liquid; odorless	Causes severe skin burns; causes severe eye burns; causes burns of the mouth, throat, and stomach.	Nitro compounds, carbides, dienes, alcohols (when heated): causes explosions. Oxidizing agents, such as chlorates and permanganates: causes fires and possible explosions. Allyl compounds and aldehydes: undergoes polymerization, possibly violent. Alkalis, amines, water, hydrated salts, carboxylic acid anhydrides, nitriles, olefinic organics, glycols, aqueous acids: causes strong exothermic reactions.	Nonflammable
Citric acid	Odorless, white granules	Causes irritation to the skin, gastrointestinal tract, and respiratory tract.	Metal nitrates (potentially explosive reaction), alkali carbonates and bicarbonates, potassium tartrate; will corrode copper, zinc, aluminum and their alloys.	Slightly flammable
Cleaning chemicals/ detergents	Liquid	Refer to individual chemical labels.	Refer to individual chemical labels.	Refer to individual chemical labels
Cleaning chemicals/ detergents for membrane-based water treatment systems (e.g., NALCO PermaClean® PC-77, NALCO PermaClean® PC-40, NALCO PermaClean® PC-98)	Liquid	Causes irritation to the skin and eyes with prolonged contact.	None.	Nonflammable

TABLE 5.5-4

Toxicity, Reactivity, and Flammability of Hazardous Substances Stored Onsite

Hazardous Materials	Physical Description	Health Hazard	Reactive and Incompatibles	Flammability[a]
Sanitizing chemicals for membrane-based (MF/RO/EDI) water treatment systems (e.g., NALCO PermaClean® PC-11)	Clear, colorless amber	Corrosive: Causes irreversible eye damage. May be fatal if inhaled or swallowed. Causes skin irritation. Prolonged or frequently repeated skin contact may cause allergic reactions in some individuals.	None.	Slightly flammable
Diesel No. 2	Oily, light liquid	May be carcinogenic.	Sodium hypochlorite.	Flammable
Hydraulic oil	Oily, dark liquid	Hazardous if ingested	Sodium hypochlorite; oxidizers.	Combustible
Laboratory reagents	Liquid and solid	Refer to individual chemical labels.	Refer to individual chemical labels.	Refer to individual chemical labels
Lubrication oil	Oily, dark liquid	Hazardous if ingested.	Sodium hypochlorite; oxidizers.	Flammable
Mineral insulating oil	Oily, clear liquid	Minor health hazard.	Sodium hypochlorite; oxidizers.	Can be combustible, depending on manufacturer
Amine solution (e.g. NALCO 5711)	Clear, pale yellow liquid with phenolic-amine odor	Harmful if swallowed; causes irreversible eye damage.	Hazardous polymerization will not occur.	Nonflammable
Sodium bisulfite (e.g., NALCO PermaCare® PC-7408)	Yellow liquid	Corrosive: Irritation to eyes, skin, and lungs; may be harmful if digested.	Strong acids and strong oxidizing agents.	Nonflammable
Sulfuric acid	Oily, colorless to slightly yellow, clear to turbid liquid; odorless	Causes severe skin burns; causes severe eye burns; causes burns of the mouth, throat, and stomach.	Nitro compounds, carbides, dienes, and alcohols (when heated): cause explosions. Oxidizing agents, such as chlorates and permanganates: causes fires and possible explosions. Allyl compounds and aldehydes: undergoes polymerization, possibly violent. Alkalis, amines, water, hydrated salts, carboxylic acid anhydrides, nitriles, olefinic organics, glycols, and aqueous acids: cause strong exothermic reactions.	Nonflammable
Sodium hydroxide	Solid, white, and odorless	Causes eye and skin burns; hygroscopic; may cause severe respiratory tract irritation with possible burns; may cause severe digestive tract irritation with possible burns.	Incompatible with acids, water, flammable liquids, organic halogens, metals, aluminum, zinc, tin, leather, wool, and nitromethane.	Nonflammable

TABLE 5.5-4

Toxicity, Reactivity, and Flammability of Hazardous Substances Stored Onsite

Hazardous Materials	Physical Description	Health Hazard	Reactive and Incompatibles	Flammability[a]
Sodium hypochlorite	Colorless liquid with strong odor	Harmful by ingestion and inhalation, and through skin contact.	Incompatible with strong acids, amines, ammonia, ammonium salts, reducing agents, metals, aziridine, methanol, formic acid, phenylacetonitrile.	Nonflammable
Hydrochloric acid	Colorless to light-yellow liquid	Hazardous in case of skin contact, of eye contact and of ingestion; slight hazard in case of inhalation; skin contact may produce burns. Inhalation may produce severe irritation of respiratory tract; severe over-exposure can result in death.	Highly reactive with metals. Reactive with oxidizing agents, organic materials, alkalis, and water.	Nonflammable
Sodium nitrite	White to slightly yellowish. Solid (powdered solid), odorless	Hazardous in case of eye contact (irritant), of ingestion, of inhalation; hazardous in case of skin contact (irritant); slightly hazardous in case of skin contact (permeator); prolonged exposure may result in skin burns and ulcerations; overexposure by inhalation may cause respiratory irritation; severe overexposure can result in death; inflammation of the eye is characterized by redness, watering, and itching.	Highly reactive with combustible materials, organic materials; reactive with reducing agents, metals, acids; slightly reactive to reactive with moisture.	Nonflammable
Proprietary corrosion/ scale inhibitor (e.g., NALCO TRAC107)	Clear liquid, ammonia smell	Irritating to eyes and skin.	Contact with strong acids (e.g. sulfuric, phosphoric, nitric, hydrochloric, chromic, sulfonic) may generate heat, splattering or boiling and toxic vapors.	Nonflammable
Proprietary nonoxidizing biocide (e.g., NALCO 7330)	Light yellow or green liquid	Corrosive. Causes irreversible eye damage or skin burns. Harmful if inhaled, swallowed or absorbed through skin. Do not get in eyes, on skin or on clothing. Prolonged or frequently repeated skin contact may cause allergic reaction in some individuals.	Contact with strong oxidizers (e.g. chlorine, peroxides, chromates, nitric acid, perchlorate, concentrated oxygen, permanganate) may generate heat, fires, explosions and/or toxic vapors.	Nonflammable

TABLE 5.5-4

Toxicity, Reactivity, and Flammability of Hazardous Substances Stored Onsite

Hazardous Materials	Physical Description	Health Hazard	Reactive and Incompatibles	Flammability[a]
Propylene glycol	Clear oily liquid	Hazardous in case in ingestion. Slightly hazardous in case of skin contact (irritant, permeator), of eye contact (irritant), of inhalation.	Hygroscopic; keep container tightly closed. Incompatible with chloroformates, strong acids (nitric acid, hydrofluloric acid), caustics, aliphatic amines, isocyanates, strong oxidizers, acid anhydrides, silver nitrate, and reducing agents.	Flammable
Trisodium phosphate/ sodium hydroxide blend (e.g., NALCO BT-3400 or NALCO BT-4000)	White crystal	Severe irritant; causes pain and redness; prolonged or repeated contact may cause mild burn.	Strong acids.	Nonflammable
Sulfur hexafluoride	Colorless gas	Simple asphyxiant. This product does not contain oxygen and may cause asphyxia if released in a confined area. Maintain oxygen levels above 19.5%. Nonflammable. Decomposes to toxic fluoride compounds at temperatures above 400°F (204°C).	Reported to explode in contact with disilane. Oxygen and certain metals cause slow decomposition to toxic fluorides.	Nonflammable
Acetylene	Colorless gas	Asphyxiant gas.	Oxygen and other oxidizers including all halogens and halogen compounds; forms explosive acetylide compounds with copper, mercury, silver, brasses containing >66 percent copper and brazing materials containing silver or copper.	Flammable
Oxygen	Colorless, odorless, tasteless gas	Therapeutic overdoses can cause convulsions; liquid oxygen is an irritant to skin.	Hydrocarbons, organic materials.	Oxidizing agent; actively supports combustion
Propane	Propane gas (odorant added to provide odor)	Asphyxiant gas; causes frostbite to area of contact.	Strong oxidizing agents and high heat.	Flammable
EPA Protocol gases	Gas	Refer to individual chemical labels.	Refer to individual chemical labels.	Refer to individual chemical labels
Paint	Various colored liquid	Refer to individual container labels.	Refer to individual container labels.	Refer to individual container labels

[a] In accordance with California Department of Transportation (Caltrans) regulations, under 49 CFR Section 173: “Flammable” liquids have a flash point less than or equal to 141°F; “Combustible” liquids have a flash point greater than 141°F.

Source: Data were obtained from Material Safety Data Sheets (MSDS) and Lewis, 1991.

Most of the hazardous substances that will be used by the project are required for oxides of nitrogen (NO_X) emissions control (i.e., 19 percent aqueous ammonia), treatment and laboratory analyses of process and closed-loop cooling water, facility maintenance, and lubrication of equipment, or will be contained within transformers and electrical switches. The only regulated substance that will be used for the project is 19 percent aqueous ammonia. The toxicity characteristics and the exposure level criteria for this regulated substance are included in Table 5.5-5 and discussed below.

TABLE 5.5-5

Toxic Effects and Exposure Levels of Regulated Substance

Name	Toxic Effects	Exposure Levels Pure NH_3
Aqueous ammonia (19 percent solution)	Contact with pure liquid or vapor causes eye, nose, and throat irritation, skin burns, and vesiculation. Ingestion or inhalation causes burning pain in mouth, throat, stomach, and thorax, constriction of thorax, and coughing followed by vomiting blood, breathing difficulties, convulsions, and shock. Other symptoms include dyspnea, bronchospasms, pulmonary edema, and pink frothy sputum. Contact or inhalation overexposure can cause burns of the skin and mucous membranes, headache, salivation, nausea, and vomiting. Other symptoms include labored breathing, bloody mucous discharge, bronchitis, laryngitis, hemoptysis, and pneumonitis. Damage to eyes may be permanent, including ulceration of conjunctiva, and cornea and corneal lenticular opacities.	Occupational Exposures: • PEL = 35 mg/m³ OSHA • TLV = 18 mg/m³ ACGIH • TWA = 25 mg/m³ NIOSH • STEL = 35 mg/m³ Hazardous Concentrations: • IDLH = 500 ppm • LD_{50} = 350 mg/kg – oral, rat ingestion of 3 to 4 ml may be fatal Sensitive Receptors: • ERPG-1 = 25 ppm • ERPG-2 = 150 ppm • ERPG-3 = 750 ppm

Notes:

ERPG	=	Emergency Response Planning Guideline
ERPG-1	=	Maximum airborne concentration below which nearly all individuals could be exposed for up to 1 hour without experiencing other than mild transient adverse health effects
ERPG-2	=	Maximum airborne concentration below which nearly all individuals could be exposed for up to 1 hour without developing irreversible or serious health effects
ERPG-3	=	Maximum airborne concentration below which nearly all individuals could be exposed for up to 1 hour without experiencing life-threatening health effects
IDLH	=	Immediately dangerous to life and health
LD_{50}	=	Dose lethal to 50 percent of those tested
mg/kg	=	milligrams per kilogram
mg/m^3	=	milligrams per cubic meter
OSHA	=	Occupational Safety and Health Administration
PEL	=	OSHA-permissible exposure limit for 8-hour workday
ppm	=	part(s) per million
STEL	=	Short-term exposure limit, 15-minute exposure
TLV	=	ACGIH threshold limit value for 8-hour workday
TWA	=	NIOSH time-weighted average for 8-hour workday

Aqueous Ammonia. The AEC facility will store the aqueous ammonia solution in two horizontal aboveground storage tanks (AST), with a 40,000-gallon tank for the AEC CCGT and a 30,000-gallon tank for the AEC SCGT. These tanks will be surrounded by a covered secondary containment structure that can hold the full contents of the tank and accumulated precipitation from a maximum 24-hour rain event. The truck unloading areas will include a concrete pad, sloped to drain spillage to the storage tank containment sump. The truck unloading stations will include a storage tank fill line and vapor return line for pressure equalization between the storage tank and truck.

Aqueous ammonia will be used in an SCR process to control NO_x emissions created from fuel combustion in the combustion gas turbines. The SCR system will include catalyst modules (located inside the HRSG), an

ammonia storage system, and an ammonia injection system. The aqueous ammonia will be vaporized and injected into the turbine exhaust flow upstream of the catalyst modules. The rate of injection will be controlled by a monitoring system that uses sensors to determine the correct quantity of ammonia to feed to the injection system.

The volume of aqueous ammonia required by the AEC and the number of truck deliveries required will depend on the actual operating hours of the plant. Based on the maximum operating profile for the AEC power blocks, a 7,000-gallon tanker truck will deliver aqueous ammonia to the AEC site approximately 6 times per month (approximately 72 deliveries per year). The aqueous ammonia storage tank will be equipped with continuous tank level monitors, automated leak detection system, temperature and pressure monitors and alarms, and emergency block valves.

Because of its hazardous properties, ammonia is classified as a regulated substance, and an accidental release of the aqueous ammonia solution could present a human health hazard. Pure ammonia (NH_3) is a volatile substance that is soluble in water. Aqueous ammonia consists of a solution of ammonia and water. If the aqueous ammonia solution leaks or is released without proper controls, the ammonia in solution could escape or evaporate as a gas into the atmosphere.

Ammonia gas can be toxic to humans at sufficiently high concentrations. Potential toxic effects of ammonia and acceptable exposure levels are summarized in Table 5.5-4. The odor threshold of ammonia is about 5 parts per million (ppm), and minor irritation of the nose and throat will occur at 30 to 50 ppm. Ammonia concentrations greater than 140 ppm will cause detectable effects on lung function even for short-term exposures (0.5 to 2 hours). At higher concentrations of 700 to 1,700 ppm, ammonia gas will cause severe effects; death will occur at concentrations of 2,500 to 6,000 ppm (Smyth, 1956).

Storage and use of ammonia are subject to the requirements of the California Fire Code, Article 80, as well as CalARP. Article 80 of the California Fire Code contains specific requirements for control of liquid and gaseous releases of hazardous materials. Secondary containment in the form of spill containment vaults will be provided for the ammonia storage tank and loading area. In addition, the facility will be required to prepare a Risk Management Plan (RMP) in accordance with CalARP, further specifying safe handling procedures for the ammonia, as well as emergency response procedures in the event of an accidental release. The RMP, which is discussed in Section 5.5.5.2.2, will be prepared for the site using updated modeling guidance prior to operation of the AEC.

Because sodium hypochlorite and aqueous ammonia are incompatible chemicals, the sodium hypochlorite will be stored within a bermed area for secondary containment (an area capable of capturing spills) and will be separated from ammonia to eliminate potential interactions/reactions if the chemicals are accidentally released.

With the implementation of these measures, impacts related to the storage and handling of aqueous ammonia will be less than significant.

5.5.3.3 Transportation of Hazardous Materials

Project operation will require regular transportation of hazardous materials to the AEC site (see also Section 5.12, Traffic and Transportation). Transportation of hazardous materials will comply with Caltrans, U.S. Environmental Protection Agency (EPA), California Department of Toxic Substances Control (DTSC), California Highway Patrol (CHP), and California State Fire Marshal regulations. Aqueous ammonia, a regulated substance, will be delivered to the facility and transported in accordance with California Vehicle Code (CVC) Section 32100.5, which regulates the transportation of hazardous materials that pose an inhalation hazard. Compliance with applicable regulations will ensure that impacts from the transportation of hazardous materials will be less than significant.

The AEC will have truck traffic associated with the delivery of cleaning chemicals, gasoline and diesel fuel, lubricants, sulfuric acid, and other hazardous material associated with plant operation. It is expected that there will be approximately 32 truck deliveries per month to the AEC site (including aqueous ammonia). The

Transportation Element of the City of Long Beach General Plan identifies truck routes through the city that comply with CVC and local ordinances (City of Long Beach Planning, 1991). The truck route used to transport hazardous materials to the AEC site will be selected by the supplier consistent with the requirements of federal and state law, likely via I-405, to SR 22 (7th Street), west along 7th Street, and then south on Studebaker Road to the AEC entrance.

5.5.3.4 Accidental Release Hazards

If a chemical release occurs without proper engineering controls in place, the public could be exposed to harmful vapors, and incompatible chemicals could mix, causing vapors that could have harmful effects. In addition, an uncontrolled release of liquid chemicals could run off and drain into the stormwater system and degrade water quality. However, the California Fire Code, Articles 79 and 80, includes specific requirements for the safe storage and handling of hazardous materials that will reduce the potential for a release of hazardous materials and mixing of incompatible materials. The design of the project will incorporate state-of-the-art chemical storage and handling facilities in compliance with the current California Fire Code and other federal, state, and local regulations. With the implementation of these measures, the impacts related to the accidental release of hazardous materials, including ammonia, will be less than significant.

Offsite Consequences Analysis. Because there is human activity in the vicinity of the AEC site, an Offsite Consequences Analysis (OCA) is provided in Appendix 5.5A. The analysis assessed the potential risk to humans at various distances from the AEC site if a spill or rupture of the aqueous ammonia storage tank occurs or if a spill from the supply truck occurs while refilling the storage tank. The OCA assessed the project in relation to the California Energy Commission's (CEC) threshold of 75 ppm and pursuant to the guidance given in *RMP Offsite Consequence Analysis Guidance* (EPA, 2004). The

5.5.3.5 Fire and Explosion Hazards

Table 5.5-3 describes the flammability for the hazardous materials that will be onsite at the AEC. Article 80 of the California Fire Code requires all hazardous material storage areas to be equipped with a fire extinguishing system and ventilation for all enclosed hazardous material storage areas.

Aqueous ammonia, which constitutes the largest quantity of hazardous materials stored onsite, is incombustible in its liquid state. Under normal storage conditions, ammonia will not evaporate to the atmosphere because it is contained in a sealed tank that maintains the ammonia in a state that precludes evaporation. If a release occurs, ammonia could evaporate directly to the atmosphere. Ammonia vapor is combustible only within a narrow range of concentrations in air. The evaporation rate of aqueous ammonia is similar to water, which is sufficiently low that the lower explosive limit of 15 percent (or 15,000 ppm) will not be reached.

The AEC machinery lubrication oil is flammable. In accordance with Article 80 of the California Fire Code, the storage area for the lubrication oil will be equipped with a fire extinguishing system, and the lubrication oil will be handled in accordance with an HMBP approved by the CEC in consultation with the City of Long Beach Department of Health and Human Services, Environmental Health Bureau (Long Beach Environmental Health Bureau) (Kerr, 2013). With proper storage and handling of flammable materials in accordance with the California Fire Code and the site-specific HMBP, the risk of fire and explosion at the generating facility will be minimal.

Natural gas will be delivered to the site via an existing 30-inch SoCalGas natural gas pipeline onsite. The natural gas will flow from the metering station to a gas pressure control station and gas scrubber/filtering equipment. Prior to being supplied to the CTGs, the natural gas will be compressed, scrubbed, and filtered consistent with the turbine vendor recommendations. The natural gas used in the HRSG duct burner will not require gas compression, but will require filtering and scrubbing at the gas metering station. The natural gas for the building heating systems will flow through the metering station and gas pressure control station and will not require compression or filtering. The natural gas fuel is flammable and could leak from the pipeline onsite.

Natural gas is composed mostly of methane, but also may contain ethane, propane, nitrogen, butane, isobutene, and isopentane. It is colorless, odorless, tasteless, and lighter than air. Methane is flammable when mixed in air at concentrations of 5 to 14 percent, which is also the detonation range. Natural gas, therefore, poses a risk of fire and explosion if an accidental release occurs. However, the risk of a fire or explosion will be reduced through compliance with codes, regulations, and industry design/construction standards.

The federal safety and operating requirements for natural gas pipelines are contained in Title 49 of the CFR, Parts 190 through 192. These requirements vary according to population density and land use. The pipeline classes are defined as follows:

- Class 1 includes pipelines in locations with 10 or fewer buildings intended for human occupancy.
- Class 2 includes pipelines in locations with more than 10, but fewer than 46 buildings intended for human occupancy.
- Class 3 includes pipelines in locations with more than 46 buildings intended for human occupancy, or where the pipeline is within 100 yards of any building or small well-defined outside area occupied by 20 or more people on at least 5 days per week for 10 weeks in any 12-month period.
- Class 4 includes pipelines in locations where buildings with four or more stories aboveground are prevalent.

The existing SoCalGas natural gas supply pipeline to the AEC site is designed to meet Class 3 service and meet the California Public Utilities Commission (CPUC) General Order 112-D and 58-A standards, in addition to the federal requirements for gas pipeline construction and safety.

The nearest fire station to the AEC is the City of Long Beach Fire Department Station No. 22, located at 6340 East Atherton Street, Long Beach. The station is approximately 2 miles away from the AEC site and will provide the first response to a fire, with an approximate 5-minute response time on average (DuRee and Zinnen, 2013). The Project Owner and the City of Long Beach Fire Department have discussed the project's fire protection needs and the City of Long Beach Fire Department's ability to respond. The facility will have an onsite fire suppression system, which is described in Section 2, Project Description. Two existing electric fire pumps, connected to two independent power feeds from the SCE distribution system, will be provided to pump water from the onsite fire/service water storage tank. Fire protection water will be provided by two sources. The primary source will be supplied via a connection to the existing water distribution system and the secondary source will be supplied from a new 600,000-gallon onsite fire/service water storage tank, which will be operated in accordance with National Fire Protection Association (NFPA) guidelines to provide 2 hours of protection for the onsite worst-case single fire. New onsite fire water piping and hydrants will be constructed at the facility as necessary. Fire protection water from the water connection and onsite fire/service water storage tank will be provided to a dedicated underground fire loop piping system.

If hazardous materials are involved in the incident, Fire Station No. 22 will be the first onsite, requesting additional resources from the 22 other stations in the district (DuRee and Zinnen, 2013) as needed. If additional response is required, the City of Long Beach Fire Department has mutual aid and automatic aid agreements with the Los Angeles County Fire Department and the Orange County Fire Authority. The most likely scenario for use of mutual aid to the AEC site will come from Orange County Fire Authority resources at Orange County Stations 48, 17, and 42 (DuRee and Zinnen, 2013). All City of Long Beach Fire Department firefighters and stations are certified and capable of managing a hazardous materials-related incident. City of Long Beach Fire Department Station No. 24 and Station No. 19 house specialized equipment and personnel for hazardous materials response, and these resources can be deployed city-wide when requested (DuRee and Zinnen, 2013).

5.5.3.6 Schools

The nearest school to the AEC site is Rosie the Riveter Charter High, located at the entrance to the AGS property at 690 North Studebaker Road, Long Beach. The Transportation Element of the City of Long Beach General Plan identifies truck routes through the city that comply with CVC and local ordinances (City of Long Beach Planning, 1991). The truck route used to transport hazardous materials to the AEC site will be selected by the supplier consistent with the requirements of federal and state law, likely via I-405, to SR 22 (7th Street), west along 7th Street, and then south on Studebaker Road to the AEC entrance. The proposed transportation route for delivery of regulated materials such as aqueous ammonia (and for all other hazardous materials used at the AEC) will pass near the school but not directly, and only when the trucks are on the AEC property.

5.5.4 Cumulative Effects

A cumulative effect refers to a proposed project's incremental effect together with other closely related past, present, and reasonably foreseeable future projects whose impacts may compound or increase the incremental effect of the proposed project (Public Resources Code Section 21083; 14 CCR Sections 15064(h), 15065(c), 15130, and 15355).

Potential cumulative impacts from construction or operation of the AEC are not expected. Existing laws and regulations address the handling of hazardous materials and the transportation and use of aqueous ammonia, an acutely hazardous material, and will ensure that hazardous materials at the AEC site are safely managed. Projects that could result in a cumulative impact will also be required to comply with federal, state, and local LORS. The AEC is unlikely, therefore, to result in cumulative impacts from hazardous materials in combination with other closely related past, present, and reasonably foreseeable future projects.

5.5.4.1 Cumulative Spills of Ammonia

The hypothetical accidental releases of aqueous ammonia was evaluated for the AEC is described in the OCA for Ammonia and included in Appendix 5.5A. Several open-top, floating-roof storage tanks that can store hazardous materials were identified in the vicinity of the AEC by the City of Long Beach Fire Department (DuRee and Zinnen, 2013). The Plains tank farm, located within 0.25 mile of the AEC site, is owned by a third party.

As noted in Section 5.5.3.4.1, the OCA determined the risk posed to the local community from the storage of aqueous ammonia at the AEC is not significant. The results of the catastrophic scenario analysis indicate that the probability of a complete storage tank failure in combination with the conservatively modeled meteorological conditions would not pose a significant threat since ammonia concentrations above the four "benchmark" thresholds of 2,000, 300, 150, and 75 ppm would not be accessible to the public. Existing laws and regulations will ensure that the AEC's incremental effect is not cumulatively considerable.

5.5.5 Mitigation Measures

The following sections present measures to mitigate potential public health and environmental effects of handling hazardous materials and regulated substances during project construction and operation.

5.5.5.1 Construction Phases

The hazardous materials that will be used during AEC construction present a relatively low public health risk, but could contaminate surface water or groundwater if a release occurred. Use of BMPs will reduce the potential for the release of construction/demolition-related fuels and other hazardous materials to stormwater and receiving waters as discussed in Section 5.15, Water Resources. BMPs prevent sediment and stormwater contamination from spills or leaks, control the amount of runoff from the site, and require proper disposal or recycling of hazardous materials.

Construction/demolition service personnel will follow general industry health, safety, and environmental BMPs for filling and servicing construction/demolition equipment and vehicles. The following BMPs are designed to reduce the potential for incidents involving the hazardous materials:

- Refueling and maintenance of vehicles and equipment will occur only in designated areas that are either bermed or covered with concrete, asphalt, or other impervious surfaces to control potential spills. Employees will be present during refueling activities.
- Vehicle and equipment service and maintenance will be conducted only by authorized personnel.
- Refueling will be conducted only with approved pumps, hoses, and nozzles.
- Catch-pans will be placed under equipment to catch potential spills during servicing.
- All disconnected hoses will be placed in containers to collect residual fuel from the hoses.
- Vehicle engines will be shut down during refueling.
- No smoking, open flames, or welding will be allowed in refueling or service areas.
- Refueling will be performed away from bodies of water to prevent contamination of water in the event of a leak or spill.
- When refueling is completed, the service truck will leave the AEC site.
- Service trucks will be provided with fire extinguishers and spill containment equipment, such as absorbents.
- Should a spill contaminate soil, the soil will be put in containers and disposed of as appropriate. All containers used to store hazardous materials will be inspected at least once per week for signs of leaking or failure. All maintenance and refueling areas will be inspected monthly. Results of inspections will be recorded in a logbook that will be maintained onsite.

In accordance with local, state, and federal regulations, a spill may need to be reported to the appropriate regulatory agencies and cleanup of contaminated soil could be required. Small spills will be contained and cleaned up immediately by trained, onsite personnel. Larger spills will be reported via emergency phone numbers to obtain help from offsite containment and cleanup crews. All personnel working on the project during construction and demolition will be trained in handling hazardous materials and the dangers associated with hazardous materials. An onsite health and safety person will be designated to implement health and safety guidelines and to contact emergency response personnel and the local hospital, if necessary.

If a large spill occurs from a service or refueling truck, contaminated soil will be placed into barrels or trucks by service personnel for offsite disposal at an appropriate facility in accordance with law. If a spill involves hazardous materials quantities equal to or greater than the specific RQ (42 gallons for petroleum products), federal, state, and local reporting requirements will be followed. In the event of a fire or injury, the local fire department will be called (City of Long Beach Fire Department Station No. 22).

5.5.5.2 Operation Phase

During AEC operations, hazardous materials and one regulated substance will be stored onsite as listed in Table 5.5-1. Table 5.5-2 presents information about these materials, including trade names, chemical names, CAS numbers, maximum quantities onsite, RQs, CalARP TPQs, and status as Proposition 65 chemicals (chemicals known to be carcinogenic or cause reproductive problems in humans). Health hazards and flammability data are summarized for these materials in Table 5.5-3, which also contains information on incompatible chemicals (e.g., sodium hypochlorite and ammonia). Table 5.5-4 describes the toxicity of the regulated substance and hazardous materials. The following sections list mitigation measures for minimizing the public health risks associated with hazardous material and regulated substance handling during AEC operations.

Hazardous Materials. Hazardous materials will be handled and stored in accordance with codes and regulations specified in Section 5.5.6. The California Fire Code lists the following specific requirements that reduce the risk of fire or the potential for a release of hazardous materials that could affect public health or the environment:

- Provide an automatic sprinkler system for indoor hazardous material storage areas.
- Provide an exhaust system for indoor hazardous material storage areas.
- Separate incompatible materials by isolating them from each other with a noncombustible partition.
- Control spills in all storage, handling, and dispensing areas.
- Separate secondary containment for each chemical storage system. The secondary containment is required to hold the entire contents of the tank plus the volume of water for the fire suppression system that could be used for fire protection for 20 minutes in the event of a catastrophic spill.

In addition, an HMBP is required by Title 19 of the CCR and the Health and Safety Code (Section 25504). As the AEC site has an existing HMBP, the plan will be updated twice—once upon operation of the AEC, and again when the AGS has been decommissioned. The HMBP will be updated in accordance with these regulations and will include an inventory and location map of hazardous materials onsite and emergency response procedures for hazardous materials incidents. Specific topics addressed in the HMBP will include:

- Facility identification
- Emergency contacts
- Chemical inventory information (for every hazardous material)
- Site map
- Emergency notification data
- Procedures to control actual or threatened releases
- Emergency response procedures
- Training procedures
- Certification

The revised HMBP will be filed with the Long Beach Environmental Health Bureau, the designated Certified Unified Program Agency (CUPA); and the City of Long Beach Fire Department, the designated Participating Agency for the AEC site. The HMBP will be updated annually in accordance with regulations.

In accordance with emergency response procedures specified in the HMBP, designated AEC personnel will be trained as members of a plant hazardous materials response team, and team members will receive the first responder and hazardous materials technical training to be developed in the HMBP, including training in appropriate methods to mitigate and control accidental spills. In the event of a chemical emergency, AEC personnel will defer to the City of Long Beach Fire Department. City of Long Beach Fire Department Station No. 22 is approximately 2 miles away from the AEC site and will provide first response, with an approximate 5-minute response time on average (DuRee and Zinnen, 2013). City of Long Beach Fire Department firefighters and stations are certified and capable of managing a hazardous materials-related incident. City of Long Beach Fire Department Station No. 24 and Station No. 19 house specialized equipment and personnel for hazardous materials response, and these resources can be deployed city-wide when requested (DuRee and Zinnen, 2013). Additional resources and personnel will be dispatched to the site after initial assessment by the first responders, if warranted.

If hazardous materials are involved in the incident, Fire Station No. 22 will be the first onsite, requesting additional resources from the 22 other stations in the district (DuRee and Zinnen, 2013). If needed, the City of Long Beach Fire Department has mutual aid and automatic aid agreements for additional response from the Los Angeles County Fire Department and the Orange County Fire Authority. The most likely scenario for use of mutual aid to the AEC site will come from Orange County Fire Authority resources at Orange County Stations 48, 17, and 42 (DuRee and Zinnen, 2013).

Aqueous Ammonia. Ammonia is a regulated substance under the federal Clean Air Act (CAA) pursuant to Title 40 of the CFR, Section 68 (Subpart G) and the CalARP pursuant to Health and Safety Code Sections 25331 through 25543.3. The California program is similar to the federal program but is more stringent in some areas.

In accordance with CalARP regulations, an RMP will be prepared for the ammonia tanks. As the AEC site has an existing RMP, the plan will be updated twice—once upon operation of the AEC, and again when the AGS has been decommissioned. The updated RMP will include a hazard assessment to evaluate the potential effects of an accidental release, a program for preventing an accidental release, and a program for responding to an accidental release. The specific components of the revised RMP include:

- Description of the facility
- Accident history of the facility
- History of equipment used at the facility
- Design and operation of the facility
- Site map(s) of the facility
- Piping and instrument diagrams of the facility
- Seismic analysis
- Hazard and operability study
- Prevention program
- Consequence analysis
- Offsite consequence analysis
- Emergency response
- Auditing and inspection
- Record keeping
- Training
- Certification

The revised RMP will be filed with the Long Beach Environmental Health Bureau, the designated CUPA, and the City of Long Beach Fire Department, the designated Participating Agency for the AEC site. The RMP will include a hazard assessment to evaluate the potential effects of accidental releases, a program for preventing accidental releases, and a program for responding to accidental releases to protect human health and the environment.

A Process Safety Management plan will not be required under the Occupational Safety and Health Act, because the regulations apply only to aqueous ammonia solutions above 44 percent (8 CCR Section 5189).

Petroleum Products. Federal and California regulations require a Spill Prevention Control and Countermeasure (SPCC) plan if petroleum products above certain quantities are stored onsite. Both federal and state laws apply only to petroleum products that might be discharged to navigable waters. If stored quantities are equal to or greater than 1,320 gallons total (including ASTs, oil-filled equipment, and drums), an SPCC plan must be prepared. Because the facility will store more than 1,320 gallons of petroleum products, an SPCC plan will be prepared. As the AEC site has an existing SPCC, the plan will be updated twice—once upon operation of the AEC, and again when the AGS has been decommissioned.

Transportation/Delivery of Hazardous Materials and Regulated Substances. Hazardous materials and one regulated substance will be delivered periodically to the facility. As discussed in Section 5.12, Traffic and Transportation, transportation of hazardous materials will comply with Caltrans, EPA, DTSC, CHP, and California State Fire Marshal regulations. Under the CVC, the CHP has the authority to adopt regulations for transporting hazardous materials in California. Aqueous ammonia, a regulated substance, will be delivered to the AEC and transported in accordance with CVC Section 32100.5, which regulates the transportation of hazardous materials that pose an inhalation hazard. In addition, ammonia will only be transported along approved transportation routes. It is expected that there will be approximately 32 truck deliveries per month of hazardous materials and 1 regulated substance to the operating facility. The Transportation

Element of the City of Long Beach General Plan identifies truck routes through the city that comply with CVC and local ordinances (City of Long Beach Planning, 1991). The truck route used to transport hazardous materials to the AEC site will be selected by the supplier consistent with the requirements of federal and state law, likely via I-405, to SR 22 (7th Street), west along 7th Street, and then south on Studebaker Road to the AEC entrance.

Security Plan. In addition to standard industrial business security measures, the AEC will prepare a security plan that will include the following elements:

- Descriptions of the site fencing and security gate
- Evacuation procedures
- A protocol for contacting law enforcement in the event of conduct endangering the facility, its employees, its contractors, or the public
- A fire alarm monitoring system
- Measures to conduct site personnel background checks, including employee and routine onsite contractors, consistent with state and federal law regarding security and privacy
- A site access protocol for vendors
- A protocol for hazardous materials vendors to prepare and implement security plans in accordance with 49 CFR Section 172.800 and to ensure that all hazardous materials drivers are in compliance with personnel background security checks in accordance with 49 CFR Part 172, Subpart I

The plan will also include a demonstration that the perimeter security measures are adequate. The demonstration may include one or more of the following:

- Security guards
- Security alarm for critical structures
- Perimeter breach detectors and onsite motion detectors
- Video or still camera monitoring system

Facility Closure. When the AEC is closed, both nonhazardous and hazardous wastes must be handled properly. Premature or unexpected closure will be for a period greater than the time required for normal maintenance, including overhaul or replacement of the combustion turbines. Causes for premature or unexpected closure could be a disruption in the supply of natural gas, flooding of the site, or damage to the plant from earthquake, fire, storm, or other natural causes.

For a premature or unexpected closure of the AEC, where there is no release of hazardous materials, facility security will be deployed on a 24-hour basis, and the CEC will be notified. Depending on the length of shutdown necessary, a contingency plan for the temporary cessation of operations will be implemented. The plan will be developed to ensure conformance with LORS and the protection of public health and safety and the environment. The plan, depending on the expected duration of the shutdown, could include draining chemicals from storage tanks and other equipment and the safe shutdown of equipment. Hazardous materials and wastes will be disposed of according to applicable LORS.

If the temporary closure is in response to facility damage, or if there is a release or threatened release of hazardous waste or materials into the environment, procedures will be followed as set forth in a risk management plan. Procedures include methods to control releases, notification of authorities and the public, emergency response, and training for generating facility personnel in responding to and controlling releases of hazardous materials and hazardous waste. Once the immediate problem of hazardous waste and materials release is contained and cleaned up, temporary closure will proceed as described for a closure where there is no release of hazardous materials or waste.

5.5.5.3 Monitoring

In accordance with federal, state, and local regulations, site personnel will regularly inspect hazardous materials handling facilities for compliance with regulations and will ensure that deficiencies are promptly repaired. In addition to the CEC's continuing regulatory oversight, the AEC could be subject to periodic inspections by the Long Beach Environmental Health Bureau (designated CUPA) and the City of Long Beach Fire Department (designated Participating Agency), which will monitor for compliance with regulatory requirements for hazardous materials and regulated substances handling.

5.5.6 Laws, Ordinances, Regulations, and Standards

The storage and use of hazardous materials and regulated substances at the facility are governed by federal, state, and local laws. Laws and regulations address the use and storage of hazardous materials to protect the environment from contamination and to protect facility workers and the surrounding community from exposure to hazardous and regulated substances. Applicable LORS are summarized in Table 5.5-6 and described below.

TABLE 5.5-6

Laws, Ordinances, Regulations, and Standards for Hazardous Materials Handling

LORS	Requirements/Applicability	Administering Agency	AFC Section Explaining Conformance
Federal			
Section 302, EPCRA (Pub. L. 99–499, 42 USC Section 11022) Hazardous Chemical Reporting: Community Right-To-Know (40 CFR Section 370)	Requires one-time notification if extremely hazardous substances are stored in excess of TPQs.	Long Beach Environmental Health Bureau (designated CUPA) and the City of Long Beach Fire Department (designated Participating Agency)	A revised HMBP will be prepared for submittal to the Long Beach Environmental Health Bureau (Section 5.5.5.2.1).
Section 304, EPCRA (Pub. L. 99–499, 42 USC Section 11002) Emergency Planning and Notification (40 CFR Section 355)	Requires notification when there is a release of hazardous material in excess of its RQ.	Long Beach Environmental Health Bureau (designated CUPA) and the City of Long Beach Fire Department (designated Participating Agency)	A revised HMBP will be prepared to describe notification and reporting procedures (Section 5.5.5.2.1).
Section 311, EPCRA (Pub. L. 99–499, 42 USC Section 11021) Hazardous Chemical Reporting: Community Right-To-Know (40 CFR Section 370)	Requires that MSDSs for all hazardous materials or a list of all hazardous materials be submitted to the CUPA, SERC, LEPC, and City of Long Beach Fire Department	Long Beach Environmental Health Bureau (designated CUPA) and the City of Long Beach Fire Department (designated Participating Agency)	A revised HMBP will include a list of hazardous materials for submission to agencies (Section 5.5.5.2.1).
Section 313, EPCRA (Pub. L. 99–499, 42 USC Section 11023) Toxic Chemical Release Reporting: Community Right-To-Know (40 CFR Section 372)	Requires annual reporting of releases of hazardous materials.	Long Beach Environmental Health Bureau (designated CUPA) and the City of Long Beach Fire Department (designated Participating Agency)	A revised HMBP will describe reporting procedures (Section 5.5.5.2.1).
Section 112, CAA Amendments (Pub. L. 101–549, 42 USC Section 7412) Chemical Accident Prevention Provisions (40 CFR Section 68)	Requires facilities that store a listed hazardous material at a quantity greater than the TQ to develop an RMP. 19% aqueous ammonia is not subject to Title 40 CFR 68.	Long Beach Environmental Health Bureau (designated CUPA) and the City of Long Beach Fire Department (designated Participating Agency)	A revised RMP will be prepared as part of the HMBP and submitted to Long Beach Environmental Health Bureau (Section 5.5.5.2.2). 19% aqueous ammonia is not subject to Title 40 CFR 68 (Section 5.5.6.1.4)

TABLE 5.5-6

Laws, Ordinances, Regulations, and Standards for Hazardous Materials Handling

LORS	Requirements/Applicability	Administering Agency	AFC Section Explaining Conformance
Section 311, CWA (Pub. L. 92–500, 33 USC Section 1251 et seq.) Oil Pollution Prevention (40 CFR Section 112)	Requires preparation of an SPCC plan if the total petroleum storage (including ASTs, oil-filled equipment, and drums) is greater than 1,320 gallons. The facility will have petroleum in excess of the aggregate volume of 1,320 gallons.	Long Beach Environmental Health Bureau (designated CUPA) and the City of Long Beach Fire Department (designated Participating Agency)	A revised SPCC will be prepared (Section 5.5.5.2.3).
Pipeline Safety Laws (49 USC Section 60101 et seq.) Hazardous Materials Transportation Laws (49 USC Section 5101 et seq.) Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards (49 CFR Section 192)	Specifies natural gas pipeline construction, safety, and transportation requirements.	U.S. Department of Transportation	The natural gas pipelines are constructed in accordance with 49 CFR requirements (Section 5.5.3.5)
State			
Health and Safety Code, Section 25500, et seq. (HMBP)	Requires preparation of an HMBP if hazardous materials are handled or stored in excess of threshold quantities.	Cal/OSHA	A revised HMBP will be prepared for submittal to the Long Beach Environmental Health Bureau (Section 5.5.5.2.1).
Health and Safety Code, Section 25531 through 25543.4 (CalARP)	Requires registration with local CUPA or lead agency and preparation of an RMP if regulated substances are handled or stored in excess of TPQs.	Long Beach Environmental Health Bureau	A revised RMP will be prepared and submitted to the Long Beach Environmental Health Bureau (Section 5.5.5.2.2).
Health and Safety Code, Section 25270 through 25270.13 (Aboveground Petroleum Storage Act)	Requires preparation of an SPCC plan if the total petroleum storage (including ASTs, oil-filled equipment, and drums) is greater than 1,320 gallons. The facility will have petroleum in excess of the aggregate volume of 1,320 gallons.	Long Beach Environmental Health Bureau (designated CUPA) and the City of Long Beach Fire Department (designated Participating Agency)	A revised SPCC plan will be prepared (Section 5.5.5.2.3).
Health and Safety Code, Section 25249.5 through 25249.13 (Safe Drinking Water and Toxics Enforcement Act) (Proposition 65)	Requires warning to persons exposed to a list of carcinogenic and reproductive toxins and protection of drinking water from same toxins.	OEHHA	The site will be appropriately labeled for chemicals on the Proposition 65 list (Section 5.5.5.2.4).
CVC Section 32100.5.	Establishes the procedures for the state to determine transportation corridors for materials that may pose an inhalation hazard.	Caltrans, CHP	Transportation of aqueous ammonia will follow designated routes (Section 5.5.5.2.4).

TABLE 5.5-6

Laws, Ordinances, Regulations, and Standards for Hazardous Materials Handling

LORS	Requirements/Applicability	Administering Agency	AFC Section Explaining Conformance
CPUC General Order Nos. 112-E and 58-A	Specify standards for gas service and construction of gas gathering, transmission, and distribution piping systems.	CPUC	Construction of the natural gas pipeline complies with the standards specified in these General Orders (Section 5.5.5.2.5).
Local			
Uniform Fire Code Articles 79 and 80	Require secondary containment, monitoring and treatment for accidental releases of toxic gases.	City of Long Beach Fire Department	Section 5.5.5.3
City of Long Beach Municipal Code Chapter 18.48, Sections 18.48.240 and 18.18.580	Relate to storage, handling, transport, and generation of hazardous materials in the city	Long Beach Environmental Health Bureau (designated CUPA) and the City of Long Beach Fire Department (designated Participating Agency)	Section 5.5.6.3

Notes:

Cal/OSHA = California Division of Occupational Safety and Health
CWA = Clean Water Act
EPCRA = Emergency Planning and Community Right-to-Know Act of 1986
LEPC = local emergency planning committee
OEHHA = Office of Environmental Health Hazard Assessment
Pub. L. = Public Law
SERC = State Emergency Response Commission
USC = United States Code

5.5.6.1 Federal LORS

Hazardous materials are governed under OSHA regulations, CERCLA, the CAA, and the CWA.

OSHA Regulations 29 CFR Parts 1910 and 1926. These sections contain requirements for equipment used to store and handle hazardous materials for the purpose of protecting worker health and safety. This regulation also addresses requirements for equipment necessary to protect workers in emergencies. It is designed primarily to protect worker health, but also contains requirements that affect general facility safety. The California regulations contained in Title 8 (California equivalent of 29 CFR) are generally more stringent than those contained in Title 29. The administering agency for the above authority is OSHA and Cal/OSHA.

49 CFR Parts 172, 173, and 179. These regulations provide standards for labels, placards, and markings on hazardous materials shipments by truck (Part 172), standards for packaging hazardous materials (Part 173), and standards for transporting hazardous materials in tank cars (Part 179). The administering agencies for the above authority are the CHP and U.S. Department of Transportation.

CERCLA. SARA amends CERCLA and governs hazardous substances. The applicable part of SARA for the proposed project is Title III, otherwise known as the Emergency Planning and Community Right-to-Know Act of 1986 (EPCRA), which requires states to establish a process for developing local chemical emergency preparedness programs and to receive and disseminate information on hazardous substances present at facilities in local communities. The law provides primarily for planning, reporting, and notification concerning hazardous substances. Key sections of the law include:

- Section 302—Requires one-time notification when EHSs are present in excess of their TPQs. EHSs and their TPQs are found in Appendixes A and B to 40 CFR Part 355.

- Section 304—Requires immediate notification to the local emergency planning committee (LEPC) and the State Emergency Response Commission (SERC) when a hazardous material is released in excess of its RQ. If a CERCLA-listed hazardous substance RQ is released, notification must also be given to the National Response Center in Washington, D.C. (RQs are listed in 40 CFR Part 302, Table 302.4). These notifications are in addition to notifications given to the local emergency response team or fire personnel.
- Section 311—Requires that either MSDSs for all hazardous materials or a list of all hazardous materials be submitted to the SERC, LEPC, and local fire department.
- Section 313—Requires annual reporting of hazardous materials released into the environment either routinely or as a result of an accident.

The administering agencies for the above authority are the EPA Region IX, the National Response Center, the Long Beach Environmental Health Bureau, and the City of Long Beach Fire Department. The Long Beach Environmental Health Bureau is the CUPA, and the City of Long Beach Fire Department is the Participating Agency. This Unified Program combines both Fire Department and Health Department programs related to hazardous materials management into one agency function for the City of Long Beach.

Clean Air Act. Regulations (40 CFR Part 68) under the CAA are designed to prevent accidental releases of hazardous materials. The regulations require facilities storing a threshold quantity (TQ) or greater of listed regulated substances to develop an RMP, including hazard assessments and response programs to prevent accidental releases of listed chemicals. Section 112(r)(5) of the CAA discusses the regulated substances. These substances are listed in 40 CFR Section 68.130. Aqueous ammonia is a listed substance, and its TQ for solutions of 20 percent and greater is 20,000 pounds of solution. Because the AEC will use and store 19 percent aqueous ammonia, it is not subject to these CCA provisions.

Clean Water Act. The SPCC rule under the CWA is designed to prevent or contain the discharge or threat of discharge of oil into navigable waters or adjoining shorelines. Regulations (40 CFR Section 112) under the CWA require facilities to prepare a written SPCC plan if they store oil and its release would pose a threat to navigable waters. The SPCC rule is applicable if a facility has total petroleum storage (including ASTs, oil-filled equipment, and drums) greater than 1,320 gallons. The SPCC rule is jointly administered by the local CUPA, which is the Long Beach Environmental Health Bureau, and the Participating Agency, which is the City of Long Beach Fire Department.

Other related federal laws that address hazardous materials, but do not specifically address their handling, include the Resource Conservation and Recovery Act, which is discussed in Section 5.14, Waste Management, and the Occupational Safety and Health Act, which is discussed in Section 5.16, Worker Health and Safety.

Natural Gas Pipeline Construction and Safety. Title 40 of the CFR, Parts 190 through 192, specifies safety and construction requirements for natural gas pipelines. Part 190 outlines pipeline safety procedures, Part 191 requires a written report for any reportable incident, and Part 192 specifies minimum safety requirements for pipelines.

5.5.6.2 State LORS

California laws and regulations relevant to hazardous materials handling at the facility include Health and Safety Code Section 25500 (hazardous materials), Health and Safety Code 25531 (regulated substances), and the Aboveground Petroleum Storage Act (petroleum in aboveground tanks).

Title 8, CCR, Section 339; Section 3200 et seq., Section 5139 et seq. and Section 5160 et seq. Section 339 of Title 8 of the CCR lists hazardous chemicals relating to the Hazardous Substance Information and Training Act; 8 CCR Section 3200 et seq. and 5139 et seq. address control of hazardous substances; and Section 5160 et seq. addresses hot, flammable, poisonous, corrosive, and irritant substances.

Health and Safety Code Section 25500. California Health and Safety Code, Section 25500, et seq., and the related regulations in 19 CCR Section 2620, et seq., require local governments to regulate local business

storage of hazardous materials in excess of certain quantities. The law also requires that entities storing hazardous materials be prepared to respond to releases. Those using and storing hazardous materials are required to submit an HMBP to their local CUPA and to report releases to their CUPA and the State Office of Emergency Services. The TQs for hazardous materials are 55 gallons for liquids, 500 pounds for solids, and 200 cubic feet for compressed gases measured at standard temperature and pressure.

Health and Safety Code Section 25531 (California Accidental Release Program). California Health and Safety Code, Section 25531, et seq., and the CalARP regulate the registration and handling of regulated substances. Regulated substances are chemicals designated as an extremely hazardous substance by the EPA as part of its implementation of SARA Title III. Health and Safety Code Section 25531 overlaps or duplicates some of the requirements of SARA and the CAA. Facilities handling or storing regulated substances at or above TPQs must register with their local CUPA and prepare an RMP, formerly known as a Risk Management and Prevention Program. The CalARP is found in Title 19, CCR, Chapter 4.5. The TPQ for ammonia is 500 pounds. Portions of the aqueous ammonia process that can be demonstrated to have a partial pressure of the regulated substance in the mixture (solution) under the handling or storage conditions (less than 10 millimeters of mercury) do not count toward the threshold.

Aboveground Petroleum Storage Act. The California Health and Safety Code Sections 25270 to 25270.13 ensure compliance with the CWA. The law applies to facilities that have a combined AST capacity greater than 1,320 gallons, or oil-filled equipment where there is a reasonable possibility that the tank(s) or equipment may discharge oil in "harmful quantities" into navigable waters or adjoining shore lands. If a facility falls under these criteria, it must prepare an SPCC plan.

Safe Drinking Water and Toxics Enforcement Act (Proposition 65). This California law requires the state to identify chemicals that cause cancer and reproductive toxicity, contains requirements for informing the public of the presence of these chemicals, and prohibits discharge of the chemicals into sources of drinking water. Lists of the chemicals of concern are published and updated periodically by California's OEHHA. Some of the chemicals to be used at the facility are on the cancer-causing and reproductive-toxicity lists of the Act.

Natural Gas Pipeline Construction and Safety. The CPUC enforces General Order No. 58-A, which specifies standards for natural gas service in the State of California, and General Order No. 112-E, which specifies rules governing the design, construction, testing, operation, and maintenance of natural gas gathering, transmission, and distribution piping systems. The proposed project will connect to an existing SoCalGas 30-inch natural gas pipeline onsite.

California Vehicle Code Section 32100.5. CVC Section 32100.5 regulates the transportation of hazardous materials that pose an inhalation hazard. Aqueous ammonia, a regulated substance, will be delivered to the facility and transported in accordance with this section by following the designated access routes, as described in Section 5.5.5.2.4.

5.5.6.3 Local LORS

The Long Beach Environmental Health Bureau has overall responsibility for CUPA programs (City of Long Beach Certified Unified Program Agency, 2013). It is responsible for administering HMBPs, Hazardous Materials Management Plans, and RMPs filed by businesses in the city. In addition, the Long Beach Environmental Health Bureau ensures that businesses and industry store and use hazardous materials safely and in conformance with regulatory codes, including Long Beach Municipal Code Chapter 18.48, Sections 18.48.240 and 18.18.580 (DuRee and Zinnen, 2013). These sections of the municipal code relate to storage, handling, transport, and generation of hazardous materials in the city. The Long Beach Environmental Health Bureau also administers hazardous waste generator and CalARP programs.

The City of Long Beach Fire Department is the Participating Agency responsible for other CUPA programs, including AST and underground storage tank permits and administers the business emergency plan program (DuRee and Zinnen, 2013; City of Long Beach Fire Department, 2013). The Long Beach Environmental Health Bureau and City of Long Beach Fire Department jointly administer SPCC plans. The Long Beach Environmental

Health Bureau and City of Long Beach Fire Department perform inspections at established facilities to verify that hazardous materials are properly stored and handled and that the types and quantities of materials reported in a business's HMBP are accurate.

The Long Beach Environmental Health Bureau and the City of Long Beach Fire Department will be contacted in the event of a release of hazardous wastes or materials to the environment. The Project Owner will work with local authorities to register and handle all hazardous materials onsite.

5.5.6.4 Codes

The design, engineering, construction, and operation of hazardous materials storage and dispensing systems will be in accordance with applicable codes and standards, including the following:

- CVC, 13 CCR Section 1160, et seq.—Provides the CHP with authority to adopt regulations for the transportation of hazardous materials in California. The CHP can issue permits and specify the route for hazardous material delivery.
- The California Fire Code, Articles 79 and 80—Includes the hazardous materials sections of the Fire Code. Local fire agencies or departments enforce this code and can require that an HMBP and a Hazardous Materials Inventory Statement be prepared. The California Fire Code is based on the federal fire guidelines, which include the Uniform Fire Code.
- State Building Standard Code, Health and Safety Code Sections 18901 to 18949—Incorporates the Uniform Building Code, Uniform Fire Code, and Uniform Plumbing Code.
- The American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, Section VIII.
- City of Long Beach Municipal Code.

5.5.7 Agencies and Agency Contacts

Several agencies regulate hazardous materials, and they will be involved in regulating the hazardous materials stored and used at the AEC. At the federal level, the EPA will be involved; at the state level, the California Environmental Protection Agency (CalEPA) will be involved. However, local agencies primarily enforce hazardous materials laws. For the AEC, the primary local agencies with jurisdiction will be the Long Beach Environmental Health Bureau as the designated CUPA and the City of Long Beach Fire Department as the designated Participating Agency. The persons to contact are listed in Table 5.5-7.

TABLE 5.5-7

Agency Contacts for Hazardous Materials Handling

Issue	Agency	Persons Contacted
CUPA for Hazardous Materials Inventory and Risk Management Plan, SPCC Plan	Long Beach Environmental Health Bureau	Nelson Kerr, Manager City of Long Beach Department of Health and Human Services, Environmental Health Bureau 2525 Grand Avenue Long Beach, CA 90815 (562) 570-4131 nelson.kerr@longbeach.gov
Participating Agency for Aboveground and Underground Storage Tanks, Emergency Business Plan, SPCC Plan	City of Long Beach Fire Department	Mike DuRee, Fire Chief and David Zinnen, Deputy Fire Marshal City of Long Beach Fire Department 3205 Lakewood Boulevard Long Beach, CA 90808 (562) 570-2579 michael.duree@longbeach.gov

TABLE 5.5-7

Agency Contacts for Hazardous Materials Handling

Issue	Agency	Persons Contacted
Fire Department Permits and Hazardous Materials Response	City of Long Beach Fire Department	Mike DuRee, Fire Chief and David Zinnen, Deputy Fire Marshal City of Long Beach Fire Department 3205 Lakewood Boulevard Long Beach, CA 90808 (562) 570-2579 michael.duree@longbeach.gov

5.5.8 Permits and Permit Schedule

The Long Beach Environmental Health Bureau requires that project developers obtain the permits listed in Table 5.5-8 before storing hazardous materials onsite.

TABLE 5.5-8

Permits and Permit Schedule for Hazardous Materials Handling

Permit	Agency Contact	Schedule
Hazardous Materials Business Plan	Nelson Kerr, Manager City of Long Beach Department of Health and Human Services, Environmental Health Bureau 2525 Grand Avenue Long Beach, CA 90815 (562) 570-4131 nelson.kerr@longbeach.gov	Approximately 60 days before any regulated substance comes onsite
Risk Management Plan	Nelson Kerr, Manager City of Long Beach Department of Health and Human Services, Environmental Health Bureau 2525 Grand Avenue Long Beach, CA 90815 (562) 570-4131 nelson.kerr@longbeach.gov	Approximately 60 days before any regulated substance comes onsite (acceptable to integrate with HMBP)

Note: Discussion of permits is included in Section 5.5.4.2, Mitigation Measures, Operations

5.5.9 References

City of Long Beach Certified Unified Program Agency. 2013. City of Long Beach Department of Health and Human Services, Environmental Health Bureau, Long Beach Certified Unified Program Agency (CUPA) website. Available online at http://www.longbeach.gov/health/eh/hazmat/cupa.asp. Accessed June 2012.

City of Long Beach Fire Department. 2013. City of Long Beach Fire Department website. Available online at: http://www.longbeach.gov/fire/. Accessed June 2013.

City of Long Beach Planning. 1991. Transportation Element of the City of Long Beach General Plan. December. Available online at: http://www.lbds.info/civica/filebank/blobdload.asp?BlobID=2542. Accessed June 2013.

City of Long Beach. 2006. *City of Long Beach Southeast Area Development and Improvement Specific Plan*.

DuRee, Mike/City of Long Beach Fire Department, Fire Chief, and David Zinnen/City of Long Beach Fire Department, Deputy Fire Marshal. 2013. Personal communication with Beth Smoker/CH2M HILL. July.

Kerr, Nelson/City of Long Beach Department of Health and Human Services, Environmental Health Bureau, Manager. 2013. Personal communication with Beth Smoker/CH2M HILL. June.

Lewis, Richard J., Sr. 1991. *Hazardous Chemical Desk Reference*. 2nd Edition.

Smyth, H. F., Jr. 1956. "Improved Communication: Hygienic Standards for Daily Inhalation." *American Industrial Hygiene Association Quarterly*, Volume 17 (Issue 2), pages 129-185.

U.S. Environmental Protection Agency (EPA). 2004. *RMP Offsite Consequence Analysis Guidance.* April. Available online at: http://www.epa.gov/oem/content/rmp/rmp_guidance.htm. Accessed June 2013.

5.6 Land Use

This section discusses the environmental and regulatory setting and analyzes potential land use impacts associated with the Alamitos Energy Center (AEC). For the purpose of this analysis, the affected environment study area is defined as those areas within 1 mile of the AEC site and construction laydown areas, as well as within 0.25 mile of the proposed offsite process/sanitary wastewater pipeline and construction access road (California Code of Regulations [CCR], Title 20, Appendix B). Section 5.6.1 describes the project setting and Section 5.6.2 describes the environment that could be affected by AEC construction and operation. Section 5.6.3 presents an environmental analysis of the development of AEC. Section 5.6.4 discusses potential cumulative effects. Section 5.6.5 discusses possible mitigation measures. Section 5.6.6 presents applicable land use-related laws, ordinances, regulations, and standards (LORS). Section 5.6.7 lists agencies and agency contacts and Section 5.6.8 provides a discussion of required permits and authorizations. Section 5.6.9 lists the references used in preparing this section.

The California Energy Commission's (CEC) authority to permit power plants preempts all state and local laws, including all local ordinances such as zoning, land use plans, and specific code requirements. The AEC site and proposed offsite process/sanitary wastewater pipeline and construction access road are located within the City of Long Beach General Plan Land Use Designation (LUD) No. 7 (Mixed Use). In addition, the AEC site, laydown areas, proposed offsite pipeline and access road are within the City of Long Beach South East Area Development and Improvement Plan (SEADIP) Specific Plan area of the General Plan. A portion of the AEC CCGT, the construction access road, the 10-acre southern laydown area and a portion the proposed wastewater pipeline alignment are within the coastal zone subject to the Local Coastal Program (LCP). The SEADIP is designated as Planned Development (PD)-1, which is also the zoning district for this area. The AEC site, laydown areas, and access road are located within Subarea 19 the SEADIP and are designated for industrial use. Power generating facilities are a permitted use within the SEADIP PD-1 Industrial use designation. The AEC will conform to the zoning requirements because the project will be implemented on lands already designated, zoned, and currently used for industrial uses. Long Beach is in the process of updating its General Plan (General Plan 2030) which includes designated place types and specific neighborhood strategies focusing on holistic places and "people-centric instead of land use-centric" urban design concepts (City of Long Beach, 2013a). In addition, the SEADIP Specific Plan is also concurrently being updated. In keeping with current land use designations, the proposed land use plan designates the AEC site within the Southeast/SEADIP Neighborhood as Economic Engine – Industrial (I) place type (City of Long Beach, 2013a).

5.6.1 Setting

AES Alamitos Energy, LLC, will construct, own, and operate the AEC, a natural-gas-fired, air-cooled, combined-cycle and simple-cycle, electrical generating facility in Long Beach, California. The proposed AEC will have a nominal generating capacity of 1,040 megawatts (MW). The AEC will be constructed on the site of the existing AES Alamitos Generating Station (AGS), located on an approximately 21-acre site within a larger, 71.1-acre parcel.

The AEC will feature two gas turbine power blocks. Combined-cycle power block will consist of two natural-gas-fired combustion turbine generators (CTG) in a combined-cycle configuration, two unfired heat recovery steam generators (HRSG), one steam turbine generators, an air-cooled condenser, an auxiliary boiler, and related ancillary equipment. Simple-cycle power block will consist of four simple-cycle LMS-100 CTGs with fin-fan coolers and ancillary facilities.

The AEC will meet the demand for new generation in the Los Angeles basin local electrical reliability area. The demand is caused in large part by the closure of the San Onofre Nuclear Generating Station and the anticipated retirement of the older, natural-gas-fired generation currently using once-through ocean water-cooling (OTC). As a result of the promulgation of the California State Water Resources Control Board's (SWRCB) *Water Quality Control Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling*

(SWRCB, 2010), more than 4,000 MW of OTC generation are expected to be retired in the Los Angeles local electrical reliability area by December 31, 2020.

The AEC will use water provided by the City of Long Beach Water Department (LBWD) for construction, operational process, and sanitary uses but at substantially lower volumes than the existing AGS historically has used. This water will be supplied through existing, onsite water lines. The AEC will include a new, 1,000-foot process/sanitary wastewater pipeline to the first point of interconnection with the existing LBWD sewer system, the potential upgrade of an additional 4,000 feet of existing pipeline downstream from the first point of interconnection, and the elimination of the current practice of treatment and discharge of process/sanitary wastewater to the San Gabriel River. Stormwater runoff from the power block areas will be directed to oil/water separators and to an existing retention basin and then ultimately discharged to the Los Cerritos channel via existing stormwater outfalls.

The AEC will interconnect to the existing, Southern California Edison (SCE) 230-kilovolt (kV) switchyard adjacent to the north side of the AGS. Natural gas will be supplied to the AEC via the existing, offsite, 30-inch-diameter pipeline owned and operated by Southern California Gas Company (SoCalGas) that currently serves Units 5 and 6 of the AGS. The AEC will require construction of new natural gas-metering facilities and construction of two new natural gas compressor buildings within the AEC footprint.

The AEC is designed to serve both peak and intermediate loads with the added capabilities of rapid startup, significant turndown capability (ability to turn down to a low load), and fast ramp rates. As California's intermittent renewable energy portfolio continues to grow, operating in either load-following or partial shutdown mode will become necessary to maintain electrical grid reliability, thus placing an increased importance upon the rapid startup, high turndown, steep ramp rate, and superior heat rate employed at the AEC.

As an in-basin generating asset, the AEC will provide local generating capacity, voltage support, and reactive power that are essential for transmission system reliability in the Western Los Angeles basin subarea and larger Los Angeles basin local reliability area. The AEC will be able to provide system stability by supplying reactive power, voltage support, frequency stability, and rotating mass in the heart of the critical Western Los Angeles local reliability area. By virtue of its location in a transmission constrained load center, the AEC also helps to avoid potential transmission line overloads and can provide reliable local energy supplies when electricity from more distant generating resources is unavailable. In recognition of its critical grid reliability benefits, the AEC combined-cycle CTGs were selected by SCE in its Local Capacity Requirements Request for Offer on November 5, 2014, and the simple-cycle CTGs will meet the capacity needs anticipated to be identified in future California Public Utilities Commission Long-term Procurement Plans.

Owing to the critical need for generating capacity at the AEC site at all times, existing Units 1 through 6 will remain in operation through much of the AEC development and construction. Given that the removal of existing Units 1 through 6 is not required for construction of the AEC, the continued operation of the AGS will not impede AEC construction. Demolition of the retired and decommissioned turbine peaking generating Unit 7 and fuel tank, ancillary equipment, small maintenance shops, and two retention basins will be required for site preparation for the construction of the AEC. Construction and site preparation activities at the AEC site are anticipated to last 56 months, from the first quarter of 2017 until the third quarter of 2021. The project will commence construction with the removal of former Unit 7's building and ancillary equipment, fuel storage tank, tank berms, small maintenance shops, and two wastewater retention basins in January 2017 to make room for construction and laydown area for the AEC CCGT. Construction of the AEC CCGT will commence during the second quarter of 2017 and will be completed by the second quarter of 2020. The AEC CCGT is expected to commence commercial operation before May 1, 2020. Construction of the AEC SCGT is scheduled to proceed from the second quarter of 2020 through the third quarter of 2021, and Power Block 2 is expected to commence commercial operation in the third quarter of 2021. A temporary construction access road may be constructed offsite beginning at the intersection of Studebaker Road and Loynes Drive traveling southeast to the AEC site. Construction of the AEC will require the use of

onsite laydown areas (approximately 8 acres dispersed throughout the existing site) and an approximately 10-acre laydown area located adjacent to the existing site.

5.6.2 Affected Environment

5.6.2.1 Existing Land Uses within the Study Area

Only the City of Long Beach's land use policies apply to the AEC project as the project features are located entirely within the City. Nevertheless, consistent with land use discussion set forth in Appendix B(g)(3)(A), the AEC AFC study area encompasses the area within a 1-mile radius of the project site and laydown areas and within one-quarter mile of any project-related linear facilities, as shown in Figure 5.6-1. The study area includes the southeastern portion of Long Beach, the westernmost portion of Seal Beach, and a small area within Rossmoor (an unincorporated community within the County of Orange). State Route 22 (7th Street) and Westminster Boulevard/East 2nd Street are the main east-west transportation corridors in the study area, and State Highway 1 (Pacific Coast Highway) and North Studebaker Road are the main north-south transportation corridors in the study area. The surrounding areas are largely built-out; therefore, new large-scale development within the study area is unlikely to occur. Existing land uses are described in greater detail in Section 5.6.2.1.4. Figure 5.6-1 shows the four existing land use categories within the study area: Residential, Commercial, Industrial, and Other (Other uses include Institutions/Schools, Open Space/Parks, Harbor/Airport, Right-of-Way, and Not Assigned, which is the Los Cerritos Channel and associated Wetlands area).

City of Long Beach. The AEC site, laydown areas and, proposed offsite process/sanitary wastewater pipeline and construction access road are located entirely within the City of Long Beach. The Southern California Edison switchyard is located north of the site; beyond that are State Highway 22 and city of Long Beach residences. The San Gabriel River and the LA Department of Water and Power (LADWP) Haynes Generating Station are to the east of the site; beyond that is the City of Seal Beach. In addition, the San Gabriel River Bike Trail travels along the eastern bank of the San Gabriel River east of the site. Land uses immediately south of the AEC site include the Plains West Coast Terminals petroleum storage facility and the proposed 10-acre laydown area (currently an undeveloped/vacant property).

To the west, the site is bounded by Studebaker Road, a major north-south thoroughfare in the city of Long Beach; west of and parallel to Studebaker Road is the Los Cerritos Channel. Land uses west of the site consist largely of mixed uses including the Los Cerritos Channel, the Alamitos Generating Station ocean water inlets, city of Long Beach residences, open space/recreation areas, and scattered commercial nodes. The nearest recreational use is the Long Beach Bikeway Route 10, which travels along the western bank of the Los Cerritos Channel within Channel View Park. Schools in the study area include: Rosie the Riveter Charter High School, which is located on the site of the AGS adjacent to the main security gate, but outside the fenced industrial site; Charles F. Kettering Elementary School; Walter B Hill Classical Middle School; and California State University Long Beach. The Los Cerritos Wetlands are located both to the west of the AEC site across North Studebaker Road and south of the site, beyond the Plains West Coast Terminals property across East 2nd Street.

City of Seal Beach. The city of Seal Beach lies east of the AEC site, across the San Gabriel River and east of the LADWP Haynes Generating Station. Land uses within this portion of the study area are mainly low- and high-density residential (Leisure World), light manufacturing and oil extraction, and recreational and natural open space areas including Edison Park and Gardens, Gum Grove Nature Park, the Los Cerritos Wetlands, and the Los Alamitos Retarding Basin.

A small portion of the Seal Beach Naval Weapons Station falls within the southeastern section of the study area. The Seal Beach Naval Weapons Station occupies approximately 5,256 acres of land within Seal Beach and provides the Navy and Marine Operating forces with ordnance, weapons, and ammunition.

Community of Rossmoor. The community of Rossmoor is approximately 0.75 mile to the northeast of the AEC site, across the San Gabriel River. Land uses within the study area include suburban residential and one elementary school site (Hopkinson Elementary School).

Specific Land Uses within the Project Study Area. In accordance with CEC siting regulations, this section provides a description of land uses located within the study area, including residential, commercial, industrial, recreational, scenic, agricultural, natural resource protection and extraction, educational, religious, cultural, historic, and unique. Table 5.6-1 lists potentially sensitive receptors, such as schools, recreational, healthcare, and religious facilities and approximate distances from the nearest project features, and Figure 5.6-1 shows existing land uses and potentially sensitive receptors.

TABLE 5.6-1
Sensitive Land Uses within AEC Study Area (1-mile radius)

Name of Facility	Approximate Distance from Nearest Project Feature (miles)[a]	City
Educational/Child Care		
Rosie the Riveter Charter High School	0.01 from project site 0.06 from proposed wastewater pipeline	Long Beach
Charles F Kettering Elementary School	0.15 from project site	Long Beach
California State University Long Beach	0.60 from project site	Long Beach
Walter B Hill Classical Middle School	0.75 from project site	Long Beach
Francis Hopkinson Elementary School	0.85 from project site	Rossmoor
Bonilla Family Child Care	0.88 from project site	Long Beach
Jacobs Family Child Care	0.77 from project site	Long Beach
Wells/Arlin Family Day Care	0.82 from project site	Long Beach
Seaside Child Development Center	1.00 from project site	Long Beach
Religious		
St. Theodore of Canterbury Episcopal Church	0.42 from project site	Seal Beach
Cornerstone Church	0.67 from project site	Long Beach
Redeemer Lutheran Church of Leisure World	0.75 from project site	Seal Beach
Church of Jesus Christ of Latter-day Saints	0.85 from project site	Long Beach
Recreational/Natural Open Space Facilities		
Long Beach Bikeway Route 10/Channel View Park	0.07 from project site 0.10 from proposed wastewater pipeline	Long Beach
San Gabriel River Bike Trail	0.08 from project site	Long Beach
Edison Park & Gardens	0.31 from project site	Seal Beach
College Park	0.35 from project site	Seal Beach
Rancho Los Alamitos	0.50 from project site	Long Beach
Bixby Village Golf Course	0.52 from project site	Long Beach
Jack Nichol Park	0.78 from project site	Long Beach
Sims Pond Biological Reserve	0.85 from project site	Long Beach
Leisure World Golf Course	0.89 from project site	Seal Beach
Jack Dunster Marine Biological Reserve	0.97 from project site	Long Beach
Gum Grove Nature Park	1.00 from project site	Seal Beach

TABLE 5.6-1

Sensitive Land Uses within AEC Study Area (1-mile radius)

Name of Facility	Approximate Distance from Nearest Project Feature (miles)[a]	City
Natural Resource Protection and Natural Resource Extraction Areas		
Los Cerritos Wetlands	0.12 from project site 0.10 from proposed wastewater pipeline	Long Beach
Hellman Ranch	0.60 from project site	Seal Beach
Healthcare		
Leisure World Health Care Center	0.85 from project site	Seal Beach
Veterans Administration Long Beach Healthcare Center	1.00 from project site	Long Beach
Retirement Housing Foundation	1.00 from project site	Long Beach

[a] The distance is not listed if the facility is over 0.25 mile from the proposed offsite process/sanitary wastewater pipeline.
Source: Google Earth; EDR, 2013

Residential. As shown in Figure 5.6-1, residential areas (including residences within mixed-use areas) constitute the majority of land uses within the study area. The residences closest to the AGS site are located approximately 500 feet to the west across the Los Cerritos Channel within the city of Long Beach. The closest residence to the noise-producing equipment (combustion turbine) is located approximately 1,200 feet to the west of the closest combustion turbine on East Vista Street (see Section 5.7, Noise).

Commercial. Sporadic commercial facilities occur within the study area, including marina/coastal recreation-serving commercial businesses around the Alamitos Bay southwest of the site, two small shopping center-nodes located approximately 0.70 mile to the north and approximately 0.80 mile to the west, as well as a large strip mall and business complex located approximately 0.70 mile to the southwest.

Industrial. The existing Alamitos Generating Station, the SCE switchyard and electrical transmission lines, the LADWP Haynes Generating Station, and the Plains West Coast Terminals petroleum storage facility are the main industrial facilities in the study area. Boeing Integrated Defense Systems light manufacturing uses are southeast of the site in Seal Beach beyond the LADWP facility. In addition, there are a number of active oil wells in the study area, the majority of which are within the Los Cerritos Wetlands and Hellman Ranch areas located west, south, and southeast of the site. No other large-scale industrial development exists within the study area.

Recreation. Eleven recreational facilities (both public and private) occur in the study area including local parks, bike trails, Edison Park and Gardens, two golf courses, biological preserves and Gum Grove Nature Park. The two closest recreational facilities are bike trails: (1) Long Beach Bikeway Route 10/Channel View Park, located approximately 0.07 mile west of the site along the western bank of the Los Cerritos Channel within Channel View Park, and (2) the San Gabriel River Bike Trail, located approximately 0.08 mile east of the site along the eastern bank of the San Gabriel River. The location of these facilities is provided in Figure 5.6-1 and their distance from the AEC site is listed in Table 5.6-1.

Scenic Areas. There are no designated scenic areas or land uses within the study area. The area surrounding the AEC site is largely a mix of industrial, residential, recreational, and open space areas, with sporadic commercial facilities. The area immediately surrounding the site is dominated by industrial use. The existing Alamitos Generating Station, the SCE switchyard and electrical transmission lines, the LADWP Haynes Generating Station, and the Plains West Coast Terminals petroleum storage facility visually dominate the area, especially for viewers in the residential neighborhoods to the north, west, and east of the site and viewers using the Long Beach Bikeway and San Gabriel River Bike Trail. The AEC site is visible from the Pacific Coast Highway (located approximately 0.7 mile west of the site at its closest point), which is not eligible for

State Scenic Highway status (Caltrans, 2013). No roadways in the project vicinity have a scenic highway designation.

Agricultural Use. Due to extensive development, there are no agricultural zones within the city of Long Beach. The California Department of Conservation (DOC), Farmland Mapping and Monitoring Program (FMMP) developed categorical definitions of important farmlands for land inventory purposes. Important farmlands provide the best opportunity for agricultural production. Land designated as Prime Farmland or Farmland of Statewide Importance has a good combination of physical and chemical features for the production of agricultural crops.

According to Patrick Hennessy at the DOC, and the Los Angeles County Williamson Act Map 2012/2013 (DOC, 2012), Long Beach is not currently mapped by the FMMP due to the highly urbanized character of the area. Therefore, the AEC site does not have a FMMP designation and does not have a Williamson Act contract.

Small section of land designated as Unique Farmland occurs within the study area approximately 0.6 mile northeast of the AEC site within Seal Beach (DOC, 2012). This Unique Farmland is a community garden managed by the City's Community Services Department within the Edison Park and Gardens with plots available to residents of Seal Beach. All other land within the study area is not in agricultural use, not designated as agricultural or farmland, and does not have Williamson Act contracts (DOC, 2013). Two areas of designated Prime Farmlands are located just outside of the study area and are associated with the US Naval Weapons Station approximately 1.3 mile east and the Los Alamitos Joint Forces Training Base approximately 1.97 mile northeast. Designated areas for grazing are also located within the Naval Weapons grounds (DOC, 2012).

Natural Resource Protection and Natural Resource Extraction Areas. The AEC site lies within the Seal Beach oil field, with major oil field developments located outside the limits of the site within the Los Cerritos Wetlands and Hellman Ranch areas to the west, south, and southeast. There are no active oil, gas, or geothermal wells within the AEC site boundary or along the proposed wastewater pipeline alignment. According to online maps of the California Division of Oil, Gas and Geothermal Resources (CDOGGR, 2012), many oil wells within the Seal Beach oil field, particularly those to the west of the project site, have been plugged and are no longer active; however, a number of active oil wells occur in the study area (see Figure 5.4-3 in Section 5.4, Geologic Hazards and Resources). There are no active wells to the north or east of the site.

The project site is an urbanized environment characterized by infill industrial development. The project site is not within the area of any adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.

Education. Five educational facilities occur in the study area, the two closest are a charter high school (Rosie the Riveter Charter High School) located on the AGS property adjacent to the main security gate, and an elementary school (Charles F Kettering Elementary School) located approximately 0.15 mile northwest of the AEC site boundary. The locations of the five educational facilities within the study area are depicted in Figure 5.6-1 and distances from the AEC site are listed in Table 5.6-1.

Religious. Four churches or religious facilities occur within the study area. The proximity of these facilities to the AEC is listed in Table 5.6-1.

Cultural and Historic. Section 5.3, Cultural Resources, provides a discussion of cultural and historic resources in the study area, including implementation of standard mitigation measures to address incidental discovery of resources during construction activities.

Unique Land Uses. No unique land uses have been identified within the study area.

5.6.2.2 Land Use at the AEC Site Construction Laydown Areas and Access Road

The existing Alamitos Generating Station was built from 1955 to 1967, has been operational since the late 1950s, and occupies approximately 71 acres. It was previously owned and operated by SCE and subsequently acquired by the AES Corporation in 1998. The Alamitos Generating Station is a 1,950 megawatt, natural-gas-fueled power plant. Seven generating units were originally operating at the facility. Unit 7 has since been retired in place and the generating components removed, and Units 1–6 are currently operational. SCE owns and operates electrical switchyards located north of the site.

The AEC site encompasses the entire approximately 71-acre Alamitos Generating Station site. In addition, the existing plant has various ancillary facilities that will be used to support AEC, such as the administration, maintenance and certain warehouse buildings, existing Southern California Gas Company natural gas pipeline, City of Long Beach water connections, the existing SCE switchyard, and other infrastructure. Other existing infrastructure at Alamitos Generating Station, such as the fire water distribution, including two emergency electric-driven fire water pumps, and process water distribution and storage systems will be re-used to the greatest extent possible.

As discussed previously, construction of the AEC will require the use of onsite laydown areas (approximately 8 acres dispersed throughout the existing site) and an approximately offsite 10-acre laydown area located on the southern boundary of the AEC site. In addition, a temporary construction access road may be constructed offsite beginning at the intersection of Studebaker Road and Loynes Drive traveling southeast to the project site.

5.6.2.3 General Plan Land Use Designations

General Plan Land Use Designations within the Study Area. Land use provisions included in every California city and county general plan (California State Planning Law, Government Code Section 65302 et seq.) reflect the goals and policies that guide the physical development of land in each jurisdiction. This section describes the land use designations within a 1-mile radius of the AEC site and laydown areas, and within 0.25 mile of the proposed offsite process/sanitary wastewater pipeline and access road. Figure 5.6-2 shows the general plan land use designations within the study area and Table 5.6-2 describes these designations.

TABLE 5.6-2

General Plan Land Use Designations within AEC Study Area (1-mile radius)[a]

General Plan Land Use Designation	Allowable Uses Description
City of Long Beach	
7 - Mixed Uses (700) - Project site, offsite process/sanitary wastewater pipeline and access road	Intended for large, multi-purpose activity centers, and may include employment centers, such as retail, offices, medical facilities; moderate-to-high density residences; visitor-serving facilities; personal and professional service; or recreational facilities. Not intended for uses that may have a detrimental effect on ambiance, environment, or social well-being of the area; however, the designation does not preclude areas which have as their base industrial, manufacturing, or warehousing uses.
1- Single Family Residential (100)	Single-family residential units (Maximum one DU per lot; 7 DU/acre on “standard” lot sizes; densities higher than 7 DU/acre may be permitted in areas where smaller lot sizes are permitted by zoning.)
3A - Townhomes (301)	Single-family duplexes, townhomes, condominiums, and apartments (Maximum 25 units per acre.
3B - Moderate Density Residential (302)	Condominiums and apartment units (Overall maximum of 30 DU/acre, but varies based on parcel size.
8N - Shopping Nodes (805)	Small, neighborhood-serving centers with retail and service uses exclusively; primarily in small clusters.

TABLE 5.6-2

General Plan Land Use Designations within AEC Study Area (1-mile radius)[a]

General Plan Land Use Designation	Allowable Uses Description
10 - Institutional /Schools (1000)	City civic centers, county and state regional office buildings, academic research institutes and headquarters, colleges, universities, major hospitals, cemeteries, public schools, and other public uses.
11 - Open Space/Parks (1100)	Parks; plazas; promenades and boardwalks; vacant lots; cemeteries; community gardens; golf courses; flood control channels and basins; rivers and river levees; utilities rights-of-way (e.g. transmission tower areas); oil drilling sites; median strips and back up lots; offshore islands; marinas and inland bodies of water; beaches and the ocean; estuaries and lagoons; and other areas that are essentially unimproved and largely devoted to an undeveloped or unconstructed type of use.
Not Assigned (9999)	Designation associated with the Los Cerritos Wetland Area, which comprises of approximately 500 acres along the San Gabriel River and the border of Los Angeles and Orange counties. The Los Cerritos Wetland Authority provides for the acquisition, protection, conservation, restoration, maintenance, and operation, and environmental enhancement of the area consistent with goals of flood protection, habitat protection and restoration, improved water supply, water quality, groundwater recharge, and water conservation.
City of Seal Beach	
Residential Low Density	Maximum of 9 single-family DU/acre. 5,000 square feet minimum lot size.
Residential High Density	Multi-unit residential developments. Lot size, density, and building intensity limits based on Planning Area. Building intensity ranges from a maximum of 20 DU/acre to a maximum of 45.3 DU/acre; minimum lot area ranges from 960 to 2,178 square feet.
Service Commercial	Commercial establishments selling a broad range of convenience and consumer goods or providing a variety of personal services. Minimum lot area of 7,000 square feet, maximum floor area ratio ranging from 0.50 to 0.75.
Community Facility	Places, buildings, activities, and services rendered by public agencies on behalf of the general public. Public uses may include administrative, educational, cultural, recreational, and protective activities.
Light Industrial	Site specific light industrial land uses within designated industrial park areas. Minimum lot area of 10,000 square feet, maximum of 0.70 floor area ratio.
Oil Extraction	Site specific oil extraction land uses (i.e. Hellman Ranch oil production area).
Open Space	Designated public or private land that provides a valuable open space resource for the community.
Park	Designated public or private land that provides a valuable recreational resource for the community.
Military	The function of the Seal Beach Naval Weapons Station is to provide the Navy and Marine Operating forces with ordinance weapons and ammunition.
Orange County – Rossmoor	
Suburban Residential (1B)	Provides for a wide range of housing types including estates, townhomes, condominiums, and clustered arrangements within a density range of between 0.5 and 18.0 DU/acre.

[a] AFC study area includes designations within the cities of Long Beach, Seal Beach, and Orange County - Rossmoor

Note:

DU = Dwelling Unit

Source: City of Long Beach, 1989; Los Cerritos Wetland Authority, 2013; City of Seal Beach, 2003; County of Orange, 2005a

General Plan Land Use Designations, Project Site. The AEC site, laydown areas, and access road have a General Plan LUD of No. 7 (Mixed Use) and are located within the SEADIP Specific Plan area of the General Plan and City of Long Beach LCP. The LCP is an element of the City's General Plan. Because a portion of the AEC CCGT, the construction access road, the 10-acre southern laydown area and a portion the proposed wastewater pipeline alignment are within the coastal zone (see Figure 5.6-1), they are subject to the City of Long Beach LCP (see Section 5.6.2.4, Zoning Land Use Designations, for further discussion of coastal zone requirements related to these portions of the project site).

According to the City's General Plan, the combination of land uses intended by the No. 7 (Mixed Use) LUD are:

> "*…for example, employment centers, such as retail, offices, medical facilities; higher density residences; visitor-serving facilities; personal and professional services; or recreational facilities. Not intended for inclusion with the above listed uses are those which may have a detrimental effect on the ambiance, environment, or social well-being of the area included in the district. Examples of these uses are industrial and manufacturing uses, warehousing activities, and outside storage. However, this is not to preclude the assignment of this district designation to areas which have as their base industrial/manufacturing/warehousing uses. In these cases, the appropriate accompanying land uses include offices, visitor-serving uses, retail and restaurants, and services, all for the purpose of supporting the working population within the district complex*."

Land uses in the No. 7 (Mixed Use) LUD are regulated by an area-wide planned development plan and ordinance, and land use controls and design and development standards for these areas are contained in the planned development plan/ordinance for each area (City of Long Beach, 1989). The AEC site, laydown areas, access road and wastewater line are located within the SEADIP Specific Plan area, and are located on land identified for Industrial use within this plan. The SEADIP is intended to implement the policies present in the General Plan and LCP.

The Long Beach General Plan Land Use element includes goals and policies related to development of the project site. These goals and policies are outlined in Table 5.6-3. The SEADIP sets forth specific goals, policies, and regulations regarding land use, development review processes, and design standards. Relevant policies from the Specific Plan are also outlined in Table 5.6-3. The SEADIP is described in more detail in Section 5.6.2.5.1.

TABLE 5.6-3
AEC Conformity with Local Land Use Plans and Policies

Goal/Objective/Policy	Project Consistency
City of Long Beach General Plan	
Land Use Element	
Economic Development: Long Beach will pursue economic development which focuses upon international trade, while maintaining and expanding its historic economic strengths in aerospace, bio-medicine and tourism. The primary reasons for fostering economic development are to create employment opportunities and tax revenue.	Yes. Project development (construction and operations) will create job opportunities. Refer to Section 5.10, Socioeconomics, for additional information on the economic benefits of implementing the AEC.
Facilities maintenance: Long Beach will maintain its physical facilities and public rights-of-way at a high level of functional and aesthetic quality, manifesting the pride of the citizens in their City and ensuring that future generations need not bear the burden of deferred maintenance.	Yes. The project includes construction of a new wastewater pipeline and possible upgrade to an existing LBWD sanitary pipeline. Construction and upgrade of sanitary facilities will ensure there is adequate infrastructure to support the project as well as increased reliability on these facilities.

TABLE 5.6-3

AEC Conformity with Local Land Use Plans and Policies

Goal/Objective/Policy	Project Consistency
Adequate Water Supply: Long Beach will continue to take the actions that are necessary to preserve an adequate supply of water for domestic, commercial and industrial purposes.	Yes. The AEC will continue the use of City of Long Beach "Commercial, Industrial, Irrigation, and the City" designated water for construction, operational process, and sanitary uses, but at substantially lower volumes than the existing Alamitos Generating Station has historically used. See Section 2.0, Project Description, and Section 5.15, Water Resources.
Functional Transportation: Long Beach will maintain or improve the current ability to more people and goods to and from development centers while preserving and protecting residential neighborhoods. One way that the Land Use Element can contribute to this goal is to locate sufficient employment in the City in proximity to residential areas.	Yes. Project development (demolition, construction and operations) will create job opportunities and the AEC site is located across the Los Cerritos Channel from city residences. Project will submit design plans to the CEC for review and approval prior to the commencement of construction, which will ensure design review consistent with the City's process. After approval, the design plans will be implemented. See Section 5.13, Visual Resources. The project will reuse an existing utility property, and, therefore, be considered a "recycled land use" and, therefore, it would not create more traffic and friction for the area. Refer to Section 5.12, Traffic and Transportation, for additional information on the trips associated with implementation of the AEC.
Policy Direction: Long Beach should strive to attain an attractive arterial system. Positive design steps that should be taken to improve appearances along our streets include large setbacks along the frontages, more plant materials, fewer curb cuts, and better building design and signage. Additionally recycled land uses should not be of the types that generate more traffic and friction.	
Activity Centers: All future large scale developments, such as at the site of drive-in theatres and in SEADIP, must be subjected to specific urban design plan as well as to use controls.	Yes. Project will submit design plans to the CEC for review and approval prior to the commencement of construction, which will ensure design review consistent with the City's process.
SEADIP	
Provision A1 – Prior to issuance of a building permit, all infrastructure, including street improvements, fire hydrants, water lines, storm drains, and sanitary sewers shall be constructed on a block basis in accordance with the approved plans. Such improvements, including engineering plans, shall be financed by subdivider(s) or by an assessment district or both.	Yes. Project will submit design plans to the CEC for review and approval prior to the commencement of construction, which will ensure design review consistent with the City's process.
Provision A2 – A minimum of thirty percent of the site shall be developed and maintained as usable open space (building footprint, streets, parking areas and sidewalks adjacent to streets shall not be considered usable open space. Bicycle and pedestrian trails not included within the public right-of-way may be considered usable open space). All buildings shall be set back a minimum of twenty feet from all public streets and a wider setback may be required by individual subarea. Within this minimum twenty-foot setback area, a strip having a minimum width of ten feet and abutting the street shall be attractively landscaped.	Yes. Project will submit design plans to the CEC for review and approval prior to the commencement of construction, which will ensure design review consistent with the City's process (including setbacks and landscaping).
Provision A5 – The maximum height of buildings shall be 30 feet for residential and 35 feet for non-residential uses, unless otherwise provided herein.	Yes. Stack height at the existing Alamitos Generating Station are over 200 feet. The AEC design will result in significantly shorter stacks (140-foot and 80-foot stack heights).
Provision A6 – Minimum parking for commercial and industrial uses shall be provided in accordance with parking standards as specified in the zoning regulations.	Yes. Project has been designed to provide adequate space for onsite parking and supporting functions. See Section 5.12, Traffic and Transportation.

TABLE 5.6-3

AEC Conformity with Local Land Use Plans and Policies

Goal/Objective/Policy	Project Consistency
Provision A9 – All development shall be designed and constructed to be in harmony with the character and quality of surrounding development so as to create community unity within the entire area.	Yes. Project has been designed to provide adequate protection to surrounding uses from the impacts of noise, light, visibility of activity, vehicular traffic, and other potential nuisance impacts, as discussed in Sections 5.7, Noise; 5.12, Traffic and Transportation; and 5.13, Visual Resources.
Provision A10 – Developers shall construct public open space, trails, pathways and bicycle trails for each development in such a manner that they will be generally accessible to the public and that they will interconnect with similar facilities in adjacent developments so as to form an integrated system of open space and trails connecting major points of destination.	Yes. Existing bicycle trails exist just outside of the AEC site to both the east and west (see Section 5.6.2.1.4 and Table 5.6-1). The project will be developed within the existing Alamitos Generating Station and therefore will not preclude use of the existing connecting trail system as discussed in Section 5.13, Visual Resources.
Provision A12 – Public views to water areas and public open spaces shall be maintained and enhanced to the maximum extent possible, consistent with the wetlands restoration plan.	Yes. New AEC project features will overall appear more streamlined, inclusive of lower stack heights compared to the height of existing structures at the Alamitos Generating Station facility. Project has been designed to provide adequate protection to surrounding uses from visual impacts as discussed in Section 5.13, Visual Resources.
Provision A13 – Adequate landscaping and required irrigation shall be provided to create a park-like setting for the entire area. A landscaped parkway area shall be provided along all developments fronting on Pacific Coast Highway, Westminster Avenue, Studebaker Road, Seventh Street and Loynes Drive.	Yes. The Project Owner will continue to collaboratively work with and submit design plans directly to the City for review and comment prior to the commencement of construction. After approval, the design plans will be implemented. See Section 5.13, Visual Resources.
Provision A14 – No additional curb cuts shall be permitted on Pacific Coast Highway, Westminster Avenue, Studebaker Road, or Seventh Street, unless it can be shown that inadequate access exists from local streets or unless specifically permitted by Subarea regulations provided herein. This restriction shall not preclude the provision of emergency access from these streets as may be required by the City.	Yes. The Project Owner will submit design plans, inclusive of the temporary construction access road, to the CEC for review and comment prior to the commencement of construction, which will ensure design review consistent with the City's process.
Provision A15 – All utility lines shall be placed underground and utility easements shall be provided as required unless waived by the Commission on the advice of the Director of Public Works.	Yes. The proposed offsite wastewater pipeline will be placed underground as it travels from the site south to the intersection with Loynes Drive, then will be affixed to the bridge as it extends westward and crosses over the Los Cerritos Channel. The pipeline will then be undergrounded again as it heads north on East Vista Street to connect to the existing LBWD sanitary system.
Provision A16 – Developers shall construct, in accordance with plans approved by the Director of Public Works, all necessary sanitary sewers to connect with existing public sewers, and shall provide easements to permit continued maintenance of these sewers by the City where the City accepts responsibility for such maintenance.	Yes. The Project Owner will submit design plans to the CEC for review and approval prior to the commencement of construction, which will ensure design review consistent with the City's process.
Local Coastal Program	
The LCP adopted the SEADIP Specific Plan by reference. Specific development and use standards are provided within the SEADIP Specific Plan.	Yes. The Project is consistent with the provisions and specific development and use standards within the SEADIP.

TABLE 5.6-3

AEC Conformity with Local Land Use Plans and Policies

Goal/Objective/Policy	Project Consistency
City of Long Beach Zoning Regulations	
21.37.050 Development standards: Development plans approved by the City Council shall serve as the applicable zoning regulations for a PD zone. Whenever a PD zone does not contain any standards for a particular aspect of development such as landscaping, then the development standards for that aspect of a zoning district which is closest to the overall intent of the particular planned development district shall apply.	Yes. The Project Owner will submit design plans to the CEC for review and approval prior to the commencement of construction which will ensure design review consistent with the City's process. The Project Owner will continue to collaboratively work with and submit design plans directly to the City for review and comment prior to the commencement of construction.
21.37.060 Site plan review: Site plan review is required for all development proposals within PD districts pursuant to Division V of Chapter 21.25 (Specific Procedures) of this Title. The Site Plan Review Committee shall refer to the Planning Commission all planned development project applications which vary from the general or specific use and development standards but which are consistent with the intent of the particular planned development district.	Yes. The Project Owner will submit design plans to the CEC for review and approval prior to the commencement of construction which will ensure design review consistent with the City's process.
21.22.010 A. The industrial districts are established to preserve and enhance areas for a broad range of industrial and manufacturing uses, recognizing that such uses provide employment, contribute to the City's tax base, and create products needed by consumers and the business community at large. 21.22.010 B. These regulations are intended to accommodate a broad range of current and future industrial and manufacturing uses, and associated technologies, at appropriate locations in the City, provided that safeguards are in place to address environmental and aesthetic concerns; to protect public health and safety; and to ensure that businesses operate within the clearly defined limits of what is allowed. 21.22.010 C. In recognition of the fact that industrial and manufacturing technologies change over time, the City has structured these regulations to address the operating characteristics and processes of industrial uses, rather than specific businesses. Thus, the determination of whether a use is permitted by right or requires discretionary review will necessarily require interpretation based upon the criteria contained in Sections 21.33.020 through 21.33.080. Pursuant to the provisions of Subsection 21.33.060.D of this Chapter 21.33, the Zoning Administrator is authorized to make such interpretation.	Yes. The AEC site is zoned as PD-1 and will be developed in accordance with the provisions of the IG zone (consistent with the SEADIP development and use standards). The industrial use proposed for the site will create job opportunities, contribute to the City's tax base, and create products (electricity) needed by the community and the western Los Angeles basin. The AEC will be constructed within the industrial site boundaries of an existing power generating facility, add more streamlined equipment and facilities inclusive of new stacks with lower overall structure height than currently exists at the site, and has been designed to provide adequate protection to surrounding uses from visual impacts (as discussed in Section 5.13, Visual Resources). While power generating facilities are not specifically listed as an allowable use in the IG zone, the AEC is consistent with the IG Zone's emphasis on the "industrial sanctuary": "The General Industrial (IG) district is considered the City's 'industrial sanctuary' district where a wide range of industries that may not be desirable in other districts may locate. The emphasis is on traditionally heavy industrial and manufacturing uses. The IG district is intended to promote an 'industrial sanctuary' where land is preserved for industry and manufacturing, and where existing industries are protected from non-industrial users that may object to the operating characteristics of industry." (Long Beach Zoning Ordinance, Section 21.33.020.C.) The AEC will be constructed within the industrial site boundaries of an existing power generating facility, has an existing base of industrial uses, and is immediately surrounded by other industrial facilities. Therefore, the AEC is consistent with the intent of the PD-1 Industrial IG zone.

Sources: City of Long Beach, 1977, 1980, 1989, 2013b

5.6.2.4 Zoning Land Use Designations

Project Area Zoning Designations. The purpose of the City of Long Beach Zoning Regulations (Title 21 of the Municipal Code) is to regulate land use development within the City of Long Beach in conformance with the General Plan and to promote and preserve the public health, safety, comfort, convenience, prosperity and general welfare of the people of Long Beach. The Zoning Regulations also function to implement the LCP, which implements the City's SEADIP, as well as public access and recreation policies of the California Coastal Act. Specifically, the intent of the City's Zoning Regulations is to achieve a number of objectives that include but are not limited to: protect residential, commercial, industrial, public and institutional areas from the intrusion of incompatible land uses; assure preservation of adequate space for commercial, industrial and other activities necessary for a healthy economy; promote the growth and productivity of the City's economy; and provide opportunities for establishments to be located for efficient operation in a mutually beneficial relationship to each other and to shared services. This section describes zoning designations within a 1-mile radius of the AEC site and laydown areas as well as within 0.25 mile of the offsite process/ sanitary wastewater pipeline and access road. Figure 5.6-3 shows the zoning districts within the study area and Table 5.6-4 defines the allowable uses.

TABLE 5.6-4

Zoning Designations in the Study Area—Cities of Long Beach, Seal Beach, and Orange County – Rossmoor

Zoning Designation	Description
City of Long Beach	
Planned Development 1 – SEADIP (PD-1) – Project site, offsite laydown area, offsite process/sanitary wastewater pipeline and access road	The SEADIP provides for a total community of residential, business and light industrial uses integrated by an extensive system of parks, open space, and trails. Subarea 19 (Project Site, offsite laydown area, and access road) of the SEADIP is fully developed with industrial land uses. Subarea 9 (Wastewater pipeline) is fully developed with residential uses. Subarea 22(b) (Wastewater pipeline) includes a golf course open to the general public Subarea 24 "South" (Wastewater pipeline) includes an overlook area and interpretive center for the bordering marsh.
Commercial Neighborhood Automobile-Oriented (CNA)	The Neighborhood Commercial Zoning Districts provide small scale, neighborhood compatible uses. Scale is determined by the size of adjoining residential uses, commercial lot size, and commercial street width. This CNA district is auto-oriented with buildings set back from the front property line and parking located between the building and the street.
Institutional (I)	Established to create, preserve, and enhance areas for public and institutional land uses and to provide restrictions to minimize the effect of such uses on surrounding uses.
Park (P)	Established to set aside and preserve publicly owned natural and open areas for active and passive public use for recreational, cultural and community service activities. Such areas are characterized by landscaped open space, beaches or inland bodies of water.
Planned Development 4 - Long Beach Marina (PD-4)	Intended to provide a set of land use regulations for the unique Long Beach Marina and its subareas. Principal uses include commercial retail, professional services, entertainment services, recreational uses, parking, and other marine-related uses.
Public Right-of-Way (PR)	Established to create, enhance, and preserve open areas of public rights-of-way and to protect such areas from encroachment by other uses.
R-1-N	A single-family residential district with standard lots that recognizes the outdoor lifestyle characteristic of Southern California and is established to protect such areas from overcrowding and conversion to higher densities.
R-4-N	A high density, multi-family residential district intended to meet the demand of a broad segment of the population which provides a diversity of houses choices.

TABLE 5.6-4

Zoning Designations in the Study Area—Cities of Long Beach, Seal Beach, and Orange County – Rossmoor

Zoning Designation	Description
R-4-R	A moderate density, multi-family residential district designed to encourage full development in established moderate density neighborhoods.
City of Seal Beach	
General Commercial, Specific Plan Regulation (GC -SPR)	Allows for sub-regional and regional centers of commercial activity and may include both pedestrian- and auto-oriented development. Other typical uses are auto service stations, auto repair, and sales.
Light Manufacturing (LM); LM - SPR (BOEING)	Business park environmental for moderate- to low-intensity commercial services and light manufacturing uses.
Military (MIL)	No description provided in City of Seal Beach zoning regulations. The function of the Seal Beach Naval Weapons Station is to provide the Navy and Marine Operating forces with ordinance weapons and ammunition.
Oil Extraction (OE - SPR) (HELLMAN RANCH)	Oil extraction and related production storage and processing, maintenance facilities, and related operational and maintenance facilities.
Open Space, Natural (OS-N) (SPR)	Preserve publicly owned parklands, environmentally sensitive lands and habitats in their natural state. Uses permitted shall be limited to those that maintain the property in its natural state.
Open Space, Parks and Recreation (OS-PR)	Appropriately located areas devoted to public recreation and recreational uses, including parks, playgrounds, swimming centers, tennis and basketball courts, golf courses, community centers within the facilities, and accessory concession sales.
Professional Office (PO)	Allows for office, medical and related uses that may also serve as a buffer area between residential areas and more intensive commercial areas.
Public and Semi-Public (PS)	Allows for appropriate public uses, including private utilities (electrical, gas, water, and telecommunications), schools (both private and public), and other city, county, state, or federal facilities.
Recreational Golf (RG)	Allows for golf courses and associated club houses, maintenance facilities, accessory concession sales, and related plant nurseries.
Residential High Density (RHD) -33	Allows for multi-unit high density residential developments with a maximum of 33 DU/acre. Additional density may be achieved through density bonuses.
RHD-PD	Allows for multi-unit high density residential land uses in a planned development with a maximum of 33 DU/acre.
Residential Low Density (RLD) -15; RLD-15	Minimum lot area of 5,000 square feet/DU; maximum density of 15 DU/ac.
Residential Low Density (RLD) -9; RLD-9 (SPR)	Allows for single-unit and small, zero-lot line neighborhoods with a maximum density of 9 DU/acre.
Specific Plan Regulation (SPR)	All property in the Specific Plan Regulation (SPR) Zone shall be used only for the purposes permitted by the General Plan and the Specific Plan adopted for such property.
Orange County – Rossmoor	
R1/28 (C3849)	Established to provide for the development and maintenance of medium density single-family detached residential neighborhoods. Only those uses are permitted that are complementary to and can exist in harmony with such a residential neighborhood. Maximum building height is 28 feet.

Source: City of Long Beach, 2013b; City of Seal Beach, 2013; Orange County, 2013.

Project Site Zoning Designations. The AEC site, laydown areas, proposed wastewater pipeline alignment, and access road are zoned Planned Development (PD). The PD district is established to allow flexible development plans to be prepared for certain areas of the city that may benefit from unique or special land use and design controls not otherwise possible under conventional zoning regulations. Purposes of the PD district include permitting a compatible mix of land uses, allowing for planned commercial areas and business parks, and encouraging a variety of housing styles and densities.

More specifically, the AEC site, and linears are within the SEADIP (PD-1) Specific Plan area. Zoning and use designations for the site, onsite and offsite laydown areas, proposed offsite process/sanitary wastewater pipeline, and access road within the SEADIP are defined in Table 5.6-4 and Section 5.6.2.5.1, and development standards applicable to the AEC site, laydown areas and access road are described in Table 5.6-3. The project does not propose changes to the zoning designation for the site.

A portion of the AEC CCGT, the construction access road, the 10-acre southern laydown area and a portion of the proposed wastewater pipeline alignment are within the coastal zone and located in the Southeast Area Communities/SEADIP area of the City's LCP. But for the CEC process, which preempts the local permitting process, the AEC would require a site plan review and approval of a Coastal Development Permit (CDP) from the City of Long Beach for construction activities within a SEADIP PD-1 zone district and the coastal zone. However, certification of the AEC will act in lieu of a CDP for construction/demolition activities related to the proposed project. The CEC process will address compliance with applicable General Plan, LCP, Zoning Code and Development Standards requirements.

5.6.2.5 Other Applicable Planning Documents

As stated previously, in addition to the General Plan and Zoning, development at the project site is governed by site-specific goals, policies and regulations found in the SEADIP and LCP.

South East Area Development and Improvement Plan (SEADIP). A specific plan, in its most basic practical function and form, is a plan (document) that encompasses a smaller and more specific geographic focus and contains a greater level of detail relative to the location and range of permitted land uses, allowable building densities, development standards, architectural design guidelines, necessary transportation and circulation systems, and infrastructure systems than are generally provided, or are legally required, within a jurisdiction's General Plan. Under California Government Code (Planning, Zoning, and Development Laws) Section 65451, the goals, objectives, and policies contained within a specific plan must be found to be consistent with the goals, objectives, and policies of the adopted general plan of the city or county in which the specific plan planning area falls.

The SEADIP plan covers approximately 1,470 acres of land and largely represents the southeastern quadrant of the city of Long Beach. The SEADIP area is roughly bounded by Colorado and Seventh streets (to the north), Marina Stadium (to the west), and the Orange County border (to the east and south). The Specific Plan contains provisions that pertain to the entire planning area, as well as specific development and use standards for 33 subareas.

The AEC site, proposed offsite laydown area, construction access road, and offsite process/sanitary wastewater pipeline are all located in Subarea 19 of the SEADIP which is designated for industrial uses. Specific development and use standards provided in the SEADIP for Subarea 19 include:

Use: Industrial

This area is fully developed in accordance with the provisions of the MG zone. [General Manufacturing (MG) is equivalent to General Industrial (IG) in the City's zoning regulations (Griffiths, 2013; Brown, 2013)]

Commercial storage/self-storage (21.15.570) shall be allowed by Conditional Use Permit (21.52.219.5).

The industrial districts are established to preserve and enhance areas for a broad range of industrial and manufacturing uses, recognizing that such uses provide employment, contribute to the City's tax base, and

create products needed by consumers and the business community at large. The City's Zoning Regulations defines the General Industrial (IG) district as:

> "*…the City's "industrial sanctuary" district where a wide range of industries that may not be desirable in other districts may locate. The emphasis is on traditionally heavy industrial and manufacturing uses. The IG district is intended to promote an "industrial sanctuary" where land is preserved for industry and manufacturing, and where existing industries are protected from non-industrial users that may object to the operating characteristics of industry. Performance standards still must be met, but the development standards are the minimum necessary to assure safe, functional, and environmentally-sound activities.*
>
> *The IG district includes uses such as large construction yards with heavy equipment, chemical manufacturing plants, rail yards, and food processing plants. The buildings that house these operations may be older industrial buildings retrofitted to accommodate the use, or new state-of-the-art manufacturing plants. As is the case with all the industrial districts, the focus of the IG district is on the operating characteristics of the use, rather than the particular product created*.

The proposed wastewater pipeline crosses Subarea 24 and extends into Subarea 9 of the SEADIP. The existing sewer line extends through Subareas 9 and 22(b) of the SEADIP. Specific development and use standards provided in the SEADIP for these subareas include:

- Subarea 9: is fully developed with residential uses.
- Subarea 22(b): golf course open to the general public.
- Subarea 24 "South": overlook area and interpretive center for the bordering marsh.

Figure 5.6-4 shows the SEADIP subarea designations within the study area. Discussion of the project's conformance with the Specific Plan can be found in Section 5.6.3.2.2 and Table 5.6-3.

Long Beach Local Coastal Program. As defined in Coastal Act Section 30108.6, an LCP consists of a local government's land use plans, zoning ordinances and maps, and other implementing actions, which taken together, meet the requirements of and implement the provisions and policies of the Coastal Act at the local level.

An LCP consists of two parts:

1. A coastal element including policies and a land use plan (LUP), and
2. An implementation program with zoning ordinances, maps, and other implementing actions.

The City of Long Beach Coastal Zone encompasses approximately 3,100 acres of land (or 4.84 square miles) in south Long Beach, bounded by Loynes Drive, Colorado Street, 6th Street, Broadway, and Ocean Boulevard to the north, the City of Long Beach municipal boundary to the east, the Los Angeles County Flood Control Channel to the west, and the Pacific Ocean to the south.

The LCP was adopted by the Long Beach City Council on February 12, 1980, and certified by the California Coastal Commission (CCC) on July 22, 1980. The CCC subsequently certified conditions and amendments to the LCP through January 1994 (CCC, 2012). The LCP area is split into seven subareas: Downtown Shoreline, Areas A through E, and SEADIP. A portion of the AEC CCGT, the construction access road, the 10-acre southern laydown area and a portion the proposed wastewater pipeline alignment are within the SEADIP subarea of the LCP. One of the steps for preparation of the City's LCP was incorporation of the SEADIP Specific Plan, which is adopted by reference as an integral part of the Long Beach LCP. SEADIP is identified as the Southeast Area Communities subarea within the LCP and is described as follows:

> "This sub-area encompasses the entire southeast corner of Long Beach. It is the "newest" area of the City in the sense that nearly all of the development is of very recent origin. Although

> principally a residential community, it also contains considerable commercial development and two very large electric generating plants. There is much land in SEADIP being used for oil production. When this resource is depleted, the land will be available for urban development."[37]

Consistent with the City's General Plan and the SEADIP, a portion of the AEC CCGT, the construction access road, the 10-acre southern laydown area and a portion the proposed wastewater pipeline alignment are identified for mixed uses (No. 7) within the LCP. Specific development and use standards that apply to the portions of the site within the Coastal Zone are provided within the SEADIP Specific Plan.

5.6.2.6 Recent or Proposed Zone Changes and General Plan Amendments

City of Long Beach. The City is in the process of updating its General Plan (General Plan 2030). In October 2013, the City adopted a Mobility Element and the 2013-2021 Housing Element was adopted on January 7, 2014. Other than these new elements, drafts of other proposed updates are not available at this time. Visioning for the General Plan 2030 update includes organized and designated place types and specific neighborhood strategies within 10 specific neighborhoods in the City. One of the urban design ingredients in creating place types is the focus on holistic places and "people-centric instead of land use-centric" concepts (City of Long Beach, 2013a). Planning strategies for the General Plan 2030 update identify the AEC site as within the Southeast/SEADIP Neighborhood with a proposed future land use, or place type, designation of Economic Engine – Industrial (I) (City of Long Beach, 2013a). Characteristics of the Industrial place type include (City of Long Beach, 2013a):

- Protect industrial lands, increase jobs
- Revitalize outdated industrial areas
- Encourage sustainable, green uses
- Provide long-term base of jobs

The City is currently in a long-range planning process which began in 2013 to update the SEADIP (PD-1) zoning district and LCP. The vision for "Southeast Long Beach is a livable, thriving, ecologically diverse and sustainable coastal gateway and destination in the City and Southern California region" (City of Long Beach, 2014c). This Specific Plan update is expected to be a 3-year planning effort with extensive public outreach and interagency involvement. At present, a proposed Land Use Plan has been developed (Placeworks, 2015) and preparation is underway of Draft Specific Plans including those for development standards, design guidelines, circulation, public realm and amenities, infrastructure phase, and administration. The proposed Land Use Plan proposes no change in land use or zoning for the AEC site, including the offsite laydown area and construction access road. The strategy for the update is to "provide clear guidance for future development, preserve neighborhoods, improve coastal access, and guarantee habitat protection" (City of Long Beach, 2015d). Major issues are the protection, restoration, and enhancement of the Los Cerritos Wetland area, the continuation of oil drilling in the area, intensification of development, traffic, and protection of priority uses, particularly at the Seaport Marina Hotel site.

City of Seal Beach. There are no recent or proposed General Plan amendments and rezones that could affect the project site (Olivera, 2013) (Fowler, 2015).

County of Orange - Rossmoor. There are no recent or proposed General Plan amendments or rezones within the Community of Rossmoor that could affect the project site (Vuong, 2013).

Recent Discretionary Review by Public Agencies. No discretionary reviews related to General Plan or zone changes are currently being processed in the City of Long Beach or the City of Seal Beach that could affect the AEC.

[37] Since this plan was certified in 1980, some of the descriptions are outdated.

5.6.2.7 Population and Growth Trends

Land use and growth trends identified for the AEC study area are based on population estimates, projections, and current land use plans. Long Beach's 2010 population estimate is 462,257. In 2000, it was estimated to be 461,522 (DOF, 2013). Long Beach has a median household income of $52,711 and 40.9 percent of the homes are owner-occupied (U.S. Census Bureau, 2013). The city has an unemployment rate of 7.6 percent; slightly higher than the state unemployment rate of 6.1 percent (EDD, 2015).

5.6.3 Environmental Analysis

5.6.3.1 Significance Criteria

Appendix G of the California Environmental Quality Act is a screening tool, not a method for setting thresholds of significance. Appendix G is typically used in the Initial Study phase of the CEQA process, asking a series of questions. The purpose of these questions is to make a determination as to whether a project requires an Environmental Impact Report, a Mitigated Negative Declaration or a Negative Declaration. As the Governor's Office of Planning and Research stated, "Appendix G of the Guidelines lists a variety of potentially significant effects, but does not provide a means of judging whether they are indeed significant in a given set of circumstances." The answers to the Appendix G questions are not determinative of whether an impact is significant or less than significant. Nevertheless, the questions presented in CEQA Appendix G are instructive.

In terms of potential effects on land use, Appendix G, asks, in part, whether the project would:

- Will the project physically divide an established community?
- Will the project conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project (including, but not limited to, the general plan, specific plan, local coastal program, or zoning ordinance) adopted for the purpose of avoiding or mitigating an environmental effect?
- Will the project conflict with any applicable habitat conservation plan or natural community conservation plan?
- Will the project convert prime farmland, unique farmland, or farmland of statewide importance (farmland), as shown on the maps prepared pursuant to the FMMP of the California Resources Agency, to nonagricultural use?
- Will the project involve other changes in the existing environment which, given their location and nature, could result in conversion of farmland to nonagricultural use?

5.6.3.2 Potential Effects on Land Use during Project Construction and Operation

Divide an Established Community. The existing generating facilities do not physically divide an established community. The AEC will be located within the larger 71 acre AGS parcel, and the existing facility is immediately surrounded by industrial uses. The land is designated for industrial uses under the SEADIP. The proposed project—construction of a new power plant on the site of an existing power plant and temporary use of vacant land as a 10-acre laydown area and access road during construction—is not a change in use. Therefore, the proposed project will not divide an established community, affect access to the city or the project area, or introduce incompatible land uses to the area. In addition, the proposed project will not displace existing non-industrial development or result in new development that would physically divide an existing neighborhood, therefore potential impacts would not occur.

Consistency with an Applicable Land Use Plan, Policy, or Regulation. The AEC site, offsite laydown area, offsite process/sanitary wastewater pipeline, and access road have a General Plan and LCP use designation of No. 7 (Mixed Use). Land use controls and design and development standards for the project area in the No. 7 (Mixed Use) district are directed by the SEADIP (of the City of Long Beach General Plan and LCP). In

addition, the AEC site, laydown area, proposed wastewater pipeline alignment, and access road are zoned as PD; SEADIP (PD-1). Therefore, SEADIP provides both the land use and zoning designation for the site.

The AEC site, offsite laydown area and access road are located in Subarea 19 of the SEADIP and designated for industrial use consistent with the City's IG zone. The proposed wastewater pipeline crosses Subareas 24, 9, and 22(b) of the SEADIP. Subarea 9 is fully developed with residential uses; Subarea 22(b): golf course open to the general public; and Subarea 24 "South": overlook area and interpretive center for the bordering marsh.

While power generating facilities are not specifically listed as an allowable use within the IG zone, the purpose of the IG district was established to support development of heavy industrial uses:
"The General Industrial (IG) district is considered the City's 'industrial sanctuary' district where a wide range of industries that may not be desirable in other districts may locate. The emphasis is on traditionally heavy industrial and manufacturing uses. The IG district is intended to promote an 'industrial sanctuary' where land is preserved for industry and manufacturing, and where existing industries are protected from non-industrial users that may object to the operating characteristics of industry." (Long Beach Zoning Ordinance, Section 21.33.020.C.). In addition, development standards provided in Chapter 21.37, *Planned Development Districts*, of the City's Zoning Regulations state:

"Development plans approved by the City Council shall serve as the applicable zoning regulations for a PD zone. Whenever a PD zone does not contain any standards for a particular aspect of development such as landscaping, then the development standards for that aspect of a zoning district which is closest to the overall intent of the particular planned development district shall apply."

Further, Chapter 21.33, *Industrial* Districts, states:

"In recognition of the fact that industrial and manufacturing technologies change over time, the City has structured these regulations to address the operating characteristics and processes of industrial uses, rather than specific businesses."

The AEC site is identified for industrial use, will be constructed within the industrial site boundaries of the existing power plant, has an existing base of industrial uses and is immediately surrounded by other industrial facilities. Use of the 10-acre adjacent land for laydown as well as access road during construction will be temporary and is an allowable use under the City's IG zone. Therefore, the AEC laydown area and access road are consistent with the intent of the PD-1 Industrial IG zone.

The proposed offsite process/sanitary wastewater pipeline crosses through an area designated as an overlook area and connects to an existing LBWD sanitary line within an area designated for residential use. As the proposed pipeline will be subsurface (with the exception of a portion that crosses over the Los Cerritos Channel), no changes to the land use or zoning in these areas is proposed and no conflict with the land use or zoning for this area would occur. While the existing sanitary line extends through areas designated for residential and golf course uses, it is an existing line and no changes to the use in these areas is proposed.

Therefore, the AEC is consistent with applicable City plans, policies and regulations.

The project site, including all project components is located in the City of Long Beach. Therefore, only the City of Long Beach's land use policies apply to the AEC site. A full listing of AEC's consistency with applicable City of Long Beach land use plans, policies, and regulations can be found in Table 5.6-3. Implementation of AEC does not conflict with any applicable land use plan, policy or regulation; therefore, environmental impacts related to land use are less than significant.

Conflict with an Applicable Habitat Conservation Plan. The AEC site is not located within the limits of any adopted Habitat Conservation Plan or Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan (CDFW, 2015), thus there will be no impact.

Convert Farmland to Nonagricultural Uses. The project does not involve the conversion of prime farmland, unique farmland, or farmland of statewide importance, and due to extensive development, Long Beach is not currently mapped by the FMMP. Therefore, the AEC site, laydown areas, proposed offsite wastewater pipeline and access road do not have a FMMP designation (Hennessy, 2013). No impacts to agricultural resources would occur as a result of implementation of the project.

Cause Changes that Would Result in the Conversion of Farmland. The project site is not in agricultural use nor is it located on designated farmland. Therefore the project will not cause changes to the existing environment that could result in conversion of farmland to nonagricultural use.

5.6.4 Cumulative Effects

A cumulative impact refers to a proposed project's incremental effect together with other closely related past, present, and reasonably foreseeable future projects whose impacts may compound or increase the incremental effect of the proposed project (Public Resources Code [PRC] Section 21083; 14 CCR Sections 15064(h), 15065(c), 15130, and 15355).

CEQA Guidelines further note that:

The cumulative impact from several projects is the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects. Cumulative effects can result from individually minor, but collectively significant, projects taking place over a period of time.

Cumulative land use impacts could occur if the development of a proposed project and other related past, present, and reasonably foreseeable probable future projects would be inconsistent with applicable plans and policies, or have other cumulative land use related impacts.

The City of Long Beach development services department has identified three projects for consideration in the cumulative impacts analysis (Brown, 2015). The AES Battery Energy Storage System (BESS) was not identified during discussions with the City's development services department.

1. PCH & 2nd Project, 6400 E. Pacific Coast Highway: commercial development to replace existing Seaport Marina Hotel, 10.93-acre site located at the southwest corner of Pacific Coast Highway and 2nd Street. Project proposal is for 150,000 square feet of first floor retail space, 73,000 square feet of second floor retail and 29,000 square feet of second floor restaurant space, with a three-story enclosed parking structure. The Project Owner has completed Conceptual Site Plan Review and has applied for full Site Plan Review and an Environmental Impact Report (currently in the early data collection stage).
2. Lyon Communities Project, 6701 E. Pacific Coast Highway: Vacant 7.01-acre site located at southeast corner of Pacific Coast Highway and Studebaker Road (site is commonly known as the Pumpkin Patch). Project proposal is for two one-story restaurant buildings fronting PCH, each at 10,000 square feet, with a 4,327 square foot bank building and three-level, 67-room hotel located on the eastern portion of this site, along with 293 surface parking spaces. The project is currently in the Conceptual Site Plan Review stage.
3. Wetlands Mitigation Bank: Submission of formal application with the City is pending. Project consists of Synergy, Pumpkin Patch and Studebaker/Loynes sites. Proposed activities are to establish a mitigation bank on the northerly approximately 76 acres of the 156-acre Synergy Oil Field, implement a wetlands habitat restoration plan, construct public access improvements including trials, parking and visitors center. In addition, proposed activities involve removal and consolidation of oil extraction operations on Synergy site and shift production activities offsite (in a proposed land exchange agreement) from the Los Cerritos Wetland Authority (LCWA) site (LCWA, 2015).

Not identified by the City of Long Beach development services department is the AES Energy Storage Battery Energy Storage System (BESS) project located at the Alamitos Generating Station. AES Energy Storage is in the development phase for a 300 MW BESS project at the Alamitos Generating Station and the City of Long

Beach has completed an Initial Study of the project. The BESS project will be located in the northern portion of the Alamitos Generating Station site in an area currently used as a parking lot and designated as construction laydown area for the AEC. The BESS project will consist of three 100-MW containment buildings, to be constructed in sequential phases, constructing from east to west. Each building will be 50 feet in height and 44,550 square feet (270 feet in length by 165 feet in width), and will be contain: two battery storage levels, electrical controls, and heating, ventilation and air conditioning units. Construction of the BESS project is proposed to commence in third quarter of 2019, after major mechanical completion of the AEC CCGT power block, with completion of the first 100-MW building completed and operational in late 2020. The second and third 100-MW buildings will commence construction and be operational in 2021 and 2022, respectively. The maximum estimated construction workforce is 58 (50 craft labor and 8 supervisors) in the middle of 2020. Construction is expected to require up to 20 trucks per day at the peak, with between 10 and 15 trucks per day during the rest of the construction period. The construction will require approximately 40 feet around the first BESS building and up to 3.5 acres of laydown area located west of the BESS building(s). The operational workforce is estimated at up to five full-time staff.

The project is an allowable use within the SEADIP and will not result in any change in land use. The project is consistent with applicable General Plan land use and zoning designations, will be constructed within the industrial site boundaries of the existing power plant site, and is similar to adjacent industrial uses. Therefore, the project will not contribute to cumulative impacts on land use.

The AEC would not involve conversion of agricultural land, so there will be no cumulative impacts on agricultural resources resulting from the project. The project is consistent with land use plans and policies, and compatible with adjacent uses. Therefore, the project will not contribute to cumulative impacts associated with land use compatibility. Moreover, there are no proposed projects that would result in adjacent incompatible land uses.

5.6.5 Mitigation Measures

The AEC will result in no change in land uses and will have no adverse land use impacts; therefore, no additional mitigation measures are necessary.

5.6.6 Laws, Ordinances, Regulations and Standards

This section lists and discusses the land use LORS that apply to the AEC. Consistent with AFC requirements, all plans and policies applicable to the 1-mile area surrounding the AEC site and offsite laydown area, as well as the 0.25 mile surrounding the proposed offsite process/sanitary wastewater pipeline and access road are summarized below. General Plan and Zoning land use designations for the City of Seal Beach and the Community of Rossmoor within the study area have been included in Tables 5.6-2 and 5.6-4. The project site, including all project components (plant site, natural gas, and water lines, switchyard, and the transmission lines), and the laydown areas are located in the City of Long Beach. The AEC includes a new 1,000-foot wastewater pipeline (and possibly the upgrade of 4,000 feet of existing LBWD sanitary pipeline), which will connect the site to the LBWD sewer system as well as an access road; all other elements of the AEC will be constructed entirely within the existing approximately 71-acre site. Only the City of Long Beach's land use policies apply to the AEC site, laydown areas, proposed wastewater pipeline, and access road. The City of Long Beach's local LORS are listed in this section and discussed in Table 5.6-3.

5.6.6.1 Federal LORS

Title 14 of the Code of Federal Regulations Section 77.13 (FAR Section 77.13), requires an applicant to submit a Notice of Proposed Construction or Alteration (FAA Form No. 7460-1) to the Federal Aviation Administration (FAA) for construction within 20,000 feet of the nearest runway of an airport with at least one runway longer than 3,200 feet. There are two airports within approximately 20,000 feet of the AEC Site: Long Beach Airport (Daugherty Field), longest runway is 10,003 feet (located approximately 20,064 feet or 3.8 miles to the northwest); and the Los Alamitos Army Airfield, longest runway is 8,000 feet (located approximately 14,256 feet or 2.7 miles to the northeast; Airnav.com, 2013). Therefore, a FAA Notice Criteria

Tool has been used to determine whether the AEC meets FAR Section 77.13 requirements regarding the need to notify FAA of AEC construction. The notice criteria tool results are provided in Appendix 3B.

5.6.6.2 State LORS

Warren-Alquist Act. PRC Section 25500 of the Warren-Alquist Act provides that the CEC, "Shall have the exclusive power to certify all sites and related facilities in the state." Thus, the CEC has exclusive jurisdiction over the permitting of AEC. The authority of the CEC is "in lieu of any permit, certificate, or similar document required by any state, local or regional agency… and shall supersede any applicable statute, ordinance, or regulation of any state, local, or regional agency…"

The CEC's authority to permit power plants, thus, supersedes all local ordinances including zoning or land use plans. Specifically, PRC Section 25525 allows the CEC to permit facilities not in compliance with local ordinances where it "determines that the facility is required for public convenience and necessity and that there are not more prudent and feasible means of achieving public convenience and necessity."

The CEC's certification process is a certified regulatory program pursuant to CEQA, and is codified in the California PRC Sections 21000 through 21178.1. As noted previously, the CEC's permitting process under the Warren Alquist Act also preempts the issuance of a CDP by the City of Long Beach. This AFC conforms to the requirements of the Warren-Alquist Act and CEQA.

California Coastal Commission, Coastal Act. The CCC was established by voter initiative in 1972 (Proposition 20) and later made permanent by the Legislature through adoption of the California Coastal Act of 1976 (Coastal Act). Coastal Act, PRC 30000 et seq., establishes a comprehensive scheme to govern land use planning along the entire California coast. The coastal zone varies in width from several hundred feet in highly urbanized areas up to five miles in certain rural areas, and offshore the coastal zone includes a 3-mile-wide band of ocean. The CCC, in partnership with coastal cities and counties, plans and regulates the use of land and water in the coastal zone. But for the CEC process, that supersedes CCC permitting requirements, development activities generally require a CDP from either the CCC or the local government.

The Coastal Act includes specific policies that address issues such as shoreline public access and recreation, lower cost visitor accommodations, terrestrial and marine habitat protection, visual resources, landform alteration, agricultural lands, commercial fisheries, industrial uses, water quality, offshore oil and gas development, transportation, development design, power plants, ports, and public works. The policies of the Coastal Act constitute the statutory standards applied to planning and regulatory decisions made by the CCC and by local governments, pursuant to the Coastal Act.

Pursuant to PRC Section 30500, each local government lying within the coastal zone is required to prepare a LCP for management of that portion of the coastal zone within its jurisdiction. Once the CCC certifies a LCP, the authority to issue CDPs for development within the coastal zone is delegated to the local jurisdiction.

The Coastal Act also provides that "[c]oastal-dependent industrial facilities shall be encouraged to locate or expand within existing sites and shall be permitted as reasonable long-term growth where consistent with [the Coastal Act]" (PRC Section 30260.) Section 30264 of the Coastal Act states that "new or expanded thermal electric generating plants may be constructed in the coastal zone if the proposed coastal site has been determined by the [CEC] to have greater relative merit…than available alternative sites and related facilities for an applicant's service area" (PRC Section 30264.). The existing Alamitos Generating Station property is designated for industrial use (within the SEADIP) and has been previously developed in its entirety for industrial uses. Construction of the AEC on the site of an existing power plant is consistent with these provisions of the Coastal Act.

The proposed offsite adjoining 10-acre laydown area and offsite access road are both currently vacant and also designated for industrial use (within the SEADIP). In addition, the access road appears to traverse an area that is currently vacant yet has the remnants of previous tank footprints. The laydown area and access road would be used to support construction activities at the AEC site, and therefore, both uses would be temporary. The proposed offsite process/sanitary wastewater pipeline is located largely outside of the

coastal zone. The segment of the pipeline that extends into the coastal zone starts at the commencement of the line at the west side of the AEC site, travels south to the intersection with Loynes Drive, then turns west and crosses over the Los Cerritos Channel (affixed to the bridge). After crossing the Channel, the pipeline heads north on East Vista Street exiting the coastal zone to connect to the LBWD's existing sanitary system in the residential subdivision (see Figure 5.6-1). These uses are consistent with the Coastal Act.

California Land Conservation Act (Williamson Act). The California Land Conservation Act of 1965, commonly known as the Williamson Act, was enacted to encourage preservation of agricultural lands and encourage open space preservation and efficient urban growth. The Williamson Act provides incentives to landowners through reduced property taxes to create an agricultural preserve and agree to keep their land in agricultural production (or another compatible use) for at least 10 years. Maps, statistics, and reports on Williamson Act lands are available online. Neither the project site nor wastewater pipeline route is subject to a Williamson Act contract.

5.6.6.3 Local LORS

Land use provisions that are included in every California city and county General Plan (California State Planning Law, Government Code Section 65302 et seq.) reflect the goals and policies that guide the physical development of land in their jurisdiction. City zoning ordinances are enforced by their respective planning and building departments. Table 5.6-5 lists the applicable LORS, administering agencies, and the AFC section that discusses project conformance. The project site, including all project components (plant site, natural gas, and water lines, switchyard, wastewater pipeline, and the transmission lines), are located in the City of Long Beach. Therefore, only the City of Long Beach's land use policies apply to the AEC site, laydown areas, and access road. Therefore, only the City of Long Beach's local LORS are listed in this section and discussed in Table 5.6-5.

TABLE 5.6-5
Laws, Ordinances, Regulations, and Standards for Land Use

LORS	Requirement/Applicability	Administering Agency	AFC Section Explaining Conformance
State			
CEQA PRC, Sections 21000-21178.1, including Guidelines for implementation of CEQA are codified in the 14 CCR Sections 15000-15387	Establishes policies and procedures for review of proposed power plants in California.	CEC	Section 5.6.6.2.1
Warren-Alquist Act (PRC Section 25000 et seq.)	Establishes policies and procedures for review of proposed power plants greater than 50 MW in California.	CEC	Section 5.6.6.2.1
California Coastal Act (PRC, Division 20, Sections 30000, et seq.)	Establishes policies to guide orderly development within California's coastal zone.	CCC, Energy Unit	Section 5.6.6.2.2
California Lands Conservation Act (Williamson Act)	Preserves agricultural land and encourages open space preservation and efficient urban growth.	Department of Conservation (NRCS)	Section 5.6.6.2.3

TABLE 5.6-5

Laws, Ordinances, Regulations, and Standards for Land Use

LORS	Requirement/Applicability	Administering Agency	AFC Section Explaining Conformance
Local			
City of Long Beach General Plan	Comprehensive long-range plan to serve as the guide for the physical development of the City.	City of Long Development Services	Sections 5.6.2.3 and 5.6.3.2.2, Tables 5.6-2 and 5.6-3
City of Long Beach Zoning Regulations (Title 21 of the Municipal Code)	Establishes zoning districts governing land use and the placement of buildings and district improvements.	City of Long Development Services	Sections 5.6.2.4 and 5.6.3.2.2, Tables 5.6-3 and 5.6-4
City of Long Beach SEADIP	Specific plan to guide development within the designated SEADIP area.	City of Long Development Services	Sections 5.6.2.5.1 and 5.6.3.2.2, Table 5.6-3
City of Long Beach LCP	Coastal land use plan and implementing ordinance establish policies to guide development within the Coastal Zone.	City of Long Development Services	Sections 5.6.2.5.2 and 5.6.3.2.2, Table 5.6-3

5.6.7 Agencies and Agency Contacts

Agencies and contacts are provided in Table 5.6-6.

TABLE 5.6-6

Agency Contacts for Land Use

Department	Agency	Persons Contacted
Development Services	City of Long Beach	Jeff Winklepleck, Planning Officer 333 W. Ocean Blvd., 3rd Floor Long Beach, CA 90802 (562) 570.6191 jill.griffiths@longbeach.gov
Development Services	City of Long Beach	Ira Brown, Planner 333 W. Ocean Blvd., 3rd Floor Long Beach, CA 90802 (562) 570-5972 ira.brown@longbeach.gov
Planning & Development	City of Seal Beach	Steve Fowler, Assistant Planner 211 Eighth Street Seal Beach, CA 90740 (562) 431-2527 ext. 1316 sfowler@sealbeachca.gov
Community Development	County of Orange	Richard Vuong, Planner 300 N. Flower Street Santa Ana, CA, 92703 (714) 667-8888

5.6.8 Permits and Permit Schedule

Except as identified in other sections of this AFC that apply to federal requirements (air quality, water quality, and roadways), given the exclusive jurisdiction of the CEC, no other discretionary land use-related permits are required for the AEC.

5.6.9 References

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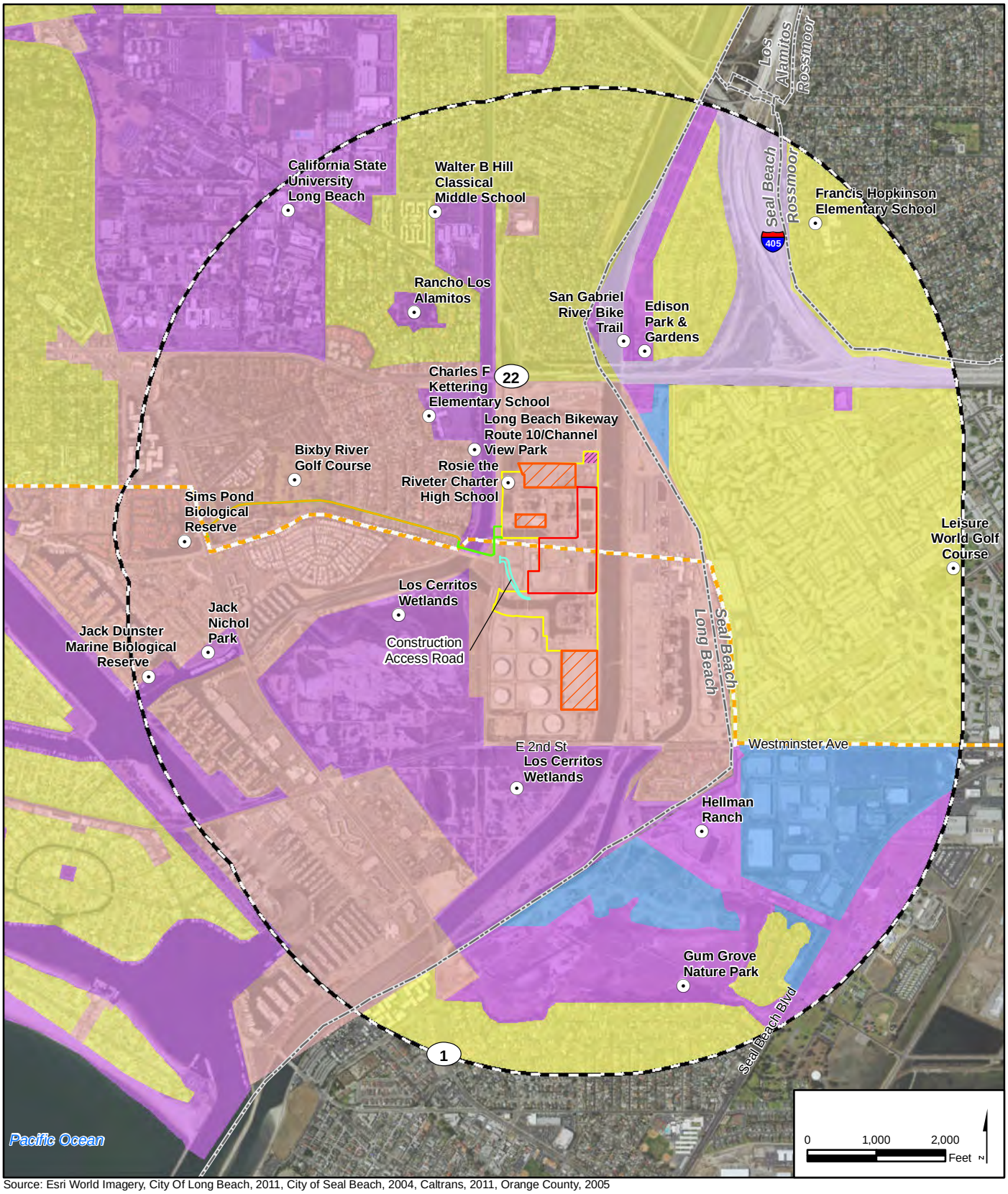

Source: Esri World Imagery, City Of Long Beach, 2011, City of Seal Beach, 2004, Caltrans, 2011, Orange County, 2005

- Sensitive Receptor
- AGS Boundary
- AEC Site
- Parking/Laydown Construction Area
- 1 Mile Project Buffer/0.25 Mile Sewer Line Buffer
- Natural Gas Metering Station
- Proposed New Process/Sanitary Wastewater Pipeline to First Point of Interconnection
- Potential Sewer Upgrade
- Coastal Zone Boundary
- Commercial Districts
- Industrial Uses
- Residential Uses
- Other Uses
- City Limit

FIGURE 5.6-1
Existing Land Use

Alamitos Energy Center
Long Beach, California
October 2015

CH2MHILL

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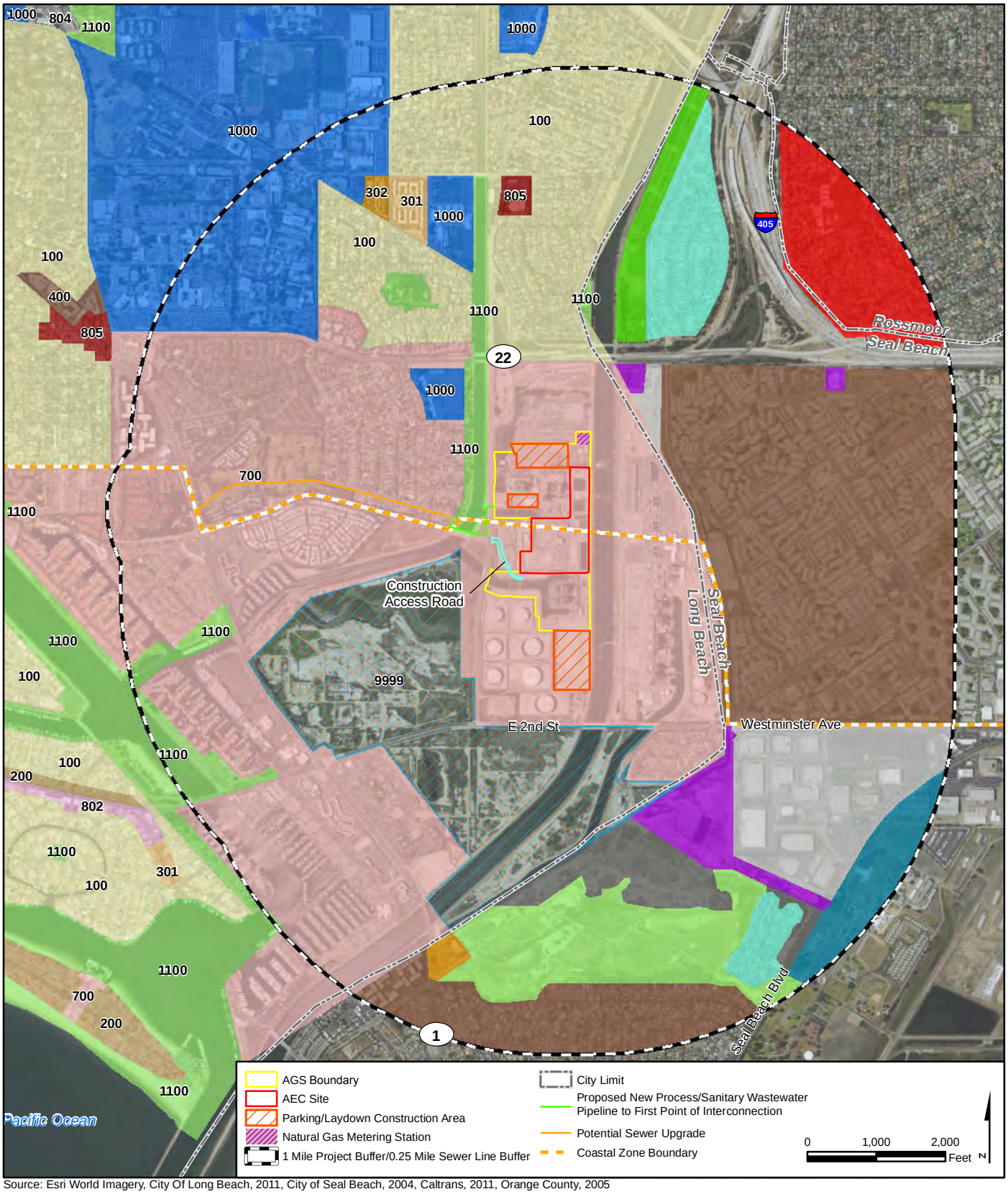

Source: Esri World Imagery, City Of Long Beach, 2011, City of Seal Beach, 2004, Caltrans, 2011, Orange County, 2005

Legend

City Of Long Beach Land Use (2011)

Residential Districts
- Single Family (100)
- Mixed Style Homes (200)
- Townhomes (301)
- Moderate Density Residential (302)
- High Density Residential (400)

Commercial Districts
- Mixed Uses (700)
- Pedestrian-Oriented Retail Strip (802)
- Shopping Nodes (805)

Other Uses
- Institution/Schools (1000)
- Open Space/Parks (1100)
- Los Cerritos Wetlands Area (9999)

City of Seal Beach Land Use (2004)
- Commercial Service
- Community Facility
- Industrial Light
- Industrial Oil Extraction
- Open Space
- Park
- Residential High Density
- Residential Low Density
- Military

Orange County (2005)
- Suburban Residential

FIGURE 5.6-2
General Plan Land Use Designations

Alamitos Energy Center
Long Beach, California
October 2015

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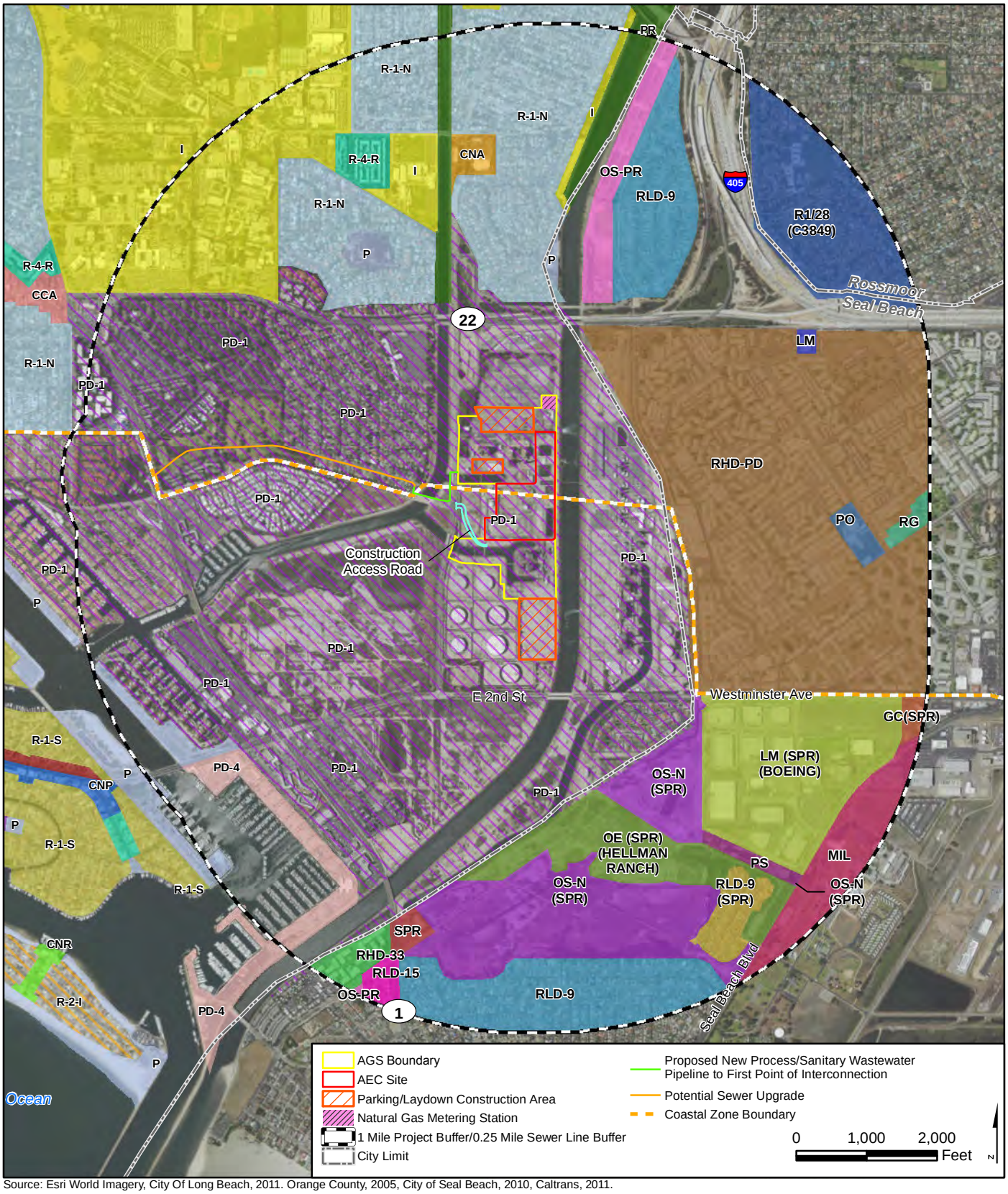


Source: Esri World Imagery, City Of Long Beach, 2011. Orange County, 2005, City of Seal Beach, 2010, Caltrans, 2011.

Legend

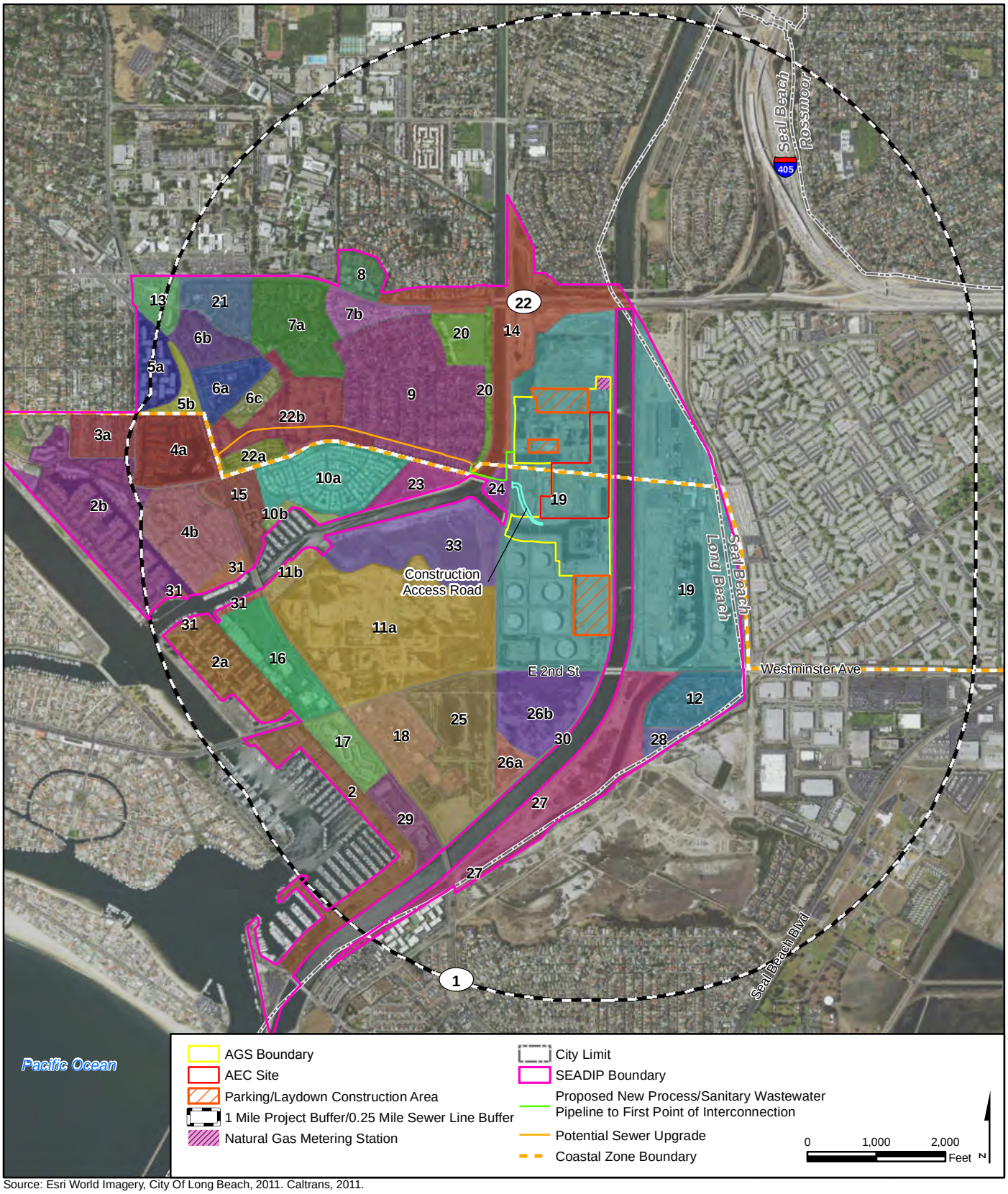
City of Long Beach (2011)
- CCA
- CNA
- CNP
- CNR
- I
- P
- PD-1
- PD-4
- PR
- R-1-N
- R-1-S
- R-2-I
- R-2-S
- R-4-N
- R-4-R

City of Seal Beach (2010)
- GC(SPR)
- LM
- LM (SPR) (BOEING)
- MIL
- OE (SPR) (HELLMAN RANCH)
- OS-N (SPR)
- OS-PR
- PO
- PS
- RG
- RHD-33
- RHD-PD
- RLD-9
- RLD-15
- RLD-9 (SPR)
- SPR

Orange County (2005)
- R1/28 (C3849)

FIGURE 5.6-3
Zoning in Project Vicinity

Alamitos Energy Center
Long Beach, California
October 2015



Source: Esri World Imagery, City Of Long Beach, 2011. Caltrans, 2011.

SUBAREAS 1, 2 (a), 2 (b), 3 (a), 3 (b), 4 (b), 5 (a), 6 (a), 6 (b), 6 (c), 7 (a), 8, 9, 10 (a), 10 (b), 11 (a), 11 (b), 12, 21, 22 (a), and 22 (b)
Residential
SUBAREA 4 (a)
Residential and Park (Sims Pond)
SUBAREA 5 (b)
Landscaped open space, Residential, or Church
SUBAREA 13, 15, 16, 17, 18, 29
Commercial
SUBAREA 14
Landscaped open space or Residential
SUBAREA 19
Industrial
SUBAREA 20
Channel View Park, a public park.
SUBAREA 23, and 33
Wetland.
SUBAREA 24
24 South - overlook area and interpretive center
24 North - park and playground.
SUBAREAS 25 and 26
Office Commercial and light Industrial
SUBAREA 27
Wetlands restoration program.
SUBAREA 28
County retention basin.
SUBAREA 30
(Deleted)
SUBAREA 31
Jack Dunster Marine Biological Reserve and Costa del Sol, public parks.
SUBAREA 32
Park.

FIGURE 5.6-4
SEADIP
Subarea Designations

Alamitos Energy Center
Long Beach, California
October 2015

5.7 Noise

This section presents an assessment of potential noise effects related to the Alamitos Energy Center (AEC) Project. Section 5.7.1 presents the proposed project and the environmental setting. Section 5.7.2 discusses the fundamentals of acoustics. Section 5.7.3 describes the affected environment, including baseline noise level survey methodology and results. Section 5.7.4 presents an environmental noise analysis of the construction and operation of the power plant and associated facilities. Section 5.7.5 discusses cumulative effects. Section 5.7.6 discusses noise minimization measures. Section 5.7.7 presents applicable laws, ordinances, regulations, and standards (LORS). Section 5.7.8 presents agency contacts, and Section 5.7.9 presents permit requirements and schedules. Section 5.7.10 contains the references used to prepare this section.

5.7.1 Setting and Affected Environment

AES Alamitos Energy, LLC, will construct, own, and operate the Alamitos Energy Center (AEC), a natural- gas-fired, air-cooled, combined-cycle and simple-cycle, electrical generating facility in Long Beach, California. The proposed AEC will have a nominal generating capacity of 1,040 megawatts (MW). The AEC will be constructed on the site of the existing AES Alamitos Generating Station (AGS), located on an approximately 21-acre site within a larger, 71.1-acre parcel.

The AEC will feature two gas turbine power blocks. Combined-cycle power block will consist of two natural-gas-fired combustion turbine generators (CTG) in a combined-cycle configuration, two unfired heat recovery steam generators (HRSG), one steam turbine generators, an air-cooled condenser, an auxiliary boiler, and related ancillary equipment. Simple-cycle power block will consist of four simple-cycle LMS-100 CTGs with fin-fan coolers and ancillary facilities.

The AEC will meet the demand for new generation in the Los Angeles basin local electrical reliability area. The demand is caused in large part by the closure of the San Onofre Nuclear Generating Station and the anticipated retirement of the older, natural-gas-fired generation currently using once-through ocean water-cooling (OTC). As a result of the promulgation of the California State Water Resources Control Board's (SWRCB) *Water Quality Control Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling* (SWRCB, 2010), more than 4,000 MW of OTC generation are expected to be retired in the Los Angeles local electrical reliability area by December 31, 2020.

The AEC will use water provided by the City of Long Beach Water Department (LBWD) for construction, operational process, and sanitary uses but at substantially lower volumes than the existing AGS historically has used. This water will be supplied through existing, onsite water lines. The AEC will include a new, 1,000-foot process/sanitary wastewater pipeline to the first point of interconnection with the existing LBWD sewer system, the potential upgrade of an additional 4,000 feet of existing pipeline downstream from the first point of interconnection, and the elimination of the current practice of treatment and discharge of process/sanitary wastewater to the San Gabriel River. Stormwater runoff from the power block areas will be directed to oil/water separators and to an existing retention basin and then ultimately discharged to the Los Cerritos channel via existing stormwater outfalls.

The AEC will interconnect to the existing, Southern California Edison (SCE) 230-kilovolt (kV) switchyard adjacent to the north side of the AGS. Natural gas will be supplied to the AEC via the existing, offsite, 30-inch-diameter pipeline owned and operated by Southern California Gas Company (SoCalGas) that currently serves Units 5 and 6 of the AGS. The AEC will require construction of new natural gas-metering facilities and construction of two new natural gas compressor buildings within the AEC footprint.

The AEC is designed to serve both peak and intermediate loads with the added capabilities of rapid startup, significant turndown capability (ability to turn down to a low load), and fast ramp rates. As California's intermittent renewable energy portfolio continues to grow, operating in either load-following or partial shutdown mode will become necessary to maintain electrical grid reliability, thus placing an increased importance upon the rapid startup, high turndown, steep ramp rate, and superior heat rate employed at the AEC.

As an in-basin generating asset, the AEC will provide local generating capacity, voltage support, and reactive power that are essential for transmission system reliability in the Western Los Angeles basin subarea and larger Los Angeles basin local reliability area. The AEC will be able to provide system stability by supplying reactive power, voltage support, frequency stability, and rotating mass in the heart of the critical Western Los Angeles local reliability area. By virtue of its location in a transmission constrained load center, the AEC also helps to avoid potential transmission line overloads and can provide reliable local energy supplies when electricity from more distant generating resources is unavailable. In recognition of its critical grid reliability benefits, the AEC combined-cycle CTGs were selected by SCE in its Local Capacity Requirements Request for Offer on November 5, 2014, and the simple-cycle CTGs will meet the capacity needs anticipated to be identified in future California Public Utilities Commission Long-term Procurement Plans.

Owing to the critical need for generating capacity at the AEC site at all times, existing Units 1 through 6 will remain in operation through much of the AEC development and construction. Given that the removal of existing Units 1 through 6 is not required for construction of the AEC, the continued operation of the AGS will not impede AEC construction. Demolition of the retired and decommissioned turbine peaking generating Unit 7 and fuel tank, ancillary equipment, small maintenance shops, and two retention basins will be required for site preparation for the construction of the AEC. Construction and site preparation activities at the AEC site are anticipated to last 56 months, from the first quarter of 2017 until the third quarter of 2021. The project will commence construction with the removal of former Unit 7's building and ancillary equipment, fuel storage tank, tank berms, small maintenance shops and two waste water retention basins in January 2017 to make room for construction and laydown area for the AEC CCGT. Construction of the AEC CCGT will commence during the second quarter of 2017 and will be completed by the second quarter of 2020. The AEC CCGT is expected to commence commercial operation before May 1, 2020. Construction of the AEC SCGT is scheduled to proceed from the second quarter of 2020 through the third quarter of 2021, and Power Block 2 is expected to commence commercial operation in the third quarter of 2021. A temporary construction access road may be constructed offsite beginning at the intersection of Studebaker Road and Loynes Drive traveling southeast to the AEC site. Construction of the AEC will require the use of onsite laydown areas (approximately 8 acres dispersed throughout the existing site) and an approximately 10-acre laydown area located adjacent to the existing site.

5.7.2 Fundamentals of Acoustics

Acoustics is the study of sound, and noise is defined as unwanted sound. Airborne sound is a rapid fluctuation or oscillation of air pressure above and below atmospheric pressure creating a sound wave. Acoustical terms used in this section are summarized in Table 5.7-1.

TABLE 5.7-1

Definitions of Acoustical Terms

Term	Definition
Ambient Noise Level	The composite of noise from all sources near and far. The normal or existing level of environmental noise or sound at a given location. The ambient level is typically defined by the energy averaged L_{eq} level.
Background Noise Level	The underlying ever-present lower level noise that remains in the absence of intrusive or intermittent sounds. Distant sources, such as traffic, typically make up the background. The background level is generally defined by the L_{90} percentile noise level.
Intrusive	Noise that intrudes over and above the existing ambient noise at a given location. The relative intrusiveness of a sound depends upon its amplitude, duration, frequency, time of occurrence, tonal content, the prevailing ambient noise level as well as the sensitivity of the receiver. The intrusive level is generally defined by the L_{10} percentile noise level.
Hertz (Hz)	The number of complete pressure fluctuations per second above and below atmospheric pressure. Hertz is a measure of the pitch of the sound. Middle C of a piano has a frequency of 262 Hz while the lowest C on an 88 key piano has a frequency of 33 Hz and the highest C has a frequency of 4186 Hz.

TABLE 5.7-1

Definitions of Acoustical Terms

Term	Definition
Pure Tone	A pure tone as used by the California Energy Commission (CEC) exists if the one-third octave band sound pressure level in the band with the tone exceeds the arithmetic average of the two contiguous bands by 5 decibels (dB) for center frequencies of 500 Hz and above, or by 8 dB for center frequencies between 160 Hz and 400 Hz, or by 15 dB for center frequencies less than or equal to 125 Hz.
Sound Pressure Level Decibel (dB)	A unit describing the amplitude of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to the reference pressure, which is 20 micropascals (20 micronewtons per square meter).
A-Weighted Sound Pressure Level (dBA)	The sound level in decibels as measured on a sound level meter using the A-weighted filter network. The A-weighted filter de-emphasizes the very low and very high frequency components of the sound in a manner similar to the frequency response of the human ear. All sound levels in this report are A-weighted unless stated otherwise.
Equivalent Sound Level (L_{eq})	The average sound level, on an equal energy basis, during the measurement period.
Percentile Level (L_n)	The sound level exceeded during "n" percent of the measurement period, where "n" is a number between 0 and 100 (for example, L_{90})
Day-Night Noise Level (L_{dn} or DNL)	The energy averaged A-weighted sound level during a 24-hour day, obtained after addition of 10 decibels penalty for the hours between 10:00 p.m. to 7:00 a.m.

The most common metric is the overall A-weighted sound level measurement that has been adopted by regulatory bodies worldwide. The A-weighting network measures sound similar to the way in which a person perceives or hears sound. There is consensus that A-weighting is appropriate for estimation of the hazard of noise-induced hearing loss. With respect to other effects, such as annoyance, A-weighting is acceptable if there is largely middle and high frequency noise present, but if the noise is unusually high at low frequencies, or contains prominent low-frequency tones, the A-weighting may not give a valid measure. Compared with other noise sources, combined-cycle power facilities are not typically substantial sources of unusual low-frequency noise and are broad band or do not generate strong low-frequency tones. Therefore, A-weighting provides a good measure for evaluating acceptable and unacceptable sound levels for projects such as the AEC.

A-weighted sound levels are typically measured or presented as equivalent noise level (L_{eq}), which is defined as the average noise level, on an equal energy basis for a stated period of time, and is commonly used to measure steady-state sound or noise that is usually dominant. Statistical methods are used to capture the dynamics of a changing acoustical environment. Statistical measurements are typically denoted by $L_{xx,}$ where xx represents the percentile of time the sound level is exceeded. The L_{90} is a measurement that represents the noise level that is exceeded during 90 percent of the measurement period. Similarly, the L_{10} represents the noise level exceeded for 10 percent of the measurement period.

Some metrics used in determining the impact of environmental noise consider the differences in response that people have to daytime and nighttime noise levels. During the nighttime, exterior background noises are generally lower than those of daytime levels. However, most household noise also decreases at night and exterior noise becomes more noticeable. Furthermore, most people sleep at night and are sensitive to intrusive noises. To account for human sensitivity to nighttime noise levels, the day-night sound level (L_{dn} or DNL) was developed. L_{dn} is a noise index that accounts for the greater annoyance of noise during the nighttime hours.

L_{dn} values are calculated by averaging hourly L_{eq} sound levels for a 24-hour period, and applying a weighting factor to nighttime L_{eq} values. The weighting factor, which reflects the increased sensitivity to noise during nighttime hours, is added to each hourly L_{eq} sound level before the 24-hour L_{dn} is calculated. For the purposes of assessing noise, the 24-hour day is divided into two time periods, with the following weightings:

- Daytime: 7:00 a.m. to 10:00 p.m. (15 hours) weighting factor of 0 decibels (dB)
- Nighttime: 10:00 p.m. to 7:00 a.m. (9 hours) weighting factor of 10 dB

The two time periods are then averaged to compute the overall L_{dn} value. For a continuous noise source, the L_{dn} value is easily computed by adding 6.4 dB to the overall 24-hour noise level (L_{eq}). For example, if the expected continuous noise level from the power plant was 60.0 decibels (A-weighted scale) (dBA), the resulting L_{dn} from the plant would be 66.4 dBA.

The effects of noise on people can be listed in three general categories:

- Subjective effects of annoyance, nuisance, and dissatisfaction
- Interference with activities such as speech, sleep, and learning
- Physiological effects such as startling and hearing loss

In most cases, environmental noise produces effects in the first two categories only. However, workers in industrial plants may experience noise effects in the third category. No completely satisfactory way exists to measure the subjective effects of noise, or to measure the corresponding reactions of annoyance and dissatisfaction. This lack of a common standard results from the wide variation in individual thresholds of annoyance and habituation to noise. Thus, an important way of determining a person's subjective reaction to a new noise is by comparing it to the existing or "ambient" environment to which that person has adapted. In general, the more the level or the tonal (frequency) variations of a noise exceed the previously existing ambient noise level or tonal quality, the less acceptable the new noise will be, as judged by the exposed individual.

Table 5.7-2 shows the relative A-weighted noise levels of common sounds measured in the environment and in industry for various sound levels.

TABLE 5.7-2

Typical Sound Levels Measured in the Environment and Industry

Noise Source at a Given Distance	A-Weighted Sound Level (decibels)	Noise Environments	Subjective Impression
Shotgun (at shooter's ear)	140	Carrier flight deck	Painfully loud
Civil defense siren (at 100 feet)	130		
Jet takeoff (at 200 feet)	120		Threshold of pain
Loud rock music	110	Rock music concert	
Pile driver (at 50 feet)	100		Very loud
Ambulance siren (at 100 feet)	90	Boiler room	
Pneumatic drill (at 50 feet)	80	Noisy restaurant	
Busy traffic; hair dryer	70		Moderately loud
Normal conversation (at 5 feet)	60	Data processing center	
Light traffic (at 100 feet); rainfall	50	Private business office	
Bird calls (distant)	40	Average living room, library	Quiet
Soft whisper (at 5 feet); rustling leaves	30	Quiet bedroom	
	20	Recording studio	
Normal breathing	10		Threshold of hearing

Source: Beranek, 1998.

5.7.3 Affected Environment

5.7.3.1 Local Land Use and Noise Sources

The AEC site has a General Plan Land Use Designation (LUD) of No. 7 (Mixed Use) and is located within the South East Area Development and Improvement Plan (SEADIP) Specific Plan area of the General Plan and City of Long Beach Local Coastal Program (LCP). The AEC site and the surrounding vicinity has numerous existing industrial operations such as the existing Alamitos Generating Station, other power generation facilities, oil storage tank farms, in addition to several major air and ground transportation corridors.

The 1-mile study area for the AEC encompasses the southeastern portion of Long Beach, the westernmost portion of Seal Beach directly east of the project site, and a small area within Rossmoor (an unincorporated community within the County of Orange) to the northeast. Existing land uses are described in greater detail in Section 5.6.2.1.4, and Figure 5.6-1 shows the four existing land use categories within the study area: Residential, Commercial, Industrial, and Other (Other uses include Institutions/Schools, Open Space/Parks, Harbor/Airport, Right-of-Way, and Not in Long Beach, which is the Los Cerritos Wetlands area).

The closest residence to the noise-producing equipment is located approximately 1,200 feet to the west of the AEC CCGT. An additional residential area is located approximately 1,300 feet to the east of the noise-producing equipment, east of Los Angeles Department of Water and Power's Haynes Generating Station. Rosie the Riveter Charter High School is a tenant on the existing Alamitos Generating Station site. Figure 5.6-1 depicts the land uses near the project site.

5.7.3.2 Ambient Noise Survey

To support the analysis of the AEC, continuous ambient noise monitoring was conducted to determine the level of existing noise in the project area. Long-term (25 hours or more) measurements were collected at three representative residential locations near the project where permission for long-term monitoring was obtained (M1 –6333 Eliot Street, Long Beach; M2 –6810 East Septimo Street, Long Beach; and Leisure World, Seal Beach). Table 5.7-3 and Figure 5.7-1 describe the noise monitoring locations. The monitoring was conducted between August 23, 2011, and August 31, 2011. The detailed monitoring results are presented in Appendix 5.7A.

TABLE 5.7-3

Summary of Noise Survey Locations

Location Number	Location Description	Primary Noise Sources
M1	Residence at 6333 Eliot Street, Long Beach	Local and distant transportation sources. Existing power plant.
M2	Residence at 6810 East Septimo Street, Long Beach	Local and distant transportation sources. Existing power plant.
M3	Residence at the intersection of El Dorado Drive and Nassau Drive in the Leisure World Retirement Community, Seal Beach	Local and distant transportation sources. Existing power plant.

A Larson Davis 824 and two Larson Davis 820 American National Standards Institute (ANSI) S1.4 Type 1 (precision) statistical sound level meters were used to conduct the sound level measurements. The sound level meters were field calibrated before and after the survey with a Larson Davis CAL200 calibrator and were factory calibrated within the previous 12 months. Weather conditions during the noise survey were conducive to accurate measurements—generally clear and sunny. The temperature ranged from 64°F to 87°F and the relative humidity varied between 16 and 83 percent.

The hourly measured L_{eq} sound levels were used to calculate the 24-hour L_{dn} levels at each site on a rolling average basis. The ranges and averages of the L_{dn} and L_{50} levels are summarized in Table 5.7-4.

TABLE 5.7-4

Average and Range in Measured Sound Levels

Location	L_{dn}			L_{50}		
	Average (dBA)	Minimum (dBA)	Maximum (dBA)	Average (dBA)	Minimum (dBA)	Maximum (dBA)
M1 – Residence at 6333 Eliot Street, Long Beach	59	56	66	52	46	55
M2 – Residence at 6810 East Septimo Street, Long Beach	61	60	62	55	46	60
M3 - Residence at the intersection of El Dorado Drive and Nassau Drive in the Leisure World Retirement Community, Seal Beach	58	55	62	50	45	56

5.7.4 Environmental Analysis

Noise will be produced during the construction (including demolition activities of existing facilities) and operation of the AEC. Potential noise impacts from AEC construction and operation activities are assessed in this section.

5.7.4.1 Significance Criteria

Appendix G of the California Environmental Quality Act (CEQA) is a screening tool, not a method for setting thresholds of significance. Appendix G is typically used in the Initial Study phase of the CEQA process, asking a series of questions. The purpose of these questions is to make a determination as to whether a project requires an Environmental Impact Report, a Mitigated Negative Declaration or a Negative Declaration. As the Governor's Office of Planning and Research stated, "Appendix G of the Guidelines lists a variety of potentially significant effects, but does not provide a means of judging whether they are indeed significant in a given set of circumstances." The answers to the Appendix G questions are not determinative of whether an impact is significant or less than significant. Nevertheless, the questions presented in CEQA Appendix G are instructive.

In terms of potential noise impacts, Appendix G, asks, in part, whether the project would:

- Expose people to noise levels in excess of standards established in the local General Plan or noise ordinance
- Expose people to excessive ground-borne noise levels or vibration
- Cause a substantial permanent increase in ambient noise levels in the project vicinity
- Cause a substantial temporary or periodic increase in ambient noise levels in the project vicinity

Generally, the AEC design basis for noise control is the minimum, or the most stringent, noise level required by the applicable LORS. Therefore, noise from the project is evaluated against the City of Long Beach's requirements. The City has established quantitative guidelines for determining appropriate noise levels for various land uses in the Noise Element of its General Plan and in its noise ordinance.

The CEC staff has stated that construction noise is typically insignificant if the construction activity is temporary, use of heavy equipment and noisy activities is limited to daytime hours, and feasible noise abatement measures are implemented for noise-producing equipment. As explained in Section 2.0, construction activity for the AEC will limit use of heavy equipment and noisy activities to daytime hours, and feasible noise abatement measures will be implemented for noise-producing construction equipment.

5.7.4.2 Construction and Demolition Impacts

Project Construction and Demolition Noise. Construction activities at the AEC site are expected to be typical of other power plants in terms equipment used and other types of activities performed. Demolition activities use equipment similar to that used for construction activities; therefore, the range in equipment sound levels during demolition activities is expected to be the same as construction activities. Construction and demolition activities at the project site are anticipated to last 56 months, from the first quarter of 2017 until the third quarter of 2021. The project will commence with the demolition of retired Alamitos Generating Station Unit 7 and other ancillary structures to make room for the construction of AEC Blocks 1 and 2 on the AGS site. The demolition of AGS Unit 7 will commence in the first quarter of 2017. The construction of the AEC CCGT is scheduled to commence in the second quarter of 2017, and construction of AEC SCGT is scheduled to commence in the second quarter of 2020. The demolition of existing units is not required to construct AEC.

The noise level will vary during the construction or demolition period, depending on the activities being performed. Construction of power plants can be divided into five phases that use different types of construction equipment. The five phases are demolition, site preparation, and excavation; concrete pouring; steel erection; mechanical; and clean-up (Miller et al., 1978). In addition to onsite construction -related activities, additional sources of noise include the transport of materials to and from the site, and construction worker traffic during commute hours. Vehicles traveling on public roads are regulated by a number of state and local agencies, as described in Section 5.12, Traffic and Transportation. Section 5.12 also discusses measures to minimize potential traffic impacts, some of which (such as the transport of heavy/oversize loads during construction) will result in nighttime traffic on public roads. The project will include best management practices (BMP) that will limit offsite noise impacts by ensuring that vehicles are appropriately muffled and that noisy activities at construction parking areas (loud stereos or conversations) are limited.

The U.S. Environmental Protection Agency (EPA) Office of Noise Abatement and Control, and the Empire State Electric Energy Research Company have extensively studied noise from individual pieces of construction equipment, from power plant construction and demolition sites, and from other types of facilities (EPA, 1971; Barnes et al., 1976). Given the dynamic nature of construction activities and because specific information on the types, quantities, and operating schedules of construction equipment is not available at this point in the project development, information from these documents for similarly sized industrial projects will be used.

The loudest equipment types generally operating at a site during each phase of construction are presented in Table 5.7-5. The composite average or equivalent site noise level, representing noise from all equipment, also is presented for each phase.

TABLE 5.7-5
Construction Equipment and Composite Site Noise Levels

Construction Phase	Loudest Construction Equipment	Equipment Noise Level (dBA) at 50 feet	Composite Site Noise Level (dBA) at 50 feet
Demolition, Site Clearing, and Excavation	Dump Truck	91	89
	Backhoe	85	
Concrete Pouring	Truck	91	78
	Concrete Mixer	85	
Steel Erection	Derrick Crane	88	87
	Jack Hammer	88	

TABLE 5.7-5

Construction Equipment and Composite Site Noise Levels

Construction Phase	Loudest Construction Equipment	Equipment Noise Level (dBA) at 50 feet	Composite Site Noise Level (dBA) at 50 feet
Mechanical	Derrick Crane	88	87
	Pneumatic Tools	86	
Cleanup	Rock Drill	98	89
	Truck	91	

Source: EPA, 1971; Barnes et al., 1976.

Average or equivalent construction and demolition noise levels projected at various distances from the project site are presented in Table 5.7-6. These results are considered conservative because the only attenuating mechanism considered was divergence of the sound waves in open air. At times, actual sound levels may exceed the long-term average sound levels and precise estimates of construction noise levels are challenging to make given the dynamic nature of construction activities. The noisiest construction activities will be confined to the daytime hours. Pile driving is currently anticipated, but it would be limited to daytime periods. Table 5.7-7 presents noise levels from common construction equipment at various distances.

Noise from construction of the sanitary/process wastewater pipeline is expected to be similar to the excavation construction phase listed in Table 5.7-5, although it will be of much shorter duration for any particular receptor location.

TABLE 5.7-6

Average Construction Noise Levels at Various Distances

	Noise Level (dBA)		
Construction Phase	At 375 feet	At 1,500 feet	At 3,000 feet
Demolition, Site Clearing, and Excavation	71	59	53
Concrete Pouring	60	48	42
Steel Erection	69	57	51
Mechanical	69	57	51
Clean-up	71	59	53

TABLE 5.7-7

Noise Levels from Common Construction and Demolition Equipment at Various Distances

Construction Equipment	Typical Noise Level (dBA) at 50 feet	Typical Noise Level (dBA) at 375 feet	Typical Noise Level (dBA) at 1,500 feet
Pile Driver (20,000 to 32,000 ft-lbs/blow)	104	86	74
Dozer (250 to 700 hp)	88	70	58
Front end Loader (6 to 15 yd^3)	88	70	58
Truck (200 to 400 hp)	86	68	56
Grader (13- to 16-foot blade)	85	67	55
Shovels (2 to 5 yd^3)	84	66	54

TABLE 5.7-7

Noise Levels from Common Construction and Demolition Equipment at Various Distances

Construction Equipment	Typical Noise Level (dBA) at 50 feet	Typical Noise Level (dBA) at 375 feet	Typical Noise Level (dBA) at 1,500 feet
Portable Generator (50 to 200 kW)	84	66	54
Derrick Crane (11 to 20 tons)	83	65	53
Mobile Crane (11 to 20 tons)	83	65	53
Concrete Pump (30 to 150 yd^3)	81	63	51
Tractor (3/4 to 2 yd^3)	80	62	50
Unquieted Paving Breaker	80	62	50
Quieted Paving Breaker	73	55	43

Notes:

yd^3 = cubic yard
ft-lbs/blow = foot pounds per blow
hp = horsepower
kW = kilowatt

Impact pile driving is one of the louder construction activities that emits a short term repetitive sound as the piles are advanced into the ground with successive hammer blows. The average sound levels for pile driving may be less than those shown in Table 5.7-7 because the hammer blows are paused while additional pile is positioned and welded into place and as equipment is repositioned for successive piles. All pile driving activities will be limited to daytime hours.

Noise generated during the testing and commissioning phase of the project is not expected to be substantially different from that produced during normal full-load operation. Starts and abrupt stops are more frequent during this period, but they are usually short lived. Additional construction hours may be necessary to make up schedule deficiencies or to complete critical construction activities (for example, critical continuous concrete pours, pouring concrete at night during hot weather, or working around time-critical shutdowns and constraints). During some construction periods and during the startup phase of the project, some activities may continue 24 hours per day, 7 days per week. These include, but are not limited to, nighttime transportation of heavy construction equipment to the site, the nighttime transport of heavy or oversize loads during construction to minimize traffic impacts, and the subsequent unloading or handling of that equipment onsite. Noise emissions from such activities will be limited to the extent feasible.

Steam blows during the construction phase are an activity designed to clean scale and other debris from the boiler tubes and steam lines before steam is admitted to the steam turbine where such debris would damage the blades. When high-pressure blows are used, several short blows several minutes in duration are generally performed each day (during daytime hours) and the entire process takes several weeks. Alternatively, quieter, lower-pressure continuous or semicontinuous blows may be used. In either case, steam blow activities are silenced to levels similar to common construction equipment (generally less than 90 dBA at 50 feet) to minimize potential for complaints.

Construction noise levels vary depending on the nature of the construction activity and its location. To minimize potential construction noise effects, noise mitigation measures, described in Section 5.7.5, have been developed. For example, haul trucks and other engine-powered equipment will be required to be equipped with adequate mufflers and operated in accordance with posted speed limits, and truck engine exhaust brake use will be limited to emergencies.

Construction and Demolition Vibration. Construction and demolition vibrations can be divided into three classes, based on the wave form and its source (see Table 5.7-8). Blasting is not currently anticipated and

pile driving will be limited to a depth of approximately 50 feet. The contractor will develop an appropriate vibration mitigation plan to ensure potential vibrations are limited to a peak particle velocity of 0.2 in/sec at the nearest sensitive receptor. Such activities will be limited to normal daytime work hours and will be of short duration; therefore, no additional mitigation is required.

TABLE 5.7-8
Construction and Demolition Vibrations

Wave Form	Example Source
Impact	Impact pile driver or blasting
Steady state	Vibratory pile driver
Pseudo steady state	Double acting pile hammer

Construction and Demolition Worker Exposure to Noise. Worker exposure to noise levels during construction of the AEC and the demolition of the Alamitos Generating Station Unit 7 will vary depending on the phase of the project and the proximity of the workers to the noise-generating activities. The project will develop a Hearing Protection Plan that complies with California Division of Occupational Safety and Health Administration (Cal/OSHA) requirements. This Hearing Protection Plan will be incorporated into the project's construction and demolition Health and Safety Plan. The plan will require appropriate hearing protection for workers and visitors during the construction and demolition period. Additional information on the overall construction worker health and safety program is included in Section 5.16, Worker Health and Safety.

5.7.4.3 Operational Impacts

Worker Exposure. Nearly all equipment and project components will be specified not to exceed near-field maximum noise levels of 90 dBA at 3 feet (or 85 dBA at 3 feet where available as a vendor standard). Neither permanent nor semipermanent workstations are near noisy plant equipment, so a worker's time-weighted average exposure to noise should not routinely approach allowable levels. Nevertheless, signs requiring the use of hearing protection devices will be posted in all areas where noise levels commonly exceed 85 dBA, such as inside acoustical enclosures, and the project will comply with applicable Cal/OSHA requirements. Outdoor noise levels throughout the plant will range from 90 dBA near certain equipment to roughly 65 dBA in areas more distant from a major noise source. Therefore, noise impacts to workers during operation will be less than significant. Additional information on the overall operational worker health and safety program is included in Section 5.16, Worker Health and Safety.

Transmission Line and Switchyard Noise Levels. One of the electrical effects of high-voltage transmission lines is corona. Corona is the ionization of air 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 a design concern with transmission lines of 345 kV and greater and with lines that are at higher elevations. Higher levels of corona noise are also associated with rain, fog, or foul weather conditions.

No offsite electrical linear developments are proposed as part of the project. As discussed in Section 3.0, Transmission System Engineering, the design voltage and current flow are not increasing; therefore, the audible noise associated with the 230-kV lines and switchyards in the area is not expected to change.

Plant Operational Noise Levels. A preliminary noise model of the proposed AEC has been developed using the CADNA/A noise model by DataKustik GmbH of Munich, Germany. The CADNA/A noise model is capable of modeling very complex industrial plants. The sound propagation factors used in the model have been adopted from International Organization for Standardization (ISO) 9613-2, *Acoustics – Sound Attenuation during Propagation Outdoors* (ISO, 1996). The model divides the proposed facility into a list of individual noise sources representing each piece of equipment that produces a significant amount of noise. Using

these noise levels as a basis, the model calculates the noise level that would occur at each receptor from each source after losses from distance, air absorption, enclosures, and blockages are considered. The sum of all these individual levels is the total plant level at the modeling point. A-weighted sound power (noise) levels used to estimate project noise are summarized in Table 5.7-9.

TABLE 5.7-9
Major Equipment Sound Power Levels

Source	Sound Power Level (dBA)
Combined-cycle Combustion Turbine Generator	115
Heat Recovery Steam Generator	107
Combined-cycle Stack Exit	101
Combined-cycle Fin Fan Cooler	111
Air-cooled Condenser (ACC)	115
Steam Turbine Generator	111
Generator Step-up Transformers	100
Fuel Gas Compressor Building	110
Boiler Feed Water Pumps	108
Simple-cycle Combustion Turbine Generator	113
Simple-cycle SCR and Stack	99
Simple-cycle Fin Fan Cooler	103

The difference between a sound power level and a sound pressure level (or noise level) is as follows: A sound power level is analogous to the wattage of a light bulb; it is a measure of the acoustical energy emitted by the source and is, therefore, independent of distance. A sound pressure level is analogous to the brightness or intensity of light experienced at a specific distance from a source and is measured directly with a sound level meter. Sound pressure levels should always be specified with a location or distance from the noise source.

Sound power level data typically are used in acoustic models to predict sound pressure levels. This is because sound power levels take into account the size of the acoustical source and account for the total acoustical energy emitted by the source. For example, the sound pressure level 15 feet from a small radio and a large orchestra may be the same, but the sound power level of the orchestra will be much larger because it emits sound over a much larger area. Similarly, 2-hp and 2,000-hp pumps can both achieve 85 decibels of A-weighted sound (dBA) at 3 feet (a common specification) but the 2,000-hp pump will have a significantly greater sound power level. Consequently the noise from the 2,000-hp pump will travel farther. A sound power level can be determined from a sound pressure level if the distance from and dimensions of the source are known. Sound power levels will always be greater than sound pressure levels, and sound power levels should never be compared to sound pressure levels such as those presented in Table 5.7-2.

Multiple acoustical design measures are available to AEC to satisfy the applicable acoustical requirements, including the following:

- Large noise barriers
- Enclosures around major equipment or equipment skids
- Additional or increased silencing
- Lagging or enclosing of the ACC ductwork
- Lagging of high-noise piping
- Steam vent silencers
- Low noise valves
- Low noise fans

As discussed in Section 5.7.7.3, the applicable sound limit for the AEC site is the City of Long Beach's District 4 criteria of 70 dBA at the boundary of the District. With the acoustical design features for the AEC, the anticipated steady-state sound levels do not exceed the District 4 criteria of 70 dBA at the district boundary. In District 1, the estimated operational noise levels at the residences, M1, M2, and M3, are shown in Table 5.7-10. The maximum anticipated steady-state sound level at an existing residence is 57 dBA (located east of AEC).

The maximum anticipated steady-state sound level at the Rosie the Riveter Charter High School, located in District 4, is 57 dBA.

TABLE 5.7-10
Anticipated Plant Operational Noise Levels

Location	Estimated Plant Operational Noise, (L_{50}, dBA)
M1 – Residence at 6333 Eliot Street, Long Beach	55
M2 – Residence at 6810 East Septimo Street, Long Beach	51
M3 – Residence at the intersection of El Dorado Drive and Nassau Drive in the Leisure World Retirement Community, Seal Beach	53

At nearby residential locations, no significant tones are anticipated. Nevertheless, audible tones are possible—certain sources within the AEC, such as the combustion turbine inlets, transformers, pump motors, and fan gearboxes, have been known to produce significant tones.

Ground and Airborne Vibration. Similar simple- and combined-cycle power blocks have not resulted in ground or airborne vibration impacts. The project is primarily driven by gas turbines exhausting into a HRSG or SCR duct and a stack silencer. These very large ducts and silencers effectively reduce low-frequency noise, which is the main source of airborne-induced vibration of structures. It is the Project Owner's intention to anticipate the potential for low-frequency noise in the design and specifications of the project equipment and take the necessary steps to minimize or prevent significant ground or airborne vibration impacts.

The equipment that would be used in the project is well balanced and is designed to produce very low vibration levels throughout the life of the project. An imbalance could contribute to ground vibration levels in the vicinity of the equipment. However, vibration-monitoring systems installed in the equipment are designed to ensure that the equipment remains balanced. Should an imbalance occur, the event would be detected and the equipment would automatically shut down. Given these protective measures, impacts related to ground and airborne vibrations will be less than significant.

5.7.5 Cumulative Effects

Section 15355 of the CEQA Guidelines defines "cumulative impacts" as "two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts." Subsection b of Section 15355 states, in part, that "The cumulative impact from several projects is the change in the environment which results from the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects." Thus, cumulative impacts under CEQA involve the potential interrelationships of two or more projects, not the impacts from a single project. Specifically, under Section 15130 of the CEQA Guidelines, an EIR is required to discuss cumulative impacts when the project's incremental effect is "cumulatively considerable." Section 15065(a)(3) then defines "cumulatively considerable" as meaning "that the incremental effects of an individual project are significant when viewed in connection with the effects of other closely related past projects, the effects of other current projects and the effects of probable future projects." Therefore, a cumulative impact refers to the AEC's incremental effect together with other closely related past, present, and reasonably foreseeable future

projects whose impacts may compound or increase the incremental effects of the proposed project (Public Resources Code §21083; CCR, Title 14, §§15064(h), 15065(c), 15130, and 15355).

Potential cumulative noise impacts from construction and/or operation of the proposed project are not expected to differ from those of the project alone. The project will have a less-than-significant noise effect in the immediate vicinity of the project site. Other pending projects identified by the City of Long Beach have not been identified as substantial sources of noise in the project vicinity (see Section 5.6.4, Land Use). Furthermore, these projects would also be required to comply with applicable federal, state, and local LORS. The proposed project's cumulative noise impacts are therefore expected to be less than significant.

5.7.6 Mitigation Measures

Even though the AEC will not cause any significant noise impacts, the following measures are proposed to further minimize any potential noise impacts from project construction and operation.

5.7.6.1 Noise Hot Line

The Project Owner will establish a telephone number for use by the public to report significant undesirable noise conditions associated with the construction, demolition, and operation of the project. If the telephone is not staffed 24 hours per day, the Project Owner will include an automatic answering feature, with date and time stamp recording, to answer calls when the phone is unattended. This telephone number will be posted at the project site during construction and demolition in a manner visible to passersby. This telephone number will be maintained until the project has been operational for at least 1 year.

5.7.6.2 Noise Complaint Resolution

Throughout the construction, demolition, and operation of the project, the Project Owner will document, investigate, evaluate, and attempt to resolve all legitimate project-related noise complaints. The Project Owner or authorized agent will take the following actions:

- Use the suggested CEC Noise Complaint Resolution Form or a functionally equivalent procedure to document and respond to each noise complaint.
- Attempt to contact the person(s) making the noise complaint within 24 hours.
- Conduct an investigation to attempt to determine the source of noise related to the complaint.
- If the noise complaint is legitimate, take all feasible measures to reduce the noise at its source.

5.7.6.3 Steam Blows

If a traditional, high-pressure steam blow process is used, the Project Owner will equip the steam blow piping with a temporary silencer that quiets the noise of steam blows to 89 dBA or less, measured at a distance of 50 feet. Use of high-pressure steam blows will be limited to the daytime hours. If the quieter, low-pressure continuous steam blow process is used, the Project Owner will prepare a description of the process, with expected noise levels and planned hours of steam blow operation.

5.7.7 Laws, Ordinances, Regulations, and Standards

Table 5.7-11 presents the LORS that apply to noise.

TABLE 5.7-11
Laws, Ordinances, Regulations, and Standards for Noise

LORS	Requirements/Applicability	Administering Agency	AFC Section Explaining Conformance
Federal			
EPA	Guidelines for state and local governments.	EPA	5.7.6.1.1
Occupational Safety and Health Act of 1970	Exposure of workers over 8-hour shift limited to 90 dBA.	Occupational Safety and Health Administration	5.7.6.1.2

TABLE 5.7-11

Laws, Ordinances, Regulations, and Standards for Noise

LORS	Requirements/Applicability	Administering Agency	AFC Section Explaining Conformance
State			
Cal/OSHA, CCR Title 8, Article 105 Sections 095 et seq.	Exposure of workers over 8-hour shift limited to 90 dBA.	Cal/OSHA	5.7.6.2.1
California Vehicle Code Sections 23130 and 23130.5	Regulates vehicle noise limits on California highways.	California Department of Transportation (Caltrans), California Highway Patrol, and the County Sheriff's Office	5.7.6.2.2
Local			
California Government Code Section 65302	Requires local government to prepare plans that contain noise provisions.	California Office of Planning and Research	5.7.6.3
City of Long Beach General Plan	Establishes policies to assist the City in making land use decisions.	City of Long Beach	5.7.6.3.1
City of Long Beach Noise Ordinance	Establishes numeric noise standards for industrial uses of 70 dBA at the industrial district boundary.	City of Long Beach	5.7.6.3.2

The AEC is located solely within the jurisdiction of the City of Long Beach.

5.7.8 Federal LORS

EPA. Guidelines are available from the EPA (1974) to assist state and local government entities in development of state and local LORS for noise. Because there are local LORS that apply to this project, the EPA guidelines are not applicable.

Occupational Safety and Health Administration. Onsite noise levels are regulated through the U.S. Occupational Safety and Health Administration (OSHA). To protect workers' hearing, the noise exposure level is regulated at 90 dBA, over an 8-hour work shift (29 Code of Federal Regulations §1910.95). Onsite noise levels will generally be in the 70-to-85-dBA range. Areas with a noise level above 85 dBA will be posted as high-noise level areas, and hearing protection will be required when entering or working in those areas. The power plant will implement a hearing conservation program for applicable employees and maintain exposure levels below 90 dBA.

5.7.8.1 State LORS

Cal/OSHA. The California Department of Industrial Relations, Division of Occupational Safety and Health enforces state noise regulations that are the same as the federal OSHA regulations described previously. The Cal/OSHA regulations are contained in the CCR, Title 8, General Industrial Safety Orders, Article 105, Control of Noise Exposure, Sections 5095, et seq.

California Vehicle Code. Noise limits for highway vehicles are regulated under the California Vehicle Code, Sections 23130 and 23130.5. The limits are enforceable on the highways by the California Highway Patrol and the County Sheriff offices.

5.7.8.2 Local LORS

City of Long Beach General Plan. The City of Long Beach General Plan (1975) Noise Element establishes goals, objectives and policies that address noise issues within the City's jurisdiction. The noise element recommends the following actions for all industrial related activities in the City:

- Complying with existing sections of the Municipal Code;
- Taking advantage of existing sound barriers in cases where noise cannot be effectively contained, muffled, or directed away from schools, hospitals, and housing;
- Choosing industrial equipment designed to emit less noise whenever possible.

More detailed recommendations are also listed in the noise element in which provides specific construction methodologies and noise abatement strategies for industrial activity such as:

- Require industrial noise control sources not kept indoors to be placed so as to take advantage of existing sound barriers, or directed toward non-sensitive uses.
- Require adequate exhaust and intake mufflers and soundproofed enclosures to restrict the noise level output and the duration of noise exposures generated by heavy noise construction equipment.
- Consider the establishment of buffer zones around industrial areas to minimize the noise impact on other adjacent land uses.

The General Plan also establishes the following recommendations for land use compatibility.

TABLE 5.7-12
City of Long Beach General Plan's (1975) Recommended Criteria for Maximum Acceptable Noise Levels (dBA)

	Outdoor			Indoor
Major Land Use Type	**Maximum Single Hourly Peak**	**L_{10}**	**L_{50}**	**L_{dn}**
Residential (7 a.m. – 10 p.m.)	70	55	45	45
Residential (10 p.m. – 7 a.m.)	60	45	35	35
Commercial (anytime)	75	65	55	
Industrial (anytime)	85	70	60	

City of Long Beach Noise Ordinance. The City of Long Beach has adopted a Noise Ordinance (Chapter 8.80), which established noise standards for the various land use districts as presented in Table 5.7-13.

TABLE 5.7-13
Long Beach Noise Ordinance—8.80.160, Table A– Exterior Noise Limits

Receiving Land Use District Category	Time Period	Noise Level** (L_{50}, dBA)
District One (Predominately Residential with other land uses types also present)	Night: 10:00pm – 7:00am	45
	Day: 7:00am – 10:00pm	50
District Two (Predominantly commercial with other land use types also present)	Night: 10:00pm – 7:00am	55
	Day: 7:00am – 10:00pm	60
District Three (Predominantly industrial with other land use types present)	Any time	65**
District Four (Predominantly industrial with other land use types present)	Any time	70**
District Five (Airport, freeways, and waterways regulated by other agencies)	Regulated by other agencies and laws	—

** Districts Three and Four limits are intended primarily for use at their boundaries rather than for noise control within those districts.

TABLE 5.7-13

Long Beach Noise Ordinance—8.80.160, Table A– Exterior Noise Limits

Receiving Land Use District Category	Time Period	Noise Level** (L_{50}, dBA)

Notes:

The Code includes corrections for time characteristics. The noise level, when measured on any other property, may not exceed:

- The noise standard for that land use district as specified in Table 5.17-13 for a cumulative period of more than thirty minutes in any hour; (Long Beach Noise Ordinance, 8.80.150(A)); or
- The noise standard plus five (5) dB for a cumulative period of more than fifteen (15) minutes in any hour (L_{25}); (Long Beach Noise Ordinance, 8.80.150(B)); or
- The noise standard plus ten (10) dB for a cumulative period of more than five (5) minutes in any hour ($L_{8.3}$); (Long Beach Noise Ordinance, 8.80.150(B)); or
- The noise standard plus fifteen (15) dB for a cumulative period of more than one minute in any hour ($L_{1.6}$); (Long Beach Noise Ordinance, 8.80.150(B)); or
- The noise standard plus twenty (20) dB for any period of time. (Long Beach Noise Ordinance, 8.80.150(B)).

If the measured ambient noise level at a receptor exceeds the levels presented in Table 5.7-13 or the levels with the time characteristic corrections, the allowable standard is increased in 5 dB increments to encompass or reflect such ambient noise. (Long Beach Noise Ordinance, 8.80.150(C)).

If the measurement location is on a boundary between two different districts, the noise level limit applicable shall be the arithmetic mean of the two districts. (Long Beach Noise Ordinance, 8.80.150(D))

In the event the noise contains a steady audible tone such as a whine, screech, or hum, or is a repetitive noise such as hammering or riveting or contains music or speech conveying informational content the standards are reduced by 5 dBA. (Long Beach Noise Ordinance, 8.80.160).

The AEC site is located in District 4 (predominantly industrial with other land use types present). The applicable limit for District 4 is 70 dBA. The project will comply with this limit.

Residences are located outside of the District 4 boundary in District 1 (see Figure 5.7-2).

Construction activities which annoy or disturb a reasonable person of normal sensitivity are not permitted between the hours of 7 p.m. and 7 a.m. on weekdays and federal holidays, between 7 p.m. Friday to 9 a.m. on Saturdays, or anytime on Sundays. The code provides for a Sunday work permit to be issued as well as procedures to obtain a variance. Interior noise limits are also established by the noise ordinance.

5.7.9 Agencies and Agency Contacts

Given the CEC's exclusive jurisdiction, no further agency contacts are required.

5.7.10 Permits and Permit Schedule

Given the CEC's exclusive jurisdiction, no additional noise permits are required; therefore, there is no permit schedule.

5.7.11 References

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Legend

- AEC Site
- AGS Boundary
- Parking/Laydown Construction Area
- Noise Monitoring Location
- Proposed New Process/Sanitary Wastewater Pipeline to First Point of Interconnection
- Potential Sewer Upgrade

0 500 1,000 Feet

N

FIGURE 5.7-1
Noise Monitoring Locations

Alamitos Energy Center
Long Beach, California
October 2015

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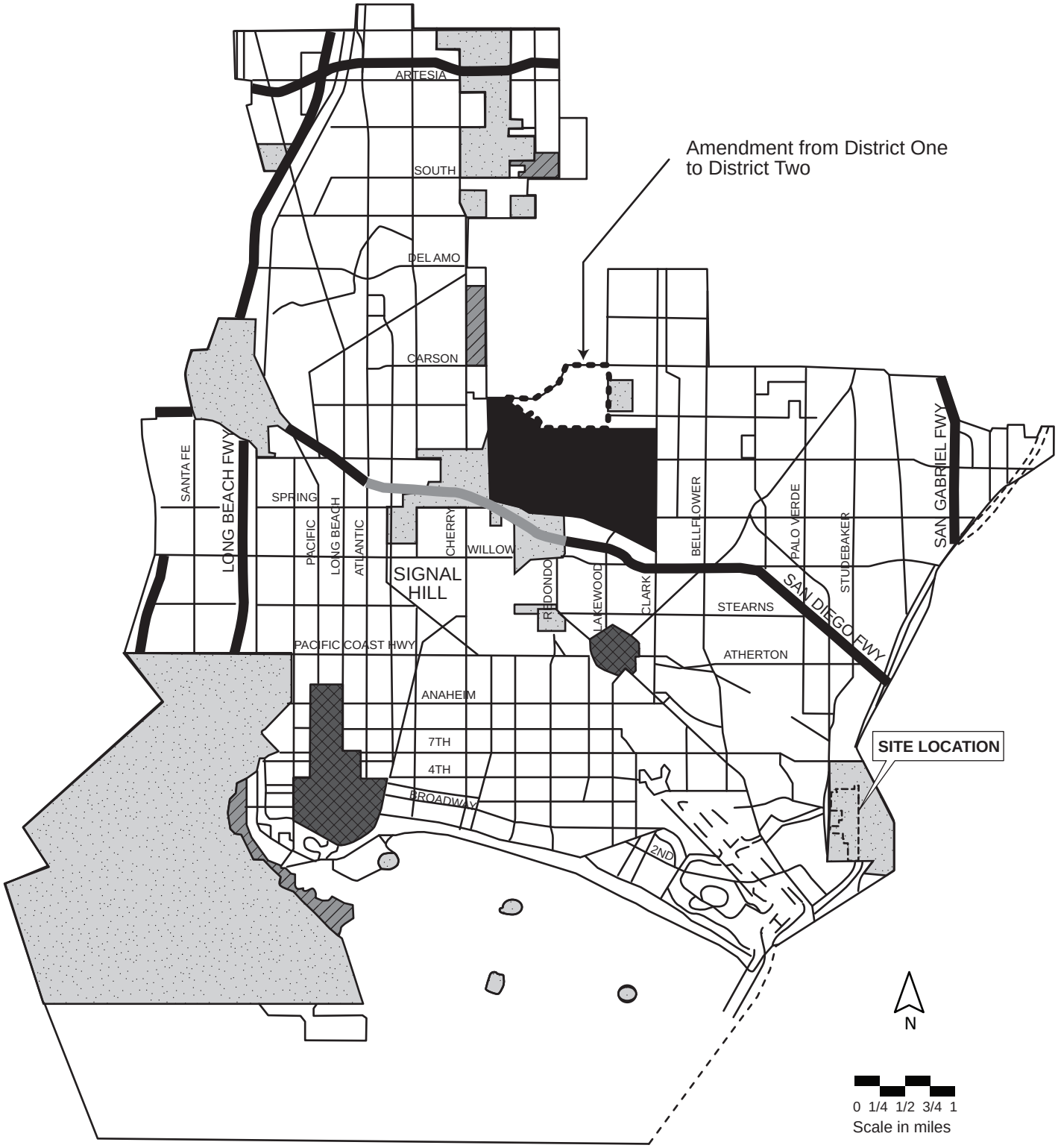

Source of the images is the (Long Beach Noise Element, 8.80.160)

LEGEND

- District 1 - Remainder of the City
- District 2
- District 3
- District 4
- District 5 - Preempted by other Agencies*

* Noise at Long Beach Airport is regulated by State & Federal Laws. It is the responsibilty of the Noise Control Officer to address complaints filed against aircraft noise. Report all violations to proper enforcing agencies and the Long Beach City Council.

FIGURE 5.7-2
Noise District Map
Alamitos Energy Center
Long Beach, California
October 2015

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5.8 Paleontological Resources

This section describes the existing environment and potential effects on paleontological resources (fossils) from the construction of the Alamitos Energy Center (AEC). Section 5.8.1 describes the project setting and Section 5.8.2 discusses the affected environment, including the resource inventory and its results. Section 5.8.3 presents the environmental analysis and impact assessment. Section 5.8.4 considers cumulative effects on paleontological resources, and Section 5.8.5 presents proposed mitigation measures. Section 5.8.6 discusses applicable laws, ordinances, regulations, and standards (LORS). Section 5.8.7 lists involved agencies and agency contacts, and Section 5.8.8 lists applicable permits that will be required for construction. Section 5.8.9 provides the references consulted.

This section of the Application for Certification (AFC) meets the siting regulations of the California Energy Commission (CEC) (2000, 2007) and conforms with guidelines that address the assessment of paleontological resources and mitigating impacts resulting from earth-moving activities, including guidelines of the Society of Vertebrate Paleontology (SVP) (SVP, 1995) and the Bureau of Land Management (BLM, 2008; 2009). This paleontological resources inventory and impact assessment was prepared by paleontologist James Verhoff, and Dr. W. Geoffrey Spaulding, paleontological resources specialist (PRS). Mr. Verhoff has experience in paleontological resources management and mitigation during both the licensing and compliance phases of a number energy generation projects throughout California. Dr. Spaulding has advanced degrees in geology with emphases in paleobiology, and is a recognized expert on the glacial-age environments of the American West. His qualifications as a PRS have been recognized by CEC Staff.

5.8.1 Setting

AES Alamitos Energy, LLC, will construct, own, and operate the Alamitos Energy Center (AEC), a natural- gas-fired, air-cooled, combined-cycle and simple-cycle, electrical generating facility in Long Beach, California. The proposed AEC will have a nominal generating capacity of 1,040 megawatts (MW). The AEC will be constructed on the site of the existing AES Alamitos Generating Station (AGS), located on an approximately 21-acre site within a larger, 71.1-acre parcel.

The AEC will feature two gas turbine power blocks. Combined-cycle power block will consist of two natural-gas-fired combustion turbine generators (CTG) in a combined-cycle configuration, two unfired heat recovery steam generators (HRSG), one steam turbine generators, an air-cooled condenser, an auxiliary boiler, and related ancillary equipment. Simple-cycle power block will consist of four simple-cycle LMS-100 CTGs with fin-fan coolers and ancillary facilities (AEC SCGT).

The AEC will meet the demand for new generation in the Los Angeles basin local electrical reliability area. The demand is caused in large part by the closure of the San Onofre Nuclear Generating Station and the anticipated retirement of the older, natural-gas-fired generation currently using once-through ocean water-cooling (OTC). As a result of the promulgation of the California State Water Resources Control Board's (SWRCB) *Water Quality Control Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling* (OTC Policy) (SWRCB, 2010), more than 4,000 MW of OTC generation are expected to be retired by December 31, 2020 in the Los Angeles local reliability area.

The AEC will use water provided by the City of Long Beach Water Department (LBWD) for construction, operational process, and sanitary uses but at substantially lower volumes than the existing AGS historically has used. This water will be supplied through existing, onsite water lines. The AEC will include a new, 1,000-foot process/sanitary wastewater pipeline to the first point of interconnection with the existing LBWD sewer system, the potential upgrade of an additional 4,000 feet of existing pipeline downstream from the first point of interconnection, and the elimination of the current practice of treatment and discharge of process/sanitary wastewater to the San Gabriel River. Stormwater runoff from the power block areas will be directed to oil/water separators and to an existing retention basin and then ultimately discharged to the Los Cerritos channel via existing stormwater outfalls.

The AEC will interconnect to the existing, Southern California Edison (SCE) 230-kilovolt (kV) switchyard adjacent to the north side of the AGS. Natural gas will be supplied to the AEC via the existing, offsite, 30-inch-diameter pipeline owned and operated by Southern California Gas Company (SoCalGas) that currently serves Units 5 and 6 of the AGS. The AEC will require construction of new natural gas-metering facilities and construction of two new natural gas compressor buildings within the AEC footprint.

The AEC is designed to serve both peak and intermediate loads with the added capabilities of rapid startup, significant turndown capability (ability to turn down to a low load), and fast ramp rates. As California's intermittent renewable energy portfolio continues to grow, operating in either load-following or partial shutdown mode will become necessary to maintain electrical grid reliability, thus placing an increased importance upon the rapid startup, high turndown, steep ramp rate, and superior heat rate employed at the AEC.

As an in-basin generating asset, the AEC will provide local generating capacity, voltage support, and reactive power that are essential for transmission system reliability in the Western Los Angeles Basin subarea and larger Los Angeles basin local reliability area. The AEC will be able to provide system stability by supplying reactive power, voltage support, frequency stability, and rotating mass in the heart of the critical Western Los Angeles local reliability area. By virtue of its location in a transmission constrained load center, the AEC also helps to avoid potential transmission line overloads and can provide reliable local energy supplies when electricity from more distant generating resources is unavailable. In recognition of its critical grid reliability benefits, the AEC combined-cycle CTGs were selected by SCE in its Local Capacity Requirements Request for Offer (LCR RFO) on November 5, 2014, and the simple-cycle CTGs will meet the capacity needs anticipated to be identified in future California Public Utilities Commission (CPUC) Long-term Procurement Plans (LTPP).

Owing to the critical need for generating capacity at the AGS site at all times, existing Units 1 through 6 will remain in operation through much of the AEC development and construction. Given that the removal of existing Units 1 through 6 is not required for construction of the AEC, the continued operation of the AGS will not impede AEC construction. Construction and site preparation activities at the project site are anticipated to last 56 months, from the first quarter of 2017 until the third quarter of 2021. The project will commence construction with the removal of former Unit 7's building and ancillary equipment, fuel storage tank, tank berms, small maintenance shops and two waste water retention basins in January 2017 to make room for construction and laydown area for the AEC CCGT. Construction of the AEC CCGT will commence during the second quarter of 2017 and will be completed by the second quarter of 2020. The AEC CCGT is expected to commence commercial operation before May 1, 2020. The construction of AEC SCGT is scheduled to commence in the second quarter of 2020 through the third quarter of 2021 and is expected to commence commercial operation in the third quarter of 2021. A temporary construction access road may be constructed offsite beginning at the intersection of Studebaker Road and Loynes Drive traveling southeast to the AEC site. Construction of the AEC will require the use of onsite laydown areas (approximately 8 acres dispersed throughout the existing site) and an approximately 10-acre laydown area located adjacent to the existing site.

5.8.2 Affected Environment

5.8.2.1 Physiographic Setting

The project area lies in the city of Long Beach, California. The project area lies in the southern portion of the Los Angeles Basin, east of the Pacific Ocean and approximately 1 mile northeast of Alamitos Bay; the San Gabriel River lies approximately 0.75 mile to the east. Physiographically, Fenneman (1931) described this area as the Angeles Section of the Pacific Border Province. The present shoreline of the Pacific Ocean is approximately 1.8 miles to the southwest, and the project site lies adjacent to one of several channelized sections of the lower San Gabriel River. Prior to development and channelization, the project area likely would have been an estuarine, lagoonal habitat near the mouth of the San Gabriel River. A largely continuous long-shore beach would have offered a barrier separating this estuarine habitat from San Pedro Bay. The plain of the Los Angeles Basin extends to the north and northwest of the project site, punctuated

by isolated uplifts such as the Dominguez Hills and the Palos Verdes Hills. The basin is bounded by the Santa Monica and San Gabriel mountains to the north, the Pacific Ocean to the west and south, and the highlands of the Puente and Chino hills to the north, and the Santa Ana Mountains to the south.

The Los Angeles Basin developed in the Late Miocene in response to tectonic events encompassing regional pull-apart of a quiescent continental shelf margin, and the basin reached a maximum depth of approximately 6,000 feet (Norton and Otott Jr., 1996). The basin rapidly filled with near-shore marine sediment for the next 10 million years or more. This basin, now filled with marine sediment with a veneer of Quaternary continental sediment less than a few hundred feet thick in most cases, has been heavily deformed by regional faulting and folding, with oil and natural gas having migrated through the permeable marine sediments to become trapped by these structures (Norton and Otott Jr., 1996). During the last glacial age and during prior glacial ages that occurred during the Middle and Late Pleistocene (the last 0.7 million years), sea level was hundreds of feet below that of the present level, and consequently for much of the last million years the project area lay on a vast coastal plain, with the shoreline some distance to the west.

The surface geology of the project area (Figures 5.4-1A and 5.4-1B in Section 5.4) has been masked by historical and modern urban development. Where native soil is present in the region it represents sands and silts associated with paralic[38] habitats, beach deposits and, further inland, estuarine silts of tidal lagoons, as well as fluvial silts and sands of the San Gabriel River (California Department of Conservation, 1998). Near-shore marine deposits also add to the array of sediments that reflect the complex interaction of the San Gabriel River and the Pacific Ocean over the past ten thousand years. Prior to that time, during the Late Pleistocene, the ocean shore and its associated habitats lay many miles farther west, and this area was a semi-arid coastal plain.

5.8.2.2 Resource Inventory

Methods. Published and available unpublished geological and paleontological literature was reviewed to develop a baseline paleontological resource inventory of the project area and surrounding lands, and to assess the potential paleontological productivity of the stratigraphic units that may be encountered during construction-related excavations. Sources included geological maps, satellite photography, technical and scientific reports, and available electronic databases. Subsurface investigations have recently been performed in the AEC project area (Ninyo & Moore, 2011), and were included in this analysis. A paleontological resources record review was conducted for the project using the online database maintained by the University of California Museum of Paleontology (UCMP, 2013) and the PaleoBiology Database (2013). In addition to these online resources, the Los Angeles County Museum of Natural History (LACM) performed a review of their vertebrate paleontology archives (LACM, 2013).

Because the entire project area is highly developed and only fill is exposed at the surface, no intensive paleontological resources survey was conducted.

Results. Available geologic maps (Poland et al., 1959; California Department of Conservation, 1998; Figure 1) indicate that the project area is underlain by active or recently active eolian (sand dune and sand sheet) deposits and Recent and Older alluvial and stream deposits. Marine terrace deposits lie approximately 3 miles to the southeast (Poland et al., 1959), on what appears to have been the southern edge of the broad deltaic zone created by the San Gabriel River mouth. Older surfaces with marine terraces are not recorded closer to the project site, and instead in this area Holocene sediments extend to some depth. The nearest outcrops of consolidated rock units lie about 11 miles to the west, in the Palos Verdes Hills (Poland et al., 1959). The project area has been heavily graded, and fill was also imported to level the surface and reclaim estuarine habitat in the mid-twentieth century. This stratum of fill extends 6 to 9 feet below ground surface (bgs; Ninyo & Moore, 2011).

[38] "Paralic" is a term used by geologists to describe the complex of sedimentary environments associated with the seashore, and it is intended to include the transitions from wave zone to beach to dune environments, and from there to estuarine and lagoonal habitats as well.

Prior to development, the uppermost sediments in the project area consisted predominantly of alluvial and fluvial sediments of the San Gabriel River further inland, with minor paralic (near-shore and beach) deposits, dominated by recent (Holocene) eolian sands (Poland et al., 1959; California Department of Conservation, 1998). The San Gabriel River, as well as the Los Angeles River whose mouth is approximately 7 miles farther west along the shore, are the ultimate sources of these sands; channelized courses of the San Gabriel River lie to both the east and west of the project site. More than 50 feet below the surface (Ninyo & Moore, 2011), these younger paralic and alluvial deposits give way to Late to Middle Pleistocene sediments. The thickness of the Pleistocene sediments is highly variable and dependent (among other things) on the location of the ancient river course and local uplift associated with the Dominguez Hills, which are less than a mile to the northwest of the western terminus of the proposed wastewater line. These deposits likely grade into the Late to Middle Pleistocene marine terrace deposits, which generally consisting of red silty sand (Poland et al., 1959), and are shown as units Qopa, Qopc, and Qops in Figures 5.4-1A and 5.4-1B.

The surficial geology of the project area and a buffer extending outward a distance of 2 miles is shown in Figures 5.4-1a and 5.4-1b. Twelve separate subunits are recognized, and five are located in within the project site and along its associated pipeline corridor. One is artificial fill (af), another is younger alluvium (Qyaf), and three are different facies of older Quaternary marine terrace deposits (Qopa, Qopc, Qops). It should be noted that, at present, only disturbed sediment and artificial fill can be observed at the surface; the geology is to a large extent reconstructed predevelopment conditions. Table 5.8-1 summarizes the geological units and relates them to the units employed in this assessment.

TABLE 5.8-1

Geological Subunits within 2 Miles of the Project Area and Their Geological, Stratigraphic, and Age Relationships

Geologic Subunit (Refer to Figures 5.4-1a and 5.4-1b)	Geological and Stratigraphic Relationships	Age Relationships
af	Artificial fill; material transported from elsewhere. No stratigraphic relationships.	None
Qms, Qp, Qb, Qpe	Younger paralic sediments ranging from near-shore marine to estuarine habitats. Beach and fluvial sands intergrading with estuarine muds.	Chiefly Holocene, to latest Pleistocene near the base. Extends to depths of at least 30 feet; off-shore fossil records suggest erosion of older Pleistocene material in the wave zone, but this is more than one mile from the project site, in different habitat.
Qya, Qyfa, Qyfc, Qyfs, Qype	Younger Quaternary alluvium of distal fan slopes, fluvial sands and silts, and estuarine deposits. Fine-grained sands and silts of terrestrial origin intergrading with fluvial sands and paralic sediments.	Chiefly Holocene, to latest Pleistocene near the base. Terrestrial sediments deposited subsequent to the post-glacial return of sea-level to near-present elevations. No Pleistocene sediments present.
Qopa, Qopc, Qops	Older Quaternary paralic deposits; often pedogenically altered silts sands and clays, normally poorly sorted and presently exposed by emergent, wave-cut marine terraces (“abrasion platforms”) along zones of regional uplift.	Middle to Late Pleistocene sediments, typical of Quaternary marine terraces exposed along the Pacific Coast of southern California. Subsequent to deposition these sediments were wave-cut and then uplifted. They can yield marine invertebrate fossils that can be important in geochronological studies (Lajoie et al., 1991).

Older Tertiary marine sandstones are exposed by local uplift in the Dominguez Hills less than 1 mile northwest of the western terminus of the proposed upgraded LBWD wastewater line. Because these units lie well below the depth of any anticipated construction activity in the vicinity of the project which, as noted previously, lies chiefly in the lowland, deltaic area associated with the historic San Gabriel River mouth, these units were not analyzed further.

Results of the Records Search. A search of the UCMP database on May 29, 2013, queried Quaternary fossil site records within Los Angeles and Orange counties, which lie to the west and east of the project area, respectively. Over 1,600 fossil sites in Los Angeles County are in the UCMP database (2013), and 136 sites are recorded in the PaleoBiology Database (2013). In Orange County, 939 localities are recorded in the UCMP database (2013), and 133 fossil sites are recorded in the PaleoBiology Database (2013). However, few if any of these fossil sites are representative of the project area, and most are far from the project site. Los Angeles County in particular includes several geomorphic provinces: the Transverse Ranges, the Peninsular Ranges, and Antelope Valley within the Mojave Desert. Both Los Angeles and Orange counties have extensive outcrops of fossiliferous Tertiary marine sediments uplifted and exposed in the hills, more than 10 miles from the coastal plain occupied by the project. The only fossil sites within 2 miles of the project area are located off-shore in Alamitos Bay (five localities) and on Seal Beach (20 localities). Both the UCMP and the PaleoBiology Database were also queried for records of fossils found within the formations that underlie the project area.

A summary of the results of these searches as they apply to the geological units occurring within the project area is provided below:

- **Disturbed Sediment / Artificial Fill:** These units, including artificial fill and modern surficial deposits, do not include scientifically significant fossils. Any fossils found in these units would be out of stratigraphic context and mechanically damaged, reducing their scientific significance to nil. This is the only sediment type exposed at the surface in the project area.
- **Younger Quaternary Alluvium and Paralic Deposits:** Although the available geological mapping does not show younger paralic deposits to be present in the project area, as discussed previously geotechnical borings show that they are at relatively shallow depth and intergrade with alluvial sediments. Scientifically significant fossils are rarely attributed to Holocene deposits, which constitute most of this unit. This sediment extends to a depth of approximately 50 feet in the main project area, and may include latest Pleistocene sediments near its base. Geotechnical studies of the AEC site have found root casts and shell fragments starting at 15 feet bgs, in alluvium likely to be early Holocene in age (Ninyo & Moore, 2011). Older Pleistocene sediments are expected to be well below the maximum depth of excavations of approximately 20 feet.
- **Older Quaternary Paralic Deposits:** Although no fossil records can be directly attributed to these geological units, and marine terrace deposits are often altered by soil formation processes that generally destroy fossils, they can also yield mollusks that are useful in assigning ages to marine terraces and their uplift (e.g., Lajoie et al., 1991).

The project area in general lies in an estuarine habitat. In the lower Los Angeles River channel, a geomorphic setting similar to the project area about 9 miles to the west, Pleistocene sediments (and significant fossil material) were encountered at depths exceeding 70 feet (Los Angeles Metro, 2000). Perhaps because few excavations reach that depth, the Quaternary alluvium in and near the project site has not yielded any significant vertebrate or plant fossils records.

Along with these well-studied formations, several finds were made at or off Seal Beach, which lies approximately 1.7 miles directly south of the project area. Unfortunately, these finds were out of stratigraphic context (Miller, 1971), and it is uncertain which stratigraphic unit they originated from. They include a mammoth tooth found just above the shoreline along the beach, and mammoth skull and teeth fragments found approximately 500 feet offshore (Miller, 1971). A bison horn core was also found near these mammoth remains (Miller, 1971). It appears likely that erosion of fossiliferous sediments in the wave zone off-shore is exposing Quaternary fossil material. These sites are all more than 1 mile from the project area. All fossil records in the area relate to material of uncertain provenance, dredged from the bottom of San Pedro Bay, or cast up on Seal Beach. Therefore, because there are no records of paleontological finds in the area that possess provenance, no map of paleontological sites is provided.

5.8.2.3 Paleontological Sensitivity of the Project Site including Offsite Linears

Assessment Criteria. Paleontological sensitivity is the qualitative assessment made by a professional paleontologist taking into account the paleontological potential of the stratigraphic units present, the local geology and geomorphology, and any other local factors that may be germane. According to SVP (1995) and BLM (2008) standard guidelines, sensitivity comprises (1) the potential for yielding abundant or significant vertebrate fossils or for yielding a few significant fossils, large or small, vertebrate, invertebrate, or paleobotanical remains, and (2) the importance of recovered evidence for new and significant taxonomic, phylogenetic, paleoecological, or stratigraphic data.

The sensitivity ratings used in this assessment are consistent with SVP (1995) and BLM (2008) guidelines, and provided in Table 5.8-2.

TABLE 5.8-2
Paleontological Sensitivity Ratings Employed

	Definition
High	Assigned to geological formations known to contain paleontological resources that include rare, well-preserved, and/or fossil materials important to ongoing paleoclimatic, paleobiological and/or evolutionary studies. They have the potential to produce, or have produced vertebrate remains that are the particular research focus of many paleontologists, and can represent important educational resources.
Moderate	Stratigraphic units that have yielded fossils that are but moderately well preserved, are common elsewhere, and/or that are stratigraphically long ranging would be assigned a moderate rating. This evaluation also can be applied to strata that have an unproven but strong potential to yield fossil remains based on the stratigraphy and/or geomorphologic setting.
Low	Sediment that is relatively recent, or that represents a high-energy subaerial depositional environment where fossils are unlikely to be preserved. A low abundance of invertebrate fossil remains, or reworked marine shell from other units, can occur but the paleontological sensitivity would remain low due to their lack of potential to serve as significant scientific or educational purposes. This evaluation also can be applied to strata that have been monitored and that have failed to yield scientifically significant fossil remains.
Marginal and Zero	Stratigraphic units with marginal potential include pyroclastic flows and soils that might preserve traces or casts of plants or animals. Most igneous rocks, however, have zero paleontological potential. Other stratigraphic units deposited subaerially in a high-energy environment (such as alluvium) also may be assigned a marginal or zero sensitivity rating. Manmade fill is also considered to possess zero (no) paleontological potential.

Employing these criteria, the geological and paleontological data gathered and described above were assessed and paleontological sensitivity assigned to the units underlying or potentially underlying the project area. These are discussed below.

- **Disturbed Sediment / Artificial Fill:** This material has been reworked and removed from its original stratigraphic context. Any fossils found in these sediments will therefore be out of stratigraphic context and would likely be badly damaged, and therefore are of no scientific interest. These sediments have zero (no) paleontological sensitivity.
- **Younger Quaternary Alluvium and Paralic Deposits:** It is unlikely that the Holocene-age alluvium or paralic sediments contain any scientifically significant paleontological resources, both because of their young age and the continual reworking of the sediment in this environment, so close to the shoreline and in a historically active river channel. However, deeper strata near the base of these units may include latest Pleistocene strata, and the presence of root casts and shell fragments at depth in geotechnical drill cores indicates the potential for fossils to be found within these sediments at depth. Regardless, because records of scientifically significant paleontological resources are unknown from these units, these largely Holocene deposits have a low paleontological sensitivity.

- **Older Quaternary Paralic Deposits:** No scientifically significant paleontological resources have been definitively attributed to these sediments in the project vicinity. Fossils assumed to be from Quaternary-age alluvial and paralic deposits have been discovered in the Los Angeles Basin, however (e.g., Long, 1993; Stock, 1972; Woodring et al., 1946). In addition, mollusk faunas recovered from the marine terraces in which these sediments are exposed have provided important paleoenvironmental and geochronological information in southern California (e.g., Lajoie et al., 1991). Therefore, these deposits possess moderate paleontological sensitivity.

5.8.3 Environmental Analysis

The subsurface of the project area consists of a sequence of deposits recording a relative decline in sea level, ranging (from oldest to youngest) from marine deposits of the Tertiary and Pleistocene to alluvial and eolian deposits of the Holocene. The uppermost portion of this sedimentary sequence is covered by artificial fill, and the sediment to a depth of at least 2 to 3 feet (and much deeper in places) is highly reworked. An analysis of potential impacts to paleontological resources from excavation of the project area is presented in the following sections.

5.8.3.1 Paleontological Resource Significance Criteria

In its standard guidelines for assessment and mitigation of adverse impacts on paleontological resources, the SVP (1995) notes that an individual fossil specimen is considered scientifically important and significant if it is: (1) identifiable, (2) complete, (3) well preserved, (4) age-diagnostic, (5) useful in paleoenvironmental reconstruction, (6) a member of a rare species, (7) a species that is part of a diverse assemblage, or (8) a skeletal element different from, or a specimen more complete than, those now available for that species. In general, the value or importance of different fossil groups varies depending on the age and depositional environment of the stratigraphic unit that contains the fossils, their abundance in the record, and their degree of preservation.

For example, identifiable land mammal fossils are considered scientifically important because of their potential use in determining the age and paleoenvironment of the sediments in which they occur. Moreover, vertebrate and plant remains are comparatively rare in the fossil record. For marine sediments, invertebrate megafossils (e.g., mollusks, cephalopods) are individually infrequently scientifically important because individual species are generally widely represented in academic archives. Marine microfossils such as foraminifera or diatoms are very common, and consequently usually not considered for resource protection because of their relative abundance.

Using these criteria and the sensitivity ratings provided above, the significance of potentially adverse impacts of excavations on the paleontological resources was assessed. Absent mitigation, an impact on a fossil site, or on a fossil-bearing rock unit of high or moderate sensitivity, could be considered potentially significant.

5.8.3.2 Potential to Affect Paleontological Resources

The significance of impacts of project-related activities on the paleontological resources of each stratigraphic unit anticipated to be present at the project site is presented in this section. This assessment includes the entirety of the project area. As stated previously, detailed subsurface studies have not been performed within the project area; therefore, some of these units may be partially removed or completely absent from the subsurface.

- **Previously Disturbed Sediment/Fill**: Construction-related excavations that do not extend beyond sediments disturbed by previous construction will not result in any adverse impacts on paleontological resources. Reworked and disturbed fossil material can be present in previously disturbed sediment or fill, but lack of stratigraphic context and likely mechanical damage would compromise all scientific value. Therefore, excavations into these sediments have no chance of affecting paleontological resources.

- **Younger Quaternary Alluvium and Paralic Deposits**: Excavations extending to depths below the artificial fill within the project area may affect these younger deposits. These units have not yielded scientifically significant paleontological resources in the past, and the depths that may contain latest Pleistocene sediments lay well below the maximum depth of project excavations (approximately 20 feet bgs). There is therefore no appreciable chance that excavations in these sediments will affect paleontological resources.
- **Older Quaternary Paralic Deposits:** These deposits range in age from the Late to Middle Pleistocene. While these sediments are often pedogenically altered marine mollusks do occur and can provide scientifically significant information. Geological mapping places these deposits, below artificial fill and disturbed sediments, in the northwest corner of the plant site, and along the part of the western portion of the LBWD wastewater line that may have to be upgraded. Excavations into these sediments have the potential to affect paleontological resources of moderate sensitivity.

The potential for this project to affect paleontological resources is directly proportional to the paleontological sensitivity of the geologic units encountered during construction-related excavations. Most sediments that will be affected by construction of this project are not paleontologically sensitive. No paleontological sites with secure provenance are known for the area, although it is evident that erosion of Pleistocene sediments is occurring off-shore in the shallows of San Pedro Bay. This is however more than a mile from the project area, in a different geological setting. Within the project area, only those excavations disturbing older paralic sediments (subunits Qopa, Qopc, and Qops) have the potential to affect paleontological resources. But because these sediments are often altered by weathering, and usually yield only marine mollusks, they possess only moderate paleontological sensitivity. Supporting this is the fact that no paleontological sites are recorded in the vicinity of the project, other than the marine fossils localities discussed previously.

5.8.4 Cumulative Effects

Development in the Los Angeles Basin has resulted in proportionate impacts on paleontological resources (Miller, 1971; Jefferson, 1991). Measures typically implemented pursuant to state statutes (see Section 5.8.6) serve to mitigate these impacts through the recovery of the scientific and educational potential of the affected paleontological resources.

The potential of this project to contribute to cumulative impacts on paleontological resources is low. A layer of disturbed sediment and Holocene-age eolian sediments underlie the project area, and impacts to paleontological resources are only possible if construction-related excavation extends below these low-sensitivity sediments. If excavations reach depths where undisturbed sediment capable of producing fossils are encountered, the mitigation described below will reduce the contribution of the project to cumulative negative impacts on paleontological resources to negligible levels.

5.8.5 Mitigation Measures

Because ground-disturbing activities have the potential to affect paleontological resources of moderate sensitivity, a paleontological resources mitigation and monitoring plan (PRMMP) should be developed and implemented.

The following proposed mitigation measures are in compliance with CEC environmental guidelines (CEC, 2000; 2007) and with SVP standard guidelines for mitigating adverse construction-related impacts on paleontological resources (SVP, 1995). Implementation of these mitigation measures would assure that the potential impacts from project-related ground disturbance on paleontological resources would be maintained at an insignificant level.

5.8.5.1 Project Paleontological Resources Specialist

No less than 60 days prior to the start of construction, the project proponent will submit the name and resume of a qualified PRS to the CEC for review and approval. This individual will prepare the paleontological

resources module of the worker education program and be available during the course of ground-disturbing construction in case there is an unanticipated paleontological discovery. The name and contact information of the PRS will be provided to all construction management personnel, the compliance manager, and the cultural resource monitors (if any).

5.8.5.2 Development of a Paleontological Resources Monitoring and Mitigation Plan

Prior to construction, a PRMMP will be drafted by the PRS. This plan will provide detailed instructions regarding which strata are paleontologically sensitive, for the monitoring of construction activities, and for sampling procedures and the curation of any paleontological resources found. The PRMMP will also outline communications protocols to be used during construction, both in the case of an unanticipated discovery and to ensure adequate monitoring takes place. This plan will also outline the procedures to be used to ensure adequate curation of any discovered paleontological resources.

5.8.5.3 Construction Personnel Education

Prior to working on the project site for the first time, all personnel involved in earth-moving activities will be provided with Paleontological Resources Awareness Training. This training ideally would be provided as a module in the worker environmental awareness training. Construction personnel involved with or supervising excavations will be informed that fossils may be encountered and will be provided with information on the appearance of fossils, the role of paleontological monitors, and on proper notification procedures. This worker training will be prepared and initially presented by the PRS. Subsequent training may be conducted via video presentation and hard-copy training materials.

5.8.6 Laws, Ordinances, Regulations, and Standards

Paleontological resources are nonrenewable scientific resources and are protected by several federal and state statutes (Marshall, 1976; Fisk and Spencer, 1994), most notably by the 1906 Federal Antiquities Act and other subsequent federal legislation and policies, and by State of California environmental regulations (California Environmental Quality Act [CEQA], Section 15064.5). Professional standards for assessment and mitigation of adverse impacts on paleontological resources have been established by the SVP (1995) and BLM (2008). Design, construction, and operation of the AEC will be conducted in accordance with all LORS applicable to paleontological resources. Federal, state, and local LORS applicable to paleontological resources are summarized in Table 5.8-3 and discussed briefly below, along with professional standards for paleontological resources assessment and impact mitigation.

TABLE 5.8-3

Laws, Ordinances, Regulations, and Standards Applicable to Paleontological Resources

LORS	Applicability	AFC Reference	Project Conformity
Omnibus Public Land Management Act of 2009 (H.R. 146), Title 6, Subtitle D	Not applicable—Applies only to federal land managed by the Secretaries of the Interior and Agriculture.	—	NA
Antiquities Act of 1906	Not applicable—Applies only to federal land (federal agency or state delegates issuing federal permits will determine applicability and compliance).	—	NA
National Environmental Policy Act of 1969	Not applicable—No major federal action.	—	NA
CEQA	Applicable—Requires assessment of the potential to affect unique paleontological resources.	Sections 5.8.2, 5.8.3, and 5.8.5	Yes
CA Public Resources Code, Sections 5097.5/5097.9	Not applicable—Applies to state-owned land.	—	NA

TABLE 5.8-3

Laws, Ordinances, Regulations, and Standards Applicable to Paleontological Resources

LORS	Applicability	AFC Reference	Project Conformity
City of Long Beach General Plan	Not applicable—Does not address paleontological resources.	—	NA

NA = Not applicable

5.8.6.1 Federal LORS

Paleontological resources are protected by numerous federal laws and regulations. Recently, President Obama signed into law the Omnibus Public Land Management Act of 2009 (H.R. 146), which includes provisions for protecting paleontological resources found on federal lands. Implementing regulations for this law have yet to be developed by the affected agencies. Additional federal legislative protection for paleontological resources stems from the Antiquities Act of 1906 (PL 59-209; 16 United States Code 431 et seq.; 34 Stat. 225), which calls for protection of historic landmarks, historic and prehistoric structures, and other objects of historic or scientific interest on federal lands. In addition, the National Environmental Policy Act of 1969 (NEPA; United States Code, section 4321 et seq.; 40 *Code of Federal Regulations*, section 1502.25), as amended, requires analysis of potential environmental impacts to important historic, cultural, and natural aspects of our national heritage.

Federal protection for significant paleontological resources would apply to the AEC only if any construction or other related project impacts occur on federally owned or managed lands, or if there is a major federal action subject to NEPA. Because no federally owned or managed lands will be affected by this project, these statutes do not apply to the AEC (see Table 5.8-3).

5.8.6.2 State LORS

As a certified regulatory program, the CEC environmental review process under the Warren-Alquist Act is considered functionally equivalent to that of CEQA (Public Resources Code Sections 21000 et seq.). CEQA requires that public agencies and private interests identify the environmental consequences of their proposed projects on any object or site of significance to the scientific annals of California (Division I, California Public Resources Code: 5020.1 [b]). The CEQA Guidelines (14 California *Code of Regulations* section 15000 et seq.) define procedures, types of activities, persons, and public agencies required to comply with CEQA.

Appendix G of the California Environmental Quality Act (CEQA) is a screening tool, not a method for setting thresholds of significance. Appendix G is typically used in the Initial Study phase of the CEQA process, asking a series of questions. The purpose of these questions is to determine whether a project requires an environmental impact report, a Mitigated Negative Declaration, or a Negative Declaration. As the Governor's Office of Planning and Research stated, "Appendix G of the Guidelines lists a variety of potentially significant effects, but does not provide a means of judging whether they are indeed significant in a given set of circumstances." The answers to the Appendix G questions are not determinative of whether an impact is significant or less than significant. Nevertheless, the questions presented in CEQA Appendix G are instructive. One of the questions to be answered in the Environmental Checklist (Section 15023, Appendix G, Section V, part c) is the following: "Would the project directly or indirectly destroy a unique paleontological resource or site…?"

CEQA does not define what is "a unique paleontological resource or site." However, by analogy, Section 21083.2 defines "unique archaeological resources" follows: "…any archaeological artifact, object, or site about which it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is a high probability that it meets any of the following criteria:

- Contains information needed to answer important scientific research questions and that there is a demonstrable public interest in that information;

- Has a special and particular quality such as being the oldest of its type or the best available example of its type; and
- Is directly associated with a scientifically recognized important prehistoric or historic event." [California Public Resources Code, 21083.2(g)(1)-(3).]

Other state requirements for paleontological resource management are in California Public Resources Code Chapter 1.7, Section 5097.5 et seq., entitled Archaeological, Paleontological, and Historical Sites. These statutory provision define any unauthorized disturbance or removal of a fossil site or remains on public land as a misdemeanor and specify that state agencies may undertake surveys, excavations, or other operations as necessary on state lands to preserve or record paleontological resources. These provisions of the Public Resources Code do not apply to the AEC because construction or other related project impacts will not occur on state owned or managed lands, and no state agency is intended to obtain ownership of project lands during the term of the project license (Table 5.8-3).

5.8.6.3 Local LORS

The City of Long Beach General Plan (City of Long Beach, 2002) does not address paleontological resources directly or indirectly.

5.8.6.4 Professional Standards

The SVP, an international organization of professional paleontologists, has established standard guidelines (SVP, 1995) that outline acceptable professional practices in the conduct of paleontological resource assessments and surveys, monitoring and mitigation, data and fossil recovery, sampling procedures, and specimen preparation, identification, analysis, and curation. Most practicing paleontologists in the nation adhere to the SVP's guidelines, and extend those to address other types of fossils of scientific significance, such as invertebrate fossils and paleobotanical specimens. These standards, which are widely used by paleontologists both on federal land and elsewhere, provide for more detailed analysis of paleontological sensitivity and, therefore, more efficient paleontological resources monitoring.

5.8.7 Agencies and Agency Contacts

There are no agencies having exclusive jurisdiction over paleontological resources. The CEC is the CEQA lead agency for this project and, therefore, has jurisdiction over review of the potential environmental effects of the project on paleontological resources. If encountered, scientifically significant fossil specimens and associated site records will be curated at a federally accredited repository, likely the Los Angeles County Museum of Paleontology or the UCMP (Table 5.8-4).

TABLE 5.8-4
Agency Contacts for Paleontological Resources

Issue	Agency	Contact
Potential Paleontological Resources Documentation and Specimen Repository	UCMP	Dr. Patricia Holroyd Curator of Vertebrate Paleontology 1101 Valley Life Sciences Building Berkeley, CA 94720-4780 (510) 642-3733
Potential Paleontological Resources Documentation and Specimen Repository	Natural History Museum of Los Angeles County	Dr. Samuel A. McLeod Curator of Vertebrate Paleontology 900 Exposition Boulevard Los Angeles, CA 90007 (213) 763-3325

5.8.8 Permits and Permit Schedule

No state, county, or city agency requires a paleontological collecting permit to allow for the recovery of fossil remains discovered as a result of construction-related earth moving on this project site.

5.8.9 References

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5.9 Public Health

This section describes and evaluates the public health effects of the Alamitos Energy Center (AEC or project). Section 5.9.1 describes the Project setting and Section 5.9.2 discusses the affected environment. Section 5.9.3 presents the analysis of the public health effects of the AEC. Section 5.9.4 evaluates any potential cumulative effects to public health, and Section 5.9.5 addresses proposed mitigation measures that would avoid or minimize any adverse impacts. Section 5.9.6 describes the laws, ordinances, regulations, and standards (LORS) that apply to the Project. Section 5.9.7 presents agency contacts, and Section 5.9.8 identifies the permits and permit schedule related to public health. Section 5.9.9 provides the references used to prepare this section.

5.9.1 Setting

AES Alamitos Energy, LLC, will construct, own, and operate the Alamitos Energy Center (AEC), a natural- gas-fired, air-cooled, combined-cycle and simple-cycle, electrical generating facility in Long Beach, California. The proposed AEC will have a nominal generating capacity of 1,040 megawatts (MW). The AEC will be constructed on the site of the existing AES Alamitos Generating Station (AGS), located on an approximately 21-acre site within a larger, 71.1-acre parcel.

The AEC will feature two gas turbine power blocks. Combined-cycle power block will consist of two natural-gas-fired combustion turbine generators (CTG) in a combined-cycle configuration, two unfired heat recovery steam generators (HRSG), one steam turbine generators, an air-cooled condenser, an auxiliary boiler, and related ancillary equipment. Simple-cycle power block will consist of four simple-cycle LMS-100 CTGs with fin-fan coolers and ancillary facilities.

The AEC will meet the demand for new generation in the Los Angeles basin local electrical reliability area. The demand is caused in large part by the closure of the San Onofre Nuclear Generating Station and the anticipated retirement of the older, natural-gas-fired generation currently using once-through ocean water-cooling (OTC). As a result of the promulgation of the California State Water Resources Control Board's (SWRCB) *Water Quality Control Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling* (SWRCB, 2010), more than 4,000 MW of OTC generation are expected to be retired in the Los Angeles local electrical reliability area by December 31, 2020.

The AEC will use water provided by the City of Long Beach Water Department (LBWD) for construction, operational process, and sanitary uses but at substantially lower volumes than the existing AGS historically has used. This water will be supplied through existing, onsite water lines. The AEC will include a new, 1,000-foot process/sanitary wastewater pipeline to the first point of interconnection with the existing LBWD sewer system, the potential upgrade of an additional 4,000 feet of existing pipeline downstream from the first point of interconnection, and the elimination of the current practice of treatment and discharge of process/sanitary wastewater to the San Gabriel River. Stormwater runoff from the power block areas will be directed to oil/water separators and to an existing retention basin and then ultimately discharged to the Los Cerritos channel via existing stormwater outfalls.

The AEC will interconnect to the existing, Southern California Edison (SCE) 230-kilovolt (kV) switchyard adjacent to the north side of the AGS. Natural gas will be supplied to the AEC via the existing, offsite, 30-inch-diameter pipeline owned and operated by Southern California Gas Company (SoCalGas) that currently serves Units 5 and 6 of the AGS. The AEC will require construction of new natural gas-metering facilities and construction of two new natural gas compressor buildings within the AEC footprint.

The AEC is designed to serve both peak and intermediate loads with the added capabilities of rapid startup, significant turndown capability (ability to turn down to a low load), and fast ramp rates. As California's intermittent renewable energy portfolio continues to grow, operating in either load-following or partial shutdown mode will become necessary to maintain electrical grid reliability, thus placing an increased importance upon the rapid startup, high turndown, steep ramp rate, and superior heat rate employed at the AEC.

As an in-basin generating asset, the AEC will provide local generating capacity, voltage support, and reactive power that are essential for transmission system reliability in the Western Los Angeles basin subarea and larger Los Angeles basin local reliability area. The AEC will be able to provide system stability by supplying reactive power, voltage support, frequency stability, and rotating mass in the heart of the critical Western Los Angeles local reliability area. By virtue of its location in a transmission constrained load center, the AEC also helps to avoid potential transmission line overloads and can provide reliable local energy supplies when electricity from more distant generating resources is unavailable. In recognition of its critical grid reliability benefits, the AEC combined-cycle CTGs were selected by SCE in its Local Capacity Requirements Request for Offer on November 5, 2014, and the simple-cycle CTGs will meet the capacity needs anticipated to be identified in future California Public Utilities Commission Long-term Procurement Plans.

Owing to the critical need for generating capacity at the AEC site at all times, existing Units 1 through 6 will remain in operation through much of the AEC development and construction. Given that the removal of existing Units 1 through 6 is not required for construction of the AEC, the continued operation of the AGS will not impede AEC construction. Demolition of the retired and decommissioned turbine peaking generating Unit 7 and fuel tank, ancillary equipment, small maintenance shops, and two retention basins will be required for site preparation for the construction of the AEC. Construction and site preparation activities at the AEC site are anticipated to last 56 months, from the first quarter of 2017 until the third quarter of 2021. The project will commence construction with the removal of former Unit 7's building and ancillary equipment, fuel storage tank, tank berms, small maintenance shops and two waste water retention basins in January 2017 to make room for construction and laydown area for the AEC CCGT. Construction of the AEC CCGT will commence during the second quarter of 2017 and will be completed by the second quarter of 2020. The AEC CCGT is expected to commence commercial operation before May 1, 2020. Construction of the AEC SCGT is scheduled to proceed from the second quarter of 2020 through the third quarter of 2021, and Power Block 2 is expected to commence commercial operation in the third quarter of 2021. A temporary construction access road may be constructed offsite beginning at the intersection of Studebaker Road and Loynes Drive traveling southeast to the AEC site. Construction of the AEC will require the use of onsite laydown areas (approximately 8 acres dispersed throughout the existing site) and an approximately 10-acre laydown area located adjacent to the existing site.

5.9.1.1 Project Overview as it Relates to Public Health

The AEC's CCGT will consist of two General Electric (GE) Frame 7FA.05 CTGs, one steam turbine generator, an air-cooled condenser, and an auxiliary boiler. Each CTG will be equipped with an unfired HRSG. The combined-cycle CTGs will use dry low oxides of nitrogen (NO_x) burners and selective catalytic reduction (SCR) to limit NO_x emissions to 2 parts per million by volume (ppmv). Emissions of carbon monoxide (CO) will be limited to 2 ppmv and volatile organic compounds (VOC) to 2 ppmv through the use of best combustion practices and an oxidation catalyst. The auxiliary boiler will use SCR and flue gas recirculation to limit NO_x emissions to 5 ppmv and CO emissions to 50 ppmv. Best combustion practices and the use of pipeline-quality natural gas will minimize emissions of the remaining pollutants from the combined-cycle CTGs and auxiliary boiler.

The AEC's simple-cycle gas turbine (SCGT) will consist of four GE LMS-100 CTGs with fin-fan coolers. The simple-cycle CTGs will use dry low NO_x burners and SCR to limit NO_x emissions to 2.5 ppmv. Emissions of CO will be limited to 4 ppmv and VOC to 2 ppmv through the use of best combustion practices and an oxidation catalyst. Best combustion practices and the use of pipeline-quality natural gas will minimize emissions of the remaining pollutants.

This section presents the methodology and results of the human health risk assessment (HRA) that was conducted to assess the potential public health impacts and exposure associated with airborne emissions from the proposed construction and routine operation of the AEC. The quantities of hazardous materials proposed to be stored onsite, a description of their uses, and the potential concerns regarding these materials are presented in Section 5.5, Hazardous Materials Handling. A discussion of the potential concerns

associated with electromagnetic field exposure is presented in Section 3.0, Transmission System Engineering.

5.9.2 Affected Environment

Based on the Environmental Data Resources (EDR) *Offsite Receptor Report* (EDR, 2015), approximately 584,644 residents live within a 6-mile radius of the AEC. Per California Energy Commission (CEC) siting regulation Appendix B (g)(9)(E)(i), sensitive receptors include infants and children, the elderly, the chronically ill, and any other member of the general population who is more susceptible to the effects of exposure than the population at large. Therefore, schools (public and private), daycare facilities, convalescent homes, and hospitals are of particular concern. Sensitive receptors within a 6-mile radius of the project site identified in the EDR *Offsite Receptor Report* include:

- 651 preschool/daycare centers
- 21 nursing homes
- 177 schools
- 739 hospitals, clinics, and/or pharmacies
- 8 colleges
- 1 arena
- 2 prisons

The EDR *Offsite Receptor Report*, which includes a figure and list of the sensitive receptors located within a 6-mile radius of the project site, is presented in Appendix 5.9A. A supplemental list of sensitive receptors within a 6-mile radius of the project site was also developed based on an internet data search (Yahoo, 2015) and aerial imagery (GoogleEarth, 2015). The supplemental list is provided in Appendix 5.9B. With this additional survey, 50 schools/preschools/daycares, 16 hospitals/clinics, and 38 senior care facilities were identified within a 6-mile radius of the project site. Figures 5.9-1A and 5.9-1B include the sensitive receptors within 6 miles of the project site, as identified in Appendixes 5.9A and 5.9B. The closest sensitive receptor is the Rosie the Riveter Charter High School, a privately owned and operated school located on the AGS site, approximately 971 feet (296 meters) from the nearest proposed stack location. The closest sensitive receptor outside the AEC property is Kettering Elementary, which is approximately 2,297 feet (700 meters) northwest of the nearest proposed stack location. Apart from the Rosie the Riveter Charter High School and Kettering Elementary, there are no other schools within approximately 0.5 mile of the AEC site.

The nearest residents are located approximately 1,165 feet (355 meters) west of the proposed stack locations along E. Mariquita Street and approximately 1,329 feet (405 meters) east of the proposed stack locations along Nassau Drive. The nearest businesses are located approximately 525 feet (160 meters) east of the AEC site.

Per CEC siting regulation Appendix B (g)(9)(c), a search of available health studies concerning the potentially affected populations within a 6-mile radius is required. In October 1997, the Multiple Air Toxics Exposure Study (MATES) II study was initiated as part of the Environmental Justice Initiatives adopted by the South Coast Air Quality Management District (SCAQMD) Governing Board. It consisted of a comprehensive monitoring program, an updated emissions inventory, and a modeling effort to characterize health risks associated with human exposures to ambient concentrations of toxic air contaminants (TAC) in the South Coast Air Basin (SCAB). The results of the MATES II study estimated that the excess lifetime carcinogenic risk from exposures to airborne TACs in the SCAB averages about 1,400 in 1 million (1.4×10^{-3}), meaning that an individual exposed over a 70-year lifetime would have about a 0.14 percent additional chance of contracting cancer. Estimated carcinogenic risk was found to be rather uniform across the SCAB. For example, risk ranged from about 1,120 in 1 million to about 1,740 in 1 million for the sites monitored.

The MATES II study showed that mobile sources (for example, cars, trucks, trains, ships, and aircraft) represent the greatest contributors to the estimated risks. Approximately 70 percent of all carcinogenic risk is attributed to diesel particulate matter (DPM) emissions; about 20 percent is attributed to other toxics

associated with mobile sources (including benzene, butadiene, and formaldehyde); and about 10 percent is attributed to emissions from stationary sources (which include industries and other businesses, such as dry cleaners and chrome plating operations). Updating the findings of MATES II, SCAQMD completed the MATES III study by issuing a final report in September 2008, based on data collected between April 2004 and March 2006. Similar to the earlier MATES II study, the MATES III study found that mobile sources continued to dominate cancer risk in the SCAB by accounting for an estimated 94 percent of the overall carcinogenic risk. DPM emissions alone accounted for 84 percent of the carcinogenic risk. Overall, the general trend in risk exposure has been decreasing with the estimated carcinogenic risk from exposure to airborne toxics reduced to 1,200 in 1 million. The MATES III study found that nondiesel risk has been lowered from the earlier MATES II estimates by 50 percent.

Updating the findings of MATES III, SCAQMD completed the MATES IV study by issuing a final report in May 2015, based on data collected between July 2012 and June 2013. Similar to the earlier MATES III study, the MATES IV study found that mobile sources continued to dominate carcinogenic risk in the SCAB by accounting for an estimated 90 percent of the overall carcinogenic risk. DPM emissions alone accounted for 68 percent of the carcinogenic risk. Again, the general trend in risk exposure was found to be decreasing with the estimated carcinogenic risk from exposure to airborne toxics reduced by approximately 60 percent to 480 in 1 million.[39]

5.9.3 Environmental Analysis

5.9.3.1 Air Toxics Exposure Assessment (Operation Impacts)

Human health risks potentially associated with hazardous substance emissions from the proposed operation of the AEC, which includes compounds on the list of Office of Environmental Health Hazard Assessment (OEHHA) TACs and U.S. Environmental Protection Agency (EPA) hazardous air pollutants (HAP), were evaluated. The HRA was conducted in accordance with SCAQMD Rules 212 and 1401 and the following guidance:

- *Air Toxic Hot Spots Guidance Manual for Preparation of Health Risk Assessments* (OEHHA, 2015)
- *Supplemental Guidelines for Preparing Risk Assessments for the Air Toxics "Hot Spots" Information and Assessment Act (AB2588)* (SCAQMD, 2015a)
- *Guideline on Air Quality Models* (EPA, 2005)
- *Dispersion Modeling Protocol for the Alamitos Energy Center* (CH2M HILL Engineers, Inc., 2015)

The HRA modeling was conducted using the California Air Resources Board's (ARB) *Hotspots Analysis Reporting Program Version 2* (HARP 2) Air Dispersion Modeling and Risk Assessment Tool (ADMRT). To facilitate calculation of annual TAC ground-level concentrations at each modeled receptor, the American Meteorological Society / EPA Regulatory Model (AERMOD) air dispersion modeling output plot files were imported into HARP 2.

The HRA process requires four general steps to estimate health impacts: (1) identify and quantify project-generated emissions; (2) evaluate pollutant transport (air dispersion modeling) to estimate ground-level TAC concentrations at each receptor location; (3) assess human exposure; and (4) use a risk characterization model to estimate the potential health risk at each receptor location. The following sections describe in detail the methods used in this HRA.

Air Toxics Emission Calculations. Air toxics (TAC and HAP) emissions associated with the project will consist of combustion byproducts produced by two GE 7FA.05 combined-cycle CTGs, four LMS-100 simple-cycle CTGs, and one auxiliary boiler, all of which are fired exclusively on natural gas. TACs are compounds designated by OEHHA as pollutants that may pose a significant health hazard. HAPs are compounds

[39] Note that with implementation of the Office of Environmental Health Hazard Assessment's (OEHHA) updated methods for estimating carcinogenic risks, the estimated carcinogenic risk from exposure to airborne toxics is closer to 1,000 in 1 million.

designated by EPA as pollutants that are known or suspected to cause cancer or other serious health effects, such as reproductive effects or birth defects, or adverse environmental effects.

Combustion Turbines. Air toxics emission factors for the CTGs were obtained from EPA's *AP-42* (EPA, 2000), with the exception of ammonia and formaldehyde. The ammonia emission factor was based on an operating exhaust ammonia limit of 5 ppmv at 15 percent oxygen and an F-factor of 8,710. The SCAQMD's emission factor of 3.6×10^{-4} pound(s) per million British thermal unit (lb/MMBtu) was used to estimate formaldehyde emissions. Additionally, polycyclic aromatic hydrocarbons (PAH) emissions were conservatively assumed to be controlled up to 50 percent through the use of an oxidation catalyst (EPA, 2000), which is proposed for use with both the AEC CCGT and the AEC SCGT.

A summary of the air toxics emissions resulting from operation of AEC, as included in the HRA, is presented in Table 5.9-1. These estimates conservatively assume that the AEC CCGT operates 4,100 hours per turbine per year with 500 startups and shutdowns (estimated at 512 hours) per turbine per year and that the AEC SCGT operates 2,000 hours per turbine per year with 500 startups and shutdowns (estimated at 358 hours) per turbine per year. Detailed emission calculations are provided in Appendix 5.1B.

TABLE 5.9-1

Air Toxic Emission Rates Modeled for AEC Operation: Combustion Turbines

		AEC CCGT Emissions (per turbine)		AEC SCGT Emissions (per turbine)	
Pollutant [a]	**CAS Registry Number**	**lb/hr [b]**	**lb/yr [b]**	**lb/hr [c]**	**lb/yr [c]**
Ammonia [d]	7664417	15.3	69,582	6.09	14,309
Acetaldehyde	75070	0.091	415	0.035	82.6
Acrolein	107028	0.015	66.4	0.0056	13.2
Benzene	71432	0.027	124	0.011	24.8
1,3-Butadiene	106990	0.0010	4.46	0.00038	0.89
Ethylbenzene	100414	0.073	332	0.028	66.1
Formaldehyde [e]	50000	0.82	3,735	0.32	743
Naphthalene	91203	0.0030	13.5	0.0011	2.68
PAHs [f]	1151	0.0025	11.4	0.0010	2.27
Propylene Oxide	75569	0.066	301	0.025	59.9
Toluene	108883	0.30	1,349	0.11	268
Xylenes	1330207	0.15	664	0.056	132

[a] Unless otherwise noted, emission rates based on EPA's *AP-42* (EPA, 2000).

[b] Hourly emission rates are based on a maximum turbine heat input of 2,275 MMBtu/hr (high heat value). The annual emission rates are based on 4,612 hours of turbine operation with an average annual heat input of 2,250 MMBtu/hr (see Appendix 5.1B for detailed emission estimates).

[c] Hourly emission rates are based on a maximum turbine heat input of 879 MMBtu/hr (high heat value). The annual emission rates are based on 2,358 hours of turbine operation with an average annual heat input of 876 MMBtu/hr (see Appendix 5.1B for detailed emission estimates).

[d] Based on the operating exhaust ammonia limit of 5 ppmv at 15 percent oxygen and an F-factor of 8,710.

[e] SCAQMD-recommended emission factor of 3.6×10^{-4} lb/MMBtu.

[f] Per Section 3.1.4.3 of *AP-42* (EPA, 2000), PAH emissions were assumed to be controlled up to 50 percent through the use of an oxidation catalyst.

Notes:

CAS = Chemical Abstracts Service
lb/hr = pound(s) per hour
lb/yr = pound(s) per year
MMBtu/hr = million British thermal unit(s) per hour

Auxiliary Boiler. A summary of the air toxics emissions resulting from operation of the auxiliary boiler, as included in the HRA, is presented in Table 5.9-2. Air toxics emission factors for the auxiliary boiler were obtained from EPA's *AP-42* (EPA, 1998). Similar to the CTGs, the maximum hourly emissions were estimated based on the maximum heat input rating. The annual emissions were estimated based on 120 startups and the maximum heat input rating. Detailed emission calculations are provided in Appendix 5.1B.

TABLE 5.9-2

Air Toxic Emission Rates Modeled for AEC Operation: Auxiliary Boiler

Pollutant [a]	CAS Registry Number	Auxiliary Boiler Emissions	
		lb/hr [b]	lb/yr [b]
2-Methylnaphthalene	91576	1.67E-06	7.30E-03
3-Methylchloranthrene	56495	1.25E-07	5.47E-04
7,12-Dimethylbenz(a)anthracene	57976	1.11E-06	4.86E-03
Acenaphthene	83329	1.25E-07	5.47E-04
Acenaphthylene	208968	1.25E-07	5.47E-04
Anthracene	120127	1.67E-07	7.30E-04
Benz(a)anthracene	56553	1.25E-07	5.47E-04
Benzene	71432	1.46E-04	6.38E-01
Benzo(a)pyrene	50328	8.33E-08	3.65E-04
Benzo(b)fluoranthene	205992	1.25E-07	5.47E-04
Benzo(g,h,i)perylene	191242	8.33E-08	3.65E-04
Benzo(k)fluoranthene	207089	1.25E-07	5.47E-04
Butane [c]	106978	1.46E-01	6.38E+02
Chrysene	218019	1.25E-07	5.47E-04
Dibenzo(a,h)anthracene	53703	8.33E-08	3.65E-04
Dichlorobenzene	25321226	8.33E-05	3.65E-01
Ethane [c]	74840	2.15E-01	9.42E+02
Fluoranthene	206440	2.08E-07	9.12E-04
Fluorene	86737	1.94E-07	8.51E-04
Formaldehyde	50000	5.21E-03	2.28E+01
Hexane	110543	1.25E-01	5.47E+02
Indeno(1,2,3-cd)pyrene	193395	1.25E-07	5.47E-04
Naphthalene	91203	4.23E-05	1.85E-01
Pentane [c]	109660	1.80E-01	7.90E+02
Phenanathrene	85018	1.18E-06	5.17E-03
Propane [c]	74986	1.11E-01	4.86E+02
Pyrene	129000	3.47E-07	1.52E-03
Toluene	108883	2.36E-04	1.03E+00
Arsenic	7440382	1.39E-05	6.08E-02
Barium	7440393	3.05E-04	1.34E+00
Beryllium	7440417	8.33E-07	3.65E-03
Cadmium	7440439	7.64E-05	3.34E-01

TABLE 5.9-2

Air Toxic Emission Rates Modeled for AEC Operation: Auxiliary Boiler

Pollutant [a]	CAS Registry Number	Auxiliary Boiler Emissions	
		lb/hr [b]	lb/yr [b]
Chromium	7440473	9.72E-05	4.26E-01
Cobalt	7440484	5.83E-06	2.55E-02
Copper	7440508	5.90E-05	2.58E-01
Manganese	7439965	2.64E-05	1.16E-01
Mercury	7439976	1.80E-05	7.90E-02
Molybdenum [c]	7439987	7.64E-05	3.34E-01
Nickel	7440020	1.46E-04	6.38E-01
Selenium	7782492	1.67E-06	7.30E-03
Vanadium	7440622	1.60E-04	6.99E-01
Zinc	7440666	2.01E-03	8.82E+00

[a] Emission rates based on EPA's *AP-42* (EPA, 1998).

[b] Emission rates are based on the auxiliary boiler operating at a maximum heat input of 70.8 MMBtu/hr (high heat value) with two cold starts, four warm starts, and four hot starts per month (see Appendix 5.1B for detailed emission estimates).

[c] Although emissions were calculated for these reportable toxics, they did not contribute to the predicted impacts as they are not contained in the HARP 2 database and were not, therefore, modeled as part of the HRA.

Dispersion Modeling. The EPA-approved AERMOD dispersion model (Version 15181) was used to predict ground-level concentrations of air toxic emissions associated with the AEC. The AERMOD settings, source parameters, meteorological data, and source definition for the risk assessment were the same as the air quality impact analysis methodology (see Section 5.1, Air Quality). A unit emission rate (1 gram per second [g/s]) was used to model each source, as outlined in the HARP 2 ADMRT manual.[40]

The maximum hourly CTG impacts were predicted using the exhaust parameters for the 65.3°F, minimum load case, which represents the turbine exhaust parameters associated with the maximum predicted 1-hour ground-level impact in Section 5.1, combined with the maximum possible TAC emission rates. The annual CTG impacts were also predicted for the 65.3°F, minimum load case, which represents the average annual temperature and load scenario resulting in the maximum predicted annual ground-level impact in Section 5.1. Maximum hourly and annual impacts from the auxiliary boiler were also predicted, based on the auxiliary boiler operating at 100 percent load and maximum heat input rating. Detailed modeling source parameters for the AEC are presented in Appendix 5.1C.

The 50-kilometer radius discrete receptor grid used for the HRA was the same as the receptor grid used in the air quality impact analysis. In addition to the discrete receptor grid, the census block receptor locations and sensitive receptors within 6 miles of the AEC site were also included in the HRA.[41]

Risk Characterization. The results of the dispersion modeling analysis represent an intermediate product in the HRA process. The AERMOD output plot files were imported into HARP 2. HARP 2 was subsequently used to determine cancer, chronic, and acute health risks.

[40] Note that the HARP 2 ADMRT manual is made available within the "Help" module of the HARP 2 program itself or *the User Manual For the Hotspots Analysis And Reporting Program Air Dispersion Modeling and Risk Assessment Tool Version 2* (ARB, 2015)

[41] All census block receptors were included within a 6-mile radius of the project site with the exception of the census block receptors located within the AGS property boundary. The census block receptors within the AGS property boundary were excluded from the analysis.

Cancer risks were evaluated based on the 5-year average air toxics ground-level concentrations, inhalation cancer potency, oral slope factor, frequency and duration of exposure at the receptor, and breathing rate of the exposed persons. Per OEHHA guidance, cancer risks were estimated using the required conservative assumption of 30-year continuous exposure duration for residential and sensitive receptors and a 25-year, 5-days-per-week, 8-hours-per-day exposure duration for commercial/industrial receptors (OEHHA, 2015).

If a predicted cancer risk, per individual unit, is greater than 1 in 1 million, the cancer burden is calculated for each census block receptor. Cancer burden is defined as the estimated increase in the occurrence of cancer cases in a population resulting from exposure to carcinogenic air contaminants. The population data for census block receptors within 6 miles of the AEC site are based on the population information made available by ARB.

Chronic toxicity is defined as adverse health effects from prolonged chemical exposure caused by chemicals accumulating in the body. Per CEC Siting Regulations, "a chronic exposure is one which is greater than twelve (12) percent of a lifetime of seventy (70) years."[42] Acute toxicity is defined as adverse health effects caused by a brief chemical exposure of no more than 24 hours. Per CEC Siting Regulations, "an acute exposure is one which occurs over a time period of less than or equal to one (1) hour."[43] To assess chronic and acute noncancer exposures, annual and 1-hour air toxics ground-level concentrations are compared with the Reference Exposure Levels (REL) developed by OEHHA to obtain a chronic or acute hazard index. The REL is a concentration in ambient air at or below which no adverse health effects are anticipated.

OEHHA/ARB Cancer and Noncancer RELs. The HRA included potential health impacts from home-grown produce, dermal absorption, soil ingestion, and mother's milk, as required by OEHHA guidelines (OEHHA, 2015). The inhalation cancer potency, oral slope factor values, and RELs used to characterize health risks associated with the modeled impacts were obtained from the *Consolidated Table of OEHHA/ARB Approved Risk Assessment Health Values* (OEHHA and ARB, 2015), and are shown in Table 5.9-3.

TABLE 5.9-3

Risk Assessment Health Values for Air Toxic Substances

Compound	Inhalation Cancer Potency (mg/kg-day)	Oral Cancer Slope Factor (mg/kg-day)	Chronic Inhalation Reference Exposure Level (µg/m³)	Chronic Oral Reference Exposure Level (mg/kg-day)	Acute Inhalation Reference Exposure Level (µg/m³)
PAHs [a]	3.9E+00	1.2E+01	—	—	—
Xylenes	—	—	7.0E+02	—	2.2E+04
Formaldehyde	2.1E-02	—	9.0E+00	—	5.5E+01
Benzene	1.0E-01	—	3.0E+00	—	2.7E+01
Acetaldehyde	1.0E-02	—	1.4E+02	—	4.7E+02
Propylene Oxide	1.3E-02	—	3.0E+01	—	3.1E+03
Naphthalene [b]	1.2E-01	—	9.0E+00	—	—
Ethylbenzene	8.7E-03	—	2.0E+03	—	—
1,3-Butadiene	6.0E-01	—	2.0E+00	—	6.6E+02
Acrolein	—	—	3.5E-01	—	2.5E+00
Toluene	—	—	3.0E+02	—	3.7E+04
Ammonia	—	—	2.0E+02	—	3.2E+03
2-Methylnaphthalene	—	—	—	—	—

[42] Data Adequacy Checklist, Appendix B (g)(9)(E)(iii)

[43] Data Adequacy Checklist, Appendix B (g)(9)(E)(ii)

TABLE 5.9-3

Risk Assessment Health Values for Air Toxic Substances

Compound	Inhalation Cancer Potency (mg/kg-day)	Oral Cancer Slope Factor (mg/kg-day)	Chronic Inhalation Reference Exposure Level (µg/m³)	Chronic Oral Reference Exposure Level (mg/kg-day)	Acute Inhalation Reference Exposure Level (µg/m³)
3-Methylchloranthrene	2.2E+01	2.2E+01	—	—	—
7,12-Dimethylbenz(a)anthracene	2.5E+02	2.5E+02	—	—	—
Acenaphthene	—	—	—	—	—
Acenaphthylene	—	—	—	—	—
Anthracene	—	—	—	—	—
Benz(a)anthracene	3.9E-01	1.2E+00	—	—	—
Benzo(a)pyrene	3.9E+00	1.2E+00	—	—	—
Benzo(b)fluoranthene	3.9E-01	1.2E+00	—	—	—
Benzo(g,h,i)perylene	—	—	—	—	—
Benzo(k)fluoranthene	3.9E-01	1.2E+00	—	—	—
Chrysene	3.9E-02	1.2E-01	—	—	—
Dibenzo(a,h)anthracene	4.1E+00	4.1E+00	—	—	—
Dichlorobenzene	—	—	—	—	—
Fluoranthene	—	—	—	—	—
Fluorene	—	—	—	—	—
Hexane	—	—	7.0E+03	—	—
Indeno(1,2,3-cd)pyrene	3.9E-01	1.2E+00	—	—	—
Phenanathrene	—	—	—	—	—
Pyrene	—	—	—	—	—
Arsenic	1.2E+01	1.5E+00	1.5E-02	3.5E-06	2.0E-01
Barium	—	—	—	—	—
Beryllium	8.4E+00	—	7.0E-03	2.0E-03	—
Cadmium	1.5E+01	—	2.0E-02	5.0E-04	—
Chromium	—	—	—	—	—
Cobalt	—	—	—	—	—
Copper	—	—	—	—	1.0E+02
Manganese	—	—	9.0E-02	—	—
Mercury	—	—	3.0E-02	1.6E-04	6.0E-01
Nickel	9.1E-01	—	1.4E-02	1.1E-02	2.0E-01
Selenium	—	—	2.0E+01	5.0E-03	—
Vanadium	—	—	—	—	3.0E+01
Zinc	—	—	—	—	—

[a] Risk assessment health values for PAHs are considered representative of any generic PAH, with the exception of naphthalene.

[b] Although naphthalene is a PAH, naphthalene-specific risk assessment health values were used to provide a level of refinement.

Notes:

µg/m³ = microgram(s) per cubic meter
mg/kg-day = milligram(s) per kilogram per day

Source: OEHHA and ARB, 2015

Significance Criteria.

Cancer Risk. Cancer risk is the probability or chance of contracting cancer over a human life span (assumed to be 30 years). Carcinogens are not assumed to have a threshold below which there is no human health impact. In other words, any exposure to a carcinogen is assumed to have some probability of causing cancer; the lower the exposure (time or mass), the lower the cancer risk (that is, a linear, no-threshold model). State and local regulations in California use an excess (that is, an incremental increase from the project) cancer risk greater than 10 in 1 million as the significant impact level for public health impact assessments. The excess cancer risk calculation also uses conservative assumptions and techniques to ensure that the excess cancer risk number bounds the actual risk. For example, the 10 in 1 million risk level is used by the Air Toxics Hot Spots (AB 2588) program and California's Proposition 65 as the public notification level for air toxic emissions from existing sources. An excess cancer risk below 1 in 1 million for a project is typically considered the *de minimis* impact level, meaning an excess cancer risk for a project less than 1 in 1 million would result in a less-than-significant health risk.

Based on SCAQMD Rule 1401 and the SCAQMD California Environmental Quality Act (CEQA) significance thresholds (SCAQMD, 2015b), a source with a maximum individual cancer risk (MICR) less than 1 in 1 million individuals and a project increment MICR of less than 10 in 1 million individuals would result in a less-than-significant health risk. Individual sources with a MICR between 1 and 10 in 1 million would be required to install best available control technology for toxics (T-BACT). Therefore, the predicted health risk values for each individual source were compared to the incremental increase in cancer risk of 1 in 1 million individuals per source (that is, each of the CTGs and the auxiliary boiler), and the predicted incremental increase in cancer risk for the project will be compared to the 10 in 1 million individuals threshold.

Based on SCAQMD Rule 1401 and the SCAQMD CEQA significance thresholds (SCAQMD, 2015b), a cancer burden greater than 0.5 excess cancer cases in areas with an incremental increase greater than 1 in 1 million individuals is considered significant.

Noncancer Risk. Noncancer health effects can be either chronic or acute. In determining potential noncancer health risks (chronic and acute) from air toxics, it is assumed there is a dose of the air toxic substance below which there would be no impact on human health. The air concentration corresponding to this dose is called the REL. Noncancer health risks are measured in terms of a hazard quotient, which is the calculated exposure of each contaminant divided by its REL. Hazard quotients for pollutants affecting the same target organ are typically summed with the resulting totals expressed as hazard indexes for each organ system. Based on SCAQMD Rule 1401 and the SCAQMD CEQA significance thresholds (SCAQMD, 2015b), a chronic or acute hazard index of less than 1.0 for each source and the project increment, respectively, is considered to be a less-than-significant health risk.

Summary of Air Toxic Exposure Assessment Results. A summary of the MICR, chronic health index, and acute health index at the point of maximum impact (PMI) locations, as well as the maximum predicted public health impacts for worker, residential, and sensitive receptors, has been included in Tables 5.9-4 and 5.9-5. In accordance with SCAQMD Rule 1401, the results in Table 5.9-4 represent the predicted risk for each individual emission unit, while the results in Table 5.9-5 represent a comparison of the total predicted AEC impact to the SCAQMD CEQA significance thresholds. The receptor grid used to evaluate the predicted impacts is included in Appendix 5.1C. Additionally, the HARP 2 report files were also prepared and are provided with this application on compact disc.

As shown in Table 5.9-4, the AEC CCGT's predicted impacts exceed the incremental increase in cancer risk threshold of 1 in 1 million; therefore, T-BACT will be required for these units. The AEC SCGT's s and auxiliary boiler do not trigger the regulatory requirement for T-BACT as their predicted impacts are below the incremental increase in cancer risk threshold of 1 in 1 million. Although not required in all cases, the emission control technologies included in the AEC for all emission sources are considered to be T-BACT. All sources have predicted impacts below the chronic and acute hazard index of 1.0.

TABLE 5.9-4

Health Risk Assessment Summary: Individual Units [a]

Risk [b]	AEC CCGT - 01	AEC CCGT - 02	AEC SCGT-100-01	AEC SCGT-100-02	AEC SCGT-100-03	AEC SCGT-100-04	Auxiliary Boiler
Cancer Risk at the PMI [c] (per million)	1.5	1.5	0.12	0.12	0.12	0.12	0.40
Cancer Risk at the MEIR [c] (per million)	1.1	1.0	0.11	0.10	0.10	0.10	0.12
Cancer Risk at a Sensitive Receptor [c] (per million)	1.0	1.1	0.049	0.050	0.057	0.058	0.080
Cancer Risk at the MEIW [d] (per million)	0.043	0.043	0.0034	0.0035	0.0035	0.0034	0.018
Chronic Hazard Index at the PMI	0.0019	0.0019	0.00015	0.00015	0.00015	0.00015	0.011
Chronic Hazard Index at the MEIR	0.0013	0.0013	0.00014	0.00013	0.00013	0.00013	0.0031
Chronic Hazard Index at a Sensitive Receptor	0.0013	0.0013	0.000063	0.000064	0.000073	0.000074	0.0021
Chronic Hazard Index at the MEIW	0.0019	0.0019	0.00015	0.00015	0.00015	0.00015	0.011
Acute Hazard Index at the PMI	0.0073	0.0074	0.0026	0.0043	0.0027	0.0026	0.0026
Acute Hazard Index at the MEIR	0.0073	0.0073	0.0017	0.0017	0.0019	0.0019	0.0017
Acute Hazard Index at a Sensitive Receptor	0.0064	0.0058	0.0016	0.0016	0.0017	0.0018	0.00054
Acute Hazard Index at the MEIW	0.0073	0.0074	0.0026	0.0043	0.0027	0.0026	0.0026

[a] The results in Table 5.9-4 represent the predicted excess risk for each individual emission unit in accordance with SCAQMD Rule 1401.

[b] A source with an excess cancer risk less than 1 in 1 million individuals is considered to be less than significant. A source with an excess cancer risk less than 10 in 1 million is considered less than significant if T-BACT is installed. A chronic or acute hazard index less than 1.0 for each source is considered to be a less-than-significant health risk.

[c] Cancer risk values are based on the Draft Risk Management Policy (RMP) methodology.

[d] Cancer risk values are based on the OEHHA Derived methodology.

A risk analysis was also performed to evaluate the potential facility-wide impacts. The potential health impacts at the PMI, MEIR, MEIW, and maximum exposed sensitive receptor resulting from AEC operation are summarized in Table 5.9-5. It should be noted that the maximum impacts reported in Table 5.9-5 represent the maximum predicted impacts at one receptor from all sources combined. In contrast, the maximum impacts reported for each individual source in Table 5.9-4 may occur at different receptors. Therefore, the AEC totals in Table 5.9-4 are not directly additive and should not be directly compared to the results presented in Table 5.9-5.

TABLE 5.9-5

Health Risk Assessment Summary: Facility [a]

Risk [b]	Receptor Number	Receptor Coordinates (UTM, m)		Value
		Easting	Northing	
Cancer Risk at the PMI [c] (per million)	681	398450	3736900	3.2
Cancer Risk at the MEIR [c] (per million)	688	398800	3736900	2.5
Cancer Risk at a Sensitive Receptor [c] (per million)	19406	397913	3737192	2.3
Cancer Risk at the MEIW [d] (per million)	681	398450	3736900	0.10
Chronic Hazard Index at the PMI	11	398280	3736757	0.013
Chronic Hazard Index at the MEIR	688	398800	3736900	0.0047
Chronic Hazard Index at a Sensitive Receptor	19406	397913	3737192	0.0050
Chronic Hazard Index at the MEIW	11	398280	3736757	0.013
Acute Hazard Index at the PMI	597	397900	3736750	0.021
Acute Hazard Index at the MEIR	769	397700	3737100	0.019
Acute Hazard Index at a Sensitive Receptor	19406	397913	3737192	0.019
Acute Hazard Index at the MEIW	597	397900	3736750	0.021

[a] The results in Table 5.9-5 represent the combined predicted risk for all five combustion units operating simultaneously.

[b] A facility with an excess cancer risk less than 10 in 1 million individuals is considered to be less than significant. A chronic or acute hazard index less than 1.0 for the facility is considered to be a less-than-significant health risk.

[c] Cancer risk values are based on the Draft RMP methodology.

[d] Cancer risk values are based on the OEHHA Derived methodology.

Notes:

m = meter(s)

UTM = Universal Transverse Mercator

As shown in Table 5.9-5, predicted impacts for the AEC are below the significance thresholds of 10 in 1 million for excess cancer risk and chronic and acute hazard index of 1.0. Therefore, the predicted health risks associated with the AEC will be less than significant.

Because the predicted cancer risk, per individual unit, is greater than 1 in 1 million, the cancer burden was calculated for each census block receptor consistent with SCAQMD guidance (SCAQMD, 2015a). The cancer burden for the AEC was estimated at 1×10^{-8}, which is well below the significance threshold of 0.5. Therefore, the AEC will not significantly increase cancer burden in the vicinity of the project site.

5.9.1.2 Uncertainty in the Public Health Impact Assessment

Sources of uncertainty in the HRA include emissions estimates, numerical dispersion modeling calculations, exposure characteristics, and extrapolation of toxicity data in animals to humans. Assumptions used in HRAs are designed to provide sufficient health protection to avoid underestimation of risk to the public, which may add an additional level of conservativeness in the predicted impacts. Some sources of uncertainty and conservativeness applicable to this HRA are discussed below.

As noted in Section 3.1, Stationary Gas Turbines, of EPA's *AP-42* (EPA, 2000), uncontrolled HAP emissions could be reduced by up to 85 to 90 percent with the use of an oxidation catalyst system.[44] The AEC design includes the use of an oxidation catalyst to reduce CO and VOC emissions to the best available control levels of 2 ppmv and 2 ppmv, respectively. Therefore, it is expected that the actual HAP emissions, and resulting predicted health risk impacts, would be significantly less than the potential risk presented in this analysis. Long-term emissions were also estimated, assuming the AEC CCGTs would operate at an annual average heat input rate for 4,100 hours per year, plus 500 startup and shutdown events, the AEC SCGTs would operate at an annual average heat input rate for 2,000 hours per year, plus 500 startup and shutdown events, and the auxiliary boiler would operate at a maximum heat input rate for 8,760 hours per year, plus 120 startup events. Under normal operating conditions, the CTGs and auxiliary boiler would likely be operated less than the permitted levels on an annual basis. Consequently, the emissions used for this HRA are expected to be higher than the actual quantities during normal operation.

The models used in dispersion modeling contain assumptions that tend to over-predict ground-level concentrations. For example, the modeling performed in the HRA assumed a conservation of mass (that is, all of the pollutants emitted from the sources remained in the atmosphere while being transported downwind). During the transport of pollutants from sources to receptors, none of the material was assumed to be removed through chemical reaction or to be lost at the ground surface through reaction, gravitational settling, precipitation, or turbulent impaction. In reality, these mechanisms work to reduce the level of pollutants remaining in the atmosphere.

The long-term exposure characteristics assessed in the HRA included the assumption that residents were exposed to turbine emissions continuously at the same location for 24 hours per day, 365 days per year, for 30 years. It is extremely unlikely that any person would meet this condition. The conservative exposure assumption tends to over-predict risk estimates in the HRA process.

The toxicity data used in the HRA contain uncertainties due to the extrapolation of data from animals to humans. Typically, safety factors are applied when doing the extrapolation. Furthermore, the human population is much more diverse, both genetically and culturally, than animals used for experimental exposures and bred and housed under controlled conditions; thus, the intraspecies variability among humans is expected to be much greater than in laboratory animals. With all of the uncertainty in the assumptions used to extrapolate toxicity data, significant measures are taken to ensure that sufficient health protection is built into the available health effects data.

5.9.1.3 Air Toxics Exposure Assessment (Construction Impacts)

The emissions of air toxics associated with the construction of the AEC will consist primarily of combustion byproducts generated during movement of onsite construction equipment and onsite and offsite movement (vehicular miles traveled) of vehicles associated with the project's construction activities.

The primary air toxic pollutant of concern associated with construction activities is DPM. The total DPM exhaust emissions from construction activities, calculated per methodology in Section 5.1 as presented in Appendix 5.1A, were averaged over the 56-month construction period and spatially distributed in: (1) the area associated with construction of the AEC CCGT and (2) the area associated with the construction of the AEC SCGT. These emission rates are presented in Table 5.9-6.

[44] *AP-42*, page 3.1-7—The oxidation process takes place spontaneously, without the requirement for introducing reactants. The performance of these oxidation catalyst systems on combustion turbines results in 90-plus percent control of CO and about 85 to 90 percent control of formaldehyde. Similar emission reductions are expected on other HAP pollutants.

TABLE 5.9-6

Air Toxic Emission Rates Modeled for AEC Construction

Construction Areas	DPM Exhaust Emissions	
	Total (tons/project)	Annualized (tpy)[a]
AEC CCGT Construction	0.053	0.013
AEC SCGT Construction	0.023	0.0054

[a] Annualized emissions were calculated by averaging the total emissions over a 56-month construction period.

Note:

tpy = ton(s) per year

The construction HRA estimated the rolling cancer risks for each 56-month period[45] during a 30-year exposure duration (starting with exposure during the third trimester), aligned with the expected construction duration, at the PMI, MEIR, MEIW, and maximum exposed sensitive receptor. The excess cancer risks were estimated using the following:

- Equations 5.4.1.1 and 8.2.4A from the *Air Toxic Hot Spots Guidance Manual for Preparation of Health Risk Assessments* (OEHHA, 2015) for residential exposure
- Equations 5.4.1.2A, 5.4.1.2B, and 8.2.4B from the *Air Toxic Hot Spots Guidance Manual for Preparation of Health Risk Assessments* (OEHHA, 2015) for worker exposure
- The maximum annual ground-level concentrations used to estimate risk were determined through dispersion modeling with AERMOD
- The AERMOD modeling approach followed that used to prepare the criteria pollutant modeling analysis, except that the receptor grid included census and sensitive receptors and excluded receptors located within AES-controlled property (see Appendix 5.9C for the AERMOD setup)
- The construction emission estimates modeled are presented in Table 5.9-6

Chronic risks were also estimated for the PMI, MEIR, MEIW, and maximum exposed sensitive receptor, based on the same emission rates and ground-level concentrations described above. To calculate chronic risk, as characterized by a health index, the maximum annual ground-level concentration was divided by the DPM REL of 5 micrograms per cubic meter ($\mu g/m^3$) (OEHHA, 2015).

The results of the construction HRA show that the excess cancer risks at the PMI, MEIR, MEIW, and maximum exposed sensitive receptor are 4.71, 3.03, 0.16, and 1.19, respectively, which are less than the significance threshold of 10 in 1 million. Similarly, the chronic hazard indices at the PMI, MEIR, MEIW, and maximum exposed sensitive receptor are 0.0026, 0.0017, 0.0026, and 0.00065, respectively, which are less than the significance threshold of 1.0. Therefore, predicted impacts associated with the finite construction activities are less than significant. Detailed calculations are provided in Appendix 5.9C. The model input and output files are included with this submission on compact disc.

5.9.4 Cumulative Effects

5.9.1.4 Operational Cumulative Effects

As previously discussed, the MATES II, MATES III, and MATES IV studies consisted of a comprehensive monitoring program, an updated emissions inventory, and a modeling effort to characterize health risks associated with human exposures to ambient concentrations of TACs in the SCAB. In the MATES II study, the estimated carcinogenic risk was found to be rather uniform across the SCAB, ranging from about 1,120 in

[45] The AEC construction period is expected to be 51 months, or 4.25 years. The first calculated value for the exposure duration includes the third trimester and the first four years of life. All subsequent cancer risk calculations were conservatively assumed to last for five years.

1 million to about 1,740 in 1 million for the sites monitored. The MATES III study was completed in September 2008. Similar to the earlier MATES II study, the MATES III study found that mobile sources continued to dominate cancer risk in the SCAB by accounting for an estimated 94 percent of the overall cancer risk, with diesel emissions alone accounting for 84 percent. The MATES III study also found that the estimated cancer risk from exposure to airborne toxics had decreased to 1,200 in 1 million. The MATES IV study was completed in May 2015 and again found that mobile sources dominated cancer risk in the SCAB by accounting for an estimated 90 percent of the overall cancer risk, with diesel emissions alone accounting for 68 percent. The MATES IV study found that the estimated cancer risk had decreased by approximately 60 percent from the MATES III study to 480 in 1 million.

The maximum incremental increase in the facility-wide cancer risk predicted at the PMI for the AEC is 3.2 in 1 million. The maximum facility-wide chronic and acute hazard indices at the PMI are 0.013 and 0.021, respectively. These levels are below the SCAQMD CEQA significance *de minimis* thresholds for cancer risk of 10 in 1 million and the chronic and acute hazard index of 1.0. Furthermore, the results of the MATES IV study indicate that the cumulative background cancer risk from exposure to airborne toxics is approximately 480 in 1 million[46], with an estimated 90 percent of the overall cancer risk due to mobile sources. Therefore, facility-wide stationary source emissions from the AEC are expected to contribute to approximately less than 0.67 percent of the background risk in the vicinity of the project site. As required, T-BACT emission control technologies will also be installed as part of the project, which will reduce the TAC emissions to the extent technically feasible. Therefore, it is concluded that the AEC will not have a significant cumulative human health risk impact.

5.9.1.5 Construction

The maximum incremental increase in the cancer risk predicted at the PMI associated with construction activities is 4.71 in 1 million, which is below the SCAQMD CEQA significance *de minimis* threshold for cancer risk of 10 in 1 million. The maximum chronic hazard index at the PMI is 0.0026, which is below the chronic hazard index of 1.0. Additionally, the AEC construction activities would be finite, and best available emission control techniques would be used throughout the 51-month activity period to control pollutant emissions. Therefore, the potential cumulative human health risk impacts from construction are expected to be less than significant.

5.9.5 Mitigation Measures

5.9.1.6 Criteria Pollutants

Operation. The results of the air dispersion modeling presented in Section 5.1 concluded that the AEC emissions during operation will not cause or contribute to a violation of the ambient air quality standards (either National Ambient Air Quality Standards [NAAQS] or California Ambient Air Quality Standards) for those pollutants for which the area is designated as attainment. These standards are intended to protect the general public with a wide margin of safety. Therefore, the AEC is not expected to have a significant impact on public health from emissions of criteria pollutants. For those criteria pollutants (and their precursor pollutants) where the ambient air quality standards are categorized as nonattainment, mitigation will be provided to reduce the impacts to less-than-significant levels (see Section 5.1). The AEC will also include emission-control technologies necessary to meet the required emission standards specified for criteria pollutants under SCAQMD rules.

[46] Note that with implementation of OEHHA's updated methods for estimating cancer risks, the estimated cancer risk from exposure to airborne toxics is closer to 1,000 in 1 million.

Construction/Demolition. The construction and demolition activities would be finite and best available emission control techniques would be used throughout the 56-month construction activity period to control criteria pollutant and DPM emissions. Construction impacts would be further reduced with the implementation of the additional construction mitigation measures presented in Section 5.1 and the implementation of a construction fugitive dust and diesel-fueled engine control plan.

5.9.1.7 Air Toxic Substances

As presented in Section 5.9.3.1.4, the maximum per emission unit incremental increases in cancer risk predicted at the PMI, MEIR, MEIW, and maximum exposed sensitive receptor are 1.5, 1.1, 0.043, and 1.1 in 1 million, respectively. As these levels are, in some cases, above the per unit emission significance threshold for cancer risk of 1 in 1 million, the AEC has incorporated T-BACT emission control technologies. The associated cancer burden for the AEC was estimated at 1×10^{-8}, which is well below the significance threshold of 0.5. Therefore, the AEC will only require the installation of T-BACT.

The maximum facility incremental increases in cancer risk predicted at the PMI, MEIR, MEIW, and maximum exposed sensitive receptor are 3.2, 2.5, 0.10 and 2.3 in 1 million, respectively. The maximum facility chronic and acute hazard indices are 0.013 and 0.021, respectively. These levels are below the facility significance thresholds for cancer risk of 10 in 1 million, and the chronic and acute hazard index of 1.0. Therefore, additional mitigation measures are not required for air toxic emissions from operation of the AEC.

As presented in Section 5.9.3.3, the predicted incremental increases in cancer risk at the PMI, MEIR, MEIW, and maximum exposed sensitive receptor associated with construction activities are 4.71, 3.03, 0.16, and 1.19 in 1 million, respectively. The predicted chronic hazard indices at the PMI, MEIR, MEIW, and maximum exposed sensitive receptor are 0.0026, 0.0017, 0.0026, and 0.00065, respectively. These levels are below the significance threshold for cancer risk of 10 in 1 million and the chronic hazard index of 1.0. Additionally, the construction activities would be finite and best available emission control techniques would be used throughout the 51-month construction period to control air toxic substance emissions. Construction impacts would be further reduced with the implementation of the additional construction mitigation measures presented in Section 5.1 and the implementation of a construction fugitive dust and diesel-fueled engine control plan.

5.9.6 Laws, Ordinances, Regulations, and Standards

An overview of the relevant LORS that affect public health as well as the conformity of the project to each of the LORS are identified in Table 5.9-7.

5.9.7 Agencies and Agency Contacts

Table 5.9-8 provides contact information for agencies involved with public health.

5.9.8 Permits and Permit Schedule

Consistent with the CEC Siting Regulations, SCAQMD is responsible for issuing the required operating permits related to public health. Sections 5.1.9 and 5.1.11 include a summary of the SCAQMD and EPA permits required and expected issuance schedule.

TABLE 5.9-7

Laws, Ordinances, Regulations, and Standards for Public Health

LORS	Requirements/Applicability	Administering Agency	Analyses of Conformance
Federal			
Title 40 CFR Part 63	Establishes national emission standards to limit emissions of HAPs, or air pollutants identified by EPA as causing or contributing to the adverse health effects of air pollution but for which NAAQS have not been established, from facilities in specific categories.	SCAQMD with EPA Region IX Oversight	The AEC has proposed a formaldehyde emission limit of 120 parts per billion, by volume (ppbv); as a result, the estimated annual AEC HAP emissions are less than the major source thresholds for HAPs (10 tpy for any one pollutant or 25 tpy for all HAPs combined), and no lower pollutant-specific maximum achievable control technology (MACT) thresholds apply to the AEC emission units. Therefore, National Emissions Standards for Hazardous Air Pollutants (NESHAP) regulations do not apply.
State			
California Health & Safety Code, Sections 44360 to 44366 (Air Toxics "Hot Spots" Information and Assessment Act—AB 2588)	Requires preparation and biennial updating of a facility's emission inventory of hazardous substances; risk assessments.	SCAQMD with Oversight from ARB/OEHHA	An estimate of TAC emissions and associated risk was conducted as part of this analysis (see conformance description for SCAQMD Rule 1401 [Permits – Toxics New Source Review] below).
California Health & Safety Code, Section 25249.5 et seq. (Safe Drinking Water and Toxic Enforcement Act of 1986—Proposition 65)	Provides notification of Proposition 65 chemicals.	OEHHA	The Project Owner will comply with all signage and notification requirements.
Local			
SCAQMD Rule 1401 (Permits – Toxics New Source Review)	The purpose of this rule is to provide for the review of new and modified sources of TAC emissions in order to evaluate potential public exposure and health risk, to mitigate potentially significant health risks resulting from these exposures, and to provide net health risk benefits by improving the level of control when existing sources are modified or replaced.	SCAQMD	T-BACT shall be applied to any new or modified source (i.e., individual permit unit) of TACs where the source risk is a cancer risk greater than 1 in 1 million (1×10^{-6}), a chronic hazard index greater than 1.0, or an acute hazard index greater than 1.0. The predicted MICR at the MEIR and MEIW for an individual unit are 1.1 and 0.043 in 1 million, respectively. Although these values are, in some cases, above the individual source threshold of 1 in 1 million (1×10^{-6}), the AEC will incorporate T-BACT emission control technologies, which will reduce impacts to a less-than-significant impact level. The predicted MICR at the MEIR and MEIW for the project are 2.5 and 0.10 in 1 million, respectively. These values are below the Permit to Construct or Permit to Operate facility thresholds for cancer risk of 10 in 1 million. The maximum predicted chronic and acute hazard indices for the project are 0.013 and 0.021, respectively, both of which are below the chronic and acute hazard index of 1.0. Therefore, additional mitigation measures will not be required.

TABLE 5.9-7

Laws, Ordinances, Regulations, and Standards for Public Health

LORS	Requirements/Applicability	Administering Agency	Analyses of Conformance
SCAQMD Rule 212 (Permits – Public Notice)	The purpose of this rule is to establish standards for approving permits and issuing public notice.	SCAQMD	Rule 212 requires public notification if: a. Any new or modified permit unit, source under Regulation XX, or equipment under Regulation XXX that may emit air contaminants is located within 1,000 feet from the outer boundary of a school; or b. Any new or modified facility that has onsite emission increases exceeding any of the daily maximums specified in subdivision (g) of this rule; or c. Any new or modified permit unit, source under Regulation XX, or equipment under Regulation XXX with increases in emissions of toxic air contaminants for which the Executive Officer has made a determination that a person may be exposed to a MICR greater than 1 in 1 million (1×10^{-6}), due to a project's proposed construction, modification, or relocation for facilities with more than one permitted equipment unless the applicant can show that the total facility-wide MICR is below 10 in 1 million (10×10^{-6}). The predicted total facility-wide MICR is less than 10 in 1 million. However, the AEC will be within 1,000 feet from the outer boundary of a school, and the onsite emissions will exceed the daily maximums listed in subdivision (g) of this rule. Therefore, a public notice consistent with the requirements outlined in Rule 212 will be issued. The process for public notification and comment will include all of the applicable provisions of 40 CFR 51, Section 51.161(b), and 40 CFR 124, Section 124.10.

TABLE 5.9-8

Agency Contacts for Public Health

Issue	Agency Contacted	Person Contacted
Regulatory oversight	EPA Region IX	Gerardo Rios EPA Region IX 75 Hawthorne Street San Francisco, CA 94105 (415) 947-3974
Regulatory oversight	ARB	Michael Tollstrup Project Assessment Branch California Air Resources Board 2020 L Street Sacramento, CA 95814 (916) 322-6026
Permit issuance, enforcement	SCAQMD	Mohsen Nazemi South Coast Air Quality Management District 21865 Copley Drive Diamond Bar, CA 91765 (909) 396-2662

5.9.9 References

California Air Resources Board (ARB). 2015. *User Manual for the Hotspots Analysis And Reporting Program Air Dispersion Modeling and Risk Assessment Tool Version 2.* March.

CH2M HILL Engineers, Inc. 2015. *Dispersion Modeling Protocol for the Alamitos Energy Center*. September.

Environmental Data Resources (EDR). 2015. *Alamitos Energy Center Offsite Receptor Report*. September.

Google Earth. 2015. Aerial view 6 miles surrounding the AEC, 690 N. Studebaker Road, Long Beach, CA 90803. Viewed September 2015.

Office of Environmental Health Hazard Assessment (OEHHA). 2015. *Air Toxics Hot Spots Program Risk Assessment Guidelines*. February.

Office of Environmental Health Hazard Assessment (OEHHA) and California Air Resources Board (ARB). 2015. *Consolidated Table of OEHHA/ARB Approved Risk Assessment Health Values.* May.

South Coast Air Quality Management District (SCAQMD). 2015a. *Supplemental Guidelines for Preparing Risk Assessments for the Air Toxics "Hot Spots" Information and Assessment* Act (AB2588). June.

South Coast Air Quality Management District (SCAQMD). 2015b. *SCAQMD Air Quality Significance Thresholds*. March.

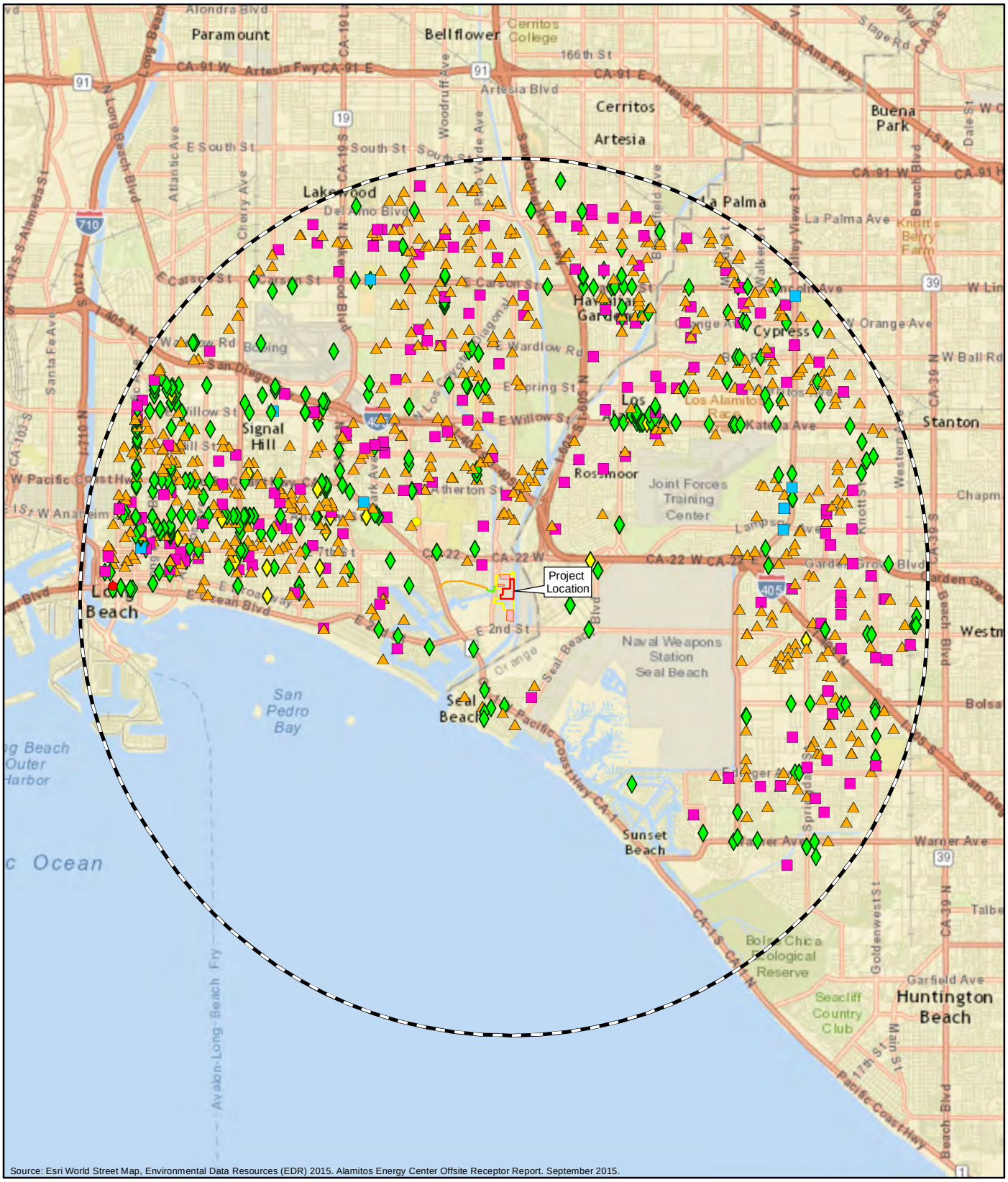
State Water Resources Control Board (SWRCB). 2010. *Water Quality Control Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling*.

U.S. Environmental Protection Agency (EPA). 1998. *AP-42, Compilation of Air Pollutant Emission Factors*. Chapter 1, Section 1.4, Natural Gas Combustion. Volume 1. Fifth Edition.

U.S. Environmental Protection Agency (EPA). 2000. *AP-42, Compilation of Air Pollutant Emission Factors*. Chapter 3, Section 3.1, Stationary Gas Turbines. Volume 1. Fifth Edition.

U.S. Environmental Protection Agency (EPA). 2005. *Guideline on Air Quality Models*, 40 CFR 51, Appendix W. November.

Yahoo Yellowpages (Yahoo). 2015. Search focused on 6 miles surrounding the AEC, 690 N. Studebaker Road, Long Beach, CA 90803. Schools, Hospitals/Clinics, and Senior Care Facilities. Available online at: http://www.yellowpages.com. Accessed September 2015.



Legend

- AEC Site
- AGS Boundary
- Parking/Laydown Construction Area
- 6-Mile Buffer
- Proposed New Process/Sanitary Wastewater Pipeline to First Point of Interconnection
- Potential Sewer Upgrade

Sensitive Receptors

- Arena
- Prison
- School
- College
- Daycare
- Hospital
- Nursing

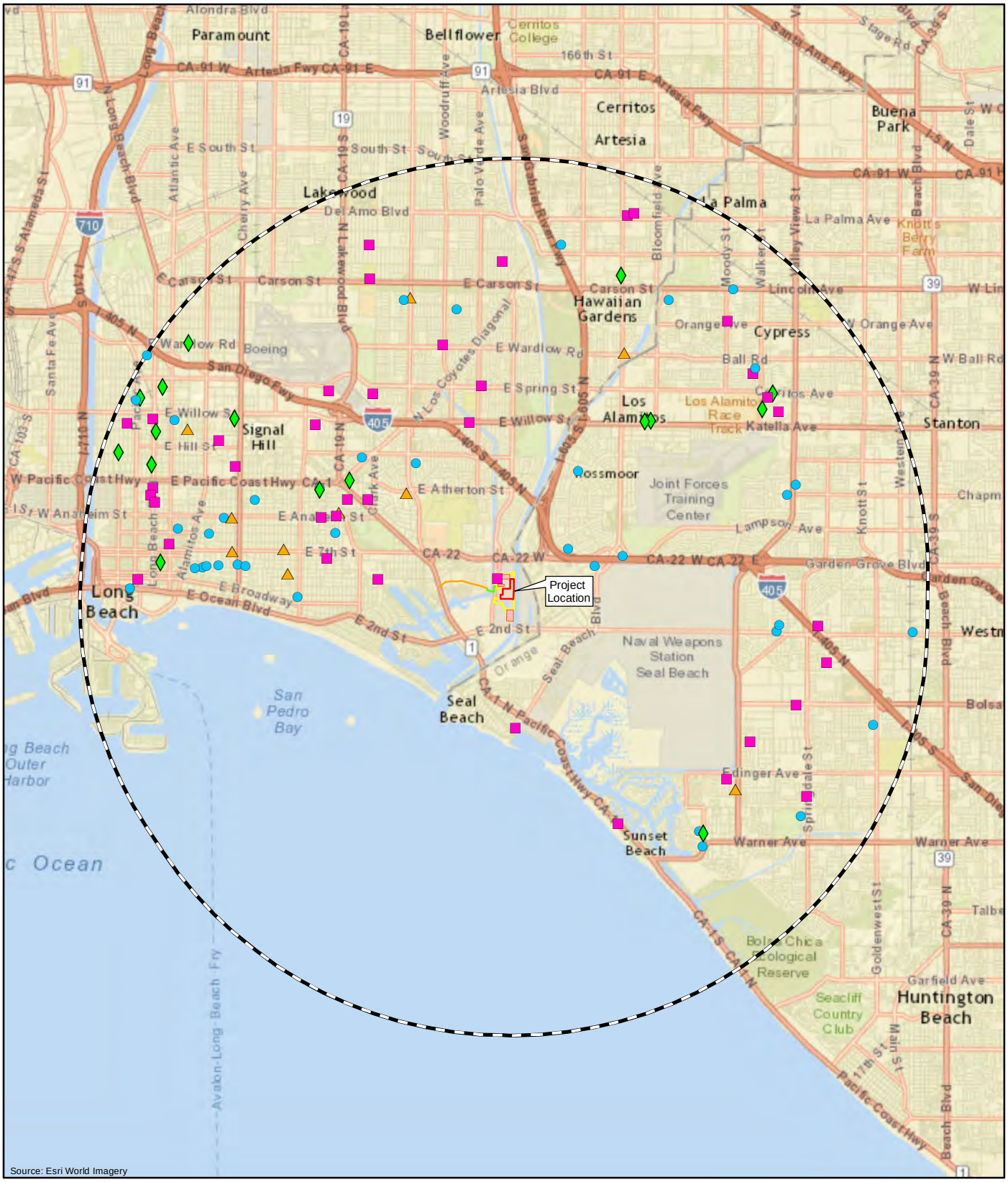
0 1 2 Miles

N

FIGURE 5.9-1A
Sensitive Receptors Within 6 miles – EDR Report

Alamitos Energy Center
Long Beach, California
October 2015

CH2MHILL



Legend

- AEC Project Site
- AGS Site
- Parking/Laydown Construction Area
- 6-Mile Buffer
- Proposed New Process/Sanitary Wastewater Pipeline to First Point of Interconnection
- Potential Sewer Upgrade

Sensitive Receptors

- School
- Daycare
- Senior Facility
- Hospital

0 1 2 Miles

N

FIGURE 5.9-1B
Sensitive Receptors Within 6 miles – Supplemental

Alamitos Energy Center
Long Beach, California
October 2015

5.10 Socioeconomics

This section describes and evaluates the socioeconomic effects of the Alamitos Energy Center (AEC). Section 5.10.1 describes the AEC setting, and Section 5.10.2 discusses the affected environment. Section 5.10.3 presents an analysis of the socioeconomic effects of the AEC. Section 5.10.4 addresses the topic of environmental justice. Section 5.10.5 evaluates potential cumulative effects on socioeconomics, and Section 5.10.6 discusses mitigation measures. Section 5.10.7 describes the laws, ordinances, regulations, and standards (LORS) that apply to the AEC, and Section 5.10.8 presents agency contacts. Section 5.10.9 discusses permit requirements, and Section 5.10.10 contains the references used to prepare this section.

5.10.1 Setting

AES Alamitos Energy, LLC, will construct, own, and operate the Alamitos Energy Center (AEC), a natural- gas-fired, air-cooled, combined-cycle and simple-cycle, electrical generating facility in Long Beach, California. The proposed AEC will have a nominal generating capacity of 1,040 megawatts (MW). The AEC will be constructed on the site of the existing AES Alamitos Generating Station (AGS), located on an approximately 21-acre site within a larger, 71.1-acre parcel.

The AEC will feature two gas turbine power blocks. Combined-cycle power block will consist of two natural-gas-fired combustion turbine generators (CTG) in a combined-cycle configuration, two unfired heat recovery steam generators (HRSG), one steam turbine generators, an air-cooled condenser, an auxiliary boiler, and related ancillary equipment. Simple-cycle power block will consist of four simple-cycle LMS-100 CTGs with fin-fan coolers and ancillary facilities.

The AEC will meet the demand for new generation in the Los Angeles basin local electrical reliability area. The demand is caused in large part by the closure of the San Onofre Nuclear Generating Station and the anticipated retirement of the older, natural-gas-fired generation currently using once-through ocean water-cooling (OTC). As a result of the promulgation of the California State Water Resources Control Board's (SWRCB) *Water Quality Control Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling* (SWRCB, 2010), more than 4,000 MW of OTC generation are expected to be retired in the Los Angeles local electrical reliability area by December 31, 2020.

The AEC will use water provided by the City of Long Beach Water Department (LBWD) for construction, operational process, and sanitary uses but at substantially lower volumes than the existing AGS historically has used. This water will be supplied through existing, onsite water lines. The AEC will include a new, 1,000-foot process/sanitary wastewater pipeline to the first point of interconnection with the existing LBWD sewer system, the potential upgrade of an additional 4,000 feet of existing pipeline downstream from the first point of interconnection, and the elimination of the current practice of treatment and discharge of process/sanitary wastewater to the San Gabriel River. Stormwater runoff from the power block areas will be directed to oil/water separators and to an existing retention basin and then ultimately discharged to the Los Cerritos channel via existing stormwater outfalls.

The AEC will interconnect to the existing, Southern California Edison (SCE) 230-kilovolt (kV) switchyard adjacent to the north side of the AGS. Natural gas will be supplied to the AEC via the existing, offsite, 30-inch-diameter pipeline owned and operated by Southern California Gas Company (SoCalGas) that currently serves Units 5 and 6 of the AGS. The AEC will require construction of new natural gas-metering facilities and construction of two new natural gas compressor buildings within the AEC footprint.

The AEC is designed to serve both peak and intermediate loads with the added capabilities of rapid startup, significant turndown capability (ability to turn down to a low load), and fast ramp rates. As California's intermittent renewable energy portfolio continues to grow, operating in either load-following or partial shutdown mode will become necessary to maintain electrical grid reliability, thus placing an increased importance upon the rapid startup, high turndown, steep ramp rate, and superior heat rate employed at the AEC.

As an in-basin generating asset, the AEC will provide local generating capacity, voltage support, and reactive power that are essential for transmission system reliability in the Western Los Angeles basin subarea and larger Los Angeles basin local reliability area. The AEC will be able to provide system stability by supplying reactive power, voltage support, frequency stability, and rotating mass in the heart of the critical Western Los Angeles local reliability area. By virtue of its location in a transmission constrained load center, the AEC also helps to avoid potential transmission line overloads and can provide reliable local energy supplies when electricity from more distant generating resources is unavailable. In recognition of its critical grid reliability benefits, the AEC combined-cycle CTGs were selected by SCE in its Local Capacity Requirements Request for Offer on November 5, 2014, and the simple-cycle CTGs will meet the capacity needs anticipated to be identified in future California Public Utilities Commission Long-term Procurement Plans.

Owing to the critical need for generating capacity at the AEC site at all times, existing Units 1 through 6 will remain in operation through much of the AEC development and construction. Given that the removal of existing Units 1 through 6 is not required for construction of the AEC, the continued operation of the AGS will not impede AEC construction. Demolition of the retired and decommissioned turbine peaking generating Unit 7 and fuel tank, ancillary equipment, small maintenance shops, and two retention basins will be required for site preparation for the construction of the AEC. Construction and site preparation activities at the AEC site are anticipated to last 56 months, from the first quarter of 2017 until the third quarter of 2021. The project will commence construction with the removal of former Unit 7's building and ancillary equipment, fuel storage tank, tank berms, small maintenance shops and two waste water retention basins in January 2017 to make room for construction and laydown area for the AEC CCGT. Construction of the AEC CCGT will commence during the second quarter of 2017 and will be completed by the second quarter of 2020. The AEC CCGT is expected to commence commercial operation before May 1, 2020. Construction of the AEC SCGT is scheduled to proceed from the second quarter of 2020 through the third quarter of 2021, and Power Block 2 is expected to commence commercial operation in the third quarter of 2021. A temporary construction access road may be constructed offsite beginning at the intersection of Studebaker Road and Loynes Drive traveling southeast to the AEC site. Construction of the AEC will require the use of onsite laydown areas (approximately 8 acres dispersed throughout the existing site) and an approximately 10-acre laydown area located adjacent to the existing site.

5.10.2 Affected Environment

The region of influence for purposes of evaluating the socioeconomic impacts associated with the AEC is the city of Long Beach and Los Angeles County.

5.10.2.1 Population

Los Angeles County has the largest population of any county in the nation and is located in the densely populated southern California region. It is bordered by Kern County to the north, San Bernardino County to the east, Ventura County to the west, and the Pacific Ocean and Orange County to the south (Los Angeles County, 2012).

As of January 1, 2015, Long Beach had an estimated population of 472,779 (Department of Finance [DOF], 2015). Historical population data for Long Beach, Los Angeles County, and California are summarized in Table 5.10-1. Annual average compounded population growth rates are summarized in Table 5.10-2. During the 1990s, population for Los Angeles County and Long Beach increased at an average annual rate of 0.7 percent—just less than half that of California as a whole. The average annual growth rate for the 15 years from 2000 to 2015 was 0.2 percent for Long Beach and 0.4 percent for Los Angeles County; whereas, the state's growth rate was substantially higher at 0.9 percent. Over the last two decades, both the county and Long Beach have shown slower population growth rates, with Long Beach experiencing a greater slowing of growth than Los Angeles County.

TABLE 5.10-1

Historical and Projected Populations

Area	1990[a]	2000[a]	2010[b]	2015[b]	2020(p)[c,d]	2030(p)[c]
Long Beach	429,321	461,522	462,257	472,779	491,000	NA
Los Angeles County	8,863,052	9,519,330	9,818,605	10,136,559	10,441,441	10,950,335
California	29,758,213	33,873,086	37,253,956	38,714,725	40,643,643	44,279,354

[a] Source: DOF, 2013a.
[b] Source: DOF, 2015.
[c] Source: DOF, 2013b.
[d] Source: Southern California Association of Governments (SCAG), 2013.

NA = Not Available
(p) = projected

TABLE 5.10-2

Historical and Projected Annual Average Compounded Population Growth Rates

Area	1990-2000 (%)	2000-2015 (%)	2015-2020 (%)	2020-2030 (%)
Long Beach	0.7	0.2	0.8	N/A
Los Angeles County	0.7	0.4	0.6	0.5
California	1.3	0.9	1.0	0.9

Source: DOF, 2015; 2013a; 2013b; SCAG, 2013.

Appendix Tables 5.10A-1 and 5.10A-2 (provided in Appendix 5.10A) show the minority and the low-income population distributions for the census blocks and census tracts that are within a 6-mile radius of the AEC site. The minority population, in the census blocks within the 6-mile radius of the AEC site, comprises 56.6 percent of this total population. The low-income population, in the census tracts within the 6-mile radius of the AEC site, comprises 13.1 percent. The minority data are from the 2010 U.S. Census, and the income data are from the 2010 American Community Survey (ACS) 5-year Estimates. In Long Beach, 46.1 percent of the population is composed of minorities, and 19.1 percent have incomes below the poverty level. Los Angeles County's population is 50.3 percent minority and 15.7 percent low-income (US Census, 2013a; 2013b). Appendix Figures 5.10A-1 and 5.10A-2 (see Appendix 5.10A) show the percent distribution of minority and low-income populations by 2010 census blocks and census tracts within a 6-mile radius of the AEC site.

5.10.2.2 Housing

As of January 1, 2015, Los Angeles County and Long Beach had 3,487,434 and 176,456 housing units, respectively (DOF, 2015). Table 5.10-3 shows the housing estimates by city, county, and state in 2013. Within Los Angeles County, single-family homes accounted for 1,951,578 units; multi-family dwellings accounted for 1,477,583 units; and mobile homes accounted for 58,273 units (DOF, 2015). In Long Beach, single-family homes accounted for 84,612 units; multi-family dwellings accounted for 89,498 units; and mobile homes accounted for 2,346 units (DOF, 2015). New housing authorizations for Los Angeles County totaled 7,468 units in 2010, of which about 32.7 percent were single-family units and 67.3 percent were multi-family units (DOF, 2013c). These authorizations were valued at $2,842,479. The median home price in Los Angeles County and the city of Long Beach in August 2015 was $500,000 and $459,000, respectively (CoreLogic, 2015). As of January 1, 2015, vacancy rates for Los Angeles County and Long Beach were 5.8 percent and 7.1 percent, respectively (DOF, 2015). As such, housing supply is not considered to be limited in Long Beach because the vacancy rate exceeds the federal standard vacancy rate of 5.0 percent.

TABLE 5.10-3

2013 Housing Estimates by City, County, and State

Area	Total Units	Single-Family	Multi-Family	Mobile Homes	Percent Vacant
Long Beach	176,456	84,612	89,498	2,346	7.1
Los Angeles County	3,487,434	1,951,578	1,477,583	58,273	5.8
California	13,914,715	9,041,758	4,312,544	560,407	7.8

Source: DOF, 2015

5.10.2.3 Economy and Employment

Los Angeles County is part of the Los Angeles-Long Beach-Glendale Metropolitan District (MD). Between 2011 and 2014, employment in the Los Angeles-Long Beach-Glendale MD increased by 314,500 jobs, or about 8 percent. This 8 percent increase is about the same as the increase in employment at the state level over the same period (California Employment Development Department ([EDD], 2015a). The services, retail trade, government, and manufacturing sectors were the largest contributors to employment in 2011 and 2014. These four sectors accounted for about 68 percent and 70 percent, respectively, of the total industry employment in the MD in 2011 and 2014. During the past 4 years, employment increases were experienced in all but three sectors (agriculture, manufacturing, and government). As shown in Table 5.10-4, on an average annual compounded growth rate basis, the mining and logging sector and the services sector experienced the largest average annual increase (at 4.7 percent) in employment, while the agricultural sector had the largest reduction (at -1.8 percent). However, the percentage growth for the mining and logging sector is misleading because the number of workers is so small. The 4.7 percent annual compound growth rate resulted from an increase of 600 workers over a 4-year period.

TABLE 5.10-4

Employment Distribution in the Los Angeles-Long Beach-Glendale MD, 2011 to 2014

	2011		2014		2011-2014	
Industry	Number of Employees	Employment Share (%)	Number of Employees	Employment Share (%)	Percentage Change (%)	Average Annual Compound Growth Rate (%)
Agriculture	5,600	0.1	5,300	0.1	-5.4%	-1.8
Mining and Logging	4,100	0.1	4,700	0.1	14.6%	4.7
Construction	105,100	2.7	120,200	2.8	14.4%	4.6
Manufacturing	366,900	9.4	364,900	8.6	-0.5%	-0.2
Wholesale Trade	205,800	5.3	223,500	5.3	8.6%	2.8
Retail Trade	393,000	10.0	414,500	9.8	5.5%	1.8
Transportation, Warehousing and Utilities	151,800	3.9	162,700	3.8	7.2%	2.3
Information	192,000	4.9	195,900	4.6	2.0%	0.7
Financial Activities	208,600	5.3	209,700	5.0	0.5%	0.2
Services	1,718,900	43.9	1,973,700	46.6	14.8%	4.7
Government	565,500	14.4	556,700	13.2	-1.6%	-0.5
Total Employment	**3,917,300**	**100.0**	**4,231,800**	100.0	**8.0%**	**2.6**

Source: EDD, 2015a.

Table 5.10-5 shows 2014 annual labor force and employment data for Long Beach and Los Angeles County compared to California. Long Beach had a higher unemployment rate than Los Angeles County and the state.

The EDD does not project future unemployment rates; therefore, a projection of the future unemployment rate for Long Beach and Los Angeles County is not available.

TABLE 5.10-5
Employment Data, 2014

Area	Labor Force	Employment	Unemployment	Unemployment Rate (%)
Long Beach	236,600	208,200	28,500	12.0
Los Angeles County	5,025,900	4,610,800	415,100	8.3
California	18,811,400	17,397,100	1,414,300	7.5

Source: EDD, 2015b; 2015c

5.10.2.4 Fiscal Resources

The local agency with taxing power is the City of Long Beach. The City of Long Beach's General Fund expenditures and revenues are presented in Table 5.10-6. General Fund revenues increased by 14 percent from fiscal year (FY) 2011-2012 to FY 2012-2013 and decreased by 7 percent from FY 2012-2013 to FY 2013-2014. In FY 2011-2012, tax revenues comprised 58 percent of total General Fund revenues. Tax revenues increased by 26 percent between FY 2011-2012 and FY 2012-2013 and decreased by 10 percent between FY 2012-2013 and FY 2013-2014.

TABLE 5.10-6
City of Long Beach General Fund Revenues and Expenditures (in $millions)

	FY 2011-2012	FY 2012-2013	FY 2013-2014
Revenues			
Taxes	238.7	299.7	268.8
Property Taxes	115.5	169.6	141.9
Sales Taxes	58.3	61.5	56.6
Utility Users Taxes	37.1	38.0	38.7
Other Taxes	27.7	30.6	31.6
Franchise Fees	23.1	25.2	26.2
Licenses and Permits	16.1	13.9	14.9
Fines and Forfeitures	17.8	16.4	16.2
Use of Money and Property	53.3	54.4	52.4
From Other Agencies	4.1	1.8	5.9
Charges for Services	27.0	26.3	26.4
Other Revenue	8.6	8.3	6.8
Other Financing Sources	23.4	24.3	18.7
Total Revenues	**412.0**	**470.3**	**437.4**
Expenditures			
Legislative and Legal	10.3	9.7	11.4
General Government	16.0	16.3	16.7
Public Safety	269.1	267.4	277.8
Public Health	5.2	5.4	5.4
Community and Cultural	41.0	40.8	41.2
Public Works	28.7	30.1	31.0

TABLE 5.10-6

City of Long Beach General Fund Revenues and Expenditures (in $millions)

	FY 2011-2012	FY 2012-2013	FY 2013-2014
Debt Service	NA	N/A	N/A
Oil Operations	9.1	4.7	4.3
Other Financing Uses	22.4	34.9	68.2
Total Expenditures	**401.8**	**374.3**	**387.8**

N/A = Not Available

Source: City of Long Beach 2015a; 2015b; 2015.

5.10.2.5 Education

Los Angeles County has 88 elementary, high school, and unified school districts (California Department of Education [CDE], 2013a). The area in which the AEC site is located is served by the Long Beach Unified School District, District 4. Students in the district attend Kettering Elementary School, Rogers Middle School, and Wilson High School (Kirk, 2013, personal communication). Historical and current enrollment figures for the school district are presented in Table 5.10-7. The projected enrollment for 2013-2014 is 80,466 students for the school district as a whole. There has been an average annual compounded decline of 1.7 percent in the 3-year period from FY 2010-2011 through 2013-2014.

TABLE 5.10-7

Historical and Current Enrollment by Grade for Long Beach Unified School District

Grade Level	2010-11	2011-12	2012-13
Kindergarten	6,312	6,339	6,519
First	6,533	6,505	6,267
Second	6,358	6,410	6,239
Third	6,336	6,260	6,337
Fourth	6,237	6,208	6,091
Fifth	6,289	6,121	6,000
Sixth	6,282	6,172	6,028
Seventh	6,400	6,237	6,076
Eighth	6,586	6,311	6,174
Ninth	6,953	6,863	6,517
Tenth	6,918	6,801	6,624
Eleventh	6,694	6,622	6,543
Twelfth	6,918	6,842	6,837
Ungraded Secondary			4
Total	**84,816**	**83,691**	**82,256**

Source: CDE, 2013b.

5.10.2.6 Public Services and Facilities

This section describes public services in the AEC area.

Law Enforcement. Law enforcement services for the AEC site are provided by the Long Beach Police Department (LBPD). The LBPD has four stations. The station located at 400 West Broadway serves as headquarters. The East Division substation at 4800 Los Coyotes Diagonal, Long Beach, is the nearest station to the AEC site. The LBPD has 819 full-time sworn officers. The East Division substation has 108 sworn officers. Officers will respond to calls from the field. The LBPD has an average response time to Priority One calls (emergency calls) of less than 5 minutes (Lopez, 2013, personal communication).

The California Highway Patrol is the primary law enforcement agency for state highways and roads. California Highway Patrol services include law enforcement, traffic control, accident investigation, and the management of hazardous material spills. Long Beach includes a segment of the Pacific Coast Highway. The California Highway Patrol is the primary law enforcement agency for the Pacific Coast Highway; however, the Highway Patrol and LBPD both serve the portions of the Pacific Coast Highway within the Long Beach city limits.

Fire Protection. The AEC site is within the Long Beach Fire Department (LBFD) jurisdiction. The LBFD has 23 stations, including two Fireboat Stations and the Airport Station. The stations are spread across 52 square miles of the city, broken into specific geographic response zones. The stations are all within 2 miles of each other to create overlapping coverage (DuRee, 2012, personal communication). The station at 3205 Lakewood Boulevard serves as the headquarters. The primary response station for the AEC site is Fire Station 22, located at 6340 Atherton Street, approximately 1 mile from the AEC site. There are five firefighters assigned to this station daily. Multiple stations (14, 4, 8, and 17) within a few miles of the AEC site also may respond when additional support is needed. Based on the characteristics of the emergency, the initial alarm response from any of these stations would include three engines, a truck, a paramedic rescue, and a battalion chief (Zinnen, 2013, personal communication). LBFD's citywide average response time is about 5.3 minutes. Average response time to an emergency at the AEC site from Fire Station 22 is about 4.5 minutes (DuRee, 2012, personal communication).

The LBFD deploys 17 engine companies, 4 truck companies, 8 paramedic rescue ambulances, 5 Basic Life Support (BLS) ambulances, 3 airport rescue firefighting apparatus, 1 urban search and rescue (CATF type 1) unit, 1 hazardous materials (Type 1) unit, two 86-foot fireboats, four 34-foot rescue boats, 3 beach lifeguard patrol units, and 3 Battalion Chief Officers. Each engine, truck, and specialty unit is staffed with four firefighters consisting of one captain, one engineer, one firefighter, and one firefighter/paramedic. Rescue ambulances are staffed with two firefighter/paramedics, and BLS ambulances are staffed with two Emergency Medical Technician (EMT) ambulance operators. Beach lifeguard units are staffed with one marine safety officer, and the airport units are staffed with one engineer each and one firefighter and one captain in a quick response vehicle (DuRee, 2012, personal communication).

There are 170 nationally accredited and State-certified paramedics in the LBFD. Currently, there are 96 full-time active paramedics in the program. The remaining staff members have kept certification but are not active within the Advanced Life Support (ALS) program (engineers and captains). Fire Station 22 is a Paramedic Assessment Engine and has one paramedic assigned to the apparatus daily with full scope of practice under Los Angeles County Assessment Engine guidelines. All firefighters on the LBFD are certified EMTs (DuRee, 2012, personal communication).

The LBFD has mutual and automatic aid agreements with the Los Angeles County Fire Department and the Orange County Fire Authority (DuRee, 2012, personal communication). In the event of an emergency on the AEC site requiring additional resources, Stations 1742 of the Orange County Fire Authority would be the responding stations (DuRee, 2012, personal communication).

Emergency Response. All firefighters and stations are capable of managing a hazardous materials related incident. Fire Station 24 and Fire Station 19 house specialized apparatus for hazardous materials response, and the personnel assigned to these stations are certified as hazardous materials technicians. These resources can be deployed citywide when requested and, under certain circumstances, are available to respond to a regional request.

Hospitals. There are six hospitals in Long Beach that offer emergency room services and that accept patients from the LBFD's ALS and BLS systems (DuRee, 2012, personal communication). The Los Alamitos Medical Center and the Community Hospital of Long Beach are the nearest hospitals to the AEC site (DuRee, 2012, personal communication). The Los Alamitos Medical Center is at 3751 Katella Avenue in Alamitos, and the Community Hospital of Long Beach is located at 1720 Termino Avenue in Long Beach. In the event of a traumatic injury at the AEC site, the patient would be transported to either Saint Mary's Medical Center or

Long Beach Memorial Medical Center. Both of these hospitals are Level 1 Trauma Centers and both are less than 6 miles from the AEC site (DuRee, 2012, personal communication).

LBFD provides both ALS and BLS ambulance service. Response time for ambulance service by LBFD, based on traffic and the location of the hospital services required, is 15 minutes (Zinnen, 2013, personal communication).

5.10.2.7 Utilities

This section describes public utilities available in the AEC area.

Electricity and Gas. The AEC will connect to the existing onsite SCE switchyard adjacent to the north side of the AGS property. No new offsite transmission lines are planned. See Section 3.0, Transmission System Engineering, for a detailed discussion of the AEC electrical interconnection to the existing SCE 230-kV switchyard.

Natural gas will be supplied to the AEC via an existing 30-inch-diameter pipeline that currently serves the AGS. No new offsite natural gas supply pipelines will be necessary for the AEC.

Water. Water for the site is supplied from three separate pipeline interconnections with the LBWD. The AEC's water requirements are significantly less than the existing generating station's current use; therefore, all the existing connections will be used to support the AEC. No new offsite water supply pipelines will be required for the AEC.

Wastewater Discharge. The AEC will require an offsite pipeline for discharge of plant process and sanitary wastewater to the Los Angeles County Sanitation District via an interconnection to an existing LBWD sanitary pipeline. A new 1,000-foot-long, 6-inch pipeline will connect the AEC to the existing LBWD sanitary system. In the event that the LBWD determines that upgrades to the existing sanitary pipeline are required, an additional 4,000 feet of pipeline may need to be installed to replace the existing pipeline. Therefore, this analysis is based on a total wastewater pipeline length of 5,000 feet. Sanitary wastewater from sinks, toilets, showers, dishwashers, and other sanitary facilities will be discharged to the new wastewater pipeline. Likewise, process wastewater will be conveyed to the Los Angeles County Sanitation District via the LBWD sanitary system by the new wastewater pipeline.

Stormwater will be directed to the southernmost existing onsite retention basin and then discharged to the existing stormwater outfalls, which discharge into the AGS cooling water canals and ultimately to the Los Cerritos Channel.

5.10.3 Environmental Analysis

This section assesses the potential socioeconomic impacts of the AEC.

5.10.3.1 Potential Environmental Impacts

Local environmental impacts were analyzed by comparing AEC demands during construction (and demolition) and operation with the socioeconomic resources of the region of socioeconomic influence (Los Angeles County). A power-generating facility such as the AEC could affect employment, population, housing, public services and utilities, and schools.

Factors used to evaluate the significance of project-related socioeconomic impacts are set forth in Appendix G of the California Environmental Quality Act (CEQA). Appendix G is a screening tool, not a method for setting thresholds of significance. Appendix G is typically used in the Initial Study phase of the CEQA process, asking a series of questions. The purpose of these questions is to determine whether a project requires an Environmental Impact Report, a Mitigated Negative Declaration, or a Negative Declaration. As the Governor's Office of Planning and Research stated, "Appendix G of the Guidelines lists a variety of potentially significant effects, but does not provide a means of judging whether they are indeed significant in a given set of circumstances." The answers to the Appendix G questions are not determinative of whether

an impact is significant or less than significant. Nevertheless, the questions presented in CEQA Appendix G are instructive.

In terms of project-related impacts from construction and operations of the plant, Appendix G, asks, in part, whether the project would:

- Induce substantial growth or concentration of population
- Displace a large number of people or impact existing housing
- Result in substantial adverse impacts on the local economy and employment
- Create adverse fiscal impacts on the community
- Result in substantial adverse impacts on educational facilities
- Result in substantial adverse impacts on the provision of utility services
- Result in substantial adverse impacts associated with the provision of public services

5.10.3.2 Construction/Demolition Impacts

Site preparation and demolition of the remaining AGS Unit 7 components is expected to start in January 2017, with the combined-cycle gas turbine (CCGT) power block construction expected to take approximately 34 months from June 2017 to March 2020. The construction of the SCGT power block is expected to take approximately 16 months and is scheduled to occur between May 2020 and August 2021.

Construction Workforce. The primary trades required for AEC construction will include craft personnel such as boilermakers, carpenters, electricians, ironworkers, laborers, millwrights, operators, and pipefitters. Table 5.10-6 provides estimates of construction personnel requirements for the CCGT power block and the SCGT power block.

Total construction personnel requirements for CCGT power block will be approximately 6,176 person-months. Construction personnel requirements for CCGT power block will peak at approximately 306 workers in July 2019. The total construction personnel requirements for the SCGT power block will be approximately 3,544 person-months. The peak construction personnel requirements for SCGT power block will be approximately 512 workers in January 2021. The average workforce for both the CCGT power block and the SCGT power block over the 51-month construction period will be 191 workers.

Available skilled labor in the Los Angeles-Long Beach-Glendale MD was evaluated by contacting the Building and Trades Council (Table 5.10-8) and surveying EDD (Table 5.10-9). Both sources show that the workforce in Los Angeles-Long Beach-Glendale MD will be more than adequate to fulfill the AEC's construction labor requirements. Therefore, the AEC will not place an undue burden on the local workforce. Additionally, AEC workforce requirements would not be expected to place undue burden on the local and regional workforce because Long Beach is within the major employment centers of southern California such as the Los Angeles-Long Beach-Glendale MD, Riverside-San Bernardino-Ontario Metropolitan Statistical Area (MSA), and the San Diego-Carlsbad-San Marcos MSA, all of which have a large available construction workforce. Finally, the AEC peak construction needs are less than 1 percent (0.8 percent) of the total of the regionally available construction workforce shown in Table 5.10-4. As a result, the construction activities associated with AEC will not result in a significant adverse impact on the construction labor supply in the area.

TABLE 5.10-8

Labor Union Contacts in Los Angeles/Orange County

Labor Union	Contact	Phone Number
Los Angeles/Orange County Building Trades Council	Ron Miller, Executive Secretary	(213) 483-4222

TABLE 5.10-9

Available Labor by Skill in Los Angeles-Long Beach-Glendale MD, 2010-2020

Occupational Title	Annual Averages		Absolute Change	Percentage Change	Average Annual Compounded Growth Rate (%)
	2010	2020			
Carpenters	15,530	17,960	2,430	15.6	1.5
Cement Masons and Concrete Finishers	2,420	3,020	600	24.8	2.2
Painters, Construction, and Maintenance	9,360	10,740	1,380	14.7	1.4
Sheet Metal Workers	2,230	2,320	90	4.0	0.4
Electricians	10,310	11,360	1,050	10.2	1.0
Industrial Truck and Tractor Operators	16,510	20,280	3,770	22.8	2.1
Operating Engineers and Other Construction Equipment Operators	3,310	4,030	720	21.8	2.0
Helpers, Construction Trades	5,150	6,560	1,410	27.4	2.4
Construction Laborers	23,160	27,810	4,650	20.1	1.8
Plumbers, Pipefitters, and Steamfitters	8,180	9,230	1,050	12.8	1.2
Administrative Services Managers	8,520	9,890	1,370	16.1	1.5
Mechanical Engineers	5,960	6,430	470	7.9	0.8
Electrical Engineers	5,410	5,840	430	7.9	0.8
Engineering Technicians	8,210	8,980	770	9.4	0.9
Plant and System Operators	6,770	7,000	230	3.4	0.3

Source: EDD, 2013d.

Population Impacts. It is anticipated that most of the AEC construction/demolition workforce will be drawn from Los Angeles County or the neighboring counties of Orange, Ventura, Kern, and San Bernardino. Additionally, a portion of the construction workforce could be drawn from other nearby counties in southern California. For the purposes of this analysis, because of the size of the local construction/demolition workforce, it was assumed that most workers will be from the Los Angeles County. Because most workers are expected to commute to the AEC site on a daily basis, they will not contribute to a significant increase in the population of the area.

Housing Impacts. The construction workforce will most likely commute daily to the AEC site; however, if needed, there are numerous hotels/motels in Los Angeles County and other neighboring counties to accommodate workers who may choose to commute to the AEC site on a workweek basis. In addition to the available hotel/motel accommodations, there are a few recreational vehicle parks within driving distance of Long Beach and neighboring cities close to the AEC site. The AEC is not expected to significantly increase the demand for temporary housing (hotel/motels/recreational vehicle parks) in the AEC area because of the size of the local workforce. As a result, AEC construction is not expected to significantly increase the demand for permanent or temporary housing in the area.

Impacts on the Local Economy and Employment. The cost of materials and supplies (excluding major equipment) required for AEC during construction is estimated at $132.29 million. Although it is expected

that most materials and supplies will be purchased in the greater southern California area, for the purpose of this analysis the estimated value of materials and supplies that are assumed to be purchased locally in Los Angeles County during construction is $132.29 million. All cost estimates are in constant 2014 dollars, as are the economic benefits figures cited later in this section.

The AEC will provide about $315.55 million in construction payroll, at an average rate of $89 per hour, including benefits. The anticipated payroll for employees, as well as the purchase of materials and supplies during construction, will have a beneficial temporary impact in Los Angeles County and in the neighboring counties. Assuming conservatively that 90 percent of the construction workforce will reside in Los Angeles County, it is expected that approximately $284 million will stay in the Los Angeles County area during the AEC construction period. These additional funds will result in a temporary beneficial impact by creating the potential for other employment opportunities for workers in other service areas in Los Angeles County, such as transportation and retail. No significant adverse impacts are expected to result related to the local economy and employment.

Indirect and Induced Economic Impacts from Construction. AEC construction activities will result in secondary economic impacts (indirect and induced) in Los Angeles County. Indirect employment effects are those resulting from the purchase of goods and services by firms involved with construction. Induced employment effects are those effects resulting from construction workers spending their income within the Los Angeles County. In addition to these secondary employment impacts, there are indirect and induced income effects arising from construction.

Indirect and induced impacts associated with the construction of the AEC were estimated using an IMPLAN Input-Output (I/O) model of the Los Angeles County economy. IMPLAN is an economic computer database and modeling system used to create input-output models for any combination of U.S. counties (Minnesota IMPLAN Group (MIG), 2010). The estimated indirect and induced employment in Los Angeles County would be 125 and 464 jobs, respectively. These additional jobs result from the $31.13 million[47] in annual local construction expenditures and the $21.84 million in annual spending by local construction workers. The $46.42 million represents the disposable portion of the annual construction payroll (here assumed to be 70 percent of $66.82 million[48]). Assuming an average direct construction employment of 191 for the AEC, the employment multiplier associated with the construction phase of the project is approximately 4.1 (i.e., [191 + 124 + 464]/ 191). This construction-phase employment multiplier is based on a Type SAM model.

Indirect and induced income impacts associated with the construction of the AEC were estimated at $6,513,950 and $20,168,770, respectively. Assuming a total annual local construction expenditure in Los Angeles County (payroll, materials, and supplies) of $77.9 million ($46.78 million in payroll + $31.13 million in materials and supplies), the AEC's construction-phase income multiplier based on a Type SAM model is approximately 1.3 (i.e., [$77,901,190 + $6,513,950 + $20,168,770]/$77,901,190).

Fiscal Impacts. The AEC's capital cost is estimated to be between $940 million and $1.11 billion. Local materials and supplies for construction are estimated at approximately $132.29 million. For the purposes of this analysis, all of the estimated $132.29 million in local purchases of materials and supplies during construction is assumed to be within Los Angeles County, with Long Beach being the point of sale for the $132.29 million for local purchases of materials and supplies.

The City of Long Beach sales tax rate is 9 percent (as of July 1, 2015). The split in the sales tax rate is as follows: 6.5 percent goes to the State; 0.25 percent goes to the County transportation funds; 0.75 goes to City operations; and 1.5 percent goes to the place of sale (California Board of Equalization [BOE], 2015). The total sales tax expected to be generated during construction of the AEC is $3,307,157 (i.e., 9.0 percent of local sales

[47] Annual portion of local construction expenditures = $132.29 million ÷ (51 months/12 months) = $31.13 million.

[48] Annual local portion of construction payroll = $315.55 million ÷ (51 months/12 months) x 90 percent = $66.82 million. The disposable portion of the annual local construction payroll = $66.82 million x 70 percent = $47.78 million.

on $132.29 million in local purchases). Assuming all local sales are made in Long Beach, the maximum total sales tax revenues the City could receive would be $992,147 (0.75 percent of $132.29 million) during the construction. No significant adverse fiscal impacts are expected to result from AEC construction.

Impacts on Education. AEC construction will not cause any population changes or housing impacts on the region because most, if not all, employees will commute to the site from within the region. As a result, AEC construction will not cause an increase in demand for school services. Even if some employees chose to relocate their families to areas within the Long Beach Unified School District, school enrollment has been decreasing, with a reduction of more than 2,500 students since the 2010-2011 school year. Therefore, there is sufficient capacity to absorb the children from the peak workforce of 447 workers.

Impacts on Public Services and Facilities. Construction will have minor, if any, impacts on the Long Beach police, fire, or hazardous materials handling resources, including medical and accident response, hazards identification, and other fire services. Copies of the records of conversation with the police, hazardous materials, and fire departments are included in Appendix 5.10C. Implementation of safety procedures for the construction site identified in Section 5.16, Worker Health and Safety, as required by applicable regulations and standards, will ensure that AEC construction does not create significant adverse impacts on medical or emergency resources in the area.

Impacts on Utilities. As discussed in Section 5.10.2.7, construction of AEC will not result in significant adverse demands on local water, sanitary sewer, electricity, or natural gas. Water requirements for construction are relatively small. Given the low number of workers and temporary duration of the construction period, the impacts on the local sanitary sewer system would not be significant.

5.10.3.3 Operational Impacts

This section discusses the changes to the local economy as a result of bringing the AEC online.

Operational Workforce. The 36 operational staff will be drawn entirely from the existing plant staff of 66. Because no new operational staff will be employed at the AEC, no population increase is anticipated as a result of this project. There will be no significant adverse impacts on local employment from operations.

Population Impacts. All 36 operations staff will be drawn from the staff at the existing plant. Consequently, no population increase is anticipated as a result of operation of the AEC.

Housing Impacts. Because the operational workforce would be from the existing plant workforce and because Los Angeles County and Long Beach vacancy rates indicate that housing is not considered limited, no significant impacts on housing are anticipated.

Impacts on the Local Economy and Employment. Operation of the AEC will generate a small, permanent beneficial impact by creating employment opportunities for local workers through local expenditures for materials, such as office supplies and services. The average salary per AEC operations employee, including benefits, is expected to be about $124,140 per year. For the assumed average of 36 full-time employees, this will result in an approximate operation payroll, including benefits, of $4,469,090 per year. There will be an annual operations and maintenance (O&M) budget of approximately $8,312,000, all of which is estimated to be spent locally within Los Angeles County. However, it is possible that some of this O&M budget may be spent in other neighboring counties. The additional jobs and spending will generate other employment opportunities and spending in Los Angeles County (including Long Beach), as well as in neighboring counties where these operational workers may reside or where these expenditures may occur. All cost estimates are in constant 2015 dollars, as are the economic benefits noted in this section. No adverse impacts on the local economy and employment are expected to result from AEC operations.

Indirect and Induced Economic Impacts from Operations. Operation of the AEC would result in indirect and induced economic impacts in Los Angeles County. These indirect and induced impacts represent permanent increases in the county's economic variables. The indirect and induced impacts would result from annual expenditures on O&M.

Estimated indirect and induced employment in Los Angeles County would be 14 and 13 permanent jobs, respectively. The additional 27 jobs result from the $8,312,000 in local annual expenditures during operation.

Indirect and induced income impacts are estimated at $2,007,560 and $669,190, respectively. The income multiplier associated with the operational phase of the AEC is approximately 1.3 (i.e., [$8,312,000 + $2,007,560 + $669,190]/$8,312,000) and is based on a Type SAM model.

Fiscal Impacts. The AEC annual non-payroll O&M budget is expected to be approximately $8,312,000 (in 2015 dollars), and for the purpose of this analysis, it is assumed that all of the budget will be spent in Los Angeles County (including Long Beach). As stated earlier, the AEC will bring about $4,469,090 million per year in operational payroll to the region; however, because all the O&M employees will be drawn from the existing plant staff, this operational payroll will not be new money flowing into the regional economy and, as such, does not represent an increase in benefits.

Although the materials and supplies required during the operational phase of the AEC could come from within Los Angeles County (including Long Beach) or from the neighboring counties in southern California, for the purposes of this analysis it is assumed that all of the O&M purchases will be made in Long Beach. Based on the assumed annual local O&M expenditures of $8,312,000, the estimated sales taxes (9 percent) will be approximately $748,080 per year. The City of Long Beach is assumed to realize approximately $187,020 (2.25 percent of $8,312,000) annually in sales tax revenues from AEC operation. The overall anticipated increase in sales tax revenue will be beneficial but will not be significant, because it would constitute only a small percent of the City of Long Beach's sales tax revenues.

The AEC is expected to bring increased property tax revenue to the City of Long Beach. The BOE has jurisdiction over the valuation of a power generation facility for property tax purposes, if the power plant produces 50 MW or more (Young, 2007, personal communication). Although the BOE assesses the property value, the property tax rate for the AEC is set by the Los Angeles County Assessor's Office. For the existing AGS property, this rate is 1.122072 percent for the most recent fiscal year (FY 2011-12). Based on the assumed capital cost of between $1.1 billion and $1.3 billion, the AEC will generate approximately $12.3 million to $14.6 million in property taxes annually. However, the increase to the City of Long Beach will be the difference between the estimated property tax and the amount of property tax currently paid on the existing AGS. The property tax assessed on the existing AGS in FY 2011-12 was $2.63 million. Thus, the estimated increase in property tax revenues generated by the construction of the AEC will be approximately $9.71 million to $11.95 million.[49] Because the property taxes are collected at the county level, their disbursement is also at the county level.

In FY 2011-12, the City of Long Beach's general fund total tax revenues were estimated at $238.7 million (see Table 5.10-6). The net increase in property taxes resulting from the AEC (adjusted by the amount currently paid for AGS) would be between 4 and 5 percent of the city's total FY 2011-12 tax revenues. Thus, the additional property tax revenues generated will be significant and beneficial to the City of Long Beach.

Impacts on Education. Because all 36 operational employees will be drawn from the existing staff, there will be no impact on the schools. Additionally, the construction of the AEC will generate revenues for the school district. Any industrial development in the Long Beach Unified School District is charged a one-time developer fee of $0.47 per square foot of commercial development (Ahn, 2013, personal communication).

[49] The property tax assessed on the existing generating station in FY 2011-2012 of $2.63 million included both the existing infrastructure (the generating station facility) as well as the property/land. Although the difference between the FY 2011-2012 tax bill and the property tax revenue for the AEC is estimated to be an increase of $9.71 million and $11.95 million, respectively, this is a conservative amount because it does not take into account that the property/land also will be reassessed after construction of the AEC is complete. Therefore, it is likely that additional annual property tax revenue will be generated in excess of $11.95 million.

Based on the approximately 16,250 square feet[50] of occupied structures and developer fee, the AEC will pay a one-time amount of $7,638 in school impact fees.

Impacts on Public Services and Facilities. AEC operations will not result in any new demands on public services or facilities because all of the 36 operational employees will be drawn from the existing operational workforce. Thus, the AEC's operation is not expected to result in significant impacts on either the LBFD or the LBPD. The AEC's operation would not create significant adverse impacts on medical resources in the area given the safety record of power plants and few operations staff. Copies of the records of conversation with the police and fire departments are included in Appendix 5.10C.

Impacts on Utilities. AEC operations will not result in a significant adverse demand on local water, sanitary sewer, electricity, or natural gas because these utilities are currently supplied to the existing AGS, and the AEC will result in a net reduction in demand on all of these services.

5.10.4 Environmental Justice

President Clinton's Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," was signed on February 11, 1994. The purpose of this Executive Order is to ensure that federal agencies consider whether a project may result in disproportionately high and adverse human health or environmental effects on any minority or low-income population.

The federal guidelines set forth a three-step screening process:

1. Identify which impacts of the project are high and adverse.
2. Determine whether minority or low-income populations exist within the high and adverse impact zones.
3. Examine the spatial distribution of high and adverse impact areas to determine whether these impacts are likely to fall disproportionately on the minority or low-income population.

According to the guidelines established by the U.S. Environmental Protection Agency (EPA, 1996) to assist federal agencies to develop strategies to address this circumstance, a minority or low-income population exists if the minority or low-income population percentage of the affected area is 50 percent or more of the area's general population. The guidance suggests using two or three standard deviations above the mean as a quantitative measure of disparate effects.

The AEC analysis of environmental justice following the federal guidelines is presented in Appendix 5.10A. According to this analysis, the AEC does not create significant and adverse impacts. Therefore, there will be no disproportionately high and adverse human health or environmental effects on any minority populations and low-income populations resulting from the construction and operation and demolition activities for the AEC.

5.10.5 Cumulative Effects

Section 15355 of the CEQA Guidelines defines "cumulative impacts" as "two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts." Subsection b of Section 15355 states, in part, that "The cumulative impact *from several projects* is the change in the environment which results from *the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects*." (Emphasis added.) Thus, cumulative impacts under CEQA involve the potential interrelationships of two or more projects, not the impacts from a single project. Specifically, under Section 15130 of the CEQA Guidelines, an EIR is required to discuss cumulative impacts when the project's incremental effect is "cumulatively considerable." Section 15065(a)(3) then defines "cumulatively considerable" as meaning "that the incremental effects of an

[50] Administration building is 50' by 100', water treatment building is 75' by 70', and the warehouse is 100' by 60'.

individual project are significant when viewed in connection with the effects of *other* closely related past projects, the effects of *other* current projects and the effects of probable *future* projects." (Emphasis added.)

Cumulative socioeconomic impacts may occur when more than one project has an overlapping construction schedule that creates a demand for workers that cannot be met by local labor, resulting in an influx of non-local workers and their dependents and resulting in excessive demand on public services.

The potential for a sufficient worker demand that could pull workers from out of the area and lead to some stress on public facilities and utilities is counterbalanced by the current weakened labor market following the recent economic recession, which has affected the building trades industries particularly hard, and the AEC's low worker requirements. Although the pace of the economic recovery has been slow and forecasters do not anticipate full recovery to the pre-2008 levels until mid-decade, it is not anticipated that AEC will, in conjunction with these other projects, cause an influx of construction workers into the AEC area.

Counterbalancing any potentially high demand for construction workers in the Los Angeles-Long Beach-Glendale MD is the fact that AEC construction and the construction of the identified cumulative projects can draw construction workers from the entire southern California area. As Table 5.10-9 shows, the AEC would use less than 1 percent of the projected construction workforce in the Los Angeles-Long Beach-Glendale MD. It is very unlikely that worker demand would be sufficiently high to cause the relocation of large numbers of workers and dependents.

Finally, AEC peak construction needs are less than 1 percent of the total 2014 construction workforce shown in Table 5.10-4. As a result, the AEC will not result in a significant adverse impact on the construction labor supply in the area. Additionally, there is a sufficient supply of skilled labor in Los Angeles County (Miller, 2013, personal communication). Other kinds of cumulative socioeconomic impacts are also unlikely, as the AEC's effects on housing, schools, and public services would be negligible.

5.10.6 Mitigation Measures

Because the AEC would be in the Long Beach Unified School District service area, the AEC would be subject to school impact fees. Any industrial development within the Long Beach Unified School District is currently charged a one-time assessment fee of $0.47 per square foot of principal building area (Ahn, 2013, personal communication). Based on 16,250 square feet of occupied structures, AEC will pay $7,638 in school impact fees. These school impact fees are considered full mitigation for any potential impacts on these school districts.

Because there are no significant adverse socioeconomic impacts caused by the AEC, given its design and the implementation of avoidance and minimization strategies, no additional mitigation measures are required.

5.10.7 Laws, Ordinances, Regulations, and Standards

A summary of the LORS, including the AEC's conformance to them, is presented in Table 5.10-10.

TABLE 5.10-10
Laws, Ordinances, Regulations, and Standards for Socioeconomics

LORS	Requirements/Applicability	Administering Agency	AFC Section Explaining Conformance
Federal			
Civil Rights Act of 1964	Prohibits discrimination on the basis of race, color, or national origin. Applies to all federal agencies and agencies receiving federal funds.	Office of Civil Rights	Section 5.10.4

TABLE 5.10-10

Laws, Ordinances, Regulations, and Standards for Socioeconomics

LORS	Requirements/Applicability	Administering Agency	AFC Section Explaining Conformance
Executive Order 12898	Avoid disproportionately high and adverse impacts on minority and low-income members of the community. Applies only to federal agencies.	EPA	Section 5.10.4, 5.10.7.1
State			
Government Code Sections 65996-65997	Establishes that the levy of a fee for construction of an industrial facility be considered to mitigate impacts on school facilities. Long Beach Unified School District may charge a one-time assessment fee to mitigate potential school impacts.	Long Beach Unified School District	Section 5.10.7.2, 5.10.3.3.6
Education Code Section 17620	Allows a school district to levy a fee against any construction within the boundaries of the district for the purpose of funding construction of school facilities. Long Beach Unified School District may charge a one-time assessment fee to mitigate potential school impacts.	California Department of Education	Section 5.10.7.2, 5.10.3.3.6
Local			
City of Long Beach General Plan (1997)	Encourages pursuit of economic development which focuses upon international trade, while maintaining and expanding its historic economic strengths in aerospace, bio-medicine and tourism.	City of Long Beach	Section 5.10.7.3, 5.10.3.2.7, 5.10.3.3.7

5.10.7.1 Federal LORS

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," requires federal agencies to consider whether the project may result in disproportionately high and adverse human health or environmental effects on any minority or low-income population. Although the CEC is not subject to this executive order, since the signing of the Executive Order 12898, the CEC has typically included this topic in its power plant siting decisions to ensure that any potential adverse impacts are identified and addressed.

5.10.7.2 State LORS

Government Code Sections 65996 and 65997 provide the exclusive methods of considering and mitigating impacts on school facilities that might occur as a result of the development of real property. Education Code Section 17620, listed in Government Code Section 65997 as an approved mitigation method, allows school districts to levy a fee or other requirement against construction within the boundaries of the school district for the purpose of funding construction of school facilities.

5.10.7.3 Local LORS

City of Long Beach. The Land Use Element of the City of Long Beach 1997 General Plan encourages the pursuit of economic development which focuses upon international trade, while maintaining and expanding its historic economic strengths in aerospace, bio-medicine, and tourism (City of Long Beach, 2013).

5.10.8 Agencies and Agency Contacts

Table 5.10-11 provides a list of agencies and contacts of potentially responsible agencies. Copies of records of conversation are provided in Appendix 5.10C.

TABLE 5.10-11

Agency Contacts for Socioeconomics

Issue	Agency	Person Contacted
Available resources, potential impacts on resources, and average response times	Long Beach Fire Department	Mike DuRee Fire Chief 3205 Lakewood Blvd Long Beach, CA 90808 (562) 570-2565 Michael.DuRee@Longbeach.gov
Available resources, potential impacts on resources, and average response times	Long Beach Fire Department	David Zinnen Deputy Fire Marshall 3205 Lakewood Blvd Long Beach, CA 90808 (562) 570-2572 David.Zinnen@Longbeach.gov
School impact fees, enrollment data, potential enrollment impacts	Long Beach Unified School District	Susan Ahn Project Manager of Facilities 1515 Hughes Way Long Beach, CA 90810 (562) 997-7557 SAhn@lbschools.net
School impact fees, enrollment data, potential enrollment impacts	Long Beach Unified School District	Kenna Kirk Supervising Research Office Technician 1515 Hughes Way Long Beach, CA 90810 (562) 997-8694 KKirk@lbschools.net
Available resources, potential impacts on resources, and average response times	Long Beach Police Department	Commander Lisa Lopez Chief of Staff 400 West Broadway Long Beach, CA 90802 (562) 570-7301 Lisa.Lopez@longbeach.gov
Availability of labor	Los Angeles/Orange County Building Trades Council	Ron Miller Executive Secretary 1626 Beverly Blvd Los Angeles, CA 90026 (213) 483-4222 RonMillerlaoc@sbcglobal.net

5.10.9 Permits and Permit Schedule

Permits dealing with the effects on public services are addressed as part of the building permit process. For example, school development fees are typically collected when the Project Owner pays in-lieu building permit fees to the city. No permits related to socioeconomic issues are required.

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5.11 Soils

This section describes the potential effects of the construction and operation of the Alamitos Energy Center (AEC) on soil resources and is organized as follows: Section 5.11.1 describes the environmental setting, including soil types and their use; Section 5.11.2 presents the environmental analysis of project development; Section 5.11.3 discusses cumulative effects; Section 5.11.4 presents mitigation measures; Section 5.11.5 presents the laws, ordinances, regulations, and standards (LORS) applicable to soils and their use; Section 5.11.6 provides agency contacts for involved agencies; and Section 5.11.7 describes permits required for the project. Section 5.11.8 provides the references used to develop this section.

5.11.1 Setting and Affected Environment

AES Alamitos Energy, LLC, will construct, own, and operate the Alamitos Energy Center (AEC), a natural- gas-fired, air-cooled, combined-cycle and simple-cycle, electrical generating facility in Long Beach, California. The proposed AEC will have a nominal generating capacity of 1,040 megawatts (MW). The AEC will be constructed on the site of the existing AES Alamitos Generating Station (AGS), located on an approximately 21-acre site within a larger, 71.1-acre parcel.

The AEC will feature two gas turbine power blocks. Combined-cycle power block will consist of two natural-gas-fired combustion turbine generators (CTG) in a combined-cycle configuration, two unfired heat recovery steam generators (HRSG), one steam turbine generators, an air-cooled condenser, an auxiliary boiler, and related ancillary equipment. Simple-cycle power block will consist of four simple-cycle LMS-100 CTGs with fin-fan coolers and ancillary facilities.

The AEC will meet the demand for new generation in the Los Angeles basin local electrical reliability area. The demand is caused in large part by the closure of the San Onofre Nuclear Generating Station and the anticipated retirement of the older, natural-gas-fired generation currently using once-through ocean water-cooling (OTC). As a result of the promulgation of the California State Water Resources Control Board's (SWRCB) *Water Quality Control Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling* (SWRCB, 2010), more than 4,000 MW of OTC generation are expected to be retired in the Los Angeles local electrical reliability area by December 31, 2020.

The AEC will use water provided by the City of Long Beach Water Department (LBWD) for construction, operational process, and sanitary uses but at substantially lower volumes than the existing AGS historically has used. This water will be supplied through existing, onsite water lines. The AEC will include a new, 1,000-foot process/sanitary wastewater pipeline to the first point of interconnection with the existing LBWD sewer system, the potential upgrade of an additional 4,000 feet of existing pipeline downstream from the first point of interconnection, and the elimination of the current practice of treatment and discharge of process/sanitary wastewater to the San Gabriel River. Stormwater runoff from the power block areas will be directed to oil/water separators and to an existing retention basin and then ultimately discharged to the Los Cerritos channel via existing stormwater outfalls.

The AEC will interconnect to the existing, Southern California Edison (SCE) 230-kilovolt (kV) switchyard adjacent to the north side of the AGS. Natural gas will be supplied to the AEC via the existing, offsite, 30-inch-diameter pipeline owned and operated by Southern California Gas Company (SoCalGas) that currently serves Units 5 and 6 of the AGS. The AEC will require construction of new natural gas-metering facilities and construction of two new natural gas compressor buildings within the AEC footprint.

The AEC is designed to serve both peak and intermediate loads with the added capabilities of rapid startup, significant turndown capability (ability to turn down to a low load), and fast ramp rates. As California's intermittent renewable energy portfolio continues to grow, operating in either load-following or partial shutdown mode will become necessary to maintain electrical grid reliability, thus placing an increased importance upon the rapid startup, high turndown, steep ramp rate, and superior heat rate employed at the AEC.

As an in-basin generating asset, the AEC will provide local generating capacity, voltage support, and reactive power that are essential for transmission system reliability in the Western Los Angeles basin subarea and larger Los Angeles basin local reliability area. The AEC will be able to provide system stability by supplying reactive power, voltage support, frequency stability, and rotating mass in the heart of the critical Western Los Angeles local reliability area. By virtue of its location in a transmission constrained load center, the AEC also helps to avoid potential transmission line overloads and can provide reliable local energy supplies when electricity from more distant generating resources is unavailable. In recognition of its critical grid reliability benefits, the AEC combined-cycle CTGs were selected by SCE in its Local Capacity Requirements Request for Offer on November 5, 2014, and the simple-cycle CTGs will meet the capacity needs anticipated to be identified in future California Public Utilities Commission Long-term Procurement Plans.

Owing to the critical need for generating capacity at the AEC site at all times, existing Units 1 through 6 will remain in operation through much of the AEC development and construction. Given that the removal of existing Units 1 through 6 is not required for construction of the AEC, the continued operation of the AGS will not impede AEC construction. Demolition of the retired and decommissioned turbine peaking generating Unit 7 and fuel tank, ancillary equipment, small maintenance shops, and two retention basins will be required for site preparation for the construction of the AEC. Construction and site preparation activities at the AEC site are anticipated to last 56 months, from the first quarter of 2017 until the third quarter of 2021. The project will commence construction with the removal of former Unit 7's building and ancillary equipment, fuel storage tank, tank berms, small maintenance shops and two waste water retention basins in January 2017 to make room for construction and laydown area for the AEC CCGT. Construction of the AEC CCGT will commence during the second quarter of 2017 and will be completed by the second quarter of 2020. The AEC CCGT is expected to commence commercial operation before May 1, 2020. Construction of the AEC SCGT is scheduled to proceed from the second quarter of 2020 through the third quarter of 2021, and Power Block 2 is expected to commence commercial operation in the third quarter of 2021. A temporary construction access road may be constructed offsite beginning at the intersection of Studebaker Road and Loynes Drive traveling southeast to the AEC site. Construction of the AEC will require the use of onsite laydown areas (approximately 8 acres dispersed throughout the existing site) and an approximately 10-acre laydown area located adjacent to the existing site.

The AEC is located on alluvial soils that have been overlain by construction fill during construction of the Alamitos Generating Station. This fill was graded to a nearly level condition prior to construction. Fill at the site was characterized as generally consisting of loose to medium dense, sandy silt and fine-grained sand with silt and clay, reaching to a depth of 6 to 9 feet (Ninyo & Moore, 2011). The fill is underlain by alluvial soils. It is expected that these fill soils were compacted during construction of the AGS to provide a suitable surface for construction.

Natural Resources Conservation Service (NRCS) soils information was used as a baseline for the determination of soil erosion potential because of the variability of fill at the AEC site. While site-specific Soil Survey Geographic Database data were not available for this area of Los Angeles County, a description of the native soils in the project area was developed using the online U.S. General Soil Map for California (STATSGO2; NRCS, 2006). Although STATSGO2 general soil map information is most often used for evaluations on a regional scale, it was used in this evaluation because it was the best-available NRCS soils information for the AEC site.

A single soil association was mapped for the entire project area, as shown in Figure 5.11-1: the s1026–Urban Land-Sorrento-Hanford Association. Soil characteristics for this association, which could be potentially affected by AEC construction activities, are summarized in Table 5.11-1. Because the STATSGO2 database did not contain tabular data for the AEC area, soil characteristics were developed primarily from the online official series description for the Sorrento and Hanford series (Soil Survey Staff, 2013).

Table 5.11-1 summarizes depth, texture, drainage, permeability, water runoff, and items related to revegetation potential. Soil conditions in the project area may differ from what is described because of

variables such as previous grading, excavations, and fill during construction of the existing facilities on the site.

TABLE 5.11-1

Soil Mapping Unit Description and Characteristics

Map Unit	Description
AEC Site – US General Soil Map for California	
s1026	**Urban Land-Sorrento-Hanford Association:**
	This soil unit underlies the entire AEC site, offsite process water/sanitary wastewater pipeline, and the surrounding areas
	Urban Land:
	Given the heavily developed nature of the AEC, offsite sewer line, and the surrounding area, it is expected that local soil conditions are primarily "Urban Land." Urban land is not associated with specific soil characteristics due to the developed nature and high variability from imported fill and historical mixing with local soil materials.
	Sorrento series:
	Formation: Formed in alluvium from sedimentary rocks; located on alluvial fans and stabilized floodplains
	Typical profile: Heavy loam over sandy loam and loamy fine sand
	Shrink-swell capacity: Moderate
	Depth and drainage: Very deep (>60 inches); well drained
	Permeability: Moderate to moderately slow
	Runoff: Negligible to medium
	Taxonomic class: Fine-loamy, mixed, superactive, thermic Calcic Haploxerolls
	Hanford series:
	Formation: Formed in moderately coarse textured alluvium derived from granite; located on stream bottoms, floodplains, and alluvial fans
	Typical profile: Fine sandy loam over fine sandy loam and sandy loam
	Shrink-swell capacity: Negligible
	Depth and drainage: Very deep (>60 inches); well drained
	Permeability: Moderately rapid
	Runoff: Negligible to low
	Taxonomic class: Coarse loamy, mixed, superactive, nonacid, thermic Typic Xerorthents

Note:

Soil characteristics are based on soil mapping descriptions provided in the online Official Soil Series Descriptions (Soil Survey Staff, 2013) and the online U.S. General Soil Map for California (STATSGO2; NRCS, 2006).

5.11.1.1 Agricultural Use

Based on a review of land use designations, windshield surveys in the surrounding areas, and recent aerial photography, no agricultural production occurs within 1 mile of the AEC site.[51] According to the Phase 1 ESA (EMS, 2013), at least a portion of the property may have been in agriculture prior to the site being developed as a power generating facility in the 1950s. Since that time, the area has been zoned and developed for industrial, commercial, and urban residential uses.

Undeveloped areas occur immediately to the west and south of the AEC site; however, they are also zoned for non-agricultural uses and would likely to be unsuitable for commercial crop production. The area to the west and southwest of the AEC contains the Los Cerritos Wetlands. The Los Cerritos Wetlands are generally undeveloped, although infrastructure for oil extraction exists (gravel roads and oil derricks). Given the current and historical land uses, the AEC site and the undeveloped areas near the AEC site are likely unsuitable for commercial crop production.

[51] A small section of land designated as Unique Farmland occurs within the study area located approximately 0.6 mile northeast of the site within the city of Seal Beach. This Unique Farmland is a community garden managed by the City's Community Services Department within the Edison Park & Gardens with plots available to residents of Seal Beach.

5.11.1.2 Wetlands

Based on the previously developed nature of the AEC area, no wetlands or waters of the U.S. are present within the AEC site. Areas south and west of the AEC site are within the Los Cerritos Wetland Complex; this area is the focus of restoration work. Wetland features in the surrounding area are further discussed in Section 5.2, Biological Resources.

5.11.1.3 Soil Mapping Units

Table 5.11-1 describes the properties of the soil mapping units that are found in the project vicinity. As shown in Figure 5.11-1, the entire region is mapped as Urban Land-Sorrento-Hanford association (s1026). These soils formed on floodplains and alluvial fans, and consist of fine sandy loam or heavy loam over sandy loam (Soil Survey Staff, 2013).

5.11.1.4 Potential for Soil Loss and Erosion

The following factors affect potential soil loss: steep slopes, lack of vegetation, and erodible soils composed of large proportions of silt and fine sands. The AEC site has been previously developed and was graded to a nearly level condition for the AGS. The soil at the site was compacted during prior development and due to industrial use at the site. Newly disturbed soils will be compacted to withstand most erosion-inducing rainfall. Any erosion from the site will drain internally (and settle in the onsite retention basins). The negligible slopes at the AEC site are not expected to result in an increase in soil loss.

In general, the soils at the AEC site are characterized as fill are underlain by alluvial deposits (Ninyo & Moore, 2011). The fill was characterized as generally consisting of loose to medium dense, sandy silt and fine-grained sand with silt and clay to a depth of 6 to 9 feet below ground surface (Ninyo & Moore, 2011). Construction fill is commonly used to achieve an adequate degree of compaction beneath buildings and other facilities when local materials cannot provide suitable bearing properties. Sandy soils tend to have poor cohesion and are more susceptible to erosion from surface runoff than soils containing higher proportions of clay (Ninyo & Moore, 2011). However, given the nearly level topography, low runoff potential, and highly developed nature of this area, erosion risk on the site is relatively low. Without best management practices, uncovered or excavated soils within the AEC site would have a relatively high potential for wind erosion if fill materials contain a significant proportion of fine-grained sands.

5.11.1.5 Other Significant Soil Characteristics

Corrosive Soils. Preliminary geotechnical laboratory testing of limited soils samples indicated that the site contains soils that are corrosive to concrete and metals (Ninyo & Moore, 2011). Corrosive soil conditions may cause premature deterioration to underground structures, foundations, and pipelines. Consistent with industry standards and practices, specific measures to reduce the potential effects of corrosive soils such as epoxy and metallic protective coatings, the use of alternative (corrosion resistant) materials, and selection of the appropriate type of cement and water/cement ratio will be incorporated into the design of the project. Specific measures to reduce the potential effects of corrosive soils would be developed in the detailed design phase. Typical mitigation measures to deal with corrosive soils include removal of near-surface corrosive soils and replacement with low-corrosion material during construction, or designing project improvements to resist the effects of corrosive soils.

Expansive Soils. Preliminary geotechnical investigations indicated that the site is underlain by sandy silt and fine-grained sand with silt and clay. These soils are considered to be low to moderately expansive. A site-specific investigation into soil expansiveness at the locations of facility improvements will be conducted during the design phase of the project to account for the potential effects of expansive soils (Ninyo & Moore, 2011). Typical mitigation measures to deal with expansive soils include removal of near-surface expansive soils and replacement with low-expansive material during construction, or designing project improvements to resist the effects of expansive soils.

Soil Contamination. As discussed in more detail in Section 5.15, Waste Management, according to the *Phase I Environmental Site Assessment for the Alamitos Electrical Power Plant* (EMS, 2013), there are areas

of potential soil contamination on the site resulting from historical agricultural land use, above- and below-ground storage tanks, historical and current chemical use on the site. Consistent with the California Energy Commission's (CEC) practices for other approved projects, the potential for recognizing and dealing with contaminated soils and groundwater will be addressed in a contingency plan post-certification. This contingency plan will describe potential soil contamination hazards onsite (locations, expected concentrations, monitoring, and testing requirements) and provide guidance for soil handling during intrusive activities if contamination is discovered. The contingency plan will provide guidelines for monitoring soil disturbance and removal activities taking place within suspected contamination areas and will contain recommendations for health and safety requirements to protect workers at the site.

5.11.2 Environmental Analysis

The following sections describe the potential environmental effects on soils during project construction, demolition, and operation.

5.11.2.1 Significance Criteria

Appendix G of the California Environmental Quality Act (CEQA) is a screening tool, not a method for setting thresholds of significance. Appendix G is typically used in the Initial Study phase of the CEQA process, asking a series of questions. The purpose of these questions is to make a determination as to whether a project requires an Environmental Impact Report, a Mitigated Negative Declaration, or a Negative Declaration. As the Governor's Office of Planning and Research stated, "Appendix G of the Guidelines lists a variety of potentially significant effects, but does not provide a means of judging whether they are indeed significant in a given set of circumstances." The answers to the Appendix G questions are not determinative of whether an impact is significant or less than significant. Nevertheless, the questions presented in CEQA Appendix G are instructive.

In terms of potential effects on soils, Appendix G, asks, in part, whether the project would:

- Convert Prime Farmland, Unique Farmland, or Farmland of Statewide Importance (Farmland), as shown on the maps prepared pursuant to the Farmland Mapping and Monitoring Program of the California Resources Agency, to non-agricultural use? (Appendix G, Section II(a).)
- Involve other changes in the existing environment which, due to their location or nature, could result in conversion of Farmland to non-agricultural use or conversion of forest land to non-forest use? (Appendix G, Section II(e).)
- Have a substantial adverse effect on federally protected wetlands as defined by Section 404 of the Clean Water Act (including, but not limited to, marsh, vernal pool, coastal, etc.) through direct removal, filling, hydrological interruption, or other means? (Appendix G, Section IV(c).)
- Result in substantial soil erosion or the loss of topsoil? (Appendix G, Section VI(b).)
- Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (International Code Council, 1997), creating substantial risks to life or property. (Appendix G, Section VI(d).)

The following sections describe the anticipated environmental impacts on agricultural production and soils during project construction and operation.

5.11.2.2 Farmland Conversion

The AEC site is not located on or near any farmland and is not located within or near any areas zoned for agricultural use or areas having a Williamson Act contract. The project will not result in the conversion of any agricultural land to a non-agricultural use. Similarly, the AEC project will not involve other changes in the existing environment that due to their location or nature could result in conversion of farmland to non-agricultural use or conversion of forest land to non-forest use.

5.11.2.3 Jurisdictional Wetlands

Based on the previously developed nature of the AEC area, there are no wetlands or waters of the U.S. present within the AEC site. Therefore, the project will not directly affect wetlands that could be regulated as wetlands or waters of the U.S. or State. The regulatory status of wetland issues, if applicable, is discussed in Section 5.2, Biological Resources.

5.11.2.4 Soil Erosion during Construction and Demolition

Potential impacts on soil resources during AEC demolition and construction can include increased soil erosion, sediment transport, and soil compaction. Soil erosion causes the loss of topsoil and can increase the sediment load in surface water bodies near the construction site. The magnitude, extent, and duration of construction/demolition-related impacts depend on the erodibility of the soil; the proximity of the construction activity to the receiving water; and the construction methods, duration, and season.

Because conditions that could lead to excessive soil erosion via water are not present at the AEC site, relatively little soil erosion from rain events is expected during the construction and demolition periods. Additionally, best management practices (BMP) will be implemented during AEC construction and demolition in accordance with a site-specific Stormwater Pollution Prevention Plan (SWPPP) that will be prepared to comply with the National Pollutant Discharge Elimination System general construction stormwater permit required under the Clean Water Act (CWA) for all construction projects over one acre in size. The CEC also requires project owners to develop and implement a drainage, erosion, and sediment control plan (DESCP) to reduce the impact of runoff from the construction site. Monitoring will involve inspections to ensure that the BMPs described in the SWPPP/DESCP are properly implemented and effective. Therefore, impacts from soil erosion via water during construction and demolition activities are expected to be less than significant.

The sandy loam and loamy soils of the Urban Land–Sorrento-Hanford Association could potentially have a high wind erosion potential, as could the sandy silt and fine-grained sand fill materials, especially if no BMPs are utilized to minimize it. Wind erosion potential would be highest when very fine sandy materials are left exposed; however, the presence of compacted fill would be expected to reduce the overall potential for wind erosion in these soils. As described previously, BMPs will be implemented to minimize the amount of soil loss due to erosion. Estimates of erosion by water and wind are provided in the following sections.

Water Erosion. An estimate of soil loss by water erosion during AEC construction and demolition activities is provided in Table 5.11-2. Detailed calculations and assumptions for the soil loss estimates are provided in Appendix 5.11A. This estimate was developed using the Revised Universal Soil Loss Equation (RUSLE2) program using the following assumptions:

- The Alamitos Generating Station property is approximately 71 acres and includes 8 acres of onsite paved laydown area and approximately 10 acres of graveled offsite laydown immediately adjacent to the southern boundary of the AEC. The AEC site approximately 21 acres within the 71 acre Alamitos Generating Station.
- Construction activities at the AEC site are anticipated to last 56 months, from the first quarter 2017 until third quarter 2021. A portion of the site, formerly a tank farm, has already been demolished and graded. This area will contain a new construction access roadway that will be created by adding gravel to the existing site. No site grading is expected for the new construction access roadway.
- AEC construction will take place after site grading. Construction will occur in stages. It is assumed that, on average, approximately 50 percent of the affected area may be exposed during the construction period.
- Two laydown areas have been identified onsite, one on the north side of the property, and the second around the existing maintenance building to the south, for a total of 8 acres. Both areas are currently paved and will not be graded or disturbed during construction.

- The adjacent offsite 10-acre laydown area will be graded and graveled prior to AEC construction. No additional soil disturbance will occur at the onsite laydown areas during AEC activities.
- Estimates of soil loss (in tons) were made using the Hanford sandy loam profile as a template. The Hanford sandy loam was chosen because of the two named soil units within the s1026 association, the Hanford sandy loam had a more conservative estimate of soil erosion than the Sorrento clay loam, and is similar to the reported texture of the fill material that comprises the top 6 to 9 feet of soils throughout most if not all of the site. Estimates of soil loss from these soils were obtained using information for the Hanford sandy loam map unit in the Soil Survey of Orange County and Western Riverside County (NRCS, 2005)
- RUSLE2 rainfall erosivity conditions were estimated for the AEC site using the site-specific rainfall estimate for the 2-year, 6-hour storm from online National Weather Service data (NOAA, 2011).
- A 100-foot slope length was assumed for all soil units. The median of each soil unit slope class was used for the RUSLE2 calculations. For this project, an average slope of 0.5 percent was assumed.

Soil losses are estimated using the following RUSLE2 conditions:

- **Construction and demolition** soil losses were approximated using Management as "bare ground, smooth surface"; Contouring: Rows up and down hill; Diversion/terracing: None; and Strips and Barriers: None.
- **Active grading** soil losses were approximated using Management as "bare ground, rough surface"; Contouring: Rows up and down hill; Diversion/terracing: None; and Strips and Barriers: None.
- **Construction** soil losses with implementation of construction BMPs was approximated using Management as "Silt fence"; Contouring: Perfect contouring, no row grade; Diversion/terracing: None; and Strips and Barriers: two silt fences, one at end of slope.
- A **'No Project'** soil loss estimate was also approximated using Management as "Dense grass – not harvested"; Contouring: Rows up and down hill; Diversion/terracing: None; and Strips and Barriers: None.

TABLE 5.11-2

Estimate of Soil Loss by Water Erosion Using Revised Universal Soil Loss Equation (RUSLE2)

			Estimates Using Revised Universal Soil Loss Equation*		
Feature (acreage)	**Activity**	**Duration (months)**	**Soil Loss (tons) without BMPs**	**Soil Loss (tons) with BMPs**	**Soil Loss (tons/yr) No Project**
AGS Demolition (17.2 acres total)	Demolition				
	Unit 7	*6*	*0.27*	*0.01*	*0.003*
	TOTAL Demolition	6	0.3	0.01	0.003
AEC Construction (21.1 acres total)	Grading (all areas)	2	6.0	0.04	0.103
	Construction				
	CCGT Power Block	*33*	*14.1*	*0.40*	*0.062*
	SCGT Power Block	*16*	*4.6*	*0.13*	*0.041*
	TOTAL Construction	51	18.7	0.53	0.103
Off-site Sewer Line (8.0 acres for construction; 0.46 acres for trench)	Grading	1	0.06	0.01	0.002
	Construction	1	0.27	0.01	---
Project Soil Loss Estimates	**All activities listed above**	**51**	**25.2**	**0.59**	**0.21**

With the implementation of appropriate BMPs required under the National Pollutant Discharge Elimination System (NPDES) permit, SWPPP, and DESCP and as described in Section 5.11.4, the total estimated project soil loss of 0.59 ton is considered to be a minimal amount and would not constitute a significant impact. It also should be recognized that the estimate of accelerated soil loss by water is very conservative (that is, tends to overestimate soil loss) because it assumes only a single BMP (silt fencing), whereas the SWPPP will include multiple soil erosion and sediment control measures, including utilization of existing retention basins.

Wind Erosion. The potential for wind erosion of surface material was estimated by calculating the total suspended particulates (TSP) that could be emitted as a result of grading and the wind erosion of exposed soil. The total site area and grading duration were multiplied by emission factors to estimate the TSP matter emitted from the site. Fugitive dust from site grading was calculated using the default particulate matter less than 10 microns in equivalent diameter (PM_{10}) emission factor used in URBEMIS2002 (Jones and Stokes Associates, 2003) and the ratio of 0.5 fugitive TSP to PM_{10} published by the South Coast Air Quality Management District (SCAQMD, 1993). Fugitive dust resulting from the wind erosion of exposed soil was calculated using the emission factor in AP-42 (U.S. Environmental Protection Agency, 1995).

Table 5.11-3 summarizes the TSP emission estimates for the AEC site from grading and the wind erosion of exposed soil during the grading and construction phases. Without mitigation, the maximum predicted wind erosion from the AEC site is estimated at 20.6 tons over the course of AEC construction. This estimate; however, is reduced to approximately 7.2 tons by implementing basic mitigation measures such as water application (see Section 5.11.4). These estimates are conservative because they make use of emission rates for a generalized soil rather than site-specific soil properties. With implementation of BMPs and mitigation measures described in Section 5.11.4, the amount of wind erosion should be significantly less than estimated amounts; therefore, the expected impacts of soil erosion from wind are considered to be less than significant.

TABLE 5.11-3
Estimated Soil Loss from Grading and Wind Erosion

Emission Source	Acreage	Duration (months)	Unmitigated TSP (tons)	Mitigated TSP (tons)
Grading Dust:				
AGS Unit 7 Demolition	3.3	6	4.40	1.54
AES Construction	21.1	51	9.28	3.25
Off-site Sewer Line	0.5	1	0.10	0.04
Wind Blown Dust:				
AGS Unit 7 Demolition	3.3	0	0.13	0.04
AES Construction	21.1	48	6.52	2.28
Off-site Sewer Line	4.0	1	0.13	0.04
Estimated Total			**20.56**	**7.20**

Note:

Assumptions for these calculations are provided in Appendix 5.11A.

5.11.2.5 Expansive Soils

Soils at the AEC site were found to be predominantly composed of sandy silt and fine-grained sand with silt and clay. These soils are considered to be low to moderately expansive (Ninyo & Moore, 2011). Consistent with the CEC's practices for other approved projects, the site-specific potential for expansive soils and

site-specific recommendations addressing such soils at the AEC will be developed post-certification and incorporated into the project's detailed design phase. With the information presented in this AFC, the site-specific geotechnical evaluation during detailed design and the design recommendations for expansive soils, the presence of expansive soils is not expected to create a substantial risk to life or property. For this reason, the potential for an adverse impact related to expansive soils is considered to be less-than-significant.

5.11.2.6 Erosion of or Exposure to Contaminated Soil Materials during Construction and Operation

Certain areas of the AEC site have been identified as having the potential for soil contamination based on previous activities and spills. Consistent with the CEC's practices for other approved projects, a contingency plan to recognize and manage contaminated soil will be developed during detailed design to provide guidelines for activities that may result in contact with or disturbance of the soil. The types of activities that will be covered by the contingency plan include:

- Soil excavation activities that require a grading permit
- Soil removal or relocation activities if the volume of soil removed or relocated will be greater than 50 cubic yards
- Soil removal activities where soils will be transported offsite

Possible contaminants at the site include agricultural chemicals, oil, gas, jet fuel, metals, volatile organic compounds (VOC), 1,4-dioxane, polychlorinated biphenyl, and asbestos.

Additional site requirements will be outlined in the contingency plan and may include requiring health and safety training and certifications (such as Hazardous Waste Operations and Emergency Response Standards or HAZWOPER) for onsite workers. It may also require other risk mitigations such as additional site security and access restrictions, dust control, personal protective equipment requirements, air monitoring, decontamination procedures, soil transport requirements, and others.

Therefore, mitigation measures implemented during construction will be sufficient to protect workers and the public from exposure to potentially contaminated soil.

AEC operation will have no effects on soils; therefore, impacts related to exposure to contaminated soils during project operation are less than significant.

5.11.2.7 Compaction during Construction

Construction of the AEC will result in soil compaction during the construction of foundations and paved roadway and parking areas. Soil compaction increases soil density by reducing soil pore space. Compaction also reduces the ability of the soil to absorb precipitation and transmit gases for respiration of soil microfauna. Soil compaction can result in increased runoff, erosion, and sedimentation. The incorporation of BMPs, in accordance with the SWPPP/DESCP guidelines, during AEC construction will reduce the adverse impacts due to soil compaction to a less-than-significant level.

The AEC will be constructed in a previously developed industrial area that was previously compacted as part of its historical development. Because the AEC site will be repaved or otherwise protected during and after construction, the overall anticipated effects of compaction during construction are considered to be less than significant.

5.11.2.8 Effects of Emissions on Soil-Vegetation Systems

Air emissions from the combustion turbine exhaust stacks include but are not limited to nitrogen oxides (NO_x), and particulates (PM_{10}). Nitrogen oxide gases (NO and NO_2) convert to nitrate particulates in a form that is suitable for uptake by most plants and could promote plant growth and primary productivity. The majority of the area surrounding the AEC is urban or industrial land; the addition of small amounts of nitrogen to these areas would be insignificant. Within the more vegetated residential areas, the addition of

small amounts of nitrogen would be insignificant within the context of existing ambient air quality, fertilizers, herbicides, and pesticides likely used by homeowners.

Therefore, with the use of inherently low sulfur natural gas, best combustion practices, emission controls, and monitoring, which will be incorporated into the AEC design and are described in detail in Section 5.1, Air Quality, impacts from AEC operating emissions of NO_x, sulfur dioxide, carbon monoxide, VOCs, and particulates (PM_{10}, and $PM_{2.5}$) will be less than significant. Additional discussion regarding potential nitrogen deposition is provided in Section 5.2, Biological Resources.

5.11.2.9 Spoils Disposal and Fill Procurement

Onsite cut and fill are anticipated to be balanced during construction. Disposal of soil spoils are expected to be minimal, and will be disposed of appropriately. It is anticipated that any required fill will come from the AEC site; however, as needed, any imported fill will be purchased and transported from commercial suppliers in the local project vicinity.

5.11.3 Cumulative Effects

A cumulative impact refers to a proposed project's incremental effect considered together with other closely related past, present, and reasonably foreseeable future projects, whose impacts may compound or increase the incremental effect of the proposed project (Public Resources Code §21083; 14 California Code of Regulations §15064(h), 15065(c), 15130, and 15355). Section 15355 of the CEQA Guidelines defines "cumulative impacts" as "two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts." Subsection b of Section 15355 states, in part, that "The cumulative impact *from several projects* is the change in the environment which results from *the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects*." (Emphasis added.) Thus, cumulative impacts under CEQA involve the potential interrelationships of two or more projects, not the impacts from a single project. Specifically, under Section 15130 of the CEQA Guidelines, an Environmental Impact Report is required to discuss cumulative impacts when the project's incremental effect is "cumulatively considerable." Section 15065(a)(3) then defines "cumulatively considerable" as meaning "that the incremental effects of an individual project are significant when viewed in connection with the effects of *other* closely related past projects, the effects of *other* current projects and the effects of probable *future* projects." (Emphasis added.) The soil conditions associated with the AEC site are reported to have only a slight water erosion hazard. Given the previous industrial development of the soils in the project area, construction fills are already expected to be relatively compact and stable. Furthermore, by applying construction BMPs that are typically required as part of the permitting process, it is expected that the effect on soils of construction activities will be minimal.

During AEC operation, periodic maintenance activities will not result in ground disturbance, therefore, soil impacts associated with AEC operation will be negligible and less than significant.

As previously described, the AEC will have no effect on agriculture because no agricultural uses occur nearby. The AEC's effects on soil erosion, sedimentation, and compaction will also be minor to negligible, and are not considered to be significant, particularly with the application of onsite BMPs. The AEC site and surrounding area are already developed for urban and industrial uses. Further development is not expected to contribute significantly to soil loss and erosion. Therefore, the potential for cumulative impacts of the AEC combined with other projects would be low.

5.11.4 Mitigation Measures

Erosion control BMPs developed in accordance with the SWPPP/DESCP will be used to minimize erosion at the site during AEC construction activities. These erosion-control measures are required to maintain water quality, protect property from erosion damage, and prevent accelerated soil erosion or dust generation that destroys soil productivity and soil capacity. Typically, these measures include mulching, physical stabilization, dust suppression, berms, ditches, and sediment barriers. Water erosion and sedimentation will

be mitigated through the use of surface protections and sediment barriers, and wind erosion potential will be reduced significantly by keeping soil moist or by covering and/or hydroseeding soil stockpiles. Upon completion of AEC construction activities, land surfaces will be permanently stabilized. The AEC site will be paved or covered with structures or pervious ground cover (for example, gravel or landscape). Therefore, with implementation of appropriate BMPs, soil erosion losses resulting from AEC construction activities are expected to be less than significant.

5.11.4.1 Temporary Erosion Control Measures

Erosion control BMPs will be implemented during construction in accordance with the SWPPP required by the State's General Construction Permit for all construction projects over 1 acre in size which discharge to the nation's waters. Additionally, the CEC typically requires that project owners develop and implement a DESCP to reduce the impact of runoff from the construction site. To facilitate compliance-related activities, the project owner should be given the option to combine the DESCP with the SWPPP into a single document.

Temporary erosion control measures required for the SWPPP and DESCP will be implemented before construction begins, and will be evaluated and maintained during AEC construction. These measures typically include but are not limited to: revegetation, mulching, physical stabilization, dust suppression, berms, ditches, and sediment barriers. These measures will be removed from the site at the completion of the project.

Sediment barriers, which slow runoff and trap sediment, will be incorporated as discussed below. Sediment barriers include straw bales, sand bags, straw wattles, and silt fences. These features are generally placed below disturbed areas, at the base of exposed slopes, and along streets and property lines below the disturbed area. Sediment barriers are often placed around sensitive areas to prevent contamination by sediment-laden water near areas such as wetlands, creeks, or storm drains.

The AEC will be constructed on relatively level ground; therefore, it is not considered necessary to place sediment barriers around the entire project boundary. However, barriers may be placed in locations where offsite drainage could occur to prevent sediment from leaving the site. If used, sediment barriers will be properly installed (staked and keyed), then removed or used as mulch after construction. Runoff detention basins, drainage diversions, and other large-scale sediment traps are likely not necessary because of the AEC site's small size, level topography, and surrounding paved areas. Sediment barriers will be installed around the base of soil stockpiles, and stockpiles will be stabilized and covered.

During project-related construction activities, dust erosion control measures will be implemented to minimize the wind-blown loss of soil from the site. Water of a quality equal to or better than existing surface runoff will be sprayed on the soil in construction areas to control dust prior to completion of permanent control measures.

Mitigation measures, such as watering exposed surfaces, are used to reduce PM_{10} emissions during construction activities. The PM_{10} reduction efficiencies are taken from the SCAQMD CEQA Handbook (1993) and were used to estimate the effectiveness of the mitigation measures. Table 5.11-4 summarizes the mitigation measures and PM_{10} reduction efficiencies.

TABLE 5.11-4
Mitigation Measures for Fugitive Dust Emissions

Mitigation Measure	PM_{10} Emission Reduction Efficiency (%)
Water active sites at least twice daily	34–68
Enclose, cover, water twice daily, or apply non-toxic soil binders, according to manufacturer's specifications, to exposed piles (gravel, sand, dirt) with 5 percent or greater silt content	30–74

Source: SCAQMD CEQA Handbook, Table 11-4 (1993)

5.11.4.2 Permanent Erosion Control Measures

Permanent erosion-control measures on the AEC site will include gravel, paving, landscaping, and drainage systems.

5.11.4.3 Geotechnical Soil Investigation

A preliminary geotechnical soil investigation was conducted to evaluate the engineering characteristics of AEC site soils and determine remedial measures to address impacts related to soil properties. Recommendations provided in the geotechnical report will be followed on a site-specific basis in detailed design to mitigate potential impacts related to compressible, expansive, and corrosive soils. The preliminary geotechnical report is provided in Appendix 5.4A. A final geotechnical investigation will be conducted to support final design.

5.11.5 Laws, Ordinances, Regulations, and Standards

Federal, state, county, and local LORS applicable to soils are discussed below and summarized in Table 5.11-5. LORS specifically applicable to soil contamination are discussed in Section 5.5, Hazardous Materials Management.

TABLE 5.11-5
Laws, Ordinances, Regulations, and Standards for Soils

LORS	Requirements/Applicability	Administering Agency	AFC Section Explaining Conformance
Federal			
Federal Water Pollution Control Act of 1972, Clean Water Act of 1977 (including 1977 amendments)	Regulates stormwater and non-stormwater discharges from construction and industrial activities	Regional Water Quality Control Board (RWQCB), Los Angeles Region (4) and State Water Resources Control Board (SWRCB).	Section 5.11.5.1.1
Natural Resources Conservation Service (1983), *National Engineering Handbook*, Sections 2 and 3	Standards for soil conservation	Natural Resources Conservation Service	Section 5.11.5.1.2
State			
Porter-Cologne Water Quality Control Act	Regulates discharges to waste to state waters and to land	RWQCB, Los Angeles Region (4) and SWRCB.	Section 5.11.5.2.1
Table 18-1-B of the Uniform Building Code (International Code Council, 1997)	Sets standards for defining expansive soils	CEC	Section 5.11.5.2.2
Local			
City of Long Beach Municipal Code Title 18, Chapter 18.40.010, Adoption	Adopts and incorporates by reference all applicable provisions of the 2013 Edition of the California Building Code,	City of Long Beach Department of Development Services	Section 5.11.5.3.1
City of Long Beach Municipal Code Title 18, Chapter 18.0**4,** Permits	Requirements for building permits, grading permits, demolition permits	City of Long Beach Department of Development Services	Section 5.11.5.3.1
City of Long Beach Municipal Code Title 18, Chapter 18.61, NPDES and Standard Urban Storm Water Mitigation Plan (SUSMP) Regulations	Provide regulations and requirements of the NPDES permit issued to the City of Long Beach, and the subsequent requirements of the SUSMP, mandated by the California RWQCB, Los Angeles region.	City of Long Beach Department of Development Services	Section 5.11.5.3.1

5.11.5.1 Federal LORS

Federal Clean Water Act. The 1972 Amendments to the Federal Water Pollution Control Act, commonly referred to as the Clean Water Act, establish requirements for discharges of stormwater or wastewater from any point source that would affect the beneficial uses of waters of the United States. Section 402 of the CWA effectively prohibits discharges of stormwater from construction sites unless the discharge is in compliance with an NPDES permit. The SWRCB is the permitting authority in California and has adopted a statewide general permit for stormwater discharges associated with construction activity (General Construction Permit; SWRCB, 2009) that applies to most projects resulting in one or more acres of soil disturbance. The proposed project is within the San Gabriel River watershed and would result in disturbance of more than one acre of soil. Therefore, the project would need to be covered under the General Construction Permit and develop and implement a site-specific SWPPP to meet permit requirements. Requirements are described in greater detail in Section 5.15, Water Resources.

U.S. Department of Agriculture Engineering Standards. Sections 2 and 3 of the U.S. Department of Agriculture, NRCS National Engineering Handbook (NRCS, 1983) provides standards for soil conservation during planning, design, and construction activities. Adherence to these standards during AEC construction will reduce soil erosion from grading and construction activities.

5.11.6 State LORS

California Porter-Cologne Water Quality Control Act. The Porter-Cologne Water Quality Control Act (California Water Code, Division 7) provides for overall regulation under state law of water quality affecting all state waters, including both surface waters and groundwater. Under the Porter-Cologne Water Quality Control Act, the SWRCB has the ultimate authority over water quality policy, and nine RWQCB oversee water quality on a day-to-day basis at the local/regional level. The Los Angeles RWQCB controls surface water discharges in the AEC area, and the project would need to meet water quality standards that are identified in the Water Quality Control Plan (Basin Plan) for this region.

Uniform Building Code. Table 18-1-B of the Uniform Building Code (International Code Council, 1997) defines the criteria for expansive soils. Building code regulations and enforcement have been adopted and incorporated into the City of Long Beach Municipal Code (LBMC). The project would be subject to the requirements of the LBMC.

5.11.6.1 Local LORS

The City of Long Beach Municipal Code includes requirements for grading permits, including exceptions (Ch. 18.04), and outlines the documents required to accompany a permit application (Ch. 18.05).

The City of Long Beach Municipal Code (Ch. 18.61) notes that any construction activity that will disturb more than one acre of soil is subject to the General Construction Activities Stormwater Permit, approved by the SWRCB (5-7.216) (also referred to as the Construction General Permit). Construction plans for sites with more than 1 acre of soil disturbance are required to include construction activity BMPs and erosion and sediment control BMPs. In addition, a SWPPP is required to be submitted to the City, and shall include appropriate construction site BMPs. Sites with more than 5 acres of soil require a SWPPP to be submitted to the City and the RWQCB.

5.11.7 Agencies and Agency Contacts

Applicable permits and agency contacts for soils are listed in Table 5.11-6.

TABLE 5.11-6

Permits and Agency Contacts for Soils

Issue	Agency	Agency Contact
Grading Permit	City of Long Beach Department of Development Services	Truong Huynh, General Superintendent Building and Safety Bureau City of Long Beach Development Services (562) 570-6921 Truong.Huynh@longbeach.gov
National Pollution Discharge Elimination System Construction Activities Stormwater General Permit	Los Angeles RWQCB	Not Applicable (submit Notice of Intent online using Stormwater Multiple Application and Report Tracking System [SMARTS])

5.11.8 Permits and Permit Schedule

The CEC has exclusive jurisdiction to issue local permits as necessary, including an equivalent to a local grading permit. Therefore, no soil-related permits beyond the CEC license are required. Stormwater-related permits, i.e., the NPDES permit, are evaluated in other sections of this document (See Section 5.15, Water Resources).

5.11.9 References

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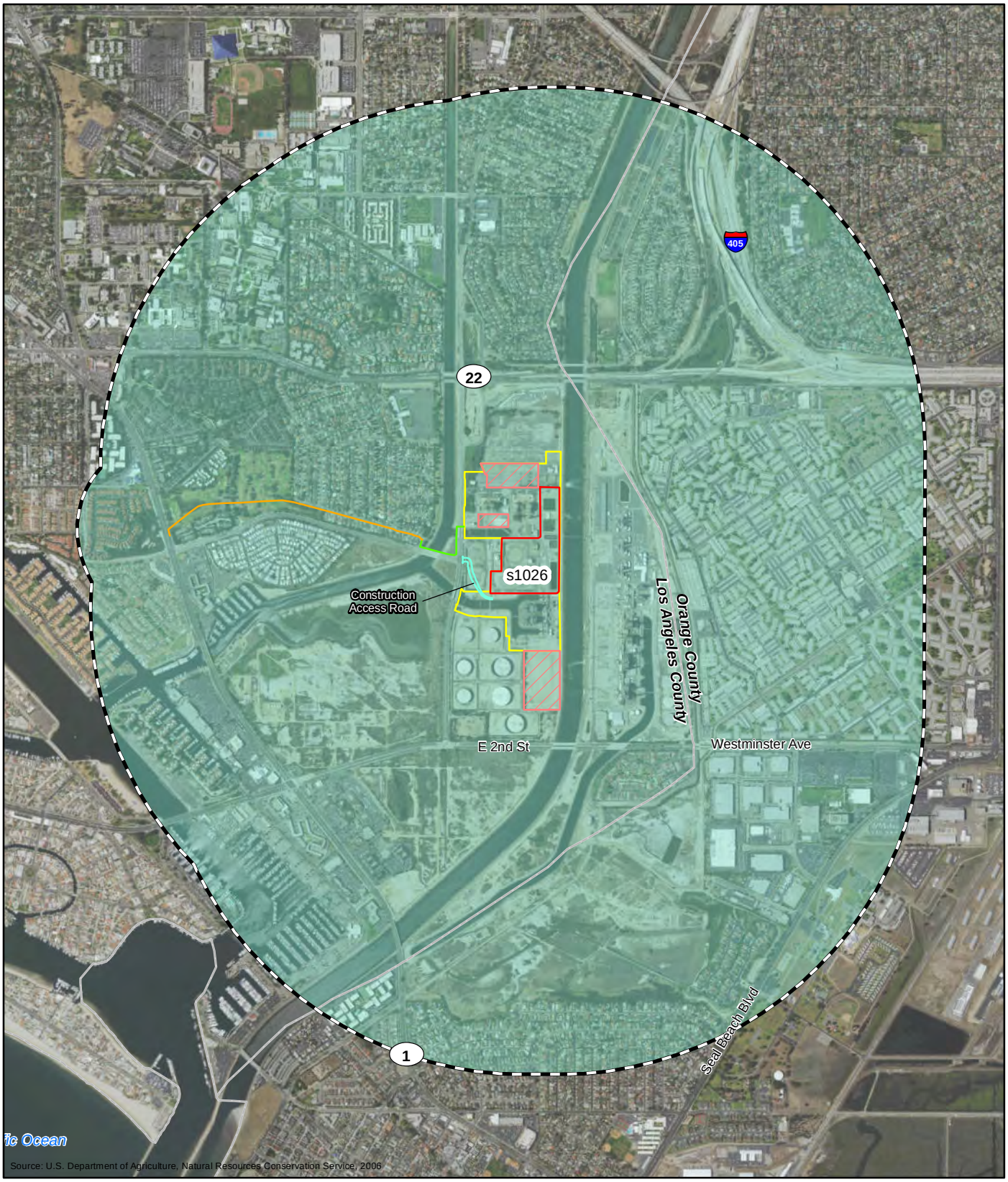

Legend

- AGS Boundary
- AEC Site
- Parking/Laydown Construction Area
- Construction Access Road
- s1026 - Urban Land-Sorrento-Hanford
- Proposed New Process/Sanitary Wastewater Pipeline to First Point of Interconnection
- Potential Sewer Upgrade
- County Boundary

0 1,000 2,000 Feet

N

FIGURE 5.11-1
Soil Types Within Project Area

Alamitos Energy Center
Long Beach, California
October 2015

5.12 Traffic and Transportation

This section addresses the potential effects of the Alamitos Energy Center (AEC) on traffic and transportation. Section 5.12.1 describes the project setting and affected environment of the local and regional traffic and transportation routes surrounding the project site. Section 5.12.2 presents the environmental analysis of the project's effects on local traffic volumes and patterns. Section 5.12.3 evaluates potential cumulative effects on traffic and transportation because of other simultaneous projects. Section 5.12.4 describes mitigation measures for the project. Section 5.12.5 describes applicable laws, ordinances, regulations, and standards (LORS). Section 5.12.6 lists the applicable regulatory agencies and contacts. Section 5.12.7 discusses traffic and transportation permits required, and Section 5.12.8 lists the references used to prepare this section.

5.12.1 Setting and Affected Environment

AES Alamitos Energy, LLC, will construct, own, and operate the AEC, a natural- gas-fired, air-cooled, combined-cycle and simple-cycle, electrical generating facility in Long Beach, California. The proposed AEC will have a nominal generating capacity of 1,040 megawatts (MW). The AEC will be constructed on the site of the existing AES Alamitos Generating Station (AGS), located on an approximately 21-acre site within a larger, 71.1-acre parcel.

The AEC will feature two gas turbine power blocks. Combined-cycle power block will consist of two natural-gas-fired combustion turbine generators (CTG) in a combined-cycle configuration, two unfired heat recovery steam generators (HRSG), one steam turbine generators, an air-cooled condenser, an auxiliary boiler, and related ancillary equipment. Simple-cycle power block will consist of four simple-cycle LMS-100 CTGs with fin-fan coolers and ancillary facilities.

The AEC will meet the demand for new generation in the Los Angeles basin local electrical reliability area. The demand is caused in large part by the closure of the San Onofre Nuclear Generating Station and the anticipated retirement of the older, natural-gas-fired generation currently using once-through ocean water-cooling (OTC). As a result of the promulgation of the California State Water Resources Control Board's (SWRCB) *Water Quality Control Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling* (SWRCB, 2010), more than 4,000 MW of OTC generation are expected to be retired in the Los Angeles local electrical reliability area by December 31, 2020.

The AEC will use water provided by the City of Long Beach Water Department (LBWD) for construction, operational process, and sanitary uses but at substantially lower volumes than the existing AGS historically has used. This water will be supplied through existing, onsite water lines. The AEC will include a new, 1,000-foot process/sanitary wastewater pipeline to the first point of interconnection with the existing LBWD sewer system, the potential upgrade of an additional 4,000 feet of existing pipeline downstream from the first point of interconnection, and the elimination of the current practice of treatment and discharge of process/sanitary wastewater to the San Gabriel River. Stormwater runoff from the power block areas will be directed to oil/water separators and to an existing retention basin and then ultimately discharged to the Los Cerritos channel via existing stormwater outfalls.

The AEC will interconnect to the existing, Southern California Edison (SCE) 230-kilovolt (kV) switchyard adjacent to the north side of the AGS. Natural gas will be supplied to the AEC via the existing, offsite, 30-inch-diameter pipeline owned and operated by Southern California Gas Company (SoCalGas) that currently serves Units 5 and 6 of the AGS. The AEC will require construction of new natural gas-metering facilities and construction of two new natural gas compressor buildings within the AEC footprint.

The AEC is designed to serve both peak and intermediate loads with the added capabilities of rapid startup, significant turndown capability (ability to turn down to a low load), and fast ramp rates. As California's intermittent renewable energy portfolio continues to grow, operating in either load-following or partial shutdown mode will become necessary to maintain electrical grid reliability, thus placing an increased

importance upon the rapid startup, high turndown, steep ramp rate, and superior heat rate employed at the AEC.

As an in-basin generating asset, the AEC will provide local generating capacity, voltage support, and reactive power that are essential for transmission system reliability in the Western Los Angeles basin subarea and larger Los Angeles basin local reliability area. The AEC will be able to provide system stability by supplying reactive power, voltage support, frequency stability, and rotating mass in the heart of the critical Western Los Angeles local reliability area. By virtue of its location in a transmission constrained load center, the AEC also helps to avoid potential transmission line overloads and can provide reliable local energy supplies when electricity from more distant generating resources is unavailable. In recognition of its critical grid reliability benefits, the AEC combined-cycle CTGs were selected by SCE in its Local Capacity Requirements Request for Offer on November 5, 2014, and the simple-cycle CTGs will meet the capacity needs anticipated to be identified in future California Public Utilities Commission Long-term Procurement Plans.

Owing to the critical need for generating capacity at the AEC site at all times, existing Units 1 through 6 will remain in operation through much of the AEC development and construction. Given that the removal of existing Units 1 through 6 is not required for construction of the AEC, the continued operation of the AGS will not impede AEC construction. Demolition of the retired and decommissioned turbine peaking generating Unit 7 and fuel tank, ancillary equipment, small maintenance shops, and two retention basins will be required for site preparation for the construction of the AEC. Construction and site preparation activities at the AEC site are anticipated to last 56 months, from the first quarter of 2017 until the third quarter of 2021. The project will commence construction with the removal of former Unit 7's building and ancillary equipment, fuel storage tank, tank berms, small maintenance shops, and two wastewater retention basins in January 2017 to make room for construction and laydown area for the AEC CCGT. Construction of the AEC CCGT will commence during the second quarter of 2017 and will be completed by the second quarter of 2020. The AEC CCGT is expected to commence commercial operation before May 1, 2020. Construction of the AEC SCGT is scheduled to proceed from the second quarter of 2020 through the third quarter of 2021, and Power Block 2 is expected to commence commercial operation in the third quarter of 2021. A temporary construction access road may be constructed offsite beginning at the intersection of Studebaker Road and Loynes Drive traveling southeast to the AEC site. Construction of the AEC will require the use of onsite laydown areas (approximately 8 acres dispersed throughout the existing site) and an approximately 10-acre laydown area located adjacent to the existing site.

5.12.1.1 Existing Regional and Local Transportation Facilities

Roadway descriptions and volumes were obtained from the best available sources at the time this analysis was prepared. These sources include the California Department of Transportation (Caltrans) Average Daily Traffic volumes (Caltrans, 2014), the *Second + PCH Development Project Traffic Impact Analysis* (Linscott, Law, and Greenspan, 2010), and the City of Long Beach Mobility Element (City of Long Beach, 2013a).

The surrounding regional and local roadway networks are shown in Figures 5.12-1, 5.12-2a, and 5.12-2b.

Regional access to the AEC site is provided from Interstate 405 (I-405), I-605, State Route 22 (SR 22)/East 7th Street, and SR 1/Pacific Coast Highway (PCH). Local access to the project site is primarily provided from East 7th Street, North Studebaker Road, Loynes Drive, East 2nd Street, and PCH. Construction workers, construction materials, and AEC employees (for operations) traveling to the AEC site are anticipated to use the roadways described below.

I-405 is a north–south freeway, running along the western and southern parts of the greater Los Angeles area from Irvine in the south to near San Fernando in the north. I-405 is heavily traveled by commuters and freight haulers along its entire length. Traffic volumes along I-405 between Seal Beach Boulevard and its interchange with I-605 average 369,500 vehicles per day (Caltrans, 2014).

I-605 is a north-south freeway connecting East Long Beach with the San Gabriel Valley. Traffic volumes along I-605 between its interchange with SR 22 and I-405 average 162,000 vehicles per day (Caltrans, 2014).

SR 22 (East 7th Street within Long Beach), between Bellflower Boulevard to the west and approximately Studebaker Road to the east, is a six-lane divided roadway running east-west. The posted speed limit is generally 40 miles per hour (mph). Traffic volumes along SR 22 near Studebaker Road average between 68,000 and 96,000 vehicles per day (Caltrans, 2014).

PCH connects to I-5 in Dana Point, and to cities and counties along the Pacific coast to the north. In the vicinity of the project, PCH is a four to six-lane north-south major arterial. Left-turn lanes are provided at major intersections. The speed limit along PCH in the project vicinity is generally 45 mph. Traffic volumes along PCH near SR 22 average from 26,000 vehicles per day (Caltrans, 2014).

Studebaker Road is generally a four-lane divided roadway oriented in a north-south direction. The posted speed limit on Studebaker Road is 45 mph. Primary access to the project site is provided via the existing entrance off Studebaker Road. However, the Project Owner is attempting to secure rights to construct a temporary construction access road at the intersection of Loynes Drive and Studebaker Road to access the AEC construction site. For the purposes of this analysis, it was assume that the temporary construction access road was available for use during demolition and construction of AEC and will be removed after these activities are completed.

East 2nd Street is generally a four-lane divided east-west roadway. Between Naples Plaza and Studebaker Road, 2nd Street is a six-lane divided roadway. The posted speed limit ranges from 25 to 50 mph.

7th Street is generally a six-lane undivided east-west roadway. The posted speed limit on 7th Street is 40 mph.

Loynes Drive is a four-lane divided east-west roadway between Studebaker Road on the east and Bellflower Boulevard on the west.

5.12.1.2 Heavy/Oversized Loads Haul Route

Heavy and oversized components of the electrical generator sets for AEC (CTGs, components of the HRSGs, transformers, and other oversize and heavy components) will be transported by ship or rail to the Port of Long Beach. The expected AEC heavy haul route is listed in Table 5.12-1, as well as the anticipated permitting agency for each road section. From the Port, these loads will be transported to the site by truck (with appropriate heavy/oversize permits from the agencies listed in Table 5.12-1) along the expected heavy haul route (shown in Figure 5.12-3) to the onsite construction laydown area. A full description of the expected route is provided in Appendix 5.12A. However, the final route will be determined when the heavy/oversize load permits are submitted to the appropriate jurisdictions.

For AEC construction, the heavy/oversize loads are expected to be permitted typically for late-night deliveries. Late-night transport of heavy/oversize loads is common practice to minimize conflicts with general traffic. The volume of these heavy/oversize trips for AEC (and the background traffic in late-night hours) will be low enough (a maximum of two deliveries per month) that a traffic operations analysis is not indicated for these infrequent, late-night heavy/oversize load transport activities.

Although the heavy vehicle route from the port to AEC necessarily includes segments not identified in the City of Long Beach Municipal Code, this lack of designated route segments occurs occasionally, and is permitted by the Municipal Code (Volume I, Title 10, Section 10.40), which does allow trucks to continue along nondesignated through routes if they are going directly to a business for deliveries/pickups.

TABLE 5.12-1

Expected Heavy Haul Route (Port of Long Beach to AEC Site)

Heavy Haul Route Road Segment	Permitting Agency
Harbor Plaza to Pico Avenue	City of Long Beach/County of Los Angeles[a]
Pico Avenue to West 10th Street	City of Long Beach/County of Los Angeles[a]
10th Street changes to 9th Street	City of Long Beach/County of Los Angeles[a]

TABLE 5.12-1
Expected Heavy Haul Route (Port of Long Beach to AEC Site)

Heavy Haul Route Road Segment	Permitting Agency
9th Street to Santa Fe Avenue	City of Long Beach/County of Los Angeles[a]
Santa Fe Avenue to West Anaheim Street	City of Long Beach/County of Los Angeles[a]
West Anaheim Street to Magnolia Avenue	City of Long Beach
Magnolia Avenue to East Ocean Boulevard	City of Long Beach
East Ocean Boulevard to Alamitos Avenue	City of Long Beach
Alamitos Avenue to East Anaheim Street	City of Long Beach
East Anaheim Street to PCH	City of Long Beach
PCH to East 2nd Street	Caltrans
East 2nd Street to North Studebaker Road	City of Long Beach

[a] Within the Overweight Corridor/Harbor District of the City of Long Beach, the City of Long Beach Department of Public Works is responsible for the issuance of permits for the operation of overweight vehicles carrying reducible loads and the Los Angeles County Department of Public Works is responsible for issuing permits for the transportation of nonreducible loads. Should the project have both reducible and nonreducible loads, a permit from both agencies would be acquired.

5.12.1.3 Existing Roadway and Intersection Operations

To identify the operating condition at roadways and intersections, the level of service (LOS) methodology from the *Highway Capacity Manual* (HCM) is used (Transportation Research Board, 2010). LOS is used to quantify impacts of traffic volumes verses roadway capacity with a letter value. The letter scale ranges from A to F with LOS A representing free flow conditions and LOS F representing congested conditions. Average daily traffic (ADT) volumes were used to assess the LOS for the study area local streets, and AM and PM peak-hour turning movement counts were used to assess intersection LOS.

The roadway segments were evaluated based on the volume to capacity (V/C) ratio for average daily conditions. In conformance with the City of Long Beach requirements and Los Angeles County Congestion Management Program requirements the intersection conditions were evaluated using the Intersection Capacity Utilization (ICU) methodology (Los Angeles County Metropolitan Transportation Authority, 2010). The ICU method estimates the V/C relationship for an intersection based on the individual V/C ratios for key conflicting traffic movements. The ICU numerical value represents the percent signal (green) time, and thus capacity, required by existing and future traffic.

Existing Roadway Conditions. Table 5.12-2 provides a summary of LOS, V/C ratios, and traffic flow characteristics for roadway segments.

TABLE 5.12-2
Level of Service Criteria for Roadway Segments

LOS	V/C Ratio	Traffic Flow Characteristics
A	0.000 – 0.600	Free flow; insignificant delays
B	0.601 – 0.700	Stable operation; minimal delays
C	0.701 – 0.800	Stable operation; acceptable delays
D	0.801 – 0.900	Approaching unstable flow; queues develop rapidly but no excessive delays
E	0.901 – 1.000	Unstable operation; significant delays
F	> 1.000	Forced flow; jammed conditions

TABLE 5.12-2
Level of Service Criteria for Roadway Segments

LOS	V/C Ratio	Traffic Flow Characteristics

Source: Transportation Research Board, 2010.

Table 5.12-3 provides a summary of LOS, V/C ratios, and traffic flow characteristics for signalized intersections.

TABLE 5.12-3
Level of Service Criteria for Signalized Intersections

LOS	V/C Ratio	Definition
A	0.000 - 0.600	Conditions of free unobstructed flow, no delays and all signal phases sufficient in duration to clear all approaching vehicles.
B	0.610 - 0.700	Conditions of stable flow, very little delay, a few phases are unable to handle all approaching vehicles.
C	0.710- 0.800	Conditions of stable flow, delays are low to moderate, full use of peak direction signal phases is experienced.
D	0.810 – 0.900	Conditions approaching unstable flow, delays are moderate to heavy, significant signal time deficiencies are experienced for short durations during the peak traffic period.
E	0.910 – 1.000	Conditions of unstable flow, delays are significant, signal phase timing is generally insufficient, congestion exists for extended duration throughout the peak period.
F	> 1.000	Conditions of forced flow, travel speeds are low, and volumes are well above capacity. This condition is often caused when vehicles released by an upstream signal are unable to proceed because of back-ups from a downstream signal.

Source: Transportation Research Board, 2010

In 2013, the City of Long Beach adopted a new Mobility Element of its General Plan, which includes a shift away from a traditional street classification system towards a context-sensitive street classification approach. This approach is intended to promote a more efficient, balanced, and multimodal mobility network. As a result of this shift to context-sensitive design, the City of Long Beach is taking a more flexible approach to traffic LOS. While vehicle congestion relief remains a key goal of the City of Long Beach, the degree of acceptable vehicle congestion can vary in different locations based on the function of the roadway and the desired character of the neighborhood or district. In general, the LOS standard is LOS D for regional corridors, boulevards, and avenues (major), and a LOS C for avenues (minor) and collector streets. LOS D is also generally considered to be the lowest acceptable level for signalized intersections (City of Long Beach, 2013a).

For the study intersection located in the City of Seal Beach (PCH at Seal Beach Boulevard), LOS D is the minimum acceptable condition that should be maintained during the peak commute hours (City of Seal Beach, 2003).

Existing Roadway LOS. ADT volumes were obtained from Caltrans for PCH and SR 22 (Caltrans, 2014). The roadway segment analysis focused on the state highways because current daily traffic volumes were not available for other local roadways in the study area. The existing roadway ADT is illustrated in Figure 5.12-4. Along PCH, in the project study area, trucks comprise approximately 2.0 percent of the total vehicular traffic.

The City of Long Beach Circulation Element does not identify specific roadway capacities for its streets, so the roadway capacities contained in the City of Seal Beach Circulation Element (City of Seal Beach, 2003) were used to evaluate the study roadways. The City of Seal Beach roadway capacities are assumed to be representative of the roadway capacities in Long Beach due to the similarities in roadway characteristics within the two cities. Table 5.12-4 is a summary of the daily traffic volumes and V/C ratios for existing conditions.

TABLE 5.12-4
Existing Roadway Segment LOS

State Highway	Between	And	Number of Lanes	Daily Vehicle Capacity[a]	Existing		
					ADT	V/C	LOS[c]
PCH	Outer traffic circle/ East Atherton St.	East Anaheim St.	4	37,500	32,250	0.860	D
	East Anaheim St.	SR 22	4	37,500	34,000	**0.907**	**E**
	SR 22	Bellflower Blvd.	6	56,300	26,000	0.462	A
	Bellflower Blvd.	Orange County line	6	56,300	41,000	0.728	C
	Orange County line	Seal Beach Blvd.	4	37,500	43,875	**1.170**	**F**
SR 22	PCH	Bellflower Blvd.	6	56,300	58,000	**1.030**	**F**
	Bellflower Blvd.	East Campus Rd.	6	56,300	61,000	**1.083**	**F**
	East Campus Rd.	Studebaker Rd.	6	56,300	68,000	**1.208**	**F**
	Studebaker Rd.	Orange County line	4[b]	79,400	96,000	**1.209**	**F**

[a]Roadway capacities were obtained from the City of Seal Beach Circulation Element.

[b]SR 22 becomes a four-lane freeway east of Studebaker Rd. Freeway capacity based on Florida Department of Transportation (FDOT) Level of Service/Quality Handbook (FDOT, 2013).

[c]Unacceptable LOS shown in **bold**.

Existing Intersection LOS. AM and PM peak hour intersection turning movement counts were obtained from the *Second + PCH Development Traffic Impact Analysis* (Linscott, Law, and Greenspan, 2010) for eight signalized intersections in the vicinity of the project site. The existing intersection turning movement counts are illustrated in Figure 5.12-4.

The existing intersection LOS is summarized in Table 5.12-5. As shown, four of the study intersections do not currently meet the City of Long Beach LOS criterion during the morning peak hour and three of the study intersections do not meet the LOS criterion during the afternoon peak hour.

TABLE 5.12-5
Existing Intersection LOS Summary

	Intersection	AM Peak Hour		PM Peak Hour	
		V/C	LOS[a]	V/C	LOS[a]
1	PCH at 7th Street	**1.090**	**F**	**1.012**	**F**
2	Studebaker Road at SR 22 Westbound Ramps	0.600	B	0.831	D
3	Studebaker Road at SR 22 Eastbound Ramps	0.492	A	0.674	B
4	PCH at Loynes Drive	**0.907**	**E**	0.796	C
5	Studebaker Road at Loynes Drive	0.736	C	0.692	B

TABLE 5.12-5
Existing Intersection LOS Summary

	Intersection	AM Peak Hour		PM Peak Hour	
		V/C	LOS[a]	V/C	LOS[a]
6	Studebaker Road at 2nd Street	**0.943**	**E**	**0.906**	**E**
7	PCH at 2nd Street	**1.047**	**F**	**1.122**	**F**
8	Seal Beach Boulevard at PCH	0.865	D	0.742	C

[a]Unacceptable LOS shown in **bold**

5.12.1.4 Truck Routes

The California Vehicle Code (CVC) Sections 35550–35559 regulates the use of trucks on state facilities, including I-405, I-605, PCH, and SR 22. The City of Long Beach regulates the use of trucks on city roadways. Project-related trucks (construction, demolition, and operations) will travel along designated truck routes near the project site. Existing regional and local truck routes (excluding state facilities) in Long Beach include:

Existing Regional Truck Routes.

- Cherry Avenue (northern city limits to PCH, within Long Beach)
- Paramount Boulevard (northern city limits to South Street)
- 7th Street (PCH to Studebaker Road)

Existing Local Truck Routes.

- Santa Fe Avenue (PCH to Anaheim Street)
- Long Beach Boulevard (within city limits)
- Lakewood Boulevard (within city limits)
- Bellflower Boulevard (Carson Street to PCH)
- Norwalk Boulevard (within city limits)
- South Street (Cherry Avenue to eastern city limits)
- Carson Street (Cherry Avenue to eastern city limits)
- Spring Street (Long Beach Boulevard to eastern city limits)
- Willow Street (I-710 to Clark Avenue, within Long Beach)
- Anaheim Street (western city limits to I-710)
- I-405, I-710, and I-91

In addition to the designated truck routes above, a heavy/oversize haul route for larger heavy haul trucks is shown in Figure 5.12-3 and discussed in Section 5.12.1.2. The heavy haul trucks will come from the Port of Long Beach directly to the AEC site and will either be immediately placed on site, if the construction schedule allows for immediate placement, or temporarily stored in the construction laydown area at the project site. (Immediate placement is preferable because it avoids the costs and logistics of moving components twice, but it cannot always be accommodated by the construction schedule.) The anticipated permitting agency for each road section is also discussed in Section 5.12.1.2. Appendix 5.12A provides the Heavy Haul Route and details on heavy/oversize truck routes.

5.12.1.5 Local Transportation Projects

The Fiscal Year 2015 Capital Improvement Program (CIP) represents the City of Long Beach's short-range strategic capital investment. The CIP identifies and provides for two types of expenditures: strategic improvements to existing infrastructure, and one-time projects designed to address important community needs. There are ten major sections of capital improvement programs that are defined by the type of capital

investment. The Transportation Enhancements section contains programs designed to meet increased needs for mobility resulting from economic growth utilizing a combination of funds. These funds include Proposition C, Gas Tax Street Improvement Capital, Capital Projects, Transportation Improvement Fees, and federal and county grants. The transportation improvements include street and intersection widening, traffic signal system expansion and upgrades, transit improvements, neighborhood traffic management, bike lanes, and bike paths. This section also includes programs that monitor and evaluate traffic congestion areas throughout the city and responds with projects to relieve congestion or enhance traffic safety. The proposed 2015 budget for transportation enhancements is $25,146,314. A summary of the proposed projects is shown in Table 5.12-6.

TABLE 5.12-6

Capital Improvement Program for Fiscal Year 2015 for the City of Long Beach

Transportation Enhancements Program Number and Title	
PR5340 Light Rail Landscaping Prop A 02-210	PW5440 Historic District Street Signs
PW4204 Steam Cleaning Downtown	PW6020 Queensway Bay Bike Path
PW5010 Bikeway & Pedestrian Improvements	PWT010 Sustainable Transportation Improvements
PW5020 Congestion Management Program Compliance	PWT020 Congestion Management Program Compliance
PW5040 Opticom Installation	PWT030 Special Problem Locations
PW5070 I-605 Retail Center	PWT040 Opticom Installation
PW5130 Neighborhood Traffic Mitigation	PWT110 Citywide Signage Program
PW5170 Traffic Mitigation Program	PWT130 Neighborhood Traffic Mitigation
PW5190 Traffic Signals-New Installations & Enhancements	PWT170 Traffic Mitigation Program
PW5240 East-West Corridor Bus Speed	PWT190 Traffic & Pedestrian Signals
PW5260 Major Corridor Enhancement Program	PWT260 Major Corridor Enhancement Program
PW5280 Light Rail Transit Related Improvements	PWT280 Light Rail Transit Related Improvements
PW5290 Millennium Beautification Program	PWT300 Parking Mitigation
PW5340 Citywide Pedestrian Safety Enhancement	PWT360 Adaptive Traffic Management System
PW5350 Downtown Regional Bikeway Connection	PWT370 I-710 FWY Major Corridor Improvements
PW5370 I-710 FWY Major Corridor Improvements	PWT380 Traffic Operations
PW5380 Traffic Operations	PWT500 Annual Traffic Count Program
PW5400 I-710 FWY Rehab Traffic Control	PWT510 Street Tree Removal and Replacement
PW5410 LED Traffic Signal Conversion Program	

Source: City of Long Beach, 2015b

5.12.1.6 Pedestrian and Bicycle Facilities

Long Beach's local street network has a well-developed bicycle circulation system that includes signed bike routes (Class III bicycle facilities), striped and signed bike lanes (Class II bicycle facilities), and on-street bike paths that are physically separated from automobile traffic (Class I bicycle facilities). This on-street bicycle network system includes 15 miles of bike routes, 19 miles of bike lanes, and 29 miles of bike paths. In addition to the on-street bicycle network, Long Beach has more than 60 miles of off-street bike and pedestrian paths within its boundaries. Major bike facilities include:

- Shoreline Pedestrian Bike Path: A 3.1-mile bike and pedestrian path along the beach from Alamitos Avenue to 54th Place
- Los Angeles River Bikeway: A 29.1-mile bikeway along the Los Angeles River and through the Downtown Marina. The path connects to the Shoreline Pedestrian Bike Path
- San Gabriel River Bike Trail: A 28-mile bikeway along the San Gabriel River and through El Dorado Regional Park
- El Dorado Park Bike Path: A 4-mile bikeway through the 450-acre El Dorado Regional Park; it connects with the San Gabriel River Bike Trail at various locations

- Heartwell Park Bike Path: A 2.5-mile bikeway through the 162-acre Heartwell Park and connecting to the San Gabriel River Bike Trail and several Class II bike lanes

The existing and proposed bicycle network in Long Beach is shown in Figures 5.12-2a and 5.12-2b.

5.12.1.7 Public Transportation

Transit service in Long Beach is provided by Long Beach Transit (LBT), Los Angeles County Metropolitan Transportation Authority (Metro), and the Orange County Transportation Authority (OCTA). See Figures 5.12-2a and 5.12-2b for the bus routes in the vicinity of the project site.

LBT provides transit and demand-response services in Long Beach and surrounding communities. LBT operates two types of bus services, within its 98-square-mile service area, local service and a downtown Passport circulator. Local service provided by LBT provides fixed-route service with frequent stops in Long Beach and adjacent cities. LBT also provides a transportation service to mobility impaired residents called Dial-A-Lift. During the summer, LBT also operates the AquaLink, a catamaran that carries passengers between the Downtown Long Beach waterfront and the Alamitos Bay Landing, as well as the AquaBus water taxi service that visits marinas and docks along the downtown waterfront. In total – on road and on water – LBT operates 38 local service routes in Long Beach. In 2012, LBT served 28 million annual passengers for 86 million annual passenger miles with 182 buses and 14 demand-response vehicles. On average, LBT serves approximately 89,000 daily weekday boardings, 58,000 Saturday boardings, and 50,200 Sunday boardings (City of Long Beach, 2013a).

Regional transportation for Long Beach is operated by Metro. On a regional scale, Metro operates five types of bus service: local service, limited-stop service, express service, shuttles, and circulators and rapid service, as well as passenger rail and transitway service in its 1,513-square-mile service area. Within Long Beach, Metro operates a limited number of local and express buses and the Metro Blue Line passenger rail. Most transit activity in Long Beach is focused around the Long Beach Transit Gallery, located on 1st Street between Pine Avenue and Pacific Avenue in Downtown Long Beach. The Long Beach Transit Gallery serves as the southern terminus of the Metro Blue Line and is the main transit hub for bus connections to various Metro, Long Beach Transit, Los Angeles Department of Transportation Commuter Express, and Torrance Transit bus routes. Part of the Metro Rail Transit System that runs north-south from Los Angeles to Long Beach, the Metro Blue Line starts at 7th Street/Metro Center/Julian Dixon in Downtown Los Angeles and travels south via Long Beach Avenue, Willowbrook Avenue, and Long Beach Boulevard to its final destination at the Long Beach Transit gallery. The Metro Blue Line operates Monday through Sunday, including all major holidays (City of Long Beach, 2013a). The nearest station to the site is the 1st Street Station, approximately 5 miles west of the project site.

OCTA operates 76 bus lines, encompassing every city in Orange County. Some of the lines serve the Los Angeles County border communities of Lakewood, La Mirada, Cerritos, Hawaiian Gardens, and Long Beach along with express service to Los Angeles, Diamond Bar, Chino Hills, and Chino and the Riverside County cities of Riverside and Corona.

5.12.1.8 Rail Traffic

The nearest passenger rail service is approximately 12 miles northeast of the project site at the Amtrak station in Fullerton. Commercial rail service in the area consists of the Burlington Northern Santa Fe (BNSF) Railroad.

Metro is planning several rail projects that would improve connectivity within the region, and Long Beach in particular. The Regional Connector Transit Corridor project includes the addition of a 1.9-mile underground Light Rail Transit Line that will connect the Metro Gold Line to the Metro Blue Line and the future Expo Line. Using this connector, passengers will be able to travel from Montclair to Long Beach and from East Los Angeles to Santa Monica on a “one-seat ride.” By providing continuous through service between these lines, the Regional Connector is anticipated to improve access to local and regional destinations, and improve the connectivity of the transportation network for the region. Operations are planned to begin in 2019.

The second major project affecting Long Beach is the Harbor Subdivision, a historic single-track main line of the BNSF Railway. This 26-mile railway extending between the rail yards near downtown Los Angeles and the Ports of Los Angeles and Long Beach was once the primary link between the two ports and the transcontinental rail network. Today, rail traffic from the ports primarily uses the Alameda Corridor to access the transcontinental rail yards, leaving the Harbor Subdivision relatively underutilized. A study conducted by Metro examined the feasibility of turning the Harbor Subdivision into a transit corridor. The study examined the extension of the Green Line to Torrance, the creation of a new light rail transit line, and the possibility of a maglev high-speed rail system. If constructed, the transit system along the Harbor Subdivision could be extended to Metro Blue Line at the Willow Station. This connection would provide more transportation choices to Long Beach residents and workers traveling to and from communities in southwest Los Angeles County.

5.12.1.9 Air Traffic

Federal Aviation Administration (FAA) Regulations, 14 Code of Federal Regulations (CFR) Part 77, establish standards for determining obstructions in navigable airspace and set forth requirements for notification of proposed construction. These regulations require FAA notification for construction higher than 200 feet above ground level. Notification also is required if the obstruction is lower than specified heights and falls within restricted airspace in the approaches to public or military airports and heliports. For airports with runways longer than 3,200 feet, the restricted space extends 20,000 feet (3.3 nautical miles) from the runway. For airports with runways measuring 3,200 feet or less, the restricted space extends 10,000 feet (1.7 nautical miles). For public or military heliports, the restricted space extends 5,000 feet (0.8 nautical mile).

People traveling to and from Long Beach are serviced by three main airports: Los Angeles International Airport (LAX), John Wayne Airport (SNA), and the Long Beach Airport (LGB). The nearest public airport to the AEC is LGB, located approximately 3.8 miles to the northwest of the project site. LAX is approximately 20 miles northwest of the project site and SNA is approximately 15 miles to the south of the project site. The Torrance Municipal Airport (14 miles northwest of the site) and the Fullerton Municipal Airport (10 miles northeast of the site) also provide limited air travel within the region. The nearest military airport is the Los Alamitos Army Airfield, which is approximately 2.7 miles northeast of AEC. The Long Beach Airport and Los Alamitos Army Airfield are shown on Figures 5.12-2a and 5.12-2b, Local Transportation Network.

In addition to the airports noted above, there are also three public or private heliports within 2 miles of AEC. For public or private heliports, the restricted space extends 5,000 feet (0.8 nautical mile/0.9 mile) from the heliport. The three heliports are as follows:

- Boeing Seal Beach (Ground Level) Heliport 1.0 mile
- Boeing Seal Beach (Rooftop) Heliport 1.0 mile
- Rockwell Facility Heliport 1.1 miles

All three heliports are more than 0.8 nautical mile from AEC. Most heliports and helistops are provided for law enforcement and emergency medical transportation services. Others are used by private helicopter operators and helicopter tour services.

5.12.2 Environmental Analysis

This section assesses the traffic and transportation effects associated with AEC construction. This analysis examines potential effects on roadway and intersection LOS expected during AEC construction activities.

The peak construction period will require up to 512 workers to access the project site during the AM and PM peak hours in month 44. To evaluate a conservative scenario, traffic impacts associated with the peak construction period, anticipated to occur in 2021, were analyzed.

The 2012-2035 Regional Transportation Plan, prepared by the Southern California Association of Governments (SCAG), provides an annual average growth rate for the SCAG region (SCAG, 2010). The SCAG growth rate, estimated at 1.2 percent per year, was applied to the existing traffic volumes to estimate the

2021 traffic conditions when the project will generate the greatest number of construction-related trips. The project construction traffic was added to the 2021 traffic volumes and the study area roadway and intersection LOS were calculated.

5.12.2.1 Significance Criteria

Appendix G of the California Environmental Quality Act (CEQA) is a screening tool, not a method for setting thresholds of significance. Appendix G is typically used in the Initial Study phase of the CEQA process, asking a series of questions. The purpose of these questions is to determine whether a project requires an Environmental Impact Report, a Mitigated Negative Declaration, or a Negative Declaration. As the Governor's Office of Planning and Research stated, "Appendix G of the Guidelines lists a variety of potentially significant effects, but does not provide a means of judging whether they are indeed significant in a given set of circumstances." The answers to the Appendix G questions are not determinative of whether an impact is significant or less than significant. Nevertheless, the questions presented in CEQA Appendix G are instructive.

In terms of Traffic and Transportation, Appendix G, asks, in part, whether the project would:

- Conflict with an applicable plan, ordinance or policy establishing measures of effectiveness for the performance of the circulation system, taking into account all modes of transportation including mass transit and nonmotorized travel and relevant components of the circulation system, including but not limited to intersections, streets, highways and freeways, pedestrian and bicycle paths, and mass transit? (Appendix G, Section XVI(a))
- Conflict with an applicable congestion management program, including, but not limited to level of service standards and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways? (Appendix G, Section XVI(b))
- Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that results in substantial safety risks? (Appendix G, Section XVI(c))
- Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment)? (Appendix G, Section XVI(d))
- Result in inadequate emergency access? (Appendix G, Section XVI(e))
- Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities? (Appendix G, Section XVI(f))

In Long Beach, impacts on local and regional transportation systems are considered significant if:

- An unacceptable peak hour LOS (i.e., LOS E or F) at any of the key intersections is projected (Iteris, 2010); and
- The project increases traffic demand at the study intersection by 2 percent of capacity (ICU increase ≥ 0.020), causing or worsening LOS E or F (Iteris, 2010).

The City of Long Beach does not have impact criteria for roadway segments. Therefore, for the purposes of this analysis, the project's potential roadway impacts were evaluated based on whether the project would increase traffic demand on the study roadways by 2 percent or more, on roadway segments that will be LOS E or F. This approach is consistent with the City of Long Beach intersection impact thresholds.

Based on the City of Seal Beach Traffic Impact Study Guidelines (City of Seal Beach, 2010), within Seal Beach, the following increases in ICU are deemed as "significant" and require mitigation:

TABLE 5.12-7
City of Seal Beach Traffic Impact Thresholds

Existing ICU	Project Related Increase in ICU
0.00 – 0.69	0.06
0.70 – 0.79	0.04
0.80 – 0.89	0.02
0.90+	0.01

Construction and Demolition Trip Generation. Estimates of the project's peak construction and/or demolition traffic were developed based on the projected size of the AEC construction and demolition workforce and the anticipated truck deliveries to the site. Construction trip estimates are presented in Table 5.12-8. The peak construction or demolition period will require up to 512 workers, including craft people, supervisory, support, and construction management personnel. The peak workforce will occur during construction of Simple-Cycle Power Block construction, anticipated to occur during 2021. The construction plan is based on a single 10-hour shift Monday through Friday, and an 8-hour shift on Saturday. Construction will typically take place between 7:00 a.m. and 7:00 p.m., Monday through Friday, and 9:00 a.m. and 6:00 p.m. on Saturday.

Materials such as concrete, pipe, wire and cable, fuels, reinforcing steel, and small tools and consumables will be delivered to the site by truck. Some of the heavy equipment items will be transported by rail. Rail deliveries will be offloaded in the Long Beach area and transported by truck to the site. Truck deliveries of construction materials and equipment will generally occur on weekdays between 6:00 a.m. and 6:00 p.m. The peak truck deliveries will occur during month 42 when 28 trucks per day (for a total of 56 truck trips/day) will be transporting construction equipment and materials.

Although the truck trips will peak in month 42, the peak traffic generation (workforce and truck trips combined) will occur during month 44, coinciding with the peak construction workforce. During the peak month, the estimated number of workers daily round trips is 1,024 (512 workers x 2 trips per worker = 1,024 total trips) plus 42 truck trips (21 trucks x 2 trips per truck = 42 total trips). For a conservative analysis (i.e., an analysis that will overstate potential impacts compared to actual impacts) it was assumed that none of the workers will carpool. It was also conservatively assumed that the construction workforce would arrive during the morning peak hour, when in actuality the construction workers should already be onsite by 7:00 a.m. Truck trips were also converted to passenger car equivalent units (PCEs) at a ratio of 1.5 passenger cars for each truck, consistent with the 2010 HCM guidelines. It was assumed that two deliveries (equivalent to four trips) would be made during each peak hour.

TABLE 5.12-8
Construction Trip Generation

		AM Peak Hour			PM Peak Hour		
Trip Type	ADT	In	Out	Total	In	Out	Total
Delivery/Haul Trucks	42	2	2	4	2	2	4
Delivery/Haul Trucks PCE (1.5)	63	3	3	6	3	3	6
Workers	1,024	512	0	512	0	512	512
Total Construction Traffic in PCE	1,087	515	3	518	3	515	518

Construction Traffic Distribution. Based on an analysis of the AEC location and surrounding transportation facilities, the following assumptions were used to distribute the construction-workforce-related traffic over the study area network:

- One-third of the trips would come from Long Beach, Signal Hill, and communities located west of the AEC site.
- One-third of the trips would come from Lakewood, Los Alamitos, Cyprus, Cerritos, and communities located to the north of the AEC site.
- One-third of the trips would come from Garden Grove, Westminster, Fountain Valley, and communities located east and south of the AEC site.

The project trip distribution is presented in Figure 5.12-5.

Roadway LOS with Construction Traffic. The daily traffic volumes generated during the AEC peak construction/demolition period were added to the 2021 daily traffic volumes on each roadway segment, and the LOS was calculated. The resulting LOS for the study area roadway segments for 2021 with and without the project are summarized in Table 5.12-9. The 2021 roadway volumes are illustrated in Figures 12-6 and the 2021 roadway volumes with the project-added traffic are illustrated in Figure 5.12-7.

The project will not increase the V/C ratios on the study roadways by more than 2 percent. As such, construction traffic impacts on the study roadways are not considered significant.

Intersection LOS with Construction/Demolition Traffic. The AM and PM peak-hour traffic generated during the peak construction/demolition period was added to the 2021 peak hour volumes at the analyzed intersections. The results of the 2021 with and without project peak hour LOS analysis for the study intersections are summarized in Tables 5.12-10 and 5.12-11. The 2021 peak hour intersection volumes are illustrated in Figure 5.12-6, and the 2021 peak hour intersection volumes with the project-added traffic are illustrated in Figure 5.12-7.

During the morning peak hour, without mitigation measures the project would increase the V/C ratio by 0.012 at the intersection of PCH and Seal Beach Boulevard, which exceeds the City of Seal Beach threshold of an increase of more than 0.01 for an intersection with an ICU greater than 0.90. The construction traffic in the morning peak hour is a significant but temporary impact (Table 5.12-10). Although several other study intersections are projected to operate at LOS E or worse under 2021 conditions, the change in the V/C ratio with the project-added traffic is below the City of Long Beach traffic impact thresholds. Mitigation measures that will reduce this impact to less than significant are discussed below in Section 5.12.4.

During the afternoon peak hour, four intersections are projected to operate at LOS E or worse under 2021 conditions. These changes in the V/C ratio with the project-added traffic are below the City of Long Beach and City of Seal Beach traffic impact thresholds (Table 5.12-11). The project would not result in any impacts during the afternoon peak hour.

5.12.2.2 Operations Traffic

The project is also anticipated to be fully operational by the end of 2021. During project operations, it is estimated that the project will generate 44 daily trips and 24 peak hour trips, which is significantly fewer than the project-related construction trips. Because the potential traffic impacts are already being evaluated for 2021 during peak construction, an additional quantitative analysis of the project operations for 2021 is not warranted.

5.12.2.3 Transport of Hazardous Materials

Some of the hazardous materials produced during demolition, construction and operations will include oil, oily rags, lead batteries, asbestos waste, solvents, and paint. Transportation of hazardous materials will comply with Caltrans, U.S. Environmental Protection Agency, California Department of Toxic Substances Control, California Highway Patrol (CHP), and California State Fire Marshal regulations.

TABLE 5.12-9

2021 + Project Construction/Demolition Roadway Segment LOS

					2021				2021 + Project				
State Highway	**Between**	**And**	**Number of Lanes**	**Daily Vehicle Capacity[a]**	**ADT**	**V/C**	**LOS**	**Construction Added Trips**	**ADT**	**V/C**	**LOS**	**Change in V/C**	**Significant Impact?**
PCH	Outer traffic circle/ East Atherton St.	East Anaheim St.	4	37,500	35,058	0.935	D	41	35,099	0.936	D	0.001	No
	East Anaheim St.	SR 22	4	37,500	36,961	0.986	F	41	37,002	0.987	F	0.001	No
	SR 22	Bellflower Blvd.	6	56,300	28,264	0.502	A	41	28,305	0.503	A	0.001	No
	Bellflower Blvd.	Orange County line	6	56,300	44,570	0.792	C	82	44,652	0.793	C	0.001	No
	Orange County line	Seal Beach Blvd.	4	37,500	47,696	1.272	F	82	47,778	1.274	F	0.002	No
SR 22	PCH	Bellflower Blvd.	6	56,300	63,051	1.120	F	0	63,051	1.120	F	0.000	No
	Bellflower Blvd.	East Campus Rd.	6	56,300	66,312	1.178	F	0	66,312	1.178	F	0.000	No
	East Campus Rd.	Studebaker Rd.	6	56,300	73,922	1.313	F	0	73,922	1.313	F	0.000	No
	Studebaker Rd.	Orange County line	4[b]	79,400	104,360	1.314	F	901	105,261	1.326	F	0.011	No

[a]Roadway capacities were obtained from the City of Seal Beach Circulation Element.

[b]SR 22 becomes a four-lane divided freeway east of Studebaker Rd. Freeway capacity based on Florida Department of Transportation Level of Service/Quality Handbook (FDOT, 2013).

TABLE 5.12-10

2021 + Project Construction/Demolition AM Peak Hour Intersection LOS

	Intersection	2021 ICU	2021 LOS	2021 + Project ICU	2021 + Project LOS	Change in V/C	Significant Impact without Mitigation?
1	PCH at 7th Street	1.235	F	1.235	F	0.000	No
2	Studebaker Road at SR 22 Westbound Ramps	0.669	B	0.827	D	0.158	No
3	Studebaker Road at SR 22 Eastbound Ramps	0.544	A	0.669	B	0.125	No
4	PCH at Loynes Drive	1.023	F	1.036	F	0.013	No
5	Studebaker Road at Loynes Drive	0.826	D	0.846	D	0.020	No
6	Studebaker Road at 2nd Street	1.060	F	1.069	F	0.009	No
7	PCH at 2nd Street	1.185	F	1.200	F	0.014	No
8	Seal Beach Boulevard at PCH	0.983	E	**0.995**	**E**	**0.012**	**Yes[a]**

[a] Assumes that AEC construction workforce are commuting during the morning peak hours of 7:00 a.m. to 9:00 a.m.

TABLE 5.12-11

2021 + Project Construction PM Peak Hour Intersection LOS

	Intersection	2021 ICU	2021 LOS	2021 + Project ICU	2021 + Project LOS	Change in V/C	Significant Impact without Mitigation?
1	PCH at 7th Street	1.145	F	1.149	F	0.004	No
2	Studebaker Road at SR 22 Westbound Ramps	0.936	E	0.937	E	0.001	No
3	Studebaker Road at SR 22 Eastbound Ramps	0.754	C	0.754	C	0.000	No
4	PCH at Loynes Drive	0.896	D	0.896	D	0.000	No
5	Studebaker Road at Loynes Drive	0.784	C	0.794	C	0.000	No
6	Studebaker Road at 2nd Street	1.018	F	1.032	F	0.014	No
7	PCH at 2nd Street	1.271	F	1.284	F	0.013	No
8	Seal Beach Boulevard at PCH	0.841	D	0.853	D	0.012	No

Similar to the current operations of the AGS, aqueous ammonia, a regulated substance, will continue to be delivered to the AEC during operation and transported in accordance with CVC Section 32100.5, which regulates the transportation of hazardous materials that pose an inhalation hazard. For a complete list of materials, quantities, estimated number of trips, routes, means of transportation, and any hazards associated with transport see Section 5.5, Hazardous Materials Handling, and Section 5.14, Waste Management. Hazardous waste generated at the AEC facility will be stored at the facility for less than 90 days. The waste will then be transported to an offsite treatment, storage, and disposal facility by a permitted hazardous waste transporter.

AEC will have truck traffic associated with the delivery of various cleaning chemical, diesel fuel, lubricants, sulfuric acid, and other hazardous materials associated with plant operation. It is expected that during AEC operation, there will be approximately 32 truck deliveries per month. The truck route used to transport hazardous materials to the AEC site will be selected by the supplier consistent with the requirements of federal and state law, likely via I-405, to SR 22 (7th Street), west along 7th Street, and then south on Studebaker Road to the AEC entrance. With the exception of Studebaker Road, this route is a designated truck route by Caltrans and the City of Long Beach. Moreover, the City of Long Beach Municipal Code allows trucks on restricted streets when necessary for the purpose of making pickups or deliveries. Removal of hazardous wastes would occur along the same routes in the reverse direction. Compliance with applicable regulations will ensure that impacts from the transportation of hazardous materials and hazardous waste will be less than significant.

5.12.2.4 Public Safety

Truck trips, including delivery of hazardous materials and removal of wastes, pose potential hazards for the public. The transporter will be required to obtain a Hazardous Material Transportation License in accordance with CVC Section 32105 and will be required to follow appropriate safety procedures when transporting and handling such materials. There are no at-grade railroad crossings or other road features that affect public safety in the vicinity of the project site.

5.12.2.5 Air Traffic

FAA Regulations, 14 CFR Part 77, establish standards for determining obstructions in navigable airspace and set forth requirements for notification of proposed construction. These regulations require FAA notification for construction over 200 feet above ground level. Notification also is required if the obstruction is lower than specified heights and falls within restricted airspace in the approaches to public or military airports and heliports. For airports with runways longer than 3,200 feet, the restricted space extends 20,000 feet (3.3 nautical miles) from the runway. For airports with runways measuring 3,200 feet or less, the restricted space extends 10,000 feet (1.7 nautical miles). For public or military heliports, the restricted space extends 5,000 feet (0.8 nautical mile).

The nearest public airport to the AEC is the Long Beach Airport, located approximately 3.8 miles to the northwest of the project site. LAX is approximately 20 miles northwest of the project site and John Wayne Airport is approximately 15 miles to the south of the project site. The Torrance Municipal Airport (14 miles northwest of the site) and the Fullerton Municipal Airport (10 miles northeast of the site) also provide limited air travel within the region. The nearest military airport is the Los Alamitos Army Airfield, which is approximately 2.7 miles northeast of AEC.

In addition to the airports above, there are also three public or private heliports within 2 miles of AEC. For public or private heliports, the restricted space extends 5,000 feet (0.8 nautical mile/0.9 mile) from the heliport. The three heliports are as follows:

- Boeing Seal Beach (Ground Level) Heliport 1.0 mile
- Boeing Seal Beach (Rooftop) Heliport 1.0 miles
- Rockwell Facility Heliport 1.1 miles

All three heliports are more than (0.8 nautical miles) from AEC. As part of the analysis for the AEC, a FAA Notice Criteria Tool has been used to determine whether AEC meets Federal Aviation Regulation 77.13 (FAR Section 77.13) requirements regarding the need to notify FAA of AEC construction. The notice criteria tool results are provided in Appendix 3B. Although all structures are well under 200 feet in height, the FAA criteria tool indicates that an FAA Form 7460-1, Notice of Proposed Construction or Alteration will need to be filed with the FAA.

5.12.2.6 Emergency Vehicle Access

Emergency vehicles will be able to access the project site through the main entrance off Studebaker Road and the temporary construction access road off Loynes Drive. There will be no impacts on emergency

vehicle access. The small changes in V/C ratio in project area roadway segments and intersections will not have a significant impact on the operations of emergency vehicles.

5.12.2.7 Parking

Construction workers will park at the onsite laydown area within the project site's boundaries. No on-street parking is anticipated, with the exception of the limited construction equipment and workers required during the installation of the wastewater pipeline along East Vista Street in Long Beach. Parking spaces also will be provided to employees during operations. There will be no impact on existing parking capacity.

5.12.3 Cumulative Effects

Section 15355 of the CEQA Guidelines defines "cumulative impacts" as "two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts." Subsection b of Section 15355 states, in part, that "The cumulative impact *from several projects* is the change in the environment which results from *the incremental impact of the project when added to other closely related past, present, and reasonably foreseeable probable future projects*." (Emphasis added.) Thus, cumulative impacts under CEQA involve the potential interrelationships of two or more projects, not the impacts from a single project. Specifically, under Section 15130 of the CEQA Guidelines, an Environmental Impact Report is required to discuss cumulative impacts when the project's incremental effect is "cumulatively considerable." Section 15065(a)(3) then defines "cumulatively considerable" as meaning "that the incremental effects of an individual project are significant when viewed in connection with the effects of *other* closely related past projects, the effects of *other* current projects and the effects of probable *future* projects." (Emphasis added.)

The project will have a less-than-significant effect on the roadways in the immediate vicinity of the project site and with the exception of one roadway segment, the project's potential impacts to the study roadways are considerably below the City's thresholds. The project would result in a temporary impact at one study intersection with the construction-added traffic during the morning peak hour (typically 7:00 a.m. to 9:00 a.m.). This is based on a conservative assumption that the construction workforce would arrive at the site during the morning peak hour. AEC construction will take place between the hours of 7:00 a.m. and 7:00 p.m., Monday through Friday, and 9:00 a.m. and 6:00 p.m. on Saturday, consistent with City of Long Beach ordinances. As such, construction workers will not be commuting during the morning peak hours and projected impacts to the Seal Beach Boulevard and PCH intersection will not be significant.

As described below, the project will include a TMP to address potential traffic impacts and identify strategies to minimize those impacts. As part of the TMP, the project will be required to coordinate traffic flows with other major projects through the study intersections. Projects that could result in a cumulative impact also would be required to comply with applicable federal, state, and local LORS and it is reasonable to assume that they would also include mitigation measures to reduce any cumulative traffic impacts to a less-than-significant level. Although it is unlikely that the peak construction period for the project, as well as the construction of multiple projects would coincide with the project's travel through the area roadways and intersections, it is possible that the construction traffic could overlap. However, a definitive construction schedule for other possible projects in the area is unknown. Cumulative traffic impacts would be reduced with the implementation of the project's TMP strategies. The proposed project is unlikely, therefore, to result in cumulative impacts on traffic in combination with other closely related past, present, and reasonably foreseeable future projects.

5.12.4 Mitigation Measures

5.12.4.1 Construction/Demolition Impacts

In the absence of mitigation, the addition of AEC construction and demolition-related traffic could result in a significant but temporary impact at one study intersection. This impact would only occur during the morning peak hour, with the construction/demolition-added traffic and as previously noted is a conservative analysis

based on the assumption that the construction workforce would arrive during the morning peak hour. With the following mitigation, this impact will be reduced to a less-than-significant level:

- The construction and demolition contractors shall be required to prepare a Construction Transportation Management Plan (TMP). The TMP shall address the employee work schedule during the peak construction period to minimize arrivals during the morning peak hour when project impacts are anticipated. Specifically, the construction workforce will be scheduled to arrive at the site prior to 7:00 a.m. (Monday through Friday).
- The TMP will also address timing of heavy equipment and building material deliveries, potential street or lane closures, signing, lighting, and traffic control device placement. Damage to any roadway caused by project construction traffic will be restored to or near its preexisting condition based on the procedures established by the TMP. The construction contractors will work with the local agencies to prepare a schedule and mitigation plan for the roadways along the construction routes in accordance with the procedures established by the TMP.

With implementation of the TMP, the project's impacts on traffic and transportation will be less than significant.

5.12.4.2 Operation Impacts

AEC operations will require an average of 36 employees and a maximum of approximately two deliveries per day, which is the same or less than currently required by the existing AGS. The traffic associated with this number of employees is minimal and insignificant when added to major movements on highways and local roadways. The operational traffic will not exceed the City of Long Beach traffic impact thresholds. Consequently no operations-related mitigation measures are required.

5.12.5 Laws, Ordinances, Regulations, and Standards

LORS related to traffic and transportation are summarized in the following subsections. Table 5.12-12 is a summary of applicable federal, state, and local LORS and administering agencies, and describes how the Project Owner will comply with all LORS pertaining to traffic and transportation impacts.

5.12.5.1 Federal LORS

- 49 CFR 172, 173, and 173 provide standards for labels, placards, and markings on hazardous materials shipments by truck (Part 172), standards for packaging hazardous materials (Parts 173), and standards for transporting hazardous materials in tank cars (Part 179). The administering agencies for the above authority are the CHP and U.S. Department of Transportation.
- 49 CFR 350-399, and Appendices A-G, Federal Motor Carrier Safety Regulations, address safety considerations for the transport of goods, materials, and substances over public highways.
- 14 CFR 77.13(2)(i) requires an applicant to notify the FAA of the construction of structures within 20,000 feet of the nearest point of the nearest runway of an airport with at least one runway longer than 3,200 feet. Los Alamitos Army Airfield is the closest airport to the site and is located more than 20,000 feet from the AEC site. Nevertheless, a form 7460-1 will be filed with the FAA.
- As part of the analysis for the AEC, a FAA Notice Criteria Tool has been used to determine whether AEC meets Federal Aviation Regulation 77.13 (FAR Section 77.13) requirements regarding the need to notify FAA of AEC construction. The notice criteria tool results are provided in Appendix 3B. Although all structures are well under 200 feet in height, the FAA criteria tool indicates that the AEC stacks are near a navigation facility and exceed an instrument approach area. Based on the results of this evaluation, an FAA Form 7460-1, Notice of Proposed Construction or Alteration will be filed with the FAA.
- 14 CFR 77.21, 77.23, and 77.25 outline the criteria used by the FAA to determine whether an obstruction would create an air navigation conflict. AEC is more than 5 nautical miles from the nearest airport. Because of the distance, these requirements are not applicable.

TABLE 5.12-12

Laws, Ordinances, Regulations, and Standards for Traffic and Transportation

LORS	Requirements/Applicability	Administering Agency	AFC Sections Explaining Conformance
Federal			
49 CFR, Sections 172, 173 and 179	Require proper handling and storage of hazardous materials during transportation.	U.S. Department of Transportation and Caltrans	Project and transportation will comply with all standards for the transportation of hazardous materials. (Sections 5.12.2.4, 5.12.2.5 and 5.12.7)
14 CFR, Sections 77.13(2)(i), 77.17, 77.21, 77.23, and 77.25	Require an applicant to notify the FAA of the construction or alterations of structures within a certain distance of an airport to avoid air navigation conflicts.	U.S. Department of Transportation and FAA	No airports are within 20,000 feet of the project site; however as part of the analysis for the AEC, a FAA Notice Criteria Tool has been used to determine whether AEC meets Federal Aviation Regulation 77.13 (FAR Section 77.13) requirements regarding the need to notify FAA of AEC construction. The notice criteria tool results are provided in Appendix 3B. Although all structures are well under 200 feet in height, the FAA criteria tool indicates that the AEC stacks are located within the proximity to a navigation facility and exceed an instrument approach area. Based on the results of this evaluation, an FAA Form 7460-1, Notice of Proposed Construction or Alteration will be filed with the FAA. (Section 5.12.2.6)
State			
CVC Sections 13369, 15275, and 15278	Address the licensing of drivers and classifications of licenses required for the operation of particular types of vehicles.	Caltrans	The project will conform to these sections in the CVC. (Sections 5.12.2.4, 5.12.2.5, and 5.12.7)
CVC Section 32100.5	Addresses the safe transport of hazardous materials.	Caltrans	The project will conform to these sections in the CVC. (Sections 5.12.2.4, 5.12.2.5, and 5.12.7)
S&HC Sections 660, 670, 1450, 1460 et seq., 1470, and 1480	Regulate right-of-way encroachment and the granting of permits for encroachments on state and county roads.	Caltrans	The project will conform to these sections in the S&HC. (Sections 5.12.1.2 and 5.12.7)
S&HC Sections 117, 660–711	Require permits from Caltrans for any roadway encroachment during truck transportation and delivery.	Caltrans	Encroachment permits will be obtained by transporters, as required. (Sections 5.12.1.2 and 5.12.7)
CVC Section 35780; S&HC Sections 660–711	Require permits for any load that exceeds Caltrans weight, length, or width standards for public roadways.	Caltrans	Transportation permits will be obtained by transporters for all overloads, as required. (Section 5.12.1.2 and 5.12.7)
CVC Sections 35550–35559	Regulate weight and load limitations.	Caltrans	The project will conform to these sections in the CVC. (Sections 5.12.1.2 and 5.12.7)

TABLE 5.12-12

Laws, Ordinances, Regulations, and Standards for Traffic and Transportation

LORS	Requirements/Applicability	Administering Agency	AFC Sections Explaining Conformance
California State Planning Law, Government Code Section 65302	Project must conform to the General Plan.	City of Long Beach	Project will comply with the City of Long Beach's General Plan. (Sections 5.12.2 and 5.12.4)
CVC, 13 CCR Section 1160 et seq.	Provide the CHP with authority to adopt regulations for the transportation of hazardous materials in California. The CHP can issue permits and specify the route for hazardous material delivery.	California Highway Patrol	The project will conform to these sections in the CVC. (Section 5.12.2.4, 5.12.2.5, and 5.12.7)
Local			
Los Angeles County Code; Chapter 16.22 Moving Permits	Requires a permit for vehicles or vehicle combinations exceeding statutory limitations (as to size, weight, and loading of vehicles) on county roadways, and roads on some local jurisdictions.	Los Angeles County	The project will conform to these sections in the county code. (Section 5.12.1.2 and 5.12.7)
City of Long Beach Municipal Code	Requires a special permit for overweight vehicles (greater than 80,000 pounds, but no more than 95,000 pounds).	City of Long Beach	The project will conform to these sections in the municipal code. (Section 5.12.1.2 and 5.12.7)
Transportation Element of the City of Long Beach General Plan	Specifies long-term transportation planning goals and policies in the City of Long Beach.	City of Long Beach	The project will have a temporary impact on the city's traffic and transportation infrastructure. (Section 5.12.2 and 5.12.4)
City of Seal Beach Municipal Code	Requires an overload permit for vehicles or vehicle combinations exceeding statutory limitations (as to size, weight, and loading of vehicles) on city roadways.	City of Seal Beach	The project will conform to these sections in the municipal code. (Section 5.12.1.2 and 5.12.7)
Circulation Element of the City of Seal Beach General Plan	Specifies long-term transportation planning goals and policies in the City of Seal Beach.	City of Seal Beach	The project will have no significant impact on the city's traffic and transportation infrastructure. (Section 5.12.2 and 5.12.4)

5.12.5.2 State LORS

- CVC Sections 13369, 15275, and 15278 address the licensing of drivers and classifications of licenses required to operate particular types of vehicles.
- CVC Section 32100.5 addresses the transportation of hazardous materials that pose an inhalation hazard. Aqueous ammonia, a regulated substance, will be delivered to the facility and transported in accordance with this section by following the designated access routes, as described in Section 5.12.2.4.
- CVC, 13 CCR Section 1160, et seq. provides the CHP with authority to adopt regulations for the transportation of hazardous materials in California. The CHP can issue permits and specify the route for hazardous material delivery.
- California Street and Highways Code (S&HC), Sections 660, 670, 1450, 1460 et seq., 1470, and 1480, regulate right-of-way encroachment and granting of permits for encroachments on state and county roads.
- S&HC Sections 117 and 660–711 and CVC Section 35780 et seq., require permits to transport oversized loads on county roads. S&HC Sections 117 and 660 to 711 require permits for any construction, maintenance, or repair involving encroachment on state highway rights-of-way. CVC Section 35780 requires approval for a permit to transport oversized or excessive loads over state highways.
- California State Planning Law, Government Code Section 65302, requires each city and county to adopt a General Plan, consisting of seven mandatory elements, to guide its physical development. Section 65302(b) requires that a circulation element be one of the mandatory elements.
- All construction in the public right-of-way will need to comply with the *Manual on Uniform Traffic Control Devices* (Federal Highway Administration, 2009).
- Caltrans weight and load limitations for state highways apply to all state and local roadways. The weight and load limitations are specified in CVC Sections 35550 to 35559. The following provisions, from the CVC, apply to all roadways and are therefore applicable to this project.
- General Provisions:
  - The gross weight imposed upon the highway by the wheels on any axle of a vehicle shall not exceed 20,000 pounds and the gross weight upon any one wheel, or wheels, supporting one end of an axle, and resting upon the roadway, shall not exceed 10,500 pounds.
  - The maximum wheel load is the lesser of the following: (a) the load limit established by the tire manufacturer, or (b) a load of 620 pounds per lateral inch of tire width, as determined by the manufacturer's rated tire width.
- Vehicles with Trailers or Semi-trailers:
  - The gross weight imposed upon the highway by the wheels on any one axle of a vehicle shall not exceed 18,000 pounds and the gross weight upon any one wheel, or wheels, supporting one end of an axle and resting upon the roadway, shall not exceed 9,500 pounds, except that the gross weight imposed upon the highway by the wheels on any front steering axle of a motor vehicle shall not exceed 12,500 pounds.

5.12.5.3 Local LORS

This section reviews compliance with all relevant local LORS without regard to their applicability as a matter of law. These LORS include the following:

- Los Angeles County has permit authority for county roadways and some local jurisdictions to authorize the movement of vehicles or vehicle combinations exceeding statutory limitations (as to size, weight,

and loading of vehicles) per Division 15 of the CVC and Los Angeles County Code; Chapter 16.22 Moving Permits.

- The City of Long Beach's Municipal Code Section 10.41 requires a special permit for overweight vehicles (greater than 80,000 pounds, but no more than 95,000 pounds). The permit allows for travel on designated streets, and special conditions may be imposed. It may include restrictions on the number of trips, seasonal or time limitations, security, damage, and other provisions.
- The City of Long Beach's Municipal Code Section 10.40 allows trucks to continue along nondesignated through routes if they are going directly to a business for deliveries/pickups.
- The City of Long Beach Transportation Element, which is a part of the City of Long Beach General Plan, sets LOS D or better for all city streets and intersections.
- The City of Seal Beach Circulation Element, which is a part of the City of Seal Beach General Plan, sets LOS D or better for all city streets and intersections.
- The City of Seal Beach Municipal Code Section 8.10.135 requires an oversize vehicle permit for vehicles, mobile equipment or loads that weigh or measure in excess of the weight, width, height, or length permitted by the CVC.

5.12.6 Agency Contacts

Table 5.12-13 lists the agency contacts related to traffic and transportation.

TABLE 5.12-13
Agency Contacts for Traffic and Transportation

Issue	Agency	Persons Contacted
Transportation Permit for Oversized Loads	Caltrans	Eric Gunn Transportation Permits Office 1823 14th Street Sacramento, CA 95811 (916) 322-4116
Hazardous Material Transportation License	CHP	Liz Silva Hazardous Material Licensing Program (916) 843-3445
Transportation Permit for Oversized or Overweight Loads	Los Angeles County	Department of Public Works Transportation Permitting Desk 900 South Fremont Avenue, 8th Floor Alhambra, CA 91803 (626) 458-3126
Overweight Vehicle Special Permit	City of Long Beach	Wing Ma Department of Public Works, Traffic and Transportation Bureau 333 West Ocean Boulevard, 10th floor Long Beach, CA 90802 (562) 570-6676
Overweight Vehicle Permit	City of Seal Beach	Department of Public Works 211 8th Street Seal Beach, CA 90740 (562) 431-2527

5.12.7 Permits and Permit Schedule

Table 5.12-14 lists the permits related to traffic and transportation and the permit schedule. The vehicles used to transport heavy equipment and construction materials will require transportation permits when they exceed the size, weight, width, or length thresholds set forth in Section 35780 of the CVC, Sections 117 and 660-711 of the S&HC, and Sections 1411.1 to 1411.6 of the CCR. Affected vehicles will be required to obtain transportation permits from Caltrans, Los Angeles County, the City of Long Beach, City of Seal Beach, and any other affected agency.

TABLE 5.12-14

Permits and Permit Schedule for Traffic and Transportation

Permit	Agency Contact	Schedule
Single/annual-trip transportation permit for oversized loads and oversized vehicles	Eric Gunn Caltrans Transportation Permits Office 1823 14th Street Sacramento, CA 95811 (916) 322-4116	Obtain when necessary, 2-day processing time (single trip) to 2 weeks (annual trip).
Hazardous Materials Transportation License	Liz Silva California Highway Patrol Hazardous Material Licensing Program (916) 843-3445	Obtain when necessary, approximately 2-week processing time.
Transportation Permit	Los Angeles County Public Works Transportation Permitting Desk (626) 458-3126	Obtain when necessary, approximately 2-week processing time.
Oversize Vehicle and Haul Route Permits	Wing Ma City of Long Beach Department of Public Works, Traffic and Transportation Bureau 333 West Ocean Boulevard, 10th floor Long Beach, CA 90802 (562) 570-6676	Obtain when necessary, approximately 1-week processing time.
Oversize Vehicle Permit	City of Seal Beach Department of Public Works 211 8th Street Seal Beach, CA 90740 (562) 431-2527	Obtain when necessary, approximately 2-week processing time.

Transport route arrangements would be required with Caltrans and CHP officials for permitting and escort, as applicable. Transportation of hazardous materials to and from AEC will be conducted in accordance with CVC Section 31303.

5.12.8 References

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Linscott, Law, and Greenspan. 2010. *Second + PCH Development Project Traffic Impact Analysis*. April.

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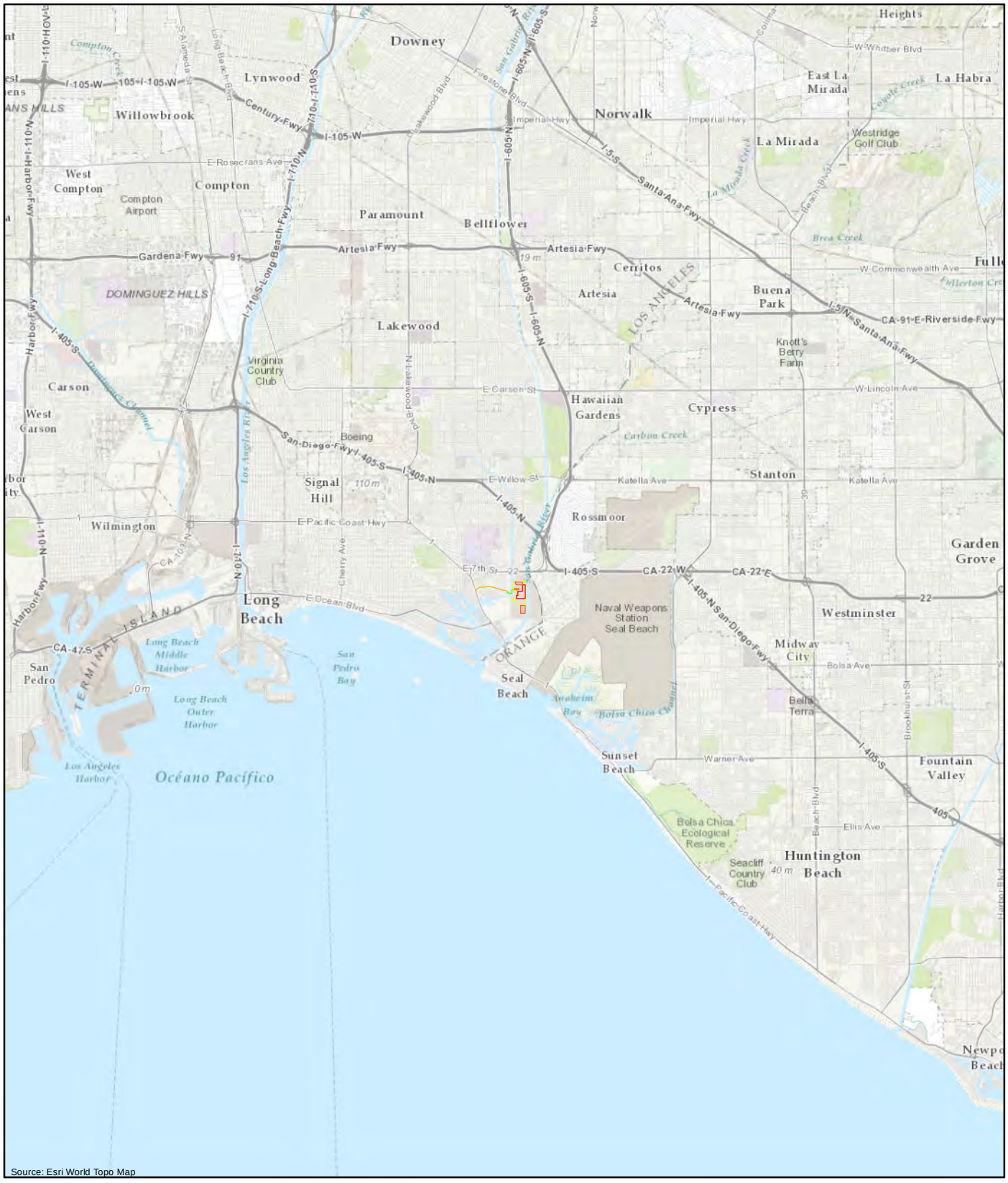


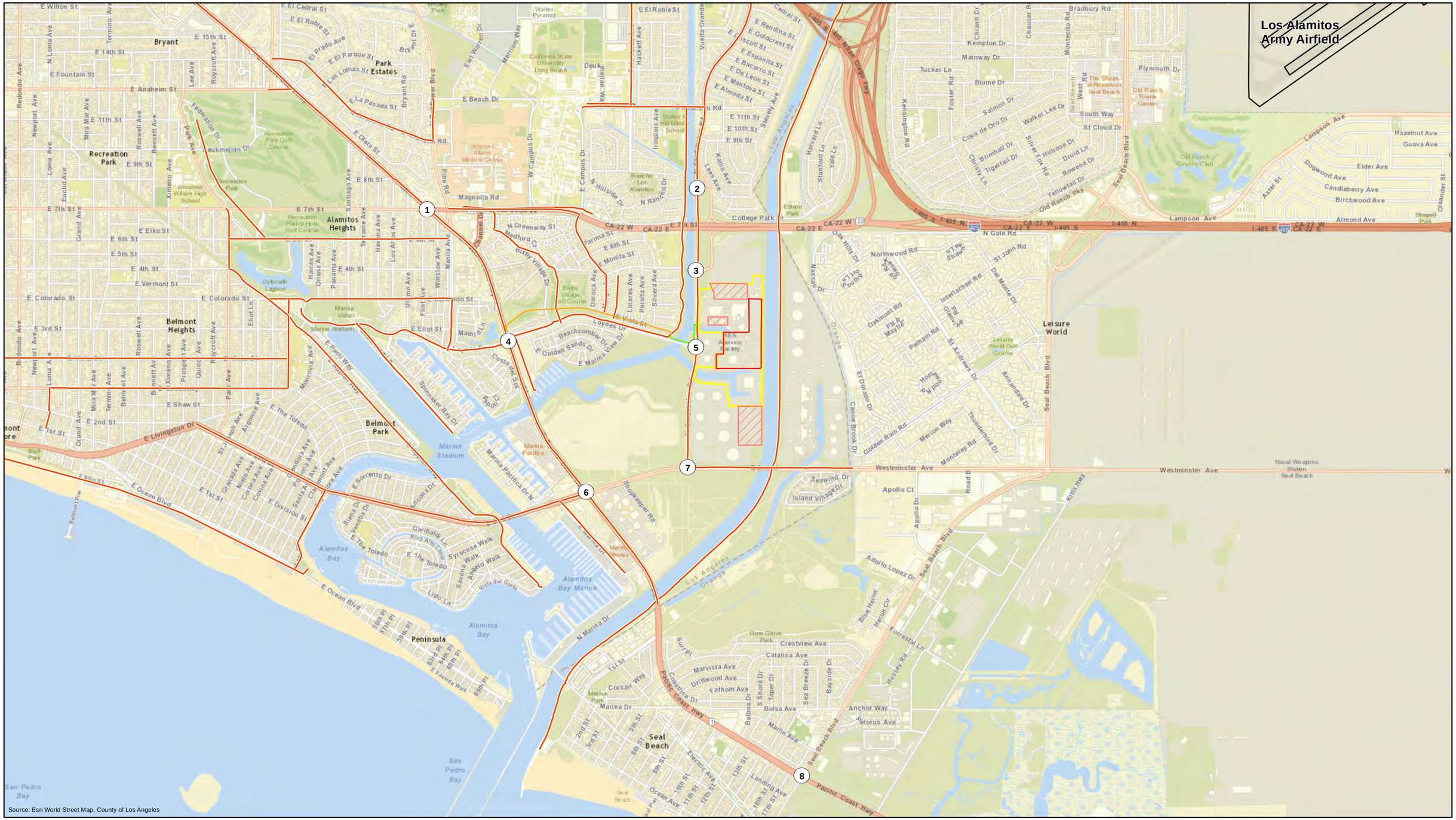
Legend

- AGS Boundary
- AEC Site
- Parking/Laydown Construction Area
- Proposed New Process/Sanitary Wastewater Pipeline to First Point of Interconnection
- Potential Sewer Upgrade

0 1.5 3 Miles

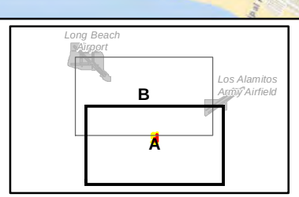
N

FIGURE 5.12-1
Regional Road Network
Alamitos Energy Center
Long Beach, California
October 2015



Legend

- AGS Boundary
- AEC Site
- Parking/Laydown Construction Area
- Proposed New Process/Sanitary Wastewater Pipeline to First Point of Interconnection
- Potential Sewer Upgrade
- Bikeway
- (#) Study Intersection



0 2,000 4,000 Feet

N

FIGURE 5.12-2a
Local Transportation Network
Alamitos Energy Center
Long Beach, California
October 2015

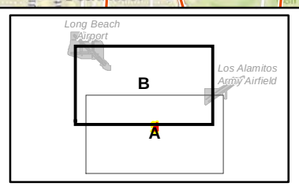
CH2MHILL

Y:\AESCORP\491232DISCPHASEREP\AFC_ARCHIVE\AEC\GIS\ALAMITOS\MAPFILES\TRANSPORTATION\FIG5_12-2_AEC_LOCAL_TRANS_20151020.MXD MD013761 10/20/2015 4:01:06 PM

Source: Esri World Street Map, County of Los Angeles

Legend

- AGS Boundary
- AEC Site
- Parking/Laydown Construction Area
- Proposed New Process/Sanitary Wastewater Pipeline to First Point of Interconnection
- Potential Sewer Upgrade
- Bikeway
- (#) Study Intersection



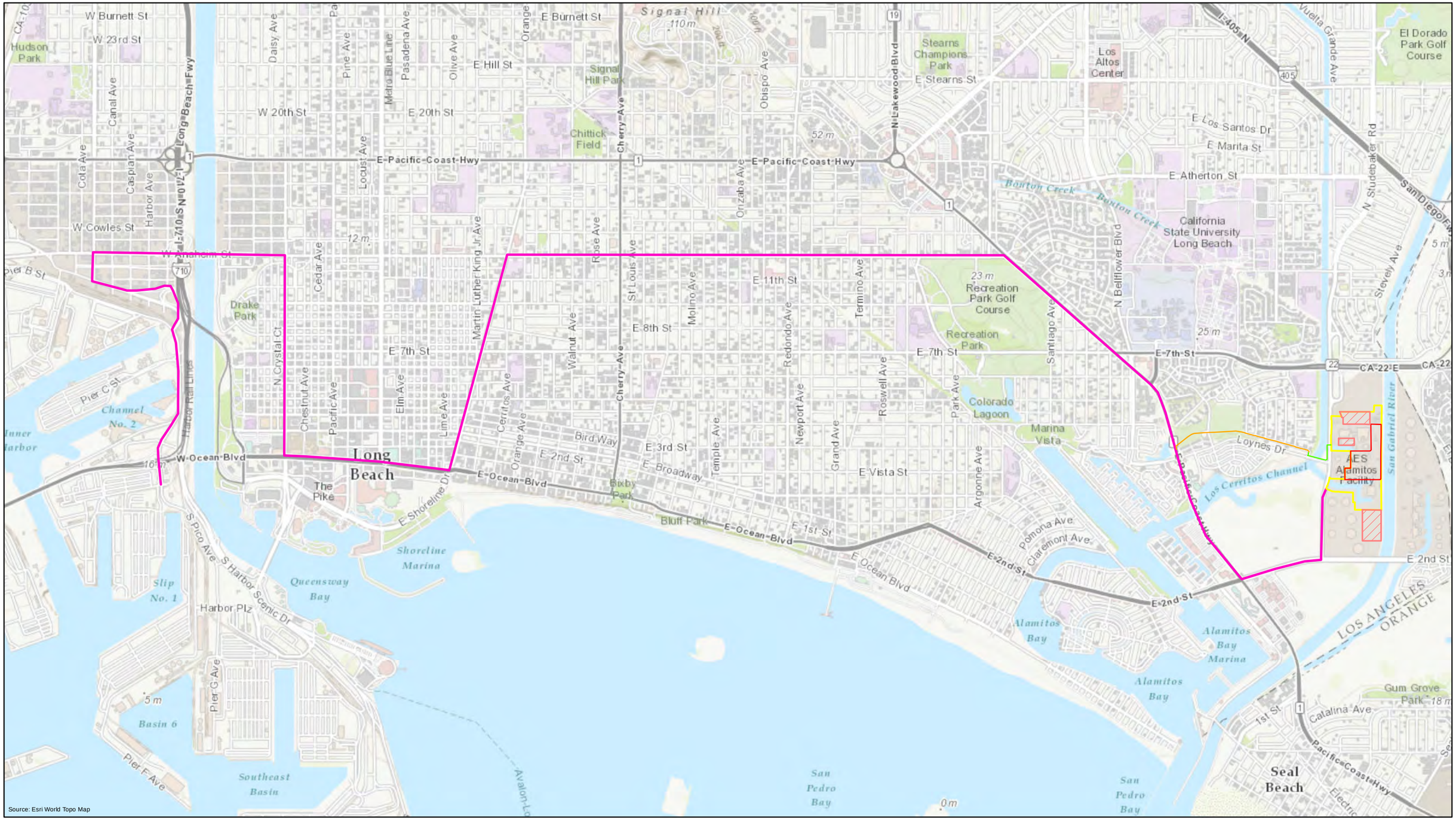
0 2,000 4,000 Feet

N

FIGURE 5.12-2b
Local Transportation Network
Alamitos Energy Center
Long Beach, California
October 2015

CH2MHILL

Y:\AESCORP\491232DISCPHASEREP\AFC_ARCHIVE\AEC\GIS\ALAMITOS\MAPFILES\TRANSPORTATION\FIG5_12-2_AEC_LOCAL_TRANS_20151020.MXD MD013761 10/20/2015 4:01:06 PM



Legend

- AGS Boundary
- AEC Site
- Parking/Laydown Construction Area
- Route
- Proposed New Process/Sanitary Wastewater Pipeline to First Point of Interconnection
- Potential Sewer Upgrade

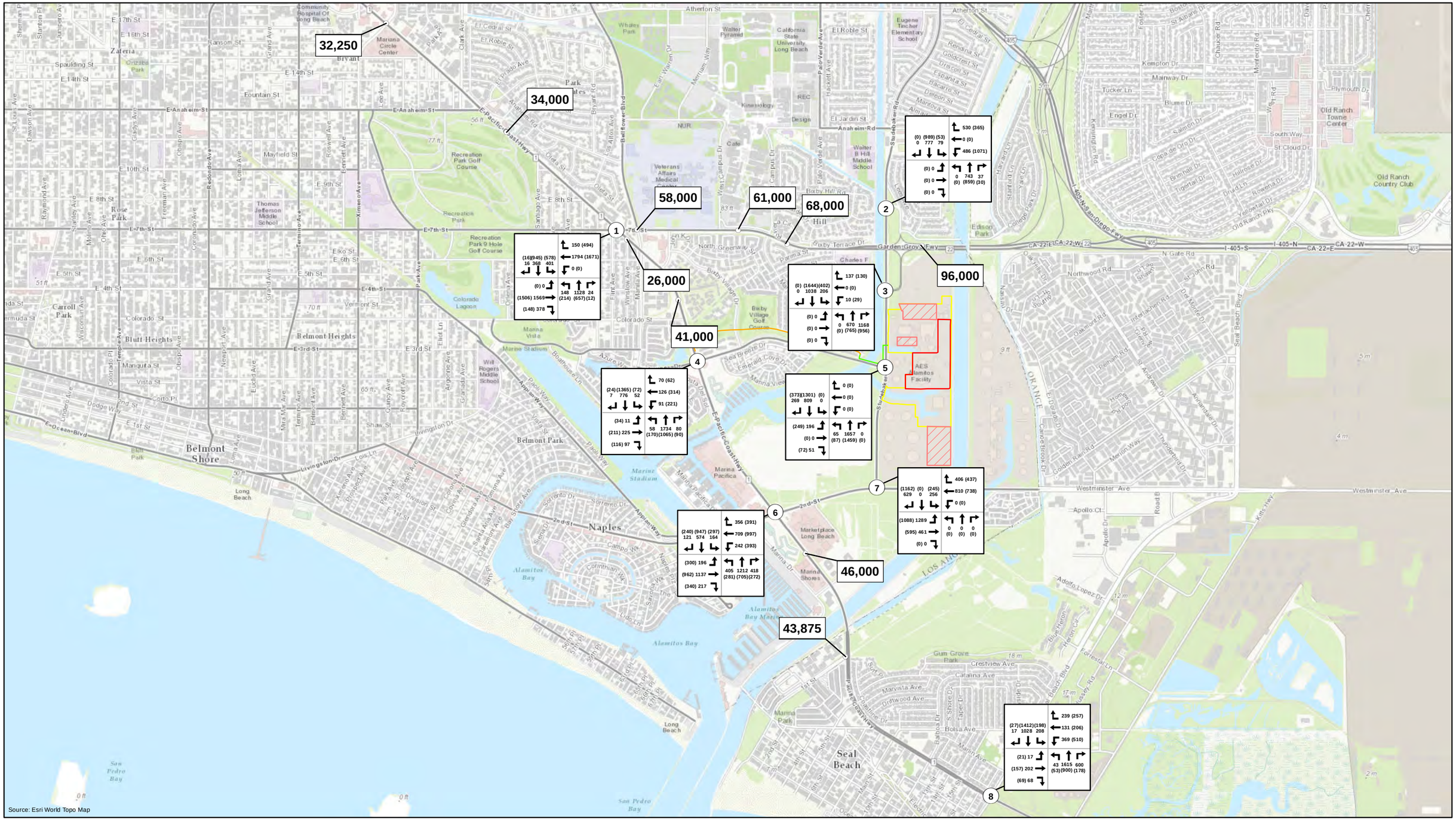
0 2,500 5,000 Feet

N

FIGURE 5.12-3
Heavy Haul Route
Alamitos Energy Center
Long Beach, California
October 2015

CH2MHILL

Y:\AESCORP\491232DISCPHASEREP\AFC_ARCHIVE\AEC\GIS\ALAMITOS\MAPFILES\TRANSPORTATION\FIG5_12-3_AEC_HEAVYHAUL_20151020.MXD MD013761 10/20/2015 4:02:39 PM



Legend

- AGS Boundary
- AEC Site
- Parking/Laydown Construction Area
- Proposed New Process/Sanitary Wastewater Pipeline to First Point of Interconnection
- Potential Sewer Upgrade
- Peak Hour Volume/PM Peak hour Volume shown in ( )
- XX Average Daily Traffic

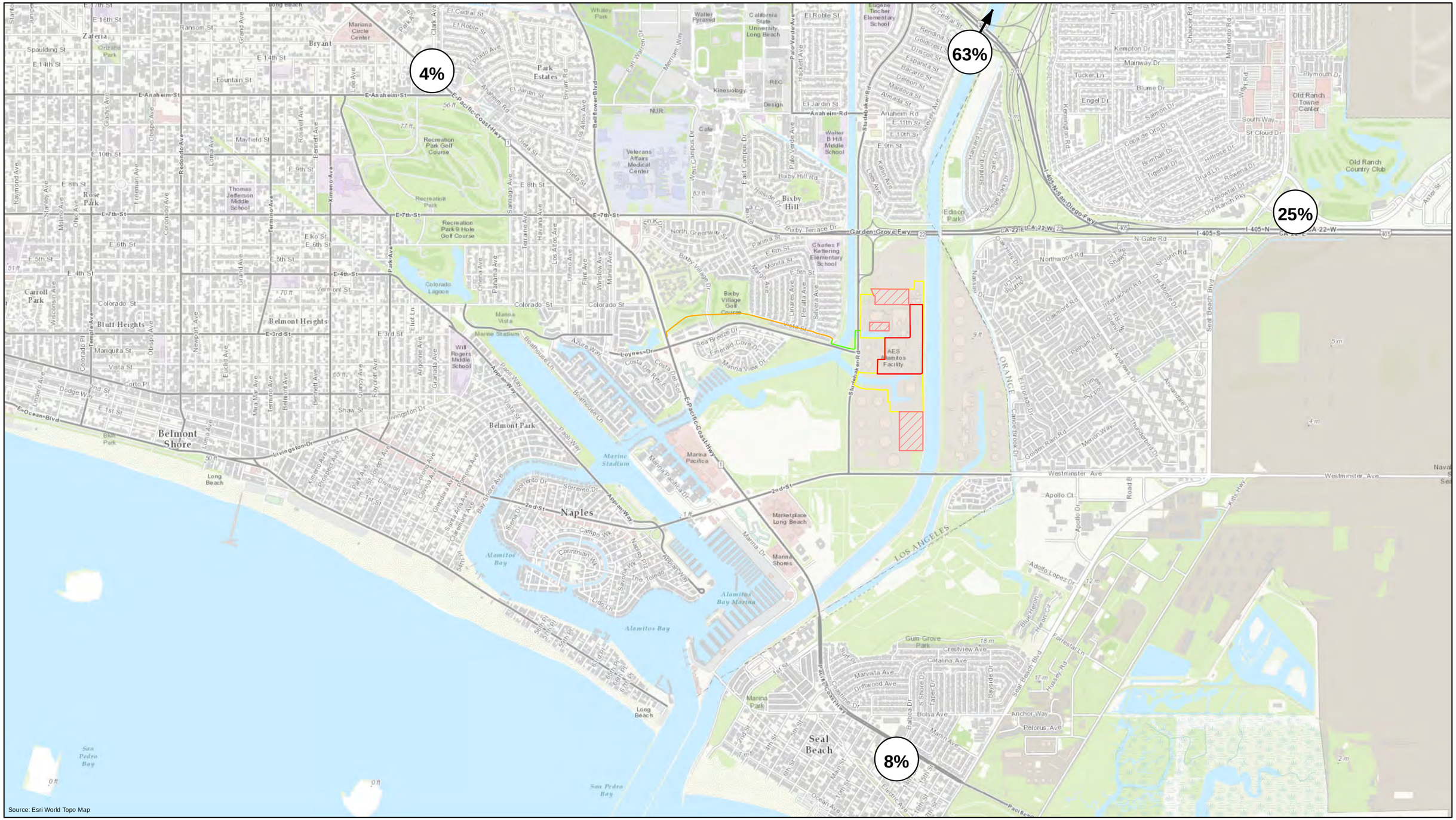
0 2,000 4,000 Feet

N

FIGURE 5.12-4
Existing Average Daily Roadway Volumes and Peak Hour Intersection Volumes
Alamitos Energy Center
Long Beach, California
October 2015

CH2MHILL

Y:\AESCORP\491232DISCPHASEREP\AFC_ARCHIVE\AEC\GIS\ALAMITOS\MAPFILES\TRANSPORTATION\FIG5_12-4_AEC_EXISTING_AV_DAILY_PEAK_HR_20151020.MXD MD013761 10/20/2015 4:20:11 PM



Legend

- AGS Boundary
- AEC Site
- Parking/Laydown Construction Area
- Proposed New Process/Sanitary Wastewater Pipeline to First Point of Interconnection
- Potential Sewer Upgrade

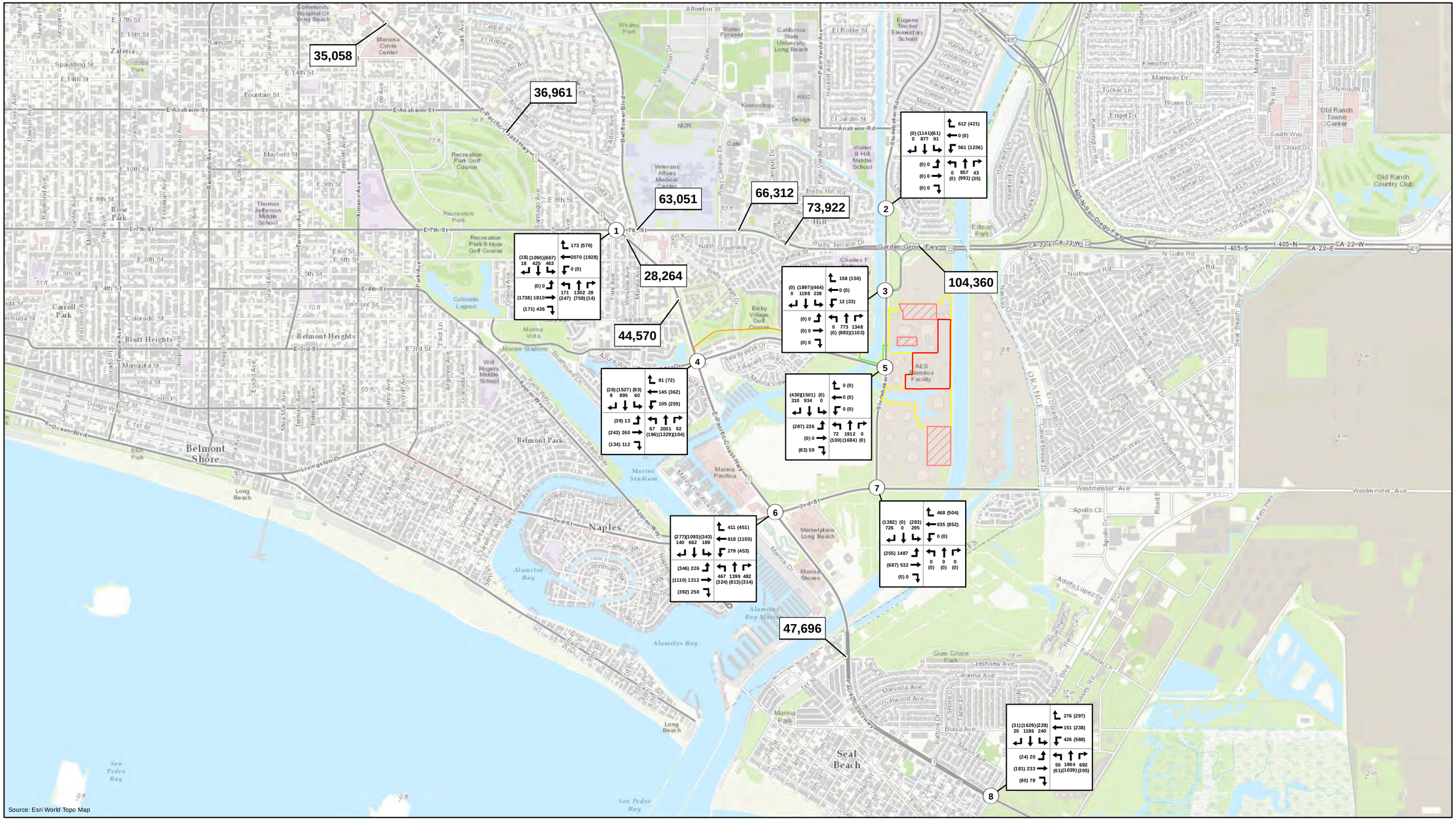
0 2,000 4,000 Feet

N

FIGURE 5.12-5
Project Trip Distribution
Alamitos Energy Center
Long Beach, California
October 2015

CH2MHILL

Y:\AESCORP\491232DISCPHASEREP\AFC_ARCHIVE\AEC\GIS\ALAMITOS\MAPFILES\TRANSPORTATION\FIG5_12-5_AEC_PROJ_DISTR_20151020.MXD MD013761 10/20/2015 4:26:30 PM



Legend

- AGS Boundary
- AEC Site
- Parking/Laydown Construction Area
- Proposed New Process/Sanitary Wastewater Pipeline to First Point of Interconnection
- Potential Sewer Upgrade
- Peak Hour Volume/PM Peak hour Volume shown in ( )
- XX Average Daily Traffic

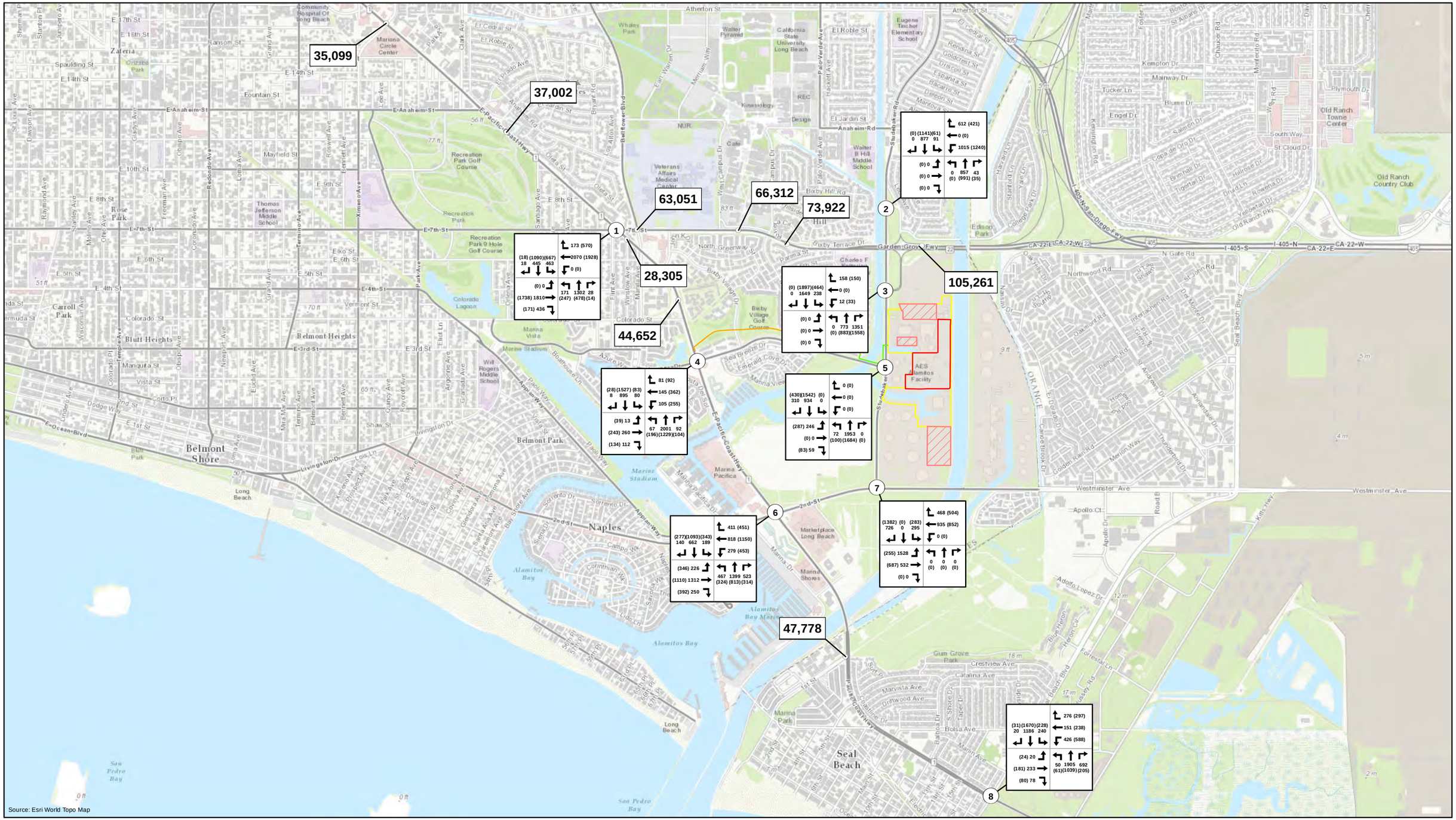
0 2,000 4,000 Feet

N

FIGURE 5.12-6
2021 Average
Daily Roadway Volumes and
Peak Hour Intersection Volumes
Alamitos Energy Center
Long Beach, California
October 2015

CH2MHILL

Y:\AESCORP\491232DISCPHASEREP\AFC_ARCHIVE\AEC\GIS\ALAMITOS\MAPFILES\TRANSPORTATION\FIG5_12-6_AEC_2021_AV_DAILY_PEAK_HR_20151020.MXD MD013761 10/20/2015 4:23:55 PM



Legend

- AGS Boundary
- AEC Site
- Parking/Laydown Construction Area
- Proposed New Process/Sanitary Wastewater Pipeline to First Point of Interconnection
- Potential Sewer Upgrade
- ← Peak Hour Volume/PM Peak hour Volume shown in ( )
- XX Average Daily Traffic

0 2,000 4,000 Feet

N

FIGURE 5.12-7
2021 Average + Project Daily Roadway Volumes and Peak Hour Intersection Volumes
Alamitos Energy Center
Long Beach, California
October 2015

CH2MHILL

Y:\AESCORP\491232DISCPHASEREP\AFC_ARCHIVE\AEC\GIS\ALAMITOS\MAPFILES\TRANSPORTATION\FIG5_12-7_AEC_2021_AV_DAILY_PEAK_HR_20151020.MXD MD013761 10/20/2015 4:47:37 PM

5.13 Visual Resources

Visual resources are the natural and cultural features of the environment that can be seen and that contribute to the public's enjoyment of the environment. Visual resource or aesthetic impacts are generally defined in terms of a project's physical characteristics and potential visibility, and the extent that the project's presence would change the visual character and quality of the environment in which it would be located.

This section was prepared following California Energy Commission (CEC) guidelines for preparing visual impact assessments for Applications for Certification (AFC). Section 5.13.1 documents the visual conditions that currently exist in the Alamitos Energy Center (AEC) area. Section 5.13.2 discusses the potential environmental effects as they relate to visual resources. Section 5.13.3 discusses the potential cumulative impacts of this and other projects in the area. Section 5.13.4 summarizes the mitigation measures proposed to reduce AEC impacts on visual resources. Section 5.13.5 describes the laws, ordinances, regulations, and standards (LORS) relevant to visual resources. Section 5.13.6 lists agencies involved and agency contacts, and Section 5.13.7 discusses permits. Section 5.13.8 lists the references used in preparation of this section.

Figures 5.13-1 and 5.13-2 show the location of the AEC site and the locations of the viewpoints referenced in this section. Four views that provide representative views looking toward the AEC site from sensitive viewing areas were selected as key observation points (KOPs) that were used for preparation of simulations and analysis of AEC visual effects. The existing views and simulated views of the AEC from the viewpoints selected as KOPs appear in Figures 5.13-3 through 5.13-6. In addition, four existing condition character views, presented in Figures 5.13-7 through 5.13-10, are included to provide a further understanding of the AEC site's existing appearance and its relationship to its context. All figures are provided at the end of this section.

5.13.1 Affected Environment

5.13.1.1 Introduction

AES Alamitos Energy, LLC (AES) proposes to construct, own, and operate the AEC—a natural-gas-fired, air-cooled, combined-cycle and simple-cycle, electrical generating facility in Long Beach, Los Angeles County, California. The proposed AEC will have a nominal generating capacity of 1,040 megawatts (MW).[52] The AEC will be located on an approximately 21- acre site within the approximately 71-acre AGS parcel.

The AEC SCGT power block will contain four stacks which will be 80 feet tall. The AEC CCGT power block will have two stacks reaching 140 feet tall. The auxiliary boiler stack will be 80 feet tall. Instead of boilers, the AEC will have HRSGs, which will be approximately 90 feet high. The AEC's air-cooled condenser will be approximately 104 feet high. The AEC's aboveground features will have placement within the existing AGS boundaries, with the majority of structures situated on the eastern edge. A total of four stacks and six transformers (inclusive of auxiliary and CTG step-up transformers) associated with the northern SCGT power block will be sited in a way that parallels the San Gabriel River. The CCGT power block's three stacks and five transformers (inclusive of auxiliary and STG and CTG step-up transformers) will be located near the center of the AEC site.

Construction of the AEC will require the use of laydown areas (approximately 8 acres) dispersed throughout the existing approximately 71-acre AGS parcel) and an approximately 10-acre laydown area located adjacent to the south of the existing AGS parcel. In addition, a temporary construction access road may be constructed offsite beginning at the intersection of Studebaker Road and Loynes Drive traveling southeast to the AEC site.

[52] Referenced to site ambient average temperature conditions of 65.3 degrees Fahrenheit (°F) dry bulb and 62.7°F wet bulb temperature without evaporative cooler operation.

5.13.1.2 Regional Setting

The AEC site is located in the southeastern area of Long Beach, southeast of the intersection of State Route (SR) 22 (7th Street) and Studebaker Road. The site is part of a zone along the San Gabriel River, one mile long and 0.6 mile wide, visible in the air photo map on Figure 5.13-1 that has, historically, been devoted to energy production. On Figure 5.13-1, the boundaries of the AES site are outlined in red, and the boundaries of the AGS site within which it is located are outlined in yellow. The area to the north of the AGS site is occupied by a large SCE 230 kV switchyard. The area to the south of the AGS site between Studebaker Road and the San Gabriel River is occupied by the large Plains West Coast Terminals Alamitos Tank Farm petroleum storage facility. Directly to the east of the AES/AGS sites, the Los Angeles Department of Water and Power (LADWP) Haynes Steam Generating Station stretches a mile along the east bank of the river. The AGS and the LADWP Haynes Station have been generating power in this zone along the river for approximately 60 years. The landscape in this zone is one that is completely dominated by large energy generation and transmission infrastructure (Figures 5.13-6a and 5.13-8), giving it a distinctive character as a landscape of energy. The open marsh lands seen on the air photo to the south and to the southwest of the AGS site and the tank farm are historic oil production areas where oil wells continue to operate, reinforcing the role of this zone as an energy production landscape.

Although the area along the San Gabriel River has been long established as a zone of energy production, this has not prevented residential development from taking place in nearby areas. The area across Studebaker Road and the Cerritos Channel to the west of the AGS site has been developed with single family residential subdivisions, including the area known as University Park Estates, which is located due west of the AGS site. To the immediate east of the LAWP Haynes Station, a large area between Highway 22 and Westminster Avenue has been developed as Leisure World, a community of single story multi-unit residences for those 55 and older. Recreational activities also take place within and in the vicinity of this power production zone. Bicycle paths that are a part of the San Gabriel River Bike Trail are located on the banks on both sides of the segment of the San Gabriel River that passes between the AGS and AEC sites and the LADWP Hanes Station. In addition, the west side of the Cerritos Channel, located across Studebaker Road from the AGS sites has been established as a park strip through which Long Beach Bikeway Route 10 travels.

There are no officially designated state scenic highways near the AEC. The Pacific Coast Highway (PCH; Highway 1), located approximately 0.7 mile west at its closest point, is listed as an eligible state scenic highway (Caltrans, 2015).

A portion of the southernmost portion of the AEC CCGT and the southern lay down area are within a coastal plan area that has specific requirements related to visual resources that are applicable to the AEC; the City of Long Beach Local Coastal Program (LCP), implemented pursuant to the California Coastal Act, is applicable to these portions of the AEC. Policies and requirements related to visual resources in the LCP, including the City of Long Beach South East Area Development and Improvement Plan (SEADIP) Specific Plan are discussed in detail in Section 5.13.5.2.

The AEC site, including the routes of the offsite wastewater pipeline and access road, lie within areas that are designated L (Mixed Use) within the City of Long Beach General Plan. As mentioned previously, the AEC is located within the specific planned development known as SEADIP of the General Plan and LCP. Specifically, within the SEADIP the AEC is located within Subarea 19, which is designated for industrial use. All applicable policies and the AEC's consistency with these policies are discussed in Section 5.13.5.

5.13.1.3 Project Site

The AEC aboveground equipment (CTGs, air-cooled condenser, etc.) will be located within the approximately 21-acre AEC site which lies within the boundaries of the AGS.

At present, the existing AGS contains six operating generating units with six prominent stacks and massive scaffold-covered boiler structures. The existing stacks are all over 200 feet tall, have a whitewashed appearance, and are unsystematically arranged. Four stacks are tightly oriented along the same line of sight

while two stacks are set along a line at right angles to the first four and appear visually separated in the landscape. The massive and visually dominant existing boilers range from 121 to 155 feet in height. The majority of the existing AGS aboveground structures are located along the northern and eastern edges of the site.

The AEC site includes land that, until recently, was owned by others and was formerly part of the AGS site and used as a tank farm by the original owners, Southern California Edison. The tanks were removed in 2010, prior to AES purchasing of the site. AES has merged the eastern half of the former tank farm parcel into the larger AGS parcel.

Structures on the properties immediately adjacent to the AEC site include the existing SCE switchyard infrastructure to the north and petroleum storage tanks associated with Plains West Coast Terminals Alamitos Tank Farm to the south.

Two new single-circuit overhead transmission lines will be installed onsite to connect the step-up transformers to the existing SCE 230-kV switchyard. See AFC Sections 2.0 and 3.0 for additional information on the AEC's interconnection to the electrical grid and transmission of electricity generated. All other linear appurtenances (natural gas and potable water), with the exception of the proposed offsite process/wastewater pipeline, will connect to infrastructure already associated with the AEC.

5.13.1.4 Construction Laydown Areas and Access Road

Temporary construction facilities will include approximately 8 acres of land that lie within the fence line of the AGS but outside of the boundaries of the AEC site, which have been allocated for laydown, storage and parking. Designated laydown areas will be located west-northwest of the proposed power blocks which are situated on the eastern and southern portions of the site. One additional temporary laydown area will be located on the adjacent property to the south and encompass approximately 10 acres. In addition, a temporary construction access road will be constructed offsite beginning at the intersection of Studebaker Road and Loynes Drive traveling southeast to the AEC site. The access road will be constructed across the portion of the former tank farm site fronting along Studebaker Road.

5.13.1.5 Sensitive Viewing Areas and Key Observation Points

To structure the analysis of the AEC's effects on visual resources, the AEC's viewshed was determined. The viewshed is the area surrounding a project from which the project is, or could be, visible to viewers based on topography, vegetation, and the built environment. The AEC viewshed analysis was conducted using geographic information system (GIS) software to generate an understanding of the AEC's visibility in the area that extends up to 3 miles from the AEC site. The analysis took into account the maximum heights of the proposed AEC structures (140-foot height of the proposed combined-cycle unit's HRSG stacks) and surrounding topography to identify locations where the AEC facilities would theoretically be visible via an unobstructed or partial line-of-sight. This analysis considers the extent to which topography would block views of AEC facilities, but does not take into account the potential screening effects of existing buildings and vegetation. Results of the viewshed analysis are presented in Figure 5.13-2, which indicates the areas within 3 miles of the AEC site in which the AEC facilities would have the potential to be visible, as well as areas where views of the facilities would be blocked by topography. Utilizing the viewshed analysis, areas within the viewshed that would be the most sensitive to the AEC's potential visual impacts and the sensitive receptors in those areas were identified prior to the site visit.[53]

During field work conducted from February 2012 through January 2015 CH2M HILL staff visited potentially sensitive receptor locations located throughout the study area and photo-documented the existing visual conditions. CH2M HILL reviewed the views from the inventory of viewpoints captured within the study area and selected four views as KOPs to be used for evaluating AEC visual effects. Three of the KOPs chosen for

[53] Typically, residents and recreationists are considered to be sensitive receptors to changes in the landscape. This is because of the potential for effects to their long-term views or their enjoyment of a particular landscape or activity.

this analysis were selected in consultation with CEC staff to represent the best viewing conditions from major areas of viewer sensitivity including Channel View Park / Long Beach Bikeway Route 10, University Park Estates, and Marine Stadium Park. A fourth view, from Loynes Drive, was added to provide an understanding of the appearance of the AEC CCGT power block and ACC

Figures 5.13-1 and 5.13-2 indicate the location of each viewpoint relative to the AEC site. Figure 5.13-1 is presented on an aerial base map and shows AEC components and the locations of the KOPs and the character views. Figure 5.13-2 identifies the AEC viewshed, the locations of the KOP and character views, and the locations of streets, and roads. Figures 5.13-3 through 5.13-6 represent the existing view from each KOP and a simulation of what the view would look like with the AEC in place. Figures 5.13-7 through 5.13-10 represent character views that provide an understanding of the relationship of the AEC site to its context. All figures are located at the end of this section.

Based on the observations made in the field and review of photographs, CH2M HILL staff documented and evaluated the existing visual conditions of the views from each of the four KOPs. Assessments of existing visual conditions were made based on application of the approach to landscape evaluation that is a part of the methodology for visual impact assessment developed by the Federal Highway Administration (FHWA, 1988) that is described in Section 5.13.2.1. The baseline existing conditions seen in the views from each of the four KOPs are described below.

KOP 1—View from Channel View Park / Long Beach Bikeway Route 10. Figure 5.13-3a depicts the view from KOP 1, which is located within Channel View Park along Long Beach Bikeway Route 10, west of Los Cerritos Channel and Studebaker Road, which is immediately west of the AEC site. KOP 1 is located approximately 0.18 mile to the northwest of the AGS entrance. The view from KOP 1 represents a recreationalist view within and traveling though Channel View Park along Long Beach Bikeway Route 10, a designated Class I (off-road) bike path (City of Long Beach, 2013c). This viewpoint also approximates the view from within the adjacent single-family residential development, University Park Estates, as well as Kettering Elementary School, which is immediately adjacent to the west of the park.

The visual quality of the view from KOP 1 is moderately low. Despite the view's greenbelt and coastal inlet visual character, as evidenced by the channelized water and palm trees, the backdrop consists entirely of an industrial landscape with the prominent existing AGS. The existing stacks and scaffolding-covered boiler are the most vivid features in the center of the view, with all six AGS stacks skylined above the treetops and utility infrastructure resulting in a moderately low level of intactness. Los Cerritos Channel in the foreground of the view is subordinate to the backdrop of the existing AGS plant beyond. Horizontal and vertical human-made elements create a coherent composition consistent with a highly urbanized area, producing a moderately low level of unity.

The AEC site, which is located behind the trees and the large AGS boilers, is not visible from this viewpoint. Viewer sensitivity is high because views from this area are seen from a park, a bike trail, the adjacent single-family residential neighborhood, and Kettering Elementary School.

KOP 2—View from University Park Estates. Figure 5.13-4a depicts the view from KOP 2, which is located within the single-family residential neighborhood of University Park Estates, within 0.2 mile of the western edge of the AEC site. This viewpoint was selected to represent the view from the closest residential development. The view of KOP 2 at Silvera Avenue, looking east down Eliot Street, provides prominent views of the existing AGS above rooftops in the immediate center foreground.

The visual quality of the view from KOP 2 is moderately low. The view from KOP 2 provides a snapshot of an established residential community with 1960s architecture which is offset by the prominence of the existing AGS and less-prominent transmission structures visible beyond. The existing AGS stacks and the boiler with exposed scaffolding which are visible over the rooftops of residences, constitute discordant industrial elements in this residential view. The human-made features of the electricity generation and residential

development appear as inconsistent in form and color, resulting in a view that possesses a moderately low degree of overall unity.

Because this view is seen from a residential neighborhood, the level of visual sensitivity is high.

KOP 3—View from Marine Stadium Park. Figure 5.13-5a depicts the view from KOP 3, which is located in Alamitos Bay at the easternmost edge of Marine Stadium Park near the intersection of East Appian Way and Bay Shore Avenue in Long Beach, approximately 1.2 mile southwest of the AEC site. This viewpoint represents the view from an area of heavily used recreational waterways and a shoreline recreational area. Though recreationists can enjoy various marine activities, Marine Stadium is most notably known for being a location for water skiing and rowing. This viewpoint also approximates the view from the northeastern edges of the adjacent Belmont Park and Naples neighborhoods. The specific viewpoint looks down the Los Cerritos Channel at the convergence of where the inlet empties into Alamitos Bay and which provides relatively open views toward the existing AGS. Thus, the view from KOP 3 toward the AEC site is seen by recreationists and residents looking northeast toward the AEC site.

The visual quality of the view from KOP 3 is moderately low. The bay views, as evidenced by the channelized waterway, boats, and docks along the waterway are the most vivid features in the view. The existing AGS stacks and associated large scaffold-covered boilers as well as the adjacent LADWP power plant stacks and boilers visible across the horizon are visually prominent elements in the view. The human-made features of both power plant facilities are recognizable as regionally unique structures in the area, although this energy generation infrastructure creates discordant forms with the existing maritime elements in terms of form and size.

Given the use of this area for active recreational activities, the visual sensitivity of this view is moderately high.

KOP 4—View from Loynes Drive. Figure 5.13-6a depicts the view from KOP 4, which is located on the bridge over Los Cerritos Channel along Loynes Drive within 0.2 mile of the western edge of the AEC site. This viewpoint was selected to provide a full view of the AEC CCGT from a location seen by a large number of viewers. The view from KOP 4 provides prominent views of the existing AGS in the immediate foreground and Los Angeles Department of Water and Power Haynes Generating Station in the background. The area seen in the center of the view, behind the blue tank, is a former tank farm site from which the tanks have been removed. The eastern two thirds of the tank farm site has been incorporated into the AEC site, while the western third of the site fronting Studebaker Road is not owned by AES, and is zoned to permit future industrial development.

The visual quality of the view from KOP 4 is low. The view from KOP 4 represents a motorist' view traveling along Loynes Drive, a designated neighborhood connector, toward Studebaker Road, a designated major avenue (City of Long Beach, 2013c). This viewpoint also approximates the view from the edge of the single-family residential development, University Park Estates, immediately adjacent to the north of Loynes Drive. The view from KOP 4 provides a panoramic view dominated by the prominence of the existing AGS and less-prominent but equally discordant LADWP structures visible beyond. The existing AGS whitewashed stacks and boilers with exposed scaffolding add distinct elements of visual interest to the overall landscape. The combination of vertical forms (stacks, transmission structures, and light poles) with horizontal forms (bridge, fencing, riprap, transmission lines, and roadway) extend from the foreground to middleground which constitute discordant industrial elements in this view. The human-made electric generation facilities appear along the horizon as well as above the horizon in no apparent order spanning the entire view creating a low level of intactness. The overall level of visual quality of this view is low.

Visibility of the AGS from this location is high with unimpeded line of sight toward the AEC. A small vegetative buffer along the AEC site perimeter along Studebaker Road partially blocks lower level views of the AGS from the street level. The number of viewers are moderate given the moderate levels of traffic on Loynes Drive, and the duration of views would be moderately low, resulting in a generally moderate to

moderately low degree of viewer exposure In light of these factors, the visual sensitivity of this view is moderately low.

5.13.1.6 Character Views

In response to a request from CEC staff, four additional views (Character View 1 through Character View 4), were prepared to provide a better understanding of the existing features on the AEC site and the role they play in views from the surrounding area. The locations of these views are indicated in Figures 5.13-1 and 5.13-2, and photographs of the existing views from these locations are presented in Figures 5.13-7 through 5.13-10. No simulations for these character views were requested, and therefore these views are not evaluated in the assessment of visual effects presented in Sections 5.13.2.4.1 through 5.13.2.4.3, given that KOPs 1-4 provide representative views for this analysis. Brief characterizations of the views from these areas are provided below.

Character View 1—View from Leisure World. Figure 5.13-7 depicts a view from Character View 1, a high-density retirement community located due east of the AEC across the Los Angeles River beyond the existing LADWP generating facility. This view is located approximately 0.3 mile from the closest point from the eastern edge of the AEC site. It was selected to represent a worst-case street-level view from within the gated senior community as well as approximate views from the western portion of the city of Seal Beach directly east of the AEC site. The existing AGS facilities are secondary elements in the view that do not dominate the scene. Rather, the stacks and power blocks at the LADWP Haynes Generating Station, which are immediately adjacent to Leisure World to the west, are the dominating elements in the view, while the AGS stacks are smaller and more distant elements. Although the AEC site occupies an area in the distance behind most of the foreground elements in this view the AEC would have little or no effect on this view because the AEC's features will be considerably shorter and less bulky than the AGS stacks and boilers now visible in this view.

Character View 2—View from Westminster Boulevard. Figure 5.13-8 depicts a view from Character View 2, a view from 2nd Street (also known as Westminster Boulevard), located across the street from the access road to the LADWP Haynes Generating Station. This view is located approximately 0.45 mile from the closest point from the southeastern edge of the AEC site. This view is one that is now completely dominated by large-scale infrastructure, including existing AGS boilers and stacks, stacks associated with the LADWP generating station, large electric transmission structures, and the channelized San Gabriel River. At the far left edge of the photograph, the view encompasses a corner of the vacant lot immediately south of the AGS site and adjacent to the San Gabriel River that will be used as a construction laydown area. Behind this viewpoint, on the south side of Westminster Boulevard, is a small gated residential development known as Island Village. This residential development, which lies on the Long Beach side of the Long Beach/Seal Beach border line, consists of a mixture of approximately 200 one- and two-story residences. Views from this residential development toward the power plant complexes on the north side of Westminster Boulevard/2nd Street are limited by the fact that Island Village is located approximately 15 feet below the elevation of the road, it is surrounded by walls and dense landscaping, and the development is dense and inward-oriented. With development of the AEC, this view will remain generally similar in appearance to what is seen now because the AEC elements will be considerably shorter, less bulky, and less cluttered appearing than the elements that are most visible in the view now, and the existing AGS structures will continue to be the most dominant features of the view.

Character View 3—View from PCH Bridge over Los Cerritos Channel

Figure 5.13-9 depicts an elevated and unobstructed view of the AEC site from Character View 3, which looks northeast from the PCH (Highway 1) Bridge over Los Cerritos Channel. This view is located approximately 0.8 mile west-southwest from the closest point from the western edge of the AEC site. The view from Character View 3 represents a motorist's view from a designated regional corridor (City of Long Beach, 2013c) as well as a recreationalists' view within the waterway. The Los Cerritos Channel provides boaters' access to Los Alamitos Bay, which flows directly into the Pacific Ocean. The existing AGS units combined with

the LADWP units are co-dominant features in the landscape, spanning across the entire view. This view provides a contextual understanding of the AEC site as a small area that is set within a much larger zone that is intensively developed with electric generation facilities. Character View 4—View from Bixby Hill

Figure 5.13-10 depicts a view toward the AEC site from North Hill Drive near Sherri Lane within Bixby Hill, a gated single-family residential development. The view from Character View 4 is located at a higher elevation approximately 0.73 mile northwest of the AEC site. This view was selected to represent a worst-case view from within the gated residential community, specifically approximating views from second-story residences with potential views oriented toward the AEC site. It is estimated that approximately 20 residences located along the southern perimeter of the neighborhood adjacent to 7th Street would likely have a worst-case view of the AEC site from any second-story views oriented toward the AEC. In this view, the tips of a few existing LADWP stacks are visible, though they are less dominant than the portions of the AGS stacks visible above and through the treeline in the center of the view. The existing AGS facilities are secondary elements of the scene. The relative visual dominance of these features is reduced by the presence of residential structures and vegetation framed in the foreground view. With the substantially reduced heights of the proposed AEC exhaust stacks and power blocks, the AEC facilities will be less visible (if visible at all) in this view than the stacks that can now be seen, resulting in no visual impacts from the AEC.

5.13.2 Environmental Analysis

5.13.2.1 Analysis Procedure

This analysis of the visual resource issues associated with the AEC, was prepared in accordance with the visual impact assessment system developed by the FHWA in *Visual Impact Assessment for Highway Projects* (FHWA, 1988). The FHWA invested considerable resources in developing and implementing of this method. As a result, it is robust and widely used to provide systematic evaluations of visual change.

The FHWA method addresses the following primary questions:

- What are the visual qualities and characteristics of the existing landscape in the project area?
- What are the potential effects of the project's proposed alternatives on the area's visual quality and aesthetics?
- Who would see the project, and what is their likely level of concern about or reaction to the way the project visually fits within the existing landscape?

Applying the FHWA method entails the following six steps:

1. Establish the project's area of visual influence.
2. Determine who has views of and from the project ("viewer").
3. Describe and assess the landscape that exists before project construction ("affected environment").
4. Assess the response of viewers looking at and from the project, before and after project construction ("viewer sensitivity or concern").
5. Determine and evaluate views of the project for before and after project construction (simulations).
6. Describe the potential visible changes to the project area and its surroundings that would result from the project.

The initial step in the evaluation process was the review of planning documents applicable to the AEC area to gain insight into the type of land uses intended for the general area, and the guidelines given for the protection or preservation of visual resources. Consideration was then given to the existing visual setting within the AEC viewshed, which is defined as the geographical area in which the AEC can be seen. As described in Section 5.13.2.1, a GIS analysis was conducted to identify the areas within 3 miles of the AEC site in which the AEC would have the potential to be visible. Site reconnaissance was conducted to view the site and surrounding area, identify potential KOPs, and take representative photographs of existing visual

conditions. The photographs used as the basis for preparing the simulations were taken with a single-lens reflex digital camera set to take photographs with a focal length equivalent to that of photographs taken with a 35-millimeter (mm) camera with a 50-mm lens (view angle 40 degrees). Photographs from the site reconnaissance were selected to represent the "before" conditions from each of the potential KOPs. Within the viewshed area, four KOPs were selected to be used as the basis for analysis of the AEC's visual effects. The existing visual conditions seen in the views from each of the KOPs were evaluated using the FHWA visual quality assessment system that entails use of a numerical rating system.

The FHWA visual quality assessment asks: Is this particular view common or dramatic? Is it a pleasing composition (a mix of elements that seem to belong together) or not (a mix of elements that either do not belong together or contrast with the other elements in the surroundings)? Under the FHWA visual quality analysis system, the visual quality of each view is evaluated in terms of its vividness, intactness, and unity:

- Vividness is defined as the degree of drama, memorability, or distinctiveness of the landscape components. Overall vividness is an aggregated assessment of landform, vegetation, water features, and human-made components in views.
- Intactness is a measure of the visual integrity of the natural and human-built landscape and its freedom from encroaching elements. This factor can be present in well-kept urban and rural landscapes, as well as in natural settings. High intactness means that the landscape is free of unattractive features and is not broken up by features and elements that appear out of place. Low intactness means that visual elements that are unattractive and/or detract from the quality of the view can be seen.
- Unity is the degree of visual coherence and compositional harmony of the landscape considered as a whole. High unity frequently attests to the careful design of individual components and their relationship in the landscape or refers to an undisturbed natural landscape.

Each of these dimensions of visual quality is documented using an FHWA rating sheet, and for each of these dimensions, a numerical rating score on a scale from 1 to 7 is assigned, where a score of 1 indicates very low visual quality, a score of 4 indicates moderate or average visual quality, and a score of 7 indicates very high visual quality. The scores for each of these three dimensions are added and then averaged to generate an overall visual quality score.

The views from each of the four viewpoints selected as KOPs for this analysis are described and the results of the FHWA-based evaluation of their visual quality are documented in Sections 5.13.1.5.1 through 5.13.1.5.4.

To provide a basis for evaluating the AEC's impacts on these views, visual simulations were produced to illustrate the "after" visual conditions from each of the KOPs. Computer modeling and rendering techniques were used to produce the simulated images of the views of the site as they would appear after development of the AEC. Existing topographic and site data provided the basis for developing an initial digital model. The AEC engineers provided site plans and digital data for the proposed generation facility, and site plans and elevations for the components of the AEC transmission interconnection to the existing SCE 230-kV switchyard. These data were used to create three-dimensional (3-D) digital models of these facilities. These models were combined with the digital site model to produce a complete computer model of the generating facility and transmission system. These simulation images represent the AEC's appearance after completion of construction of the AEC structures on the AEC site located near the existing AGS infrastructure. These simulations provide the viewer with a clear image of the location, scale, and visual appearance of the AEC. The images are accurate within the constraints of the available site and project data. The final "hardcopy" visual simulation images that appear in this AFC document were produced from the digital image files using a color printer. The "before" site photographs are included for each KOP in Figures 5.13-3 through 5.13-6 along with the "after" visual simulations.

Based on review of the simulated with-project views from each KOP, the visual quality of each view was re-evaluated using the FHWA visual quality evaluative system. The results of the evaluations of the existing

and with project views from each KOP are documented on the FHWA worksheets that are attached as Appendix 5.13A. The evaluations of the existing and with-project views were compared to determine the degree of visual change. Based on the assessment of the degree of visual change that the development of the project would bring about and an evaluation of the sensitivity of the view, overall determinations of visual impact were made and were expressed in terms of the impact level (very low to very high).

Once all effects were examined, a determination was made as to whether any potential impacts would reach a level that would be significant under the four California Environmental Quality Act (CEQA) Guidelines checklist questions discussed in Section 5.13.2.2.

5.13.2.2 Impact Evaluation Criteria

The following criteria from the CEQA Guidelines were considered in determining whether a visual impact would be significant.

The CEQA Guidelines define a "significant effect" on the environment to mean a "substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project including objects of historic or aesthetic significance" (14 CCR 15382).

Factors used to evaluate the significance of project-related visual impacts are set forth in Appendix G of CEQA. Appendix G is a screening tool, not a method for setting thresholds of significance. Appendix G is typically used in the Initial Study phase of the CEQA process, asking a series of questions. The purpose of these questions is to determine whether a project requires an Environmental Impact Report, a Mitigated Negative Declaration, or a Negative Declaration. As the Governor's Office of Planning and Research stated, "Appendix G of the Guidelines lists a variety of potentially significant effects, but does not provide a means of judging whether they are indeed significant in a given set of circumstances." The answers to the Appendix G questions are not determinative of whether an impact is significant or less than significant. Nevertheless, the questions presented in CEQA Appendix G are instructive.

Appendix G of the CEQA Guidelines, under Aesthetics, lists the following four questions to be addressed regarding whether the potential impacts of a project are significant:

1. Would the project have a substantial adverse effect on a scenic vista?
2. Would the project substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a State Scenic Highway?
3. Would the project substantially degrade the existing visual character or quality of the site and its surroundings?
4. Would the project create a new source of substantial light or glare that would adversely affect day or nighttime views in the area?

5.13.2.3 Project Appearance

For the purposes of this analysis, and to orient the viewer, Figure 5.13-1 shows the relationship between the proposed AEC equipment within the footprint of the existing AGS in the larger landscape in which it would be located. The existing AGS will remain intact while AEC infrastructure will be integrated and constructed to the east as part of the AEC development. Offsite linear construction consists solely of a new sanitary/process wastewater pipeline as part of the project.

Project Structures and Dimensions. The AEC facilities are described in detail in Section 2.0, Project Description. Figure 2.1-2 shows the general arrangement and layout of the AEC features on the site, and Figures 2.1-3a through 2.1-3d provide typical elevation views. Table 5.13-1 summarizes the dimensions, finishes, and materials of the generating facility's major features. The exteriors of major project equipment will be treated with a neutral gray or tan finish to optimize its visual integration with the surrounding environment. As it currently exists, the AEC is an unfenced area within the AGS boundaries, which is surrounded by a chain-link fence.

TABLE 5.13-1

Approximate Dimensions and Colors, Materials, and Finishes of the Major AEC Features

Feature	Length (feet)	Width (feet)	Height (feet)	Diameter (feet)	Color	Materials	Finish
Combined-cycle Power Block							
Administration Building	100	50	25	—	Tan		Flat / Untextured
Water Treatment Building	75	70	20	—	Tan	Ribbed Sheet Steel	Flat / Untextured
Warehouse Building	100	60	25	—	Tan	Ribbed Sheet Steel	Flat / Untextured
Gas Compressor Building	100	62	25	—	Tan	Ribbed Sheet Steel	Flat / Untextured
Air Cooled Condenser	299	211	104	—	Gray	A-36 Steel Shapes	Flat / Untextured
Demin Water Storage Tank	—	—	25	28	Gray	A-36 Steel	Flat / Untextured
Steam Turbine and Generator	90	33	62	—	Gray	A-36 Steel Plate	Flat / Untextured
STG Step-Up Transformer	28	16	25	—	Gray	Mild Steel Plate	Flat / Untextured
Combustion Turbine	56	25	29	—	Gray	Steel	Flat / Untextured
Combustion Turbine Generator	37	18	28	—	Gray	Steel	Flat / Untextured
Air Inlet Filter	45	25	40	—	Gray	Custom Steel Shape	Flat / Untextured
Fuel Gas Filter/Separator	11	11	22	—	Gray	Custom Steel Shape	Flat / Untextured
Generator Breaker	19	15	28	—	Gray	Mild Steel Plate	Flat / Untextured
CTG Step-Up Transformer	30	23	25	—	Gray	Custom Steel Shape	Flat / Untextured
HRSG	139	57	95	—	Gray	A-36 Steel Plate	Flat / Untextured
Stack	—	—	140	20	Gray	A-36 Steel Plate	Flat / Untextured
Blowdown Tank	—	—	20	9	Gray	A-36 Steel	Flat / Untextured
Auxiliary Boiler and Associated Equipment	40	41	38	—	Gray	Ribbed Sheet Steel	Flat / Untextured
Air Cooled Heat Exchanger	81	56	35	—	Gray	Mild Steel Plate	Flat / Untextured
Waste Water Tank	—	—	25	28	Gray	A-36 Steel	Flat / Untextured
Condensate Tank	—	—	25	28	Gray	A-36 Steel	Flat / Untextured
Transformer Wall	50	40	28	—	Untinted	Concrete	Flat / Untextured
Acoustical Barrier	262	182	35	—	Untinted	Concrete	Flat / Untextured
Single-Cycle Power Block							
Fin Fan Cooler	151	130	32	—	Gray	A-36 Steel Shapes	Flat / Untextured

TABLE 5.13-1

Approximate Dimensions and Colors, Materials, and Finishes of the Major AEC Features

Feature	Length (feet)	Width (feet)	Height (feet)	Diameter (feet)	Color	Materials	Finish
Combined-cycle Power Block							
Site Fence	—	—	7	—	Gray	Steel	Flat / Untextured
Combustion Turbine	60	20	15	—	Gray	Steel	Flat / Untextured
Combustion Turbine Generator	28	22	28	—	Gray	Steel	Flat / Untextured
Air Inlet Filter	48	35	14	—	Gray	Custom Steel Shape	Flat / Untextured
Fuel Gas Compressors	42	27	18	—	Gray	Ribbed Sheet Steel	Flat / Untextured
Intercooler Skid	50	31	14	—	Gray	Structural Steel Shape	Flat / Untextured
Stack	—	—	80	13.5	Gray	A-36 Steel Plate	Flat / Untextured
SCR	37	23	38	—	Gray	Mild Steel Plate	Flat / Untextured
Combustion Turbine VBV Silencer Stack	—	—	48	11	Gray	A-36 Steel Plate	Flat / Untextured

Transmission Interconnection. Two new, single-circuit, onsite 230–kV transmission interconnection lines will connect the AEC power blocks to the existing SCE 230-kV switchyard adjacent to the north. No new offsite transmission connections are required. The effects of any visible features related to this interconnection are discussed below as applicable in the analysis of the visual effects resulting from the AEC as a whole. For additional information on the transmission lines, see Section 3.0, Transmission System Engineering.

Construction Laydown Area. AEC will utilize areas outside of the AEC site but within the existing AGS boundary for temporary construction facilities. These areas will include approximately 8 acres of land within the fence line of the AGS site which have been allocated for laydown, storage and parking. Ten acres of offsite laydown area adjacent to the southern boundary of the AGS parcel will also be utilized as a laydown area. An approximately 775-foot temporary construction access road is being considers and included in this assessment if rights can be secured by the Project Owner (see Figure 2.1-1). The major generating equipment part of the AGS, including steam turbines, generators, boilers, and duct work, will be retained. In addition, the water treatment building, maintenance/warehouse building, administration building, water tanks, car port, fire water pump, and metering station will remain intact. Designated laydown areas will be located west-northwest of the proposed eastern Power Block 1. A new administrative building and water treatment building are situated in the southwestern areas of the AEC site. Construction-related vehicle traffic will access the AEC site from two access points along Studebaker Road, one at the intersection of Loynes Drive and the other at the secured entry to further to the north. As detailed in Section 2.2, construction activities at the AEC site are anticipated to last 51 months. Construction materials and large equipment (turbines, generators, transformers, and HRSG modules), trucks, and parked vehicles could be temporarily visible on the site, although views toward these areas from outside of the AEC site are mostly screened by intervening vegetation and perimeter fencing. After construction is complete, all debris would be removed from these laydown areas and the access road.

Landscaping. The existing AGS is currently screened by a chain-link security fence around the entire perimeter, with a security entrance located along Studebaker Road. Long stretches of linear fencing are apparent fronting Studebaker Road as well as the eastern perimeter of the AGS site located along the San Gabriel River. Fencing is also located on AGS' northern boundary, adjacent to the SCE switchyard, and southern boundary adjacent to the Plains West Coast Terminals Alamitos Tank Farm and undeveloped/vacant land. Zones of dense plantings lie along AGS' western perimeter, near the security entrance, along Studebaker Road. In addition, dense screening plantings are located on the northern side of the SCE switchyard, which obscure views to the AGS and AEC site. To the east of and outside of the existing AGS is the San Gabriel River Bike Trail, which is situated atop a low-lying vegetated berm. Views toward the AEC site from the northeast, east, and southeast are partially limited because of the AEC's location at an elevation below the berm. Because the AGS property within which the AEC site is located is already screened and landscaped, no additional screening walls or landscaping are being proposed.

Lighting. The power plant may be operational (although not necessarily generating power) 24 hours per day, 7 days per week and would require night lighting for safety and security. The lighting system will provide illumination for operation under normal conditions, for safety under emergency conditions, and for manual operations during a power outage. The system will also provide 120-volt convenience outlets for portable lamps and tools.

To reduce offsite lighting impacts, lighting for the AEC will be restricted to areas required for safety and operation. Exterior lights will be hooded and directed onsite to minimize light or glare. Low-pressure sodium lamps and fixtures of a non-glare type will be specified. In addition, switched lighting circuits will be provided for areas where lighting is not required for normal operation or safety to allow these areas to remain dark at most times and to minimize the amount of lighting potentially visible offsite.

Construction will typically take place between the hours of 7 a.m. and 7 p.m., Monday through Friday, and 9 a.m. to 7 p.m. on Saturdays. Additional hours may be necessary to make up schedule deficiencies or to complete critical construction activities (for example, pouring concrete at night during hot weather, working around time-critical shutdowns and constraints). During the commissioning and startup phase of each power block, the typical work hours will remain the same; however, some activities may continue 24 hours per day, 7 days per week.

At times when onsite construction occurs during hours of darkness, lighting will be used on an as-needed basis to illuminate the areas where the construction is taking place. This lighting will be the minimum required to meet operational and safety requirements and will be shielded and directed at the areas, pointing toward the center of the site, where it is required to eliminate offsite light spill and illumination of the night sky.

MOU With the City of Long Beach Regarding of Demolition of Existing Units 1-6. Owing to the critical need for generating capacity at the AGS site at all times, existing Units 1 through 6 will remain in operation through much of the AEC development and construction. Given the land available, the need for regulatory approval before the existing AGS can be taken out of service, and the fact that the existing Units 1-6 do not need to be removed to enable the construction of the AEC, the existing power plant will not impede construction of AEC. The City and Project Owner have entered into a Memorandum of Understand (MOU) for the demolition of the existing units. Demolition of Units 1-6 will be conducted in accordance with the MOU once all necessary regulatory approvals to retire and decommission the existing units are received. The MOU provides certainty for the public that the existing AGS units will removed after the AEC is constructed and operating. The assessment of visual effects presented in Section 5.13.2.4 below does not consider the demolition of facilities on the AGS property that may occur after the AEC is constructed.

5.13.2.4 Assessment of Visual Effects

As previously noted, the systematic evaluation of visual effects from the AEC was conducted using FHWA worksheets, which are attached as Appendix 5.13A and provide fuller details regarding the comparison between existing and simulated views as summarized below. Figures 5.13-3 through 5.13-6 include the

existing view from the viewpoint (referred to in Section 5.13.1.5) and a simulation of the same view during the AEC's operational period, with existing components of the existing AGS intact.

KOP 1—View from Channel View Park/Long Beach Bikeway Route 10. Figure 5.13-3a presents the existing view toward the AGS from Channel View Park/Long Beach Bikeway Route 10 and Figure 5.13-3b presents a simulation of the same view as it will appear during the AEC's operational period. As shown in the simulated view of the AEC, an assemblage of AGS structures, tanks, and stacks located across the foreground of the view will remain intact. The features of the proposed AEC would be screened by the existing AGS and intervening vegetation, and would not be visible. The AEC will not be the dominant feature, rather the existing AGS development, with the skyline remaining the same in the view from this location. Overall, the AEC will result in no change to the visual quality of this view. This assessment is supported by the analysis documented on the FHWA worksheet, which indicates a visual quality score which remains the same. KOP 2—View from University Park Estates

Figure 5.13-4a presents a photograph of the existing view toward the AGS from the single-family residential development of University Park Estates at Silvera Street, looking east down Eliot Street and Figure 5.13-4b presents a simulation of the same view as it will appear during the AEC's operational period. When the AEC is constructed, two new stacks will be partially visible above the rooftops in the right side of the view and solid blocky forms are barely detectable through the intervening AGS infrastructure and vegetative screening in the left portion of the view. The new AEC features will be mostly screened from the view, and the only features that will be seen will be the tops of the two stacks above the rooftops on the right side of the view.

As indicated in the FHWA worksheet, there will be a very slight decrease in the overall visual quality of this view. With the addition of the tops of the two AEC stacks to the view, the degree to which power plant structures encroach the view is increased to a minor degree. Overall, with the AEC, there will be a minor decrease in the visual quality of this view However, this change will not change the view's existing moderately low visual quality rating and will not be a significant impact. KOP 3—View from Marine Stadium Park

Figure 5.13-5a presents a photograph of the existing view toward the AEC site from Marine Stadium Park and Figure 5.13-5b shows a simulation of the view as it will appear during the AEC's operational period. As shown in the simulation, two of the six AEC stacks and HRSG units along with an assemblage of structures and stacks of the existing AGS and neighboring LADWP plant will be visible across the far-middleground of the view. The new elements added by the AEC will appear smaller in scale than the features of the existing AGS.

The AEC features will be co-dominant human-made features with the many other objects in the relatively open view across Alamitos Bay up Los Cerritos Channel, and will contribute to the visual mosaic of features of varying in type, scale, color and form. A total of six new AEC stacks will be added to the six taller existing AGS stacks are oriented in an asymmetric design pattern which appear orderly in the far-middleground view. The impact of the new ACC forms combined with the stacks fill in small areas that now appear as open sky, which will slightly reduce the level of visual intactness in the view. The AEC and AGS infrastructure will be in the backdrop of the view from this park and residential area, silhouetted against the sky. The analysis completed using the FHWA worksheet indicates that overall, with the AEC in place, the visual quality of the view will remain the same. With the AEC, the view from KOP 3 will be slightly more unified and intensified by creating a horizontal pattern across the middleground that reinforces the visual cohesion of the view. The AEC will have a low and streamlined profile in the landscape that is consistent with the scale of the landscape's other elements. This positive effect will be counterbalanced by a slight decrease in the intactness of the view created by the introduction of the new structures and stacks in the now-open area seen at the far end of the Los Cerritos Channel.

Overall, with the AEC, the visual quality of the views from KOP 3 will remain the same.

KOP 4—View from Loynes Drive. Figure 5.13-6a presents a photograph of the existing view toward the AEC site from the Loynes Drive bridge over Los Cerritos Channel. Figure 5.13-6b is a simulation of the view as it will appear during the AEC's operational period. As shown in the simulation, four of the six AEC stacks, HRSG units, and ACC along with an assemblage of structures and stacks of the existing AGS will be visible across the foreground of the view. The existing stacks and scaffolding associated with the LADWP Haynes Generating Station will remain partially visible in the view's background.

As indicated in the FHWA worksheet, there will be a small incremental increase in the overall visual quality of this view. The new AEC stacks are measurably lower and its infrastructure more streamlined than the existing AGS structures. The scale and height of the new power plant structures result in a slight increase in the degree of development, reinforcing the moderate level of human-made vividness in the view. With the addition of AEC to the existing AGS structures, though lower in height and more streamlined, the degree in which all these elements encroach the view is slightly increased resulting in a lower level of intactness. The presence of new AEC stacks and HRSG units create a horizontal pattern across the foreground that reinforces the visual unity of the view by creating a more cohesive composition.

Although AEC elements will appear smaller in scale than the existing AGS features, the proposed structures will be co-dominant human-made features in the relatively open view across Loynes Drive emphasizing the overall presence of power generation across the panoramic view. The AEC and AGS infrastructure will be highly visible along Loynes Drive and Studebaker Road, a designated neighborhood connector and major avenue (City of Long Beach, 2013c), respectively in the foreground of the view. The analysis completed using the FHWA worksheet indicates that overall, with the AEC in place, there will be a minor improvement to the visual quality of the view

Light and Glare. The AEC site is located within a completely urbanized area in which street lighting and other infrastructure, including the light and glare produced from the existing AGS and the adjacent LADWP plant, create substantial levels of light in the nighttime landscape. The effect of the AEC on visual conditions in this area during hours of darkness would be to slightly increase the sources of nighttime lighting. Because they are over 200 feet tall, all of the existing AGS stacks are equipped with red flashing aviation safety lights. The exposed stairways and scaffolding on the exteriors of the tall boiler structures are illuminated with bright, unshielded bulbs. The new AEC stacks associated with the AEC CCGT will be 140 feet tall while the stacks for the AEC SCGT will be 80 feet. The AEC structures will be considerably lower than the existing boiler structures, and because their sides will be completely enclosed, without external scaffolding and stairways, there will be little to no need for external lighting. For the most part, external lighting will be restricted to the platforms on the tops of the HRSG structures. Furthermore, to the extent to which lighting is required on or around the AEC structures, it will, unlike the lighting on the 1950s- and 1960s-era facilities, conform to contemporary Dark Skies standards. Consequently, the lighting on the new facilities will be restricted to areas where lighting is required for safety and operation, exterior lights will be hooded, and lights will be directed onsite to minimize glare and light spill off of the site or into the sky.

Low-pressure sodium or light emitting diode lamps and fixtures of a non-glare type will be specified. In addition, switched lighting circuits will be provided for areas where lighting is not required for normal operation or safety to allow these areas to remain dark at most times and to minimize the amount of lighting potentially visible offsite. The lighting associated with the AEC will represent a substantial upgrade compared to existing AGS lighting yet at the same time will minimally contribute to an increase in the overall light and glare produced from the site. Therefore, the degree of nighttime lighting on elevated structures that would be visible from the surrounding community or which could spill into the sky would slightly increase or remain relatively the same. As a consequence, during the operational period, the AEC will have the potential to create a slight increase in the existing levels of light and glare. It is important to note that once the existing AGS generating units are retired (expected by the end of 2020), the AGS nighttime lighting needed for worker safety will no longer be required and will be turned off. At that time, the amount of lighting on the site, even with the lighting required by the AEC, will be less than it is at present.

For the most part, AEC construction is being planned to occur during daylight hours. To the extent that conditions arise that require construction to occur at night, lighting will be required to meet operational and worker safety requirements. When lighting is needed to support nighttime construction activities, to the extent feasible and consistent with worker safety codes, it will be restricted to the minimum required and will be directed toward the center of the construction site and shielded to prevent light from straying offsite. Task-specific construction lighting would be used to the extent practical while complying with worker safety regulations. Despite these measures, there may be limited times during the construction period when the AEC site may appear as a brightly lit area seen in the midst of a now brightly lit area of concentrated electric generation facilities.

Water Vapor Plumes. Visible plumes from power plants (and other sources) form when the mass of water in an exhaust plume exceeds the saturation point of the exhaust gases. The saturation point of air is directly related to its temperature with warm air having a higher saturation point (being able to carry more water in a vapor state) than cold air. When the saturation point is reached, water will condense out of vapor state to a liquid state, forming fine water droplets. These water droplets are visible in an exhaust plume.

AEC will use air-cooled condenser/fin-fan coolers for plant cooling and dry low NOx burners on the combustion turbines, which reduces the potential for visible plume formation. Use of air cooled condensers and fin-fan coolers eliminates the formation of visible plumes from plant cooling equipment (i.e., cooling towers or wet surface air coolers). The use of dry low NOx burners eliminates the introduction of moisture into the combustion air, which reduces plume formation. The simple-cycle turbines will emit exhaust at a temperature of approximately 800 °F with a moisture concentration of approximately eight percent. This combination of temperature and low moisture content will result in negligible visible plume formation. The combined-cycle turbines will emit exhaust at a temperature of approximately 200 °F with a moisture concentration of approximately nine percent. The temperature and low moisture content is expected to result in negligible visible plume formation. The auxiliary boiler will emit exhaust at a temperature between 250 and 315 °F with a moisture concentration of approximately ten percent, which could result in infrequent visible plumes over the range of ambient conditions in the AEC area.

5.13.2.5 Impact Significance

A discussion regarding whether the visual effects of the AEC would be significant pursuant to CEQA is provided below. The assessment of these impacts applies the criteria set forth in Appendix G of the CEQA Guidelines. The CEQA Guidelines define a “significant effect” on the environment to mean a “substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project, including objects of historic or aesthetic significance.” (14 CCR 15382)In terms of project-related aesthetic impacts from construction and operations of the plant, Appendix G, asks, in part, whether the project:

- **Would the project have a substantial adverse effect on a scenic vista?**

  No. There are no designated scenic vista points in the vicinity of the AEC.

- **Would the project substantially damage scenic resources, including, but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?**

  No. Because the AEC site is not located within the boundaries of an adopted state scenic highway, and furthermore does not contain scenic resources, including trees, rock outcroppings, and historic buildings. The AEC will not substantially damage scenic resources and, therefore, impacts will be less than significant.

- **Would the project substantially degrade the existing visual character or quality of the site and its surroundings?**

  No. At present, the AEC site and the zone along the San Gabriel River in which it is located have a visual character that is dominated by large-scale electric generation and transmission facilities. With the

project, there will be little change in the visual quality of the views in this area. As established in the analysis in section 5.13.2.4, with the AEC, there will be no change in the views from KOPs 1 and 3, there will be a very minor and clearly less than significant change to the view from KOP 2, and there will be a slight positive change to the visual quality of the view from KOP 4.

In the period after construction of the AEC is complete and the facility has started operation, implementation of the measures in the Memo of Understanding with the City of Long Beach will result in removal of the stacks, boilers, and other equipment that is currently visible on the AGS site that surrounds the AES site. With removal of the AGS equipment under the provisions of the MOU, the views looking into the AES site from the KOPs and from other locations in the project vicinity will be substantially improved.

- **Would the project create a new source of substantial light and glare that would adversely affect day or nighttime views in the area?**

  No. As described in Section 5.13.2.4.5, with the addition of new AEC structures added to the existing AGS, the overall amount of lighting on the AEC site will slightly increase. The lighting fixtures installed at AES will conform to contemporary standards geared to minimizing offsite light impacts and the potential for the lighting to have an adverse effect on night skies. As a result, the cumulative amount of lighting visible will not be substantially increased from what it is at present. As a consequence, the potential for an increase in ambient lighting conditions in the AEC vicinity, and in skyglow above the AEC site will be limited.

  Because none of the major AEC features will have surfaces that are highly reflective, the AEC will not be a source of daytime glare.

  Any lighting that will be installed to facilitate nighttime construction activities will, to the extent feasible and consistent with worker safety codes, be directed toward the center of the construction site and shielded to prevent light from straying offsite. Task-specific construction lighting will be used to the extent practical while complying with worker safety regulations.

5.13.3 Cumulative Effects

A cumulative impact refers to a proposed project's incremental effect together with other closely related past, present, and reasonably foreseeable future projects whose impacts may compound or increase the incremental effect of the proposed project (Public Resources Code Section 21083; 14 California Code of Regulations [CCR] Sections 15064(h), 15065(c), 15130, and 15355).

The AEC will not contribute to adverse impacts of other projects. As described in Section 5.6.4, Land Use Cumulative Effects, three projects have been identified for consideration as cumulative impacts with the City of Long Beach (Brown, 2015). The 2nd & PCH project is an approximately 11-acre mixed-use development consisting of retail, residential, hotel, restaurant, entertainment and associated parking. The proposed development would be located at the southwest corner of PCH and 2nd Street, approximately 0.75 mile southwest from the AEC. The Project Owner has completed Conceptual Site Plan Review, applied for full Site Plan Review and the Final Environmental Impact Report was released March 2011. Though the Planning Commission approved the plans, Long Beach City Council rejected the plan.

The Lyon Communities project is a vacant 7.01 acre lot currently used for temporary and seasonal businesses including a pumpkin patch and Christmas tree lot. Proposed development at this site includes two restaurant buildings, a bank, a hotel, and associated parking. Located at southeast corner of PCH and Studebaker Road, the site is approximately 0.7 mile south-southwest of the AEC. The project is currently in the Conceptual Site Plan Review stage.

Submission of a formal application with the City is pending for a wetlands mitigation bank. The project consists of Synergy, Pumpkin Patch and Studebaker/Loynes sites. Proposed activities are to establish a mitigation bank on the northerly approximately 76 acres of the 156-acre Synergy Oil Field, implement a wetlands habitat restoration plan, construct public access improvements including trials, parking and visitors

center. In addition, proposed activities involve removal and consolidation of oil extraction operations on Synergy site and shift production activities offsite (in a proposed land exchange agreement) from the Los Cerritos Wetland Authority (LCWA) site (LCWA, 2015).

In addition to the three projects identified in consultations with the City of Long Beach Development Services Department, an additional project now under consideration in the project area is a proposal by AES Energy Storage to develop a 100 MW AES Battery Energy Storage System (BESS). The BESS would be developed in the northern portion of the AGS site in the area that is bounded on the south by the road that extends eastward across the site from the main entrance gate and on the north by the boundary line between the AGS site and the SCE switchyard. At this time, no additional information about this project is publicly available for inclusion in this analysis.

The AEC may contribute to temporary visual impacts associated with construction. This could add cumulatively with other projects that are to be constructed over the same time period. However, cumulative construction-related impacts are not expected because a temporal overlap with the construction periods of the projects listed is considered unlikely.

The AEC will be constructed within the industrial site boundaries of the existing AGS within the surrounding industrial landscape. The incremental effect of the AEC will be to contribute to the overall dominance of an existing power generation in the vicinity, without substantially changing the level of visual quality, and thereby will neither add nor subtract cumulatively to other projects having an impact on visual quality of the area. Therefore, the AEC is not expected to have any cumulatively considerable visual effects in conjunction with any of the projects described above. Therefore, no cumulative impacts are expected.

5.13.4 Mitigation Measures

This analysis has documented that the AEC will not substantially change the existing visual character and quality of the AEC as viewed from any of the KOPs. Furthermore, there would be no substantial adverse effects on any scenic vistas, scenic resources within a state scenic highway, and would not create a new source of substantial light and glare that would adversely affect day or nighttime views in the area. In fact, proposed activities would result in an overall visual quality which would remain the same. Because there will be no significant adverse visual impacts, given the existing conditions and the design features discussed above, no additional mitigation measures are required.

5.13.5 Laws, Ordinances, Regulations, and Standards

This subsection describes the LORS relevant to the visual resource issues associated with the AEC. The AEC site is within the city limits of Long Beach and within the coastal zone. Visual resource and urban design concerns applicable to the AEC are also addressed in the City of Long Beach General Plan, Southeast Area Development and Improvement Plan, and the City of Long Beach Municipal Code. No federal or regional LORS are known that would apply to the AEC's visual resource analysis. Applicable state and local LORS are described below.

5.13.5.1 State LORS

The California Coastal Act and California Scenic Highway Program are state LORS that typically apply to power plant projects in coastal locations.

California Coastal Act. A portion of the AEC is located within the City of Long Beach's coastal zone and is subject to the California Coastal Act. Section 30251 of the California Coastal Act requires that "permitted development shall be sited and designed to protect views to and along the ocean and scenic coastal areas, to minimize the alteration of natural land forms, to be visually compatible with the character of surrounding areas, and, where feasible, to restore and enhance visual quality in visually degraded areas." As described in Section 5.13.2.4, the AEC would result in a positive visual change in the surrounding area. In compliance with the requirements of the Coastal Act, the City of Long Beach prepared an LCP.

As discussed in detail in Section 5.6, Land Use, the LCP was adopted by the Long Beach City Council on February 12, 1980, and certified by the California Coastal Commission (CCC) on July 22, 1980, and now implements the Coastal Act, including Section 30251 through the LCP. The CCC subsequently certified conditions and amendments to the LCP through January 1994. AEC consistency with the California Coastal Act is addressed in the discussion of its consistency with the LCP, which is discussed in greater detail in Section 5.13.5.2.2.

California Scenic Highway Program. The California Scenic Highway Program protects and enhances the natural scenic beauty of California highways and adjacent corridors through special conservation treatment (Caltrans, 2008). A highway may be designated scenic depending upon how much of the natural landscape can be seen by travelers, the scenic quality of the landscape, and the extent to which development intrudes upon the traveler's enjoyment of the view. The status of a proposed state scenic highway changes from eligible to "officially designated" when the local governing body applies to Caltrans for scenic highway approval, adopts a Corridor Protection Program, and receives notification that the highway has been officially designated a Scenic Highway. At present, there are no officially designated state scenic highways near the AEC. The PCH (Highway 1), which is listed as an eligible state scenic highway (Caltrans, 2015), passes through Long Beach in the area south and west of the AEC site and, at its closest point, passes within 0.7 mile of the site. At the point at which the PCH crosses the Alamitos Channel, the AEC site is visible in the view up the channel, at about 0.75 mile in the distance. This is view is Character View 3, and a photograph of the existing view from this location can be seen in Figure 5.13.9. This existing view from PCH is one in which energy generation facilities dominate the view. Because Long Beach has not adopted a Corridor Protection Program for the segment of the PCH in this area of Long Beach and this segment has not been officially designated as a State Scenic Highway, it does not qualify for any special consideration that State Scenic Highway designation might confer.

5.13.5.2 Local LORS

Table 5.13-2 lists the applicable state and local LORS that are pertinent to the AEC and visual resources. In addition to the state plans described previously, the specific provisions of each plan or ordinance that have potential relevance to the AEC are the City of Long Beach General Plan, Southeast Area Development and Improvement Plan (SEADIP), and City of Long Beach Municipal Code Zoning Ordinance, and which are discussed in Sections 5.13.5.2.1, 5.13.5.2.2, and 5.13.5.2.3, respectively.

TABLE 5.13-2
Laws, Ordinances, Regulations, and Standards for Visual Resources

LORS	Requirements/Applicability	Administering Agency	AFC Section Explaining Conformance
California Coastal Act	Section 30251 of the California Coastal Act addresses the protection and, where feasible, enhancement of visual resources and visual quality when permitting a proposed development in the coastal zone. The CCC certified the amended LCP in 1994. With this certification, the LCP, implements the Coastal Act, including Section 30251.	City of Long Beach Development Services	Section 5.13.5.1.1
California Scenic Highway Program	Protects and enhances the natural scenic beauty of California highways and adjacent corridors through special conservation treatment.	California Department of Transportation	Section 5.13.5.1.2
City of Long Beach General Plan	Comprehensive long-range plan to serve as the guide for the physical development of the City of Long Beach.	City of Long Beach Development Services	Section 5.13.5.2.1
City of Long Beach Southeast Area Development and	Specific plan to guide development within the SEADIP subarea within the LCP.	City of Long Beach Development Services	Section 5.13.5.2.2

TABLE 5.13-2

Laws, Ordinances, Regulations, and Standards for Visual Resources

LORS	Requirements/Applicability	Administering Agency	AFC Section Explaining Conformance
Improvement Plan Specific Plan			
City of Long Beach Municipal Code Zoning Ordinance, Title 21	Establishes zoning districts governing land use and the placement of buildings and district improvements.	City of Long Beach Development Services	Section 5.13.5.2.3

City of Long Beach General Plan. The AEC site is located within the city limits of Long Beach and is, therefore, subject to the provisions of the City of Long Beach General Plan. The AEC site and the route of the offsite wastewater pipeline as well as temporary construction access road are designated No. 7 (Mixed Use) in the General Plan and LCP. Policies pertaining to visual resources that are applicable to the AEC are summarized and evaluated in Table 5.13-3. As discussed further in Section 5.6, Land Use, the City is in the process of updating its General Plan, referred to as General Plan 2030 (City of Long Beach, 2013b).

TABLE 5.13-3

Conformity with the City of Long Beach General Plan

Provision	Conformity?
Open Space and Recreation Element	
Policy 1.2 Protect and improve the community's natural resources, amenities and scenic values including nature centers, beaches, bluffs, wetlands and water bodies.	Yes. Addition of AEC to the existing AGS would be in harmony with existing development on the site as well as surrounding presence of power generation in views from the surrounding areas, as discussed in Section 5.13.2.4. The amount of nighttime lighting on the site would slightly increase however and the lighting design would ensure exterior lights within the AEC site are shielded and downward-facing, minimizing the potential for light spill outside of the AEC site and into nearby recreation and open spaces.
Air Quality Element	
Policy 6.1 Further reduce particulate emissions from roads, parking lots, construction site, unpaved alleys, and port operations and related uses.	Yes. Construction activities, inclusive of onsite and offsite laydown areas and offsite access road, associated with the addition of AEC to the existing AGS would ensure proper measures to control dust over the period of construction as discussed in Section 5.1, Air Quality.
Land Use Element	
Urban Design Analysis Conclusions and Policy Directions Certain City entrances at arterial and freeways should be beautified to enhance the City's image. Of particular importance are the entrances at Seventh Street and Studebaker Road, and all the entrances from the Long Beach Freeway.	Yes. The existing AGS has landscaping in place that complies with the requirements for setbacks, screening and vegetation. The AEC would not affect landscaping that is already in place. Therefore, the AEC will be consistent with these policies.
Conservation Element	

TABLE 5.13-3

Conformity with the City of Long Beach General Plan

Provision	Conformity?
Overall Goals of the City No. 2 To create and maintain a productive harmony between man and his environment through conservation of natural resources and protection of significant areas having environment and aesthetic value. Goals for Other Resources No. 1 To identify and preserve sites of outstanding scenic, historic, and cultural significant or recreational potential.	Yes. The AEC will comply with applicable conservation goals set forth in the General Plan, and as required by state regulations. AEC has been designed to comply with all setback and buffer requirements. The AEC will be constructed within the industrial site boundaries of the existing power plant where the level of visual quality will remain substantially the same as discussed in Section 5.13.2.4.
Local Coastal Program	
The LCP adopted the SEADIP Specific Plan by reference. Specific development and use standards are provided within the SEADIP Specific Plan. The SEADIP's development and use standards that have relevance for visual resources issues and the AEC's conformance with them are identified in Table 5.13-4.	Yes. The AEC is consistent with the provisions and specific development and use standards within the SEADIP (see Table 5.13-4 below).

Source: City of Long Beach, 1980, 1989, 1996, 2002 (Reprinted 2005)

South East Area Development and Improvement Plan (SEADIP) Specific Plan. The AEC is located within the SEADIP area defined in the LCP. Prior to implementation of the LCP, the SEADIP was adopted as a Specific Plan in 1977 through a Planned Development Ordinance. The AEC site would be subject to design and development standards within the No. 7 (Mixed Use) district as directed by the SEADIP (of the City of Long Beach General Plan and LCP). In addition, the AEC site, laydown areas, proposed offsite wastewater pipeline alignment and access road are zoned as PD; SEADIP (PD-1).

The SEADIP provides for a total community of residential, business, and light industrial uses integrated by an extensive system of parks, open space, and trails. In particular, the SEADIP includes provisions applicable to all areas as well as specific development and use standards applicable to subareas. Within the SEADIP, the AEC site, inclusive of onsite and offsite laydown areas and offsite construction access road, are located in Subarea 19, which is designated for industrial use consistent with the City's IG (General Industrial) zone. The proposed wastewater pipeline crosses Subareas 24, 9, and 22(b) of the SEADIP. Subarea 9 is fully developed with residential uses; Subarea 22(b): golf course open to the general public; and Subarea 24 "South": overlook area and interpretive center for the bordering marsh. The AEC consistency with all Specific Plan provisions applicable to visual resources is addressed in Table 5.13-4. It would appear that many of the provisions of the SEADIP plan that are presented as "applying to all areas" are intended for areas that might be developed for residential use, as opposed to areas that are currently in industrial or energy-production use and which might be redeveloped for continued use for those purposes. It has been 37 years since the time that the SEADIP plan was adopted. Since that time, the zoning requirements for the Industrial General Zone that applies to the portion of Subarea 19 where the AEC would be located have not been revised to incorporate these provisions. Because these provisions of the plan have not been translated into mechanisms that would allow them to be enforced on the AEC site, it is assumed that they are not applicable to the AEC.

As discussed further in Section 5.6, Land Use, the City is currently in a long-range planning process which began in 2013 to update the SEADIP (PD-1) zoning district and LCP. At present, a proposed Land Use Plan has been developed (Placeworks, 2015) and preparation is underway of Draft Specific Plans including those for development standards, design guidelines, circulation, public realm and amenities, infrastructure phase, and administration.

TABLE 5.13-4

Conformity with the City of Long Beach South East Area Development and Improvement Plan (SEADIP) Specific Plan

Provision	Conformity?
Provision A2 – A minimum of thirty percent of the site shall be developed and maintained as usable open space (building footprint, streets, parking areas and sidewalks adjacent to streets shall not be considered usable open space. Bicycle and pedestrian trails not included within the public right-of-way may be considered usable open space). All buildings shall be set back a minimum of twenty feet from all public streets and a wider setback may be required by individual subarea. Within this minimum twenty-foot setback area, a strip having a minimum width of ten feet and abutting the street shall be attractively landscaped.	Yes. Project Owner will work with the City of Long Beach to identify open space areas on the AEC and AGS sites that are consistent with this requirement and make them a part of the final Project landscape plan. Project will submit design plans to the CEC for review and approval prior to the commencement of construction, which will ensure design review consistent with the City's process (including setbacks and landscaping).
Provision A5 – The maximum height of buildings shall be 30 feet for residential and 35 feet for non-residential uses, unless otherwise provided herein.	Yes. Under the Long Beach Municipal Code Section **21.15.410** 'Building' is defined as any roofed structure built for the support, shelter or enclosure of persons, animals, chattels or property of any kind. Thus the project stacks and most other project structures are not classified as "buildings" and are not subject to these height limits. The structures to which this definition applies (administration and warehouse buildings) are 25 feet in height.
Provision A9	
All development shall be designed and constructed to be in harmony with the character and quality of surrounding development so as to create community unity within the entire area.	AEC is designed to be in harmony with the industrial zone in which it is located. The AEC will comply with applicable development policies set forth in the General Plan and SEADIP, and as required by state regulations. The AEC is also consistent with the General Industrial zoning development standards presented in Table 33-3 of Title 21 of the Municipal Code.
Provision A12	
Public views to water areas and public open spaces shall be maintained and enhanced to the maximum extent possible, consistent with the wetlands restoration plan.	The AEC does not block views of water areas and public open spaces. It will uphold the views analyzed at the KOPs.
Provision A13	
Adequate landscaping and required irrigation shall be provided to create a park-like setting for the entire area. A landscaped parkway area shall be provided along all developments fronting on Pacific Coast Highway, Westminster Avenue, Studebaker Road, Seventh Street and Loynes Drive.	The existing AGS has landscaping in place that complies with the requirements for setbacks, screening and vegetation with General Industrial zoning development standards for landscaping as presented in Table 5.13-5 below and Table 33-3 of Title 21 of the Municipal Code. The AEC would not affect landscaping that is already in place along Studebaker Road.

Source: City of Long Beach, 1977 (Amended 2006), 2007

City of Long Beach Municipal Code Zoning Ordinance, Title 21. Title 21 of the Municipal Code contains the Zoning Ordinance. The AEC site is zoned Planned Development (PD-1) Industrial IG zone. The AEC site is identified for industrial use, will replace and be constructed within the industrial site boundaries of the existing power plant, has an existing base of industrial uses, and is immediately surrounded by other industrial facilities. The provisions of the Municipal Code that are applicable to the AEC are discussed in detail in Section 5.6, Land Use. Those that pertain to visual resources are summarized in Table 5.13-5.

TABLE 5.13-5

Conformity with the City of Long Beach Municipal Code Zoning Ordinance

Provision	Conformity?
21.42.010 Landscaping Standards Landscaping Purpose-Landscapes are intended to improve the physical appearance of the City by providing visual, ecological, and psychological relief in the urban environment. Successfully designed and maintained landscape areas provide an attractive living, working, and recreating environment in addition to their role in reducing water and energy consumption. General Requirement C – Plans Required. When applicable, a Landscape Document Package shall be approved prior to the issuance of any planning or building permit. For projects proposing landscape area coverage with a minimum of ninety percent (90%) very low to low water use plantings, ETWU and MAWA calculations are not required in the Landscape Document Package submittal. Applicable landscaping, irrigation, planter drainage, water reuse, retention and filtration improvements shall be implemented before any final building and planning inspection is approved. 21.42.040 Landscaping standards for R-3, R-4 and Nonresidential Districts. Landscape Area Requirements. A. Applicability. All portions of a lot not paved or occupied by a structure shall be attractively landscaped. All required set back areas shall be landscaped unless used for a permitted use. B. Landscape Area Requirements On-Site Street Frontage- Within the required setback area along all street frontages, except at driveways, a minimum five-foot (5') wide landscaping strip (inside dimension to planter) shall be provided. This area shall be landscaped with one (1) tree for each fifteen (15) linear feet of street frontage and three (3) shrubs for each tree. Fences and retaining walls. All required fences and retaining walls shall be landscaped with vines planted no more than ten feet (10') on center on all accessible sides of a wall or alternative plant materials approved by the Director of Development Services.	The existing AGS has landscaping in place that complies with the requirements for setbacks, screening and vegetation with General Industrial zoning development standards for landscaping as presented in Table 33-3 of Title 21 of the Municipal Code. No adjustments to setbacks or landscaping are proposed. The AEC will not affect landscaping that is already in place along Studebaker Road.

Source: City of Long Beach, 2015a.

5.13.5.3 Summary of Project's Conformity with Applicable LORS

The AEC complies with applicable LORS related to visual resource issues.

5.13.6 Agencies and Agency Contacts

The City of Long Beach would be responsible for design review (see Table 5.13-6).

TABLE 5.13-6
Agency Contacts for Visual Resources

Issue	Agency	Contact
Design Review	City of Long Beach Development Services - Planning Bureau 333 W. Ocean Boulevard Long Beach, California 90802	Amy Bodek Development Services Director (562) 570-6428 Amy.Bodek@longbeach.gov

5.13.7 Permits and Permit Schedule

The City of Long Beach process that is of the most direct relevance to visual resource issues is the City's design review process, which includes site plan, architectural, and landscape elements. There are no permits related to visual resources; however, but for the exclusive jurisdiction of the CEC, which supersedes local permitting requirements, the City of Long Beach would normally conduct design and site plan review and approval for the AEC. However, because the CEC process supersedes this review and approval requirement from the City of Long Beach, the design of the AEC will not be approved by the City. As the permitting authority for the AEC, the CEC will accomplish the design review approval with the City as a reviewing agency. The CEC may request that the City review and comment on AEC final design and site plans prior to construction (see Table 5.13-7).

TABLE 5.13-7
Permits and Permit Schedule for Visual Resources

Permit or Approval	Agency Contact	Schedule
Design and Site Plan Review	Amy Bodek, Development Services Director City of Long Beach Development Services - Planning Bureau 333 W. Ocean Boulevard Long Beach, California 90802 (562) 570-6428 Amy.Bodek@longbeach.gov	Prior to construction, at discretion of CEC.

5.13.8 References Cited or Consulted

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Legend

- AGS Boundary
- AEC Site
- Parking/Laydown Construction Area
- Natural Gas Metering Station
- Proposed Stack Locations
- Equipment Footprint
- Construction Access Road
- Key Observation Point
- Character View
- City Limit
- 25-foot Topographic Contour
- Proposed New Process/Sanitary Wastewater Pipeline to First Point of Interconnection
- Potential Sewer Upgrade

0 250 500 750 1,000 Feet

N

Aerial Source: Google (2015)

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FIGURE 5.13-1
Project Components, Key Observation Points and Character Views
Alamitos Energy Center
Long Beach, California
October 2015

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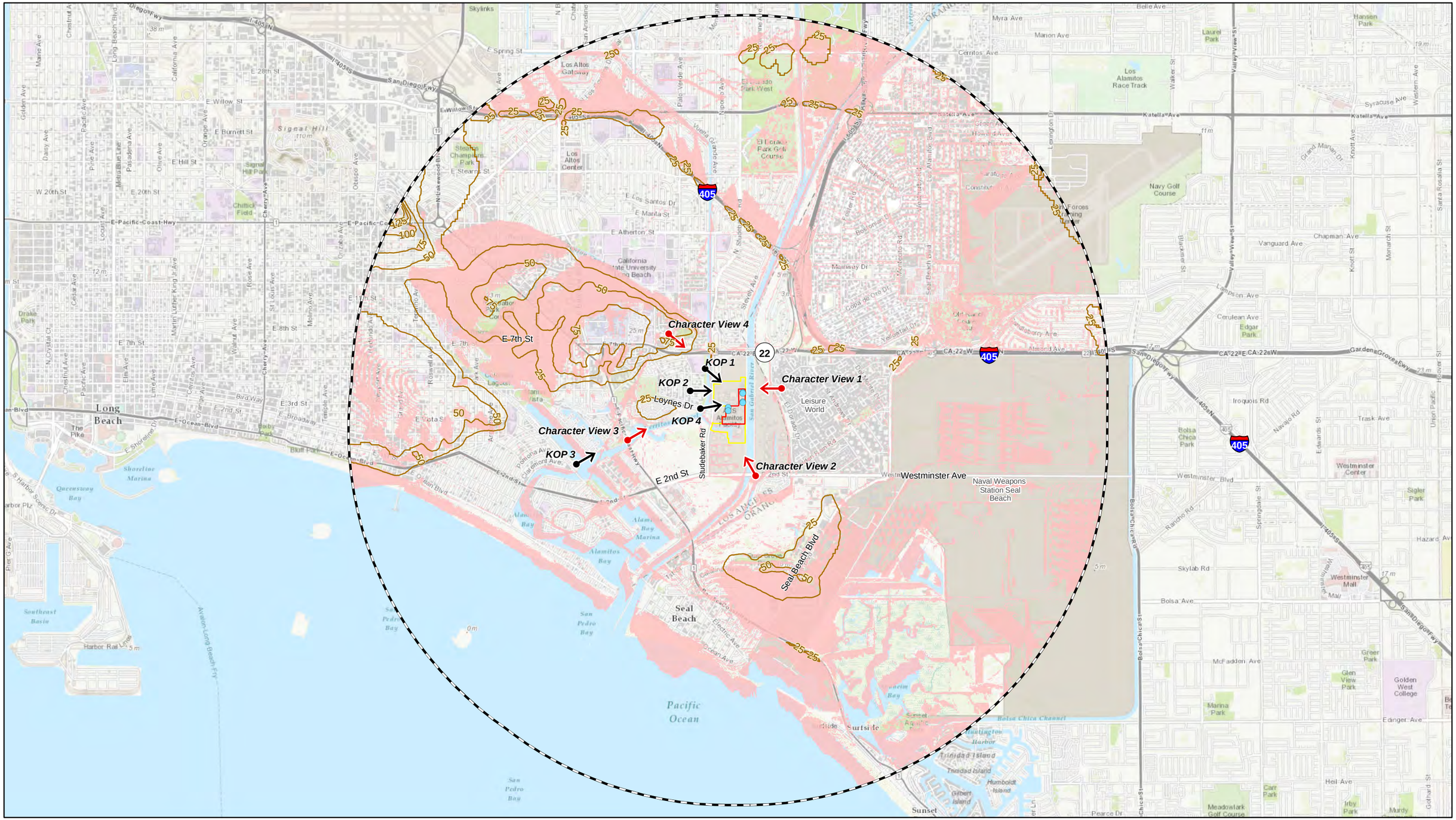
Character View 4
KOP 1
KOP 2
Character View 1
KOP 4
Character View 3
KOP 3
Character View 2
Alamitos Energy Center
Studebaker Rd
E 2nd St
Loynes Dr
E 7th St
Westminster Ave
Seal Beach Blvd
Seal Beach
Pacific Ocean
Long Beach
Leisure World
Naval Weapons Station Seal Beach
Navy Golf Course
Los Alamitos Race Track
Los Alamitos Gateway
El Dorado Park West
El Dorado Park Golf Course
Los Altos Center
Stearns Champions Park
Signal Hill
Signal Hill Park
Chittick Field
California State University Long Beach
Shoreline Marina
Queensway Bay
Alamitos Bay
Alamitos Bay Marina
San Pedro Bay
Southeast Basin
Harbor Rail Line
Avalon-Long Beach Fwy
Sunset Aquatic
Huntington Harbor
Trinidad Island
Humboldt Island
Gilbert Island
Bolsa Chica Channel
Surfside
Sunset
Vanguard Ave
Chapman Ave
Cerulean Ave
Edgar Park
Iroquois Rd
Trask Ave
Bolsa Chica Park
Westminster Center
Westminster Mall
Skylab Rd
Bolsa Ave
McFadden Ave
Edinger Ave
Golden West College
Glen View Park
Marina Park
Meadowlark Golf Course
Heil Ave
Cart Park
Irby Park
Sigler Park
Hazard Ave
Rancho Rd
Springdale St
Bolsa Chica St
Pearce Dr
Lampson Ave
Katella Ave
Westminster Blvd
Garden Grove Fwy
San Diego Fwy
Pacific Coast Hwy
E Willow St
E Spring St
E Burnett St
E Hill St
E 28th St
E 20th St
W 20th St
E 8th St
E 3rd St
E Ocean Blvd
Bluff Park
Belle Ave
Myra Ave
Marion Ave
Cerritos Ave
Palo Verde Ave
Los Alamitos Blvd
Lexington Dr
Walker St
Valley View St
Syracuse Ave
Western Ave
Grand Marion Dr
Knott Ave
Santa Rosalia St
Monarch St
Hansen Park
Laurel Park
Union Pacific
Hoover St
Navalo Rd
Edwards St
Harbor Plz
Pier G Ave
Aviation-Long Beach Fwy
Harbor Rail Line
Shoreline Dr
Bird Way
Baby Park
Drake Park
Martin Luther King Jr Ave
Cedar Ave
Pine Ave
Pacific Ave
Maine Ave
Daisy Ave
Golden Ave
Long Beach Blvd
California Ave
Orange Ave
Olive Ave
Pasadena Ave
Obispo Ave
Cherry Ave
Rose Ave
St Louis Ave
Molino Ave
Walnut Ave
Elm Ave
Lime Ave
Cerritos Ave
Temple Ave
Redondo Ave
Roswell Ave
Termino Ave
Orchard Dr
Chestnut Ave
Locust Ave
N Crystal Ct
Cedar Ave
Martin Luther King Jr Ave
Maine Ave
Metro Blue Line
Pacific Coast Hwy
Skylinks
Los Altos Gateway
Stearns Champions Park
Signal Hill
Chittick Field
Queensway Bay
Shoreline Marina



A. KOP-1. Existing view toward the project site from Channel View Park and Long Beach Bikeway Route 10.



B. KOP-1. Simulated view toward the project site after the addition of new AEC structures. New facilities will not be visible in this view.

FIGURE 5.13-3
KOP-1. View from Channel View Park/Long Beach Bikeway Route 10
Alamitos Energy Center
Long Beach, California
October 2015



A. KOP-2. Existing view toward the project site from a street in University Park Estates, the residential area closest to the project site. A boiler and stacks that are part of the Alamitos Generating Station that surround the project site are visible extending above the trees in the background of the view.



B. KOP-2. Simulated view toward the project site after the addition of new AEC structures. After the addition of AEC structures, two stacks will be partially visible in the right portion of the view.

FIGURE 5.13-4
KOP-2. View from University Park Estates
Alamitos Energy Center
Long Beach, California
October 2015

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A. KOP-3. Existing view toward the project site from Marine Stadium Park. The Alamitos Generating Station that surrounds the project site is visible in the left half of the view as the two power units with the large, scaffold-covered boilers as well as the tops of two white appearing stacks in the center-right of the view which are partially obscured behind commercial development. The stacks and generating units that extend along the horizon in the right half of the view are all part of the LADWP Haynes Generating Station.



B. KOP-3. Simulated view toward the project site after the addition of new AEC structures. The AEC structures will be visible in the distance at the far end of the channel in the center of the view.

FIGURE 5.13-5
KOP-3. View from Marine Stadium Park
Alamitos Energy Center
Long Beach, California
October 2015

CH2MHILL



A. KOP-4. Existing view toward the project site from Loynes Drive.



B. KOP-4. Simulated view toward the project site after the addition of new AEC structures.

FIGURE 5.13-6
KOP-4. View from Loynes Drive
Alamitos Energy Center
Long Beach, California
October 2015



Character View -1. Existing view toward the project site from the Leisure World gated retirement community. The tall stacks that are prominently visible behind the structures in the foreground of the view are part of the LADWP Haynes Generating Station. The smaller, white appearing stacks visible in the background at the left and right sides of the view are part of the Alamitos Generating Station that surround the project site.

FIGURE 5.13-7
Character View-1. View from Leisure World
Alamitos Energy Center
Long Beach, California
October 2015

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Character View -2. Existing view from Westminster Boulevard toward the Alamitos Generating Station that surrounds the project site, visible on the left side of the San Gabriel River channel. The electric infrastructure visible on the right side of the view is part of the LADWP Haynes Generating Station.

FIGURE 5.13-8
Character View -2. View from Island Village
Alamitos Energy Center
Long Beach, California
October 2015

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Character View -3. Existing view toward the project site from the Pacific Coast Highway bridge over Los Cerritos Channel. The Alamitos Generating Station that surrounds the project site is visible on the left and center of the view as the three power units with the large, scaffold-covered boilers. The stacks and generating units that extend along the horizon from the center to the right behind these AGS generating units are all part of the LADWP Haynes Generating Station.

FIGURE 5.13-9
Character View -3. View from Pacific Coast Highway Bridge
Alamitos Energy Center
Long Beach, California
October 2015



Character View -4. Existing view toward the project site from North Hill Drive within the gated Bixby Hill single family residential community. Tops of stacks that are a part of the Alamitos Generating Station that surround the project site are visible in the center of the view.

FIGURE 5.13-10
Character View -4. View from Bixby Hill
Alamitos Energy Center
Long Beach, California
October 2015

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5.14 Waste Management

This section discusses the potential effects on human health and the environment from nonhazardous and hazardous waste generated at the Alamitos Energy Center (AEC) project. Section 5.14.1 describes the project, previous site investigations, and the waste and waste streams that would be generated by the project. Section 5.14.2 describes the project's environmental analysis in terms of waste and waste disposal sites. Section 5.14.3 discusses potential cumulative effects. Section 5.14.4 describes mitigation measures. Section 5.14.5 presents laws, ordinances, regulations, and standards (LORS) that apply to the generated waste. Section 5.14.6 describes agencies that have jurisdiction over the generated waste and specifies whom to contact in those agencies. Section 5.14.7 describes permits required for generated waste and a schedule for obtaining those permits, and Section 5.14.8 provides the references used to prepare this section.

5.14.1 Setting

AES Alamitos Energy, LLC, will construct, own, and operate the AEC, a natural- gas-fired, air-cooled, combined-cycle and simple-cycle, electrical generating facility in Long Beach, California. The proposed AEC will have a nominal generating capacity of 1,040 megawatts (MW). The AEC will be constructed on the site of the existing AES Alamitos Generating Station (AGS), located on an approximately 21-acre site within a larger, 71.1-acre parcel.

The AEC will feature two gas turbine power blocks. Combined-cycle power block will consist of two natural-gas-fired combustion turbine generators (CTG) in a combined-cycle configuration, two unfired heat recovery steam generators (HRSG), one steam turbine generators, an air-cooled condenser, an auxiliary boiler, and related ancillary equipment. Simple-cycle power block will consist of four simple-cycle LMS-100 CTGs with fin-fan coolers and ancillary facilities.

The AEC will meet the demand for new generation in the Los Angeles basin local electrical reliability area. The demand is caused in large part by the closure of the San Onofre Nuclear Generating Station and the anticipated retirement of the older, natural-gas-fired generation currently using once-through ocean water-cooling (OTC). As a result of the promulgation of the California State Water Resources Control Board's (SWRCB) *Water Quality Control Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling* (SWRCB, 2010), more than 4,000 MW of OTC generation are expected to be retired in the Los Angeles local electrical reliability area by December 31, 2020.

The AEC will use water provided by the City of Long Beach Water Department (LBWD) for construction, operational process, and sanitary uses but at substantially lower volumes than the existing AGS historically has used. This water will be supplied through existing, onsite water lines. The AEC will include a new, 1,000-foot process/sanitary wastewater pipeline to the first point of interconnection with the existing LBWD sewer system, the potential upgrade of an additional 4,000 feet of existing pipeline downstream from the first point of interconnection, and the elimination of the current practice of treatment and discharge of process/sanitary wastewater to the San Gabriel River. Stormwater runoff from the power block areas will be directed to oil/water separators and to an existing retention basin and then ultimately discharged to the Los Cerritos channel via existing stormwater outfalls.

The AEC will interconnect to the existing, Southern California Edison (SCE) 230-kilovolt (kV) switchyard adjacent to the north side of the AGS. Natural gas will be supplied to the AEC via the existing, offsite, 30-inch-diameter pipeline owned and operated by Southern California Gas Company (SoCalGas) that currently serves Units 5 and 6 of the AGS. The AEC will require construction of new natural gas-metering facilities and construction of two new natural gas compressor buildings within the AEC footprint.

The AEC is designed to serve both peak and intermediate loads with the added capabilities of rapid startup, significant turndown capability (ability to turn down to a low load), and fast ramp rates. As California's intermittent renewable energy portfolio continues to grow, operating in either load-following or partial shutdown mode will become necessary to maintain electrical grid reliability, thus placing an increased

importance upon the rapid startup, high turndown, steep ramp rate, and superior heat rate employed at the AEC.

As an in-basin generating asset, the AEC will provide local generating capacity, voltage support, and reactive power that are essential for transmission system reliability in the Western Los Angeles basin subarea and larger Los Angeles basin local reliability area. The AEC will be able to provide system stability by supplying reactive power, voltage support, frequency stability, and rotating mass in the heart of the critical Western Los Angeles local reliability area. By virtue of its location in a transmission constrained load center, the AEC also helps to avoid potential transmission line overloads and can provide reliable local energy supplies when electricity from more distant generating resources is unavailable. In recognition of its critical grid reliability benefits, the AEC combined-cycle CTGs were selected by SCE in its Local Capacity Requirements Request for Offer on November 5, 2014, and the simple-cycle CTGs will meet the capacity needs anticipated to be identified in future California Public Utilities Commission Long-term Procurement Plans.

Owing to the critical need for generating capacity at the AEC site at all times, existing Units 1 through 6 will remain in operation through much of the AEC development and construction. Given that the removal of existing Units 1 through 6 is not required for construction of the AEC, the continued operation of the AGS will not impede AEC construction. Demolition of the retired and decommissioned turbine peaking generating Unit 7 and fuel tank, ancillary equipment, small maintenance shops, and two retention basins will be required for site preparation for the construction of the AEC. Construction and site preparation activities at the AEC site are anticipated to last 56 months, from the first quarter of 2017 until the third quarter of 2021. The project will commence construction with the removal of former Unit 7's building and ancillary equipment, fuel storage tank, tank berms, small maintenance shops, and two wastewater retention basins in January 2017 to make room for construction and laydown area for the AEC CCGT. Construction of the AEC CCGT will commence during the second quarter of 2017 and will be completed by the second quarter of 2020. The AEC CCGT is expected to commence commercial operation before May 1, 2020. Construction of the AEC SCGT is scheduled to proceed from the second quarter of 2020 through the third quarter of 2021, and Power Block 2 is expected to commence commercial operation in the third quarter of 2021. A temporary construction access road may be constructed offsite beginning at the intersection of Studebaker Road and Loynes Drive traveling southeast to the AEC site. Construction of the AEC will require the use of onsite laydown areas (approximately 8 acres dispersed throughout the existing site) and an approximately 10-acre laydown area located adjacent to the existing site.

5.14.1.1 Site Investigations

Investigations that have been undertaken at the project site include multiple Phase I Environmental Site Assessments (ESA).

The Alamitos Generating Station site currently consists of three parcels totaling approximately 71.1 acres. The site is comprised of land identified by parcel numbers 7237-018-808 for the northern portion of the site, 7237-019-808 for the southern portion of the site and 7237-019-005 for the former aboveground storage tank farm (Environmental Management Strategies, Inc. [EMS], 2015).

Site History. The AEC site is located within the boundaries of the existing and operating AGS. This power plant was formerly operated by SCE. The current AGS is a natural-gas-fueled electrical power plant operated by the AES Corporation since 1998. SCE previously operated the plant using both natural gas and fuel oil until 1989, when fuel oil was permanently retired as a fuel source.

The site was previously vacant, undeveloped land possibly used for agricultural purposes prior to construction of the original electrical power generating station in the mid-1950s (EMS, 2015). The site includes underground fuel-oil pipelines and wastewater retention basins once operated by SCE. Subsurface investigations regarding former SCE operations are ongoing at the site (EMS, 2015).

The site includes a portion of a former aboveground storage tank (AST) farm referred to as the Tom Dean property in the Phase I ESAs. The Tom Dean property was also previously owned by Plains America. The Tom

Dean and Plains America tank farms were once part of the power plant when SCE operated the plant using fuel oil (EMS, 2015).

Phase I Environmental Site Assessments. AES-SLD retained EMS to complete three Phase I ESAs in support of power development plans at the facility (EMS, 2012; 2013; 2015). AES-SLD retained EMS in October 2011 to perform a Phase I ESA for the site. Results of this investigation were presented in EMS's *Phase I Environmental Site Assessment, Alamitos Electrical Power Plant* (EMS, 2012). EMS was retained again in December 2012 to perform a second Phase I ESA in support of AES-SLD's application to the California Energy Commission (CEC) for upgrades to the current facility. EMS was retained in June 2015 to perform the Phase I ESA in support of AES-SLD's purchase of part of the former aboveground storage tank field adjacent to the site.

The purpose of the Phase I ESAs was to identify Recognized Environmental Conditions (REC) as defined by the U.S. Environmental Protection Agency's (EPA) Standards and Practices for All Appropriate Inquiries (40 Code of Federal Regulations Part 312). The ESAs were conducted in accordance with methods prescribed by the American Society for Testing and Materials (ASTM) document entitled *Standard Practice for Environmental Site Assessments: Phase 1 Environmental Site Assessment Process* (Designation: E 1527-93, May 1993).

Previous Phase I ESA and portions of a Phase II ESA were conducted by CH2M-HILL, Inc., during 1997. The results of these investigations are summarized in EMS' *Phase I Environmental Site Assessment, Alamitos Electrical Power Plant* (EMS, 2015).

The Phase I ESA reports concluded that a number of RECs, Historical Recognized Environmental Conditions, and De Minimis Conditions were present at the project site.

The following RECs were identified in the Phase I ESAs (EMS, 2012; 2013; 2015):

- Historical sources indicate the site may have been used for agriculture. Detectable levels of agricultural chemicals, such as fertilizers and pesticides, may be present in the subsurface. Generally, these chemicals would not be detected at concentrations that would present an environmental concern to the site unless a specific facility existed where these chemicals were used or handled in a manner that would result in the accumulation of higher concentrations. No such facility was identified on historical use sources with the following exceptions: Small structures that appear to be farm houses and associated outbuildings were observed in the general area of Units 3 and 4 prior to construction of the power plant in the 1960s. In the event soil becomes exposed in this area due to decommissioning of Units 3 and 4, EMS recommends sampling soils in this area for agricultural chemicals.
- The site was previously fueled by petroleum fuel oil. ASTs, previously associated with the site, are known to have impacted shallow soil with petroleum hydrocarbons. These ASTs are no longer part of the site; however, aboveground and underground fuel oil pipelines remain on the site.
- One large AST previously used to store jet fuel remains on the site. This was used to fuel jet engines formerly located in the Unit 7 peaker building; however, these jet engines were removed from the site. The tank is no longer used but may contain residual fuel and water. Jet fuel was transferred from the tank to the Unit 7 peaker building via underground pipelines.
- Groundwater underlying the site is known to be impacted by metals, volatile organic compounds (VOC) and 1,4-dioxane. Groundwater is monitored as part of ongoing subsurface investigations regarding previous SCE operations at the site including former operation of wastewater retention basins. These investigations are currently overseen by the California Department of Toxic Substance Control (DTSC).
- EMS did not observe any significant instances of the misuse or improper storage of chemicals or poor housekeeping during the site visits; therefore, the current use of nonhazardous and hazardous substances is not an environmental concern with the following exceptions: perchloroethene (PCE, also referred to as tetrachloroethene), trichloroethene (TCE) and 1,1,1-trichloroethane (TCA) were

apparently used at the site. These halogenated solvents, and their breakdown products, have been detected in groundwater underlying the site.

- Several spills have been noted at the site. Most documented spills involved petroleum products and were immediately addressed and observed and/or reported to local agencies. Most of these spills appear to represent De Minimis Conditions in connection with the site. Oil spills were also reported in the pig launching area and a location where a pipeline crosses under the roadway near Units 5 and 6. These spills were reported to have been cleaned up; however, some contamination was noted to remain due to limited access. Staining was also previously noted in the power block areas and associated with fuel-oil handling equipment. Although the site is currently powered by natural gas, it is reasonable to assume that historical operations have resulted in spills of fuel oil in various areas of the site. Even if cleanup was performed at the time of the spill, it is reasonable to assume that residual contamination exists and may not be revealed until equipment is decommissioned and removed.
- Transformers are currently reported to use non-polychlorinated biphenyl (PCB) containing mineral oil; however, PCB-containing oil was used in the past.
- One underground storage tank (UST) is present at the site to store ammonia. The UST is a 20,000-gallon, double-walled UST and includes a monitoring system. Based on this information, this UST does not appear to pose an environmental concern to the site. Three other USTs, including a 550-gallon waste oil, 6,000-gallon diesel tank, and 6,000-gallon gasoline tank were reportedly installed in 1986 and removed in April 2003. A closure letter dated May 13, 2003, from the Long Beach/Signal Hill Joint Powers Agency confirmed the satisfactory removal of the three tanks and issued a “no further action” statement. Based on this information, these three former USTs represent a historical REC in connection with the site.
- Environmental Data Resources’ (EDR) Historical UST (HIST UST) listing identified over 25 HIST UST records for the site. The installation dates range from 1956 to 1982 and the contents are reported as unleaded product, product, waste oil and waste. Some records may be duplicate records or refer to waste contained in below-grade oil/water separators and/or clarifiers; however, a total of eleven are identified as containing product and two contain waste oil. One inactive permit for a “Spray Booth, Paint and Solvent” was identified for the site and dated March 3, 1998. The location of the former spray booth is unknown.
- EMS noted asbestos waste being stored onsite in a waste bin prior to its removal from the site.
- There were no instances of offsite sources of groundwater contamination that are currently likely to have impacted the site based on available regulatory information and recent groundwater flow; however, the site is located in an area documented to have had commercial and industrial activities dating back several decades. The possibility exists that nearby historical activities and previous groundwater flow directions could have caused offsite migration onto the site in the past. Adjacent properties known or suspected of containing soil contamination include the adjacent ASTs formally associated with the site and now owned by Plains America and Tom Dean, the former hazardous waste site located at Loynes Drive and Studebaker Road to the northwest, and the Dredged Materials Area south of the site and east of the Plains America ASTs.
- Recent sampling performed in 2012 detected PCBs within wastewater contained in the North Retention Basin. The wastewater was removed and the solids were filtered, separated, and stored in bins for subsequent disposal as hazardous material. EMS was informed the PCBs were believed to have originated in contaminated oil from the Unit 7 peaker unit.
- Elevated levels of nickel were detected in monitoring well AW-33 near the Central Retention Basin. AES-SLD personnel were unsure of the source of the nickel, but indicated the source may be a corroded transfer line leading from the North Retention Basin that was found to be leaking. This pipeline was cut and replaced. EMS was previously informed that some nickel detected between the basins and the San Gabriel River channel may be from dredged materials. The elevated levels of nickel in monitoring well

AW-33 may also be the result of these materials and a rising groundwater elevation. EMS was previously informed by SCE that the majority of additional soil and soil vapor investigation work, including soil matrix sampling along the fuel-oil pipelines, has been completed and that all work was reported by November 2014. EMS was able to review these reports. EMS was informed by SCE that the soil vapor plume previously identified north of the Central Basin appears limited in extent and significantly degraded, and that residual gasoline from the removed USTs was detected adjacent to the electrical building (former auto shop). EMS' review of the final Soil Characterization Report and Soil Vapor Survey Report indicates that the soil below the Central Basin has been impacted by a release of wastewater and the impacted soil is confined to the basin footprint.

Although not considered RECs as defined by the EPA All Appropriate Inquiries rule and ASTM E 1527-05, EMS also noted the following potential environmental issues in its Phase I ESAs (EMS, 2012; 2013; 2015):

- The site buildings were constructed prior to 1980; therefore, asbestos-containing building materials and lead based paint may be present onsite.
- The presence of VOCs in soil and groundwater underlying the site represents a potential vapor intrusion issue in connection with the site.
- The presence of insulation material stored in a covered outdoor area of the Site may impact stormwater runoff.

The 2015 EMS Phase I ESA reports is provided as Appendix 5.14A.

5.14.1.2 Project Waste Generation

Wastewater, nonhazardous waste, and hazardous waste will be generated at the AEC site during construction and operation.

Demolition Phase. The following subsections describe the type and estimated amounts of wastes that will be generated from the demolition of the existing Alamitos Generating Station Unit 7. Typical wastes generated during demolition are identified in Table 5.14-1. The overall strategy for demolition is to recycle/salvage as much of the existing generation units as is feasible and cost effective. Therefore, waste generation information presented in Table 5.14-1 represents a conservative estimate of the maximum expected values.

TABLE 5.14-1
Wastes Generated during Demolition

Waste	Origin	Composition	Estimated Quantity	Classification	Disposal
Scrap wood, glass, plastic, paper, calcium silicate insulation, and mineral wool insulation	Demolition of Piping, Structure, tanks and equipment	General Construction waste	16,000 pounds per week (Dumpster)	Nonhazardous	Recycle and/or dispose of in a Class II or III landfill
Scrap Metals	Demolition of Piping and Structure	Metal	2,500 tons[a]	Nonhazardous	Recycle and/or dispose of in a Class III landfill
Concrete	Demolition	Concrete	188 tons	Nonhazardous	Recycle and/or dispose of in a Class III landfill
Asphalt	Demolition of roads and berms	Hydrocarbons	8 tons	Nonhazardous	Recycle and/or dispose of in a Class III landfill
Spent welding and cutting materials	Construction	Solid	100 pounds per month	Nonhazardous	Recycle with vendors or Dispose at a Class I landfill if hazardous

TABLE 5.14-1

Wastes Generated during Demolition

Waste	Origin	Composition	Estimated Quantity	Classification	Disposal
Waste oil filters	Construction equipment and vehicles	Solids	200 pounds per month	Nonhazardous	Recycle at a permitted TSDF
Used and waste lube oil	Turbine lube oil draining	Hydrocarbons	45 drums	Hazardous	Recycle at a permitted TSDF
Oily rags, oil sorbent excluding lube oil flushes	Cleanup of small spills	Hydrocarbons	100 pounds per month	Hazardous	Recycle or dispose at a permitted TSDF
Residual fuel oil from decommissioned storage tanks and piping	Demolition	Hydrocarbons	150 gallons	Hazardous	Recycle at a permitted TSDF
Spent lead acid batteries	Construction equipment, trucks.	Heavy metals	5 batteries per year	Hazardous	Store no more than 10 batteries (up to one year) then recycle offsite
Spent alkaline batteries	Equipment	Metals	10 batteries per month	Universal Waste solids	Recycle or dispose offsite at an Universal Waste Destination Facility
Asbestos waste	Demolition of unabated Unit 7	Asbestos	Minimum of 25 tons[b]	Hazardous	Disposal in licensed and permitted landfill
Waste oil	Equipment, vehicles	Hydrocarbons	40 gallons per month	Non-RCRA Hazardous Liquid	Dispose at a permitted TSDF
Sanitary waste	Portable toilet holding tanks	Sewage	1,000 gallons per day	Nonhazardous Liquid	Remove by contracted sanitary service
Storm water	Rainfall	Water	17.9 acre-feet (from 10-year storm event)[c]	Nonhazardous Liquid	Discharge to storm water drain
Fluorescent, mercury vapor lamps	Lighting	Metals and PCBs	100 pounds per year	Universal Waste solids	Recycle or dispose offsite at an Universal Waste Destination Facility

[a] 85% is ferrous material and 15% is copper-based or alloy materials
[b] Includes water as part of the asbestos containing material weight
[c] Calculated from *Orange County Hydrology Manual* for 10-year storm event

Notes:

RCRA = Resource Conservation and Recovery Act
TSDF = treatment, storage, and disposal facility

Nonhazardous Waste. The following nonhazardous waste is expected to be generated during demolition of the existing Alamitos Generating Station:

- Mixed nonhazardous wastes, including debris that has wood, metal, or other nonhazardous material attached to it in a manner that is not economical for separation for recycling purposes
- Plastics from cleaned piping, equipment, and utilities that have been classified as nonhazardous
- Electrical equipment that has been classified as nonhazardous and cannot be salvaged

- Duct work or other ventilation material that is determined to be non-recyclable and that has been classified as nonhazardous
- General waste that has been classified as nonhazardous

All nonhazardous material will be stockpiled in a location that is removed from other site activities and easily accessible. The waste will be stored in a manner that will not allow surface water to move through the waste and into nearby areas. A Stormwater Pollution Prevention Plan (SWPPP) will be prepared for the management of stormwater during construction and demolition activities, as described in Section 5.15, Water Resources.

Hazardous Waste. The following hazardous waste is expected to be generated during the Alamitos Generating Station demolition activities:

- Asbestos waste, potentially friable, from demolition of unabated areas in old plant.
- Electrical equipment that has been classified as hazardous and cannot be salvaged.
- Used oils removed from equipment.
- Various universal wastes (for example, fluorescent light tubes).
- Lead-acid storage batteries.

The waste will be temporarily stored in containers (drums, roll-off boxes, etc.) pending characterization for waste profiling. The SWPPP will address the engineering controls that will be required for management of stormwater during demolition activities. A Construction Waste Management Plan will be prepared to describe procedures that will be used during demolition and construction activities.

Recyclable Material. It is estimated that 188 tons of recyclable concrete and 8 tons of asphalt will be generated from partial removal of roadways and existing foundations and that 2,500 tons of metal will also be recycled. The metal consists of fencing, tanks, support beams, piping, miscellaneous building materials, equipment, and components. Additionally, plastic, electrical components, and other miscellaneous materials will be recycled when practical. A waste minimization program will be established to recycle and reuse as much of the demolition materials as economically and practically possible.

Construction Phase. During construction, the primary waste generated will be nonhazardous waste. However, some hazardous waste will also be generated. All of the hazardous wastes will be generated at the plant site. The types of waste and their estimated quantities are described in the following discussion. Typical wastes generated during project construction are identified in Table 5.14-2A for the AEC CCGT power block and in Table 5.14-2B for the AEC SCGT power block.

TABLE 5.14-2A

Wastes Generated during Construction of the AEC CCGT

Waste	Origin	Composition	Estimated Quantity	Classification	Disposal
Scrap wood, glass, plastic, paper, calcium silicate insulation, and mineral wool insulation	Construction	Normal refuse	10,000 pounds per month (Dumpster)	Nonhazardous	Recycle and/or dispose of in a Class II or III landfill
Scrap Metals	Construction	Parts, containers	1,500 pounds per month	Nonhazardous	Recycle and/or dispose of in a Class III landfill
Concrete	Construction	Concrete	880 tons[a] during construction	Nonhazardous	Recycle and/or dispose of in a Class III landfill

TABLE 5.14-2A

Wastes Generated during Construction of the AEC CCGT

Waste	Origin	Composition	Estimated Quantity	Classification	Disposal
Empty liquid material containers	Construction	Drums, containers, totes	100 containers[b]	Nonhazardous solids	Containers <5 gallons will be disposed as normal refuse. Containers >5 gallons will be returned to vendors for recycling or reconditioning.
Spent welding materials, i.e. welding rods	Construction	Solid	150 pounds per month	Nonhazardous	Recycle with vendors or dispose at a Class I landfill if hazardous
Waste oil filters	Construction equipment and vehicles	Solids	50 pounds per month[c]	Nonhazardous	Recycle at a permitted TSDF
Used and waste lube oil	CTG and STG lube oil flushes	Hydrocarbons	100 drums[d] (life of project construction)	Hazardous	Recycle at a permitted TSDF
Oily rags, oil sorbent excluding lube oil flushes	Cleanup of small spills	Hydrocarbons	100 pounds per month	Hazardous	Recycle or dispose at a permitted TSDF
Solvents, paint, adhesives	Maintenance	Varies	125 pounds per month	Hazardous	Recycle at a permitted TSDF
Spent lead acid batteries	Construction equipment, trucks.	Heavy metals	5 batteries per year	Hazardous	Store no more than 10 batteries (up to one year) then recycle offsite
Spent alkaline batteries	Equipment	Metals	100 batteries per month	Universal Waste solids	Recycle or dispose offsite at an Universal Waste Destination Facility
Steam turbine cleaning waste	Pre-boiler piping	Corrosive cleaning chemicals	125 gallons before plant startup	Hazardous or nonhazardous liquid	Dispose at a permitted TSDF
Waste oil	Equipment, vehicles	Hydrocarbons	50 gallons per month	Non-RCRA Hazardous Liquid	Dispose at a permitted TSDF
Sanitary waste	Portable toilet holding tanks	Sewage	800 gallons per day	Nonhazardous Liquid	Remove by contracted sanitary service
Stormwater	Rainfall	Water	9 acre-feet[e] (from 10-year storm event)	Nonhazardous Liquid	Discharge to existing permitted outfalls
Fluorescent, mercury vapor lamps	Lighting	Metals and PCBs	30 pounds per year	Universal Waste solids	Recycle or dispose offsite at an Universal Waste Destination Facility
Passivating and chemical cleaning fluid waste	Pipe cleaning and flushing	Varies	400,000 gallons[f] (life of project construction)	Hazardous or nonhazardous liquid	Sample and characterize – if clean, dispose of in sanitary sewer; otherwise, manage appropriately offsite

TABLE 5.14-2A

Wastes Generated during Construction of the AEC CCGT

Waste	Origin	Composition	Estimated Quantity	Classification	Disposal
Hydrotest water	Testing equipment and piping integrity	Water	200,000 gallons (life of project construction)	Hazardous or nonhazardous liquid	Sample and characterize – if clean, dispose of in storm drain; otherwise, manage appropriately offsite

[a] 30 cubic yards
[b] Containers include <5-gallon containers and 55-gallon drums or totes
[c] Assumes one oil change
[d] Assumes 2,500 gallons for each generator times 16 units
[e] Calculated from *Orange County Hydrology Manual* for 10-year storm event
[f] Estimated quantity for clean, flush, and rinse of 2 HRSGs

TABLE 5.14-2B

Wastes Generated during Construction of the AEC SCGT

Waste	Origin	Composition	Estimated Quantity	Classification	Disposal
Scrap wood, glass, plastic, paper, calcium silicate insulation, and mineral wool insulation	Construction	Normal refuse	50 tons during construction	Nonhazardous	Recycle and/or dispose of in a Class II or III landfill
Scrap Metals	Construction	Parts, containers	12 tons during construction	Nonhazardous	Recycle and/or dispose of in a Class III landfill
Concrete	Construction	Concrete	34 tons[a] during construction	Nonhazardous	Recycle and/or dispose of in a Class III landfill
Empty liquid material containers	Construction	Drums, containers, totes	4 cubic yards per week[b]	Nonhazardous solids	Containers <5 gallons will be disposed as normal refuse. Containers >5 gallons will be returned to vendors for recycling or reconditioning.
Spent welding materials, i.e. welding rods	Construction	Solid	2 tons during construction	Nonhazardous	Recycle with vendors or dispose at a Class I landfill if hazardous
Waste oil filters	Construction equipment and vehicles	Solids	60 pounds per month[c]	Nonhazardous	Recycle at a permitted TSDF
Used and waste lube oil	CTG and STG lube oil flushes	Hydrocarbons	10,000 gallons during construction[d]	Hazardous	Recycle at a permitted TSDF
Oily rags, oil sorbent excluding lube oil flushes	Cleanup of small spills	Hydrocarbons	800 pounds per month	Hazardous	Recycle or dispose at a permitted TSDF
Solvents, paint, adhesives	Maintenance	Varies	16 gallons per month	Hazardous	Recycle at a permitted TSDF

TABLE 5.14-2B

Wastes Generated during Construction of the AEC SCGT

Waste	Origin	Composition	Estimated Quantity	Classification	Disposal
Spent lead acid batteries	Construction equipment, trucks.	Heavy metals	4 batteries per year	Hazardous	Store no more than 10 batteries (up to one year) then recycle offsite
Spent alkaline batteries	Equipment	Metals	60 batteries per month	Universal Waste solids	Recycle or dispose offsite at an Universal Waste Destination Facility
Waste oil	Equipment, vehicles	Hydrocarbons	60 gallons per month	Non-RCRA Hazardous Liquid	Dispose at a permitted TSDF
Sanitary waste	Portable toilet holding tanks	Sewage	3,000 gallons per week	Nonhazardous Liquid	Remove by contracted sanitary service
Fluorescent, mercury vapor lamps	Lighting	Metals and PCBs	70 pounds per year	Universal Waste solids	Recycle or dispose offsite at an Universal Waste Destination Facility
Passivating and chemical cleaning fluid waste	Pipe cleaning and flushing	Varies	21,000 gallons (life of project construction)	Hazardous or nonhazardous liquid	Sample and characterize – if clean, dispose of in sanitary sewer; otherwise, manage appropriately offsite
Hydrotest water	Testing equipment and piping integrity	Water	7,000 gallons (life of project construction)	Hazardous or nonhazardous liquid	Sample and characterize – if clean, dispose of in storm drain; otherwise, manage appropriately offsite

[a] 20 cubic yards
[b] Containers include <5-gallon containers and 55-gallon drums or totes
[c] Assumes one oil change
[d] Assumes 2,500 gallons for each generator

Nonhazardous Solid Waste. The following nonhazardous waste streams potentially could be generated from construction of the AEC:

- **Paper, wood, glass, and plastics.** Approximately 550 tons of paper, wood, glass, and plastics will be generated from packing materials, waste lumber, insulation, and empty nonhazardous chemical containers during project construction. These wastes will be recycled where practical. Waste that cannot be recycled will be disposed of weekly in a Class III landfill. Onsite, the waste will be placed in Dumpsters.
- **Metal.** Approximately 70 tons of metal including steel (from welding and cutting operations, packing materials, and empty nonhazardous chemical containers) and aluminum waste (from packing materials and electrical wiring) will be generated during construction. Waste will be recycled, where practical, and non-recyclable waste will be deposited in a Class III landfill.

Wastewater. Wastewater generated during construction will include sanitary waste, stormwater runoff, equipment washdown water, and water from excavation dewatering during construction (if dewatering is required). Depending on the chemical quality of these wastewaters, they could be classified as hazardous or nonhazardous. As discussed, wastewater would be sampled and if found hazardous would be disposed of consistent with applicable LORS. Methods for disposing of nonhazardous wastewaters are identified in Section 5.14.4.1.1.

Hazardous Waste. Most of the hazardous waste generated during construction will consist of water from excavation dewatering (if it contains contaminants), flushing and cleaning fluids, passivating fluid (to prepare pipes for use), and solvents. Other hazardous waste, such as welding materials and dried paint, also may be generated during construction; however, the quantity of welding, solvent, and paint waste is expected to be minimal.

When pipes are cleaned and flushed, waste will be generated. The volume of flushing and cleaning waste generated is estimated to be one to two times the internal volume of the pipes cleaned. Wastewaters generated during construction could also be considered hazardous, if demonstrated to be so by sampling. Methods for recycling and disposal of hazardous wastes during construction are described in Section 5.14.4.1.2.

Operation Phase. During AEC operation, the primary waste generated will be nonhazardous waste. However, varying quantities of hazardous waste also will be generated periodically. The types of wastes and their estimated quantities are discussed below.

Nonhazardous Waste. The AEC will produce wastes typical of power generation facility operations and maintenance activities. These will include rags, turbine air filters, broken and rusted metal and machine parts, defective or broken electrical materials, empty containers, the typical refuse generated by workers and small office operations, and other miscellaneous wastes. The quantity of all nonhazardous waste generated during operations is estimated to be about 50 cubic yards per year (approximately 35 tons per year). Large metal parts will be recycled.

Nonhazardous Wastewater. The water balance schematic diagrams, provided in Section 2.0, Figures 2.1-5a through 2.1-5c, illustrate the expected waste streams and Table 2.1-2 lists waste stream flow rates. The wastewater collection system will collect sanitary wastewater from sinks, toilets, and other sanitary facilities.

General facility drainage will consist of area washdown, sample drains, equipment leakage, 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 will be routed to the facility's concrete-lined wastewater sump. Water from this sump will be sampled and analyzed at an approved lab. If contamination is present, the water will be trucked offsite for disposal at an approved wastewater disposal facility. If sampling results show no contamination, the water will be discharged to the stormwater drainage system. The AEC will connect into the exiting onsite stormwater system that includes two re-contoured retention basins, with ultimate disposal to the San Gabriel River via existing permitted outfalls.

Process wastewater will be conveyed to the Sanitation Districts of Los Angeles County via a new proposed sewer line interconnection to the LBWD.

Hazardous Waste. Hazardous waste generated will include waste lubricating oil, used oil filters from turbine equipment, spent catalysts, and chemical cleaning wastes. The catalyst units will contain heavy metals that are considered hazardous. Chemical cleaning wastes, which consist of alkaline and acidic cleaning solutions, will be generated from periodic pipe cleaning. These wastes may contain high concentrations of heavy metals and will be collected for offsite disposal.

The chemical feed area drains will collect spillage, tank overflows, effluent from maintenance operations, and liquid from area washdowns. Water collected will be sampled and, if it is not contaminated, released. The quantity of this effluent is expected to be minimal.

Hazardous wastes that potentially will be generated during operations at the facility are summarized in Table 5.14-3A for the AEC CCGT and in Table 5.14-2B for the AEC SCGT.

TABLE 5.14-3A

Hazardous Wastes Generated during Operations of the AEC CCGT

Waste	Origin	Composition	Estimated Quantity	Classification	Disposal
Lubricating oil/oil sorbents	Small leaks and spills from the gas turbine lubricating oil system	Hydrocarbons	50 pounds per year	Hazardous	Cleaned up using sorbent and rags – disposed of by certified oil recycler
Lubricating oil filters	Gas turbine lubricating oil system	Paper, metal, and hydrocarbons	500 pounds per year	Hazardous	Recycled by certified oil recycler
Lubricating oil	Maintenance of CTG and STG equipment	Hydrocarbons	3,500 pounds per year	Hazardous	Recycled by certified oil recycler
Solvents, paint, adhesives	Maintenance	Varies	100 pounds per month	Hazardous	Recycle at a permitted TSDF
Laboratory analysis waste	Water treatment	Waste reagents/ laboratory chemicals	800 gallons per year	Hazardous	Recycled by certified recycler
Selective catalytic reduction (SCR) catalyst units	SCR system (Warranty is 3 years; use tends to be 3 to 5 years)	Metal and heavy metals, including vanadium	20 to 50 tons every 3 to 5 years	Hazardous	Recycled by SCR manufacturer or disposed of in Class I landfill
Carbon monoxide catalyst units	HRSG (Use tends to be 3 to 5 years)	Metal and heavy metals, including vanadium	20 to 50 tons every 3 to 5 years	Hazardous	Recycled by manufacturer
Spent lead acid batteries	Electrical room, equipment	Metals	10 batteries per year	Hazardous	Store no more than 10 batteries (up to one year) then recycle offsite
Spent alkaline batteries	Equipment	Metals	200 pounds per year	Universal waste solids	Recycle or dispose offsite at an Universal Waste Destination Facility
Fluorescent tubes	Lighting of maintenance areas	Metals	100 pounds per year	Universal waste solids	Recycle or dispose offsite at an Universal Waste Destination Facility
Electronic Components	Distributed control system, plant computers, instruments	Metals	200 pounds per year	Universal Waste Solids	Recycle with an approved facility
Oily rags	Maintenance, wipe down of equipment, etc.	Hydrocarbons, cloth	200 pounds per year (~1,600 rags per year)	Hazardous	Recycled by certified oil recycler
Chemical feed area drainage	Spillage, tank overflow, area washdown water	Water with water treatment chemicals	Minimal	May be hazardous if corrosive	Discharged to sewer if nonhazardous; shipped offsite for disposal if hazardous

TABLE 5.14-3B

Hazardous Wastes Generated during Operations of the AEC SCGT

Waste	Origin	Composition	Estimated Quantity	Classification	Disposal
Lubricating oil/oil sorbents	Small leaks and spills from the gas turbine lubricating oil system	Hydrocarbons	400 pounds per year	Hazardous	Cleaned up using sorbent and rags – disposed of by certified oil recycler
Lubricating oil filters	Gas turbine lubricating oil system	Paper, metal, and hydrocarbons	700 pounds per year	Hazardous	Recycled by certified oil recycler
Lubricating oil	Maintenance of CTG and STG equipment	Hydrocarbons	300 pounds per year	Hazardous	Recycled by certified oil recycler
Solvents, paint, adhesives	Maintenance	Varies	110 gallons per month	Hazardous	Recycle at a permitted TSDF
Selective catalytic reduction (SCR) catalyst units	Use tends to be 3 to 5 years	Metal and heavy metals, including vanadium	40 to 60 tons every 3 to 5 years	Hazardous	Recycled by SCR manufacturer or disposed of in Class I landfill
Carbon monoxide catalyst units	Use tends to be 3 to 5 years	Metal and heavy metals, including vanadium	4 to 6 tons every 3 to 5 years	Hazardous	Recycled by manufacturer
Spent lead acid batteries	Electrical room, equipment	Metals	4 batteries per year	Hazardous	Store no more than 10 batteries (up to one year) then recycle offsite
Spent alkaline batteries	Equipment	Metals	40 pounds per year	Universal waste solids	Recycle or dispose offsite at an Universal Waste Destination Facility
Fluorescent tubes	Lighting of maintenance areas	Metals	40 pounds per year	Universal waste solids	Recycle or dispose offsite at an Universal Waste Destination Facility
Electronic Components	Distributed control system, plant computers, instruments	Metals	60 pounds per year	Universal Waste Solids	Recycle with an approved facility
Oily rags	Maintenance, wipe down of equipment, etc.	Hydrocarbons, cloth	200 pounds per year	Hazardous	Recycled by certified oil recycler
Chemical feed area drainage	Spillage, tank overflow, area washdown water	Water with water treatment chemicals	Minimal	May be hazardous if corrosive	Discharged to sewer if nonhazardous; shipped offsite for disposal if hazardous

5.14.2 Environmental Analysis

5.14.2.1 Significance Criteria

Appendix G of the California Environmental Quality Act (CEQA) is a screening tool, not a method for setting thresholds of significance. Appendix G is typically used in the Initial Study phase of the CEQA process, asking a series of questions. The purpose of these questions is to make a determination as to whether a project requires an Environmental Impact Report, a Mitigated Negative Declaration, or a Negative Declaration. As the Governor's Office of Planning and Research stated, "Appendix G of the Guidelines lists a variety of

potentially significant effects, but does not provide a means of judging whether they are indeed significant in a given set of circumstances." The answers to the Appendix G questions are not determinative of whether an impact is significant or less than significant. Nevertheless, the questions presented in CEQA Appendix G are instructive.

In terms of Waste Management, Appendix G, asks, in part, whether the project would:

- Create a significant hazard to the public or the environment through the routine transport, use, or disposal of hazardous materials? (Appendix G, Section VIII(a).)[54]
- Be located on a site that is included on a list of hazardous materials sites (Cortese List) compiled pursuant to Government Code Section 65962.5 and, as a result, would create a significant hazard to the public or the environment. (Appendix G, Section VIII(d).)
- Be served by a landfill with sufficient permitted capacity to accommodate the project's solid waste disposal needs? (Appendix G, Section XVII(f).)
- Comply with federal, state, and local statutes and regulations related to solid waste? (Appendix G, Section XVII(g).)

5.14.2.2 Cortese List

An examination of the DTSC Hazardous Waste and Substances Site List (Cortese List) compiled pursuant to Government Code Section 65962.5 shows that 116 sites currently listed within 6 miles of the AEC site (DTSC, 2015a).

Of these sites, the closest listing to the AEC is approximately 6 miles away. The Los Angeles Defense Area Nike Battery Site 32, located at northwest corner of Western and Chapman Avenues in Rancho Los Alamitos, California, 80000285, is listed as inactive – needs evaluation as of July 1, 2005 (DTSC, 2015a).

The approximately 71-acre project site itself is located on a Cortese-listed site for the SCE Alamitos Generating Station and is listed in a corrective action status with voluntary cleanup ongoing (DTSC, 2015a). Numerous site investigations have been completed and corrective action and site cleanup are under way on the affected parcels related to the former SCE Alamitos Generating Station. Site history and site investigations related to the SCE Alamitos Generating Station are discussed in Section 5.14.1.1.

Although the site is currently undergoing an active site cleanup under jurisdiction of the DTSC, it is highly unlikely that any impacts will result from Cortese-listed properties, nor will the AEC present a significant hazard to the public or the environment after implementation of proposed mitigation.

5.14.2.3 Solid Waste Disposal

Nonhazardous waste (often referred to as municipal waste, or garbage) will be recycled or deposited in a Class III landfill. Hazardous wastes will be delivered to a permitted offsite TSDF for treatment or recycling, or will be deposited in a permitted Class I landfill. The following sections describe the waste disposal sites feasible for disposal of AEC wastes.

Nonhazardous Waste. Approximately 3,000 tons of nonhazardous waste will be generated during the demolition, construction, and operation of AEC. Nonhazardous wastes will be recycled to the extent possible, and what cannot be recycled will be disposed of at a permitted landfill as discussed below.

It is anticipated that all excavated soil will be used onsite for grading and leveling purposes. In the event that some excavated soil is not reused onsite, it would be classified for disposal on the basis of sampling. Soil determined to be nonhazardous could be suitable for reuse at a construction site or disposal at a regional disposal facility, depending on the chemical quality.

[54] The risks or hazards posed by the transportation of hazardous materials, including hazardous wastes, are described and analyzed in Section 5.5, Hazardous Materials Handling.

Universal Waste Systems, Inc., is contracted as the primary hauler for solid waste from the project site, providing residential and commercial waste and recycling services, including waste hauling for the AEC (City of Long Beach Department of Public Works, 2013), and is expected to be the hauler, although other similarly qualified vendors are available.

The primary disposal facility for the AEC is the Bel-Art Waste Transfer Station, located approximately 12 miles from the AEC site at 2501 East 68th Street, Long Beach, California, 90805. It is permitted as a large-volume transfer and processing facility, comprising 3.2 acres and accepting mixed municipal waste, construction waste, green materials, and inert wastes. The waste is processed and then transported to one of the area landfills for disposal (CalRecycle, 2015). The Savage Canyon Landfill and Puente Hills Landfill are the nearest landfills that may be used to handle the AEC's solid waste and recycling (County of Los Angeles Department of Public Works, 2013). The Bel-Art Waste Transfer Station, Savage Canyon Landfill, and Puente Hills Landfill have adequate capacity to handle and process solid waste generated by the AEC, as shown in Table 5.14-4.

The Savage Canyon Landfill is located at 13919 East Penn Street, Whittier, California, 90602. As an active solid waste landfill, Savage Canyon accepts mixed municipal, construction debris, industrial waste, green materials, and inert wastes. The disposal area currently covers 132 acres (CalRecycle, 2015). Savage Canyon Landfill had one violation related to operator compliance with terms and conditions in 2009, six violations for gas monitoring and control and operator compliance with terms and conditions in 2010, and eight violations in 2011 for operator compliance with terms and conditions (CalRecycle, 2015).

TABLE 5.14-4
Solid Waste Disposal Facilities in the Vicinity of the AEC

Landfill/ Transfer Station	Location	Class	Permitted Capacity[a] (cubic yards)	Remaining Capacity[a] (cubic yards)	Permitted Throughput[a] (tons per day)	Estimated Closure Date[a]	Violation of Minimum State Standards Noted[a]
Savage Canyon Landfill	Whittier, CA	III	19,337,450	9,510,833	3,350	12/31/2055	No
Bel-Art Waste Transfer Station	Long Beach, CA	NA	NA	NA	1,500	Not Listed	No

[a] As of October 2015, based on CalRecycle Solid Waste Information System Database (CalRecycle, 2015). Violations checked for 2014–2015.

Note:

NA = not applicable

It is anticipated that any excavated soil will be used onsite for grading and leveling purposes. In the event that some excavated soil is not reused onsite, it would be classified for disposal on the basis of sampling. Soil determined to be nonhazardous could be suitable for reuse at a construction site or disposal at a regional disposal facility.

According to CalRecycle and as shown in Table 5.14-4, the capacity of the Savage Canyon is more than 89 million cubic yards of refuse and the estimated combined remaining capacity of approximately 44.5 million cubic yards of refuse. Adequate landfill capacity exists; therefore, disposal of nonhazardous waste will not be a constraint on development of the AEC. Impacts related to landfill capacity will be less than significant.

Hazardous Waste. Hazardous waste generated during AEC operation will be stored at the facility for less than 90 days. The waste will then be transported to a TSDF by a permitted hazardous waste transporter. According to DTSC, there are 56 facilities in California that can accept hazardous waste for treatment and recycling (DTSC, 2013b). For ultimate disposal, California has three hazardous waste (Class I) landfills. The closest commercial hazardous waste disposal facility to the AEC is Waste Management's Kettleman Hills Landfill.

Waste Management Kettleman Hills Landfill. This facility accepts Class I and II waste. The B-18 landfill is permitted for and will accept all hazardous wastes except radioactive, medical, and unexploded ordnance. Currently, B-18 landfill phase 1 and 2 are in operation with a permitted capacity of 10.7 million cubic yards. B-18 phase 1 and 2 are near capacity, but B-18 phase 3 will be opening with a permitted capacity of approximately 5 million cubic yards and a life expectancy of 8 years (Henry, 2012). After B-18 closes, a new B-20 landfill will be opened on currently undeveloped land on the site. B-20 has a permitted capacity of 15 million cubic yards and a life expectancy of 24 years (Henry, 2012). As a whole, Kettleman Hills Landfill will be accepting waste for the next 32 years, until 2044. However, they are continuously searching for more expansion opportunities (Henry, 2012).

Clean Harbors Buttonwillow Landfill. This landfill is permitted at 13.1 million cubic yards and can accept 4,050 tons per day (Linton, 2012). As of January 2012, it is approximately 2 percent full (Linton, 2012). The landfill is permitted to accept waste until 2040 (CalRecycle, 2013a). Buttonwillow has been permitted to manage a wide range of hazardous wastes, including RCRA hazardous wastes, California hazardous waste, and nonhazardous waste for stabilization treatment, solidification, and landfill. The landfill can handle waste in bulk (solids and liquids) and in containers. Typical waste streams include nonhazardous soil, California hazardous soil, hazardous soil for direct landfill, hazardous waste for treatment of metals, plating waste, hazardous and nonhazardous liquid, and debris for microencapsulation (Clean Harbors, 2013).

Clean Harbors Westmoreland Landfill. This facility is not currently open or accepting waste because the Buttonwillow facility can accommodate the current hazardous waste generation rate. The facility is, however, available in reserve and could be reopened if necessary. The landfill's conditional use permit prohibits the acceptance of some types of waste, including radioactive (except geothermal) waste, flammables, biological hazard waste (medical), PCBs, dioxins, air- and water-reactive wastes, and strong oxidizers.

Additional Facilities. In addition to hazardous waste landfills, there are numerous offsite commercial hazardous waste treatment and recycling facilities in California. Some of the facilities currently used by the Alamitos Generating Station include Crosby & Overton in Long Beach, Demenno/Kerdoone in Compton, Filter Recycling Services Inc. in Bloomington, Pacific Resource Recovery in Los Angeles, and Siemens Water Technologies in Vernon. All hazardous waste not treated or recycled by these facilities would then be transported to one of the permitted hazardous waste landfills previously discussed.

5.14.2.4 Waste Disposal Summary

The AEC will generate nonhazardous waste that will add to the total waste generated in Los Angeles County and in California. However, there is adequate recycling and landfill capacity in California to recycle and dispose of the waste generated by the AEC. During demolition, construction, and operation of the AEC approximately 3,000 tons of solid waste will be generated (including approximately 200 tons of hazardous waste) and the AEC operation will generate about 35 tons per year. The impact of the project on solid waste recycling and disposal capacity will not be significant.

Hazardous waste generated will consist of asbestos materials, waste oil, filters, oily rags, SCR and oxidation catalysts, and fluids used to clean piping. The waste oil and catalysts will be recycled. Hazardous waste treatment and disposal capacity in California is more than adequate. Therefore, the effect of the AEC on hazardous waste recycling, treatment, and disposal capability will not be significant.

5.14.3 Cumulative Effects

A cumulative impact refers to a proposed project's incremental effect together with other closely related past, present, and reasonably foreseeable future projects whose impacts may compound or increase the incremental effect of the proposed project (Public Resources Code § 21083; California Code of Regulations, Title 14, §§15064(h), 15065(c), 15130, and 15355).

The quantities of nonhazardous and hazardous wastes that would be generated during AEC demolition, construction, and operation would be relatively low. Recycling efforts would be prioritized wherever practical, and capacity is available in a variety of treatment and disposal facilities. Sufficient landfill capacity is available in the project area. Therefore, the added waste quantities generated by the AEC would not result in significant cumulative waste management impacts.

5.14.3.1 Mitigation and Waste Management Methods

The handling and management of waste generated by the AEC will follow the hierarchical approach of source reduction, recycling, treatment, and disposal. The first priority will be to reduce the quantity of waste generated through pollution prevention methods (for example, high-efficiency cleaning methods). The next level of waste management will involve reusing or recycling wastes (for example, used oil recycling). For wastes that cannot be recycled, treatment will be used, if possible, to make the waste nonhazardous (for example, neutralization). Finally, offsite disposal will be used for residual wastes that cannot be reused, recycled, or treated.

The following sections present methods for managing nonhazardous and hazardous waste generated by the AEC.

5.14.3.2 Construction and Demolition Phase

Handling requirements and mitigation measures for the handling of wastes during construction and demolition are described in the following sections.

Nonhazardous Wastes. Nonhazardous waste generated during construction and demolition will be collected in onsite dumpsters and picked up periodically by Universal Waste Systems, Inc., or other similarly qualified vendor. The waste then will be taken to the Bel-Art Waste Transfer Station, Savage Canyon Landfill, Puente Hills Landfill, or another local landfill. Recyclable materials can be segregated and transported by construction contractors or other private haulers to an area recycling facility. Vendors like Universal Waste Systems, Inc., can provide drop boxes or debris boxes for large quantities of recyclables.

Wastewater generated during construction and demolition will include sanitary waste and could include excavation dewatering water, equipment washwater, and stormwater runoff. Sanitary waste will be collected in portable, self-contained toilets. Excavation dewatering water will be contained in portable tanks and sampled prior to offsite disposal. Equipment washwater will be contained at designated wash areas and will be disposed of offsite. Stormwater runoff will be managed in accordance with a stormwater management permit, which will be obtained before construction starts. Nonhazardous wastewater generation will be minimized by water conservation and reuse measures.

Hazardous Wastes. Most hazardous waste generated during construction and demolition will consist of excavation dewatering water, flushing and cleaning fluids, passivating fluids, and solvents. Demolition of Alamitos Generating Station Unit 7 expected to generate approximately 150 tons of asbestos waste. Some waste in the form of welding materials and dried paint also may be generated. Nonhazardous materials will be used whenever possible to minimize the quantity of hazardous waste generated. The construction contractor will be the generator of hazardous construction waste and will be responsible for proper handling in compliance with all applicable federal, state, and local laws and regulations, including licensing, training of personnel, accumulation limits and times, and reporting and recordkeeping. The hazardous waste will be collected in satellite accumulation containers near the points of generation. This waste will be moved daily to the contractor's 90-day hazardous waste storage area, located at the plant construction laydown area.

The waste will be delivered to an authorized hazardous waste management facility before expiration of the 90-day storage limit.

5.14.3.3 Operation Phase

Handling requirements and mitigation measures for the handling of wastes during operation are described in the following sections.

Nonhazardous Wastes. Wastewater from sinks, toilets, and showers will be disposed of to the sanitary sewer.

Nonhazardous waste will be collected and deposited in a local landfill. Whenever practical, recycling will be implemented throughout the facility to minimize the quantity of nonhazardous waste that must be disposed of in a landfill.

Hazardous Wastes. To avoid the potential effects on human health and the environment from handling and disposing of hazardous wastes, procedures will be developed to ensure proper labeling, storage, packaging, recordkeeping, and disposal of all hazardous wastes. The following general procedures will be employed:

- The Alamitos Generating Station is currently classified as a hazardous waste generator and will continue to use the site-specific EPA identification number that will be used to manifest hazardous waste from the AEC. Hazardous waste from the AEC will be stored onsite for less than 90 days before offsite disposal, treatment, or recycling.
- Hazardous wastes will be accumulated at the generating facility according to the California Code of Regulations Title 22 requirements for satellite accumulation.
- Hazardous wastes will be stored in appropriately segregated storage areas surrounded by berms to contain leaks and spills. The bermed areas will be sized to hold the full contents of the largest single container and, if not roofed, will be sized for an additional 20 percent to allow for rainfall, for a 24-hour event. These areas will be inspected daily.
- Hazardous wastes will be collected by a licensed hazardous waste hauler using a hazardous waste manifest. Wastes will be shipped only to authorized hazardous waste management facilities. Biannual hazardous waste generator reports will be prepared and submitted to the DTSC. Copies of manifests, reports, waste analyses, and other documents will be kept onsite and will remain accessible for inspection for at least 3 years.
- Employees will be trained in hazardous waste procedures, spill contingencies, and waste minimization.
- Procedures will be developed to reduce the quantity of hazardous waste generated. Nonhazardous materials will be used instead of hazardous materials whenever practical, and wastes will be recycled whenever practical.

Specifically, hazardous waste handling will include the following practices. Handling of hazardous wastes in this way will minimize the quantity of waste deposited to landfills:

- Waste lubricating oil will be recovered and recycled by a waste oil recycling contractor, such as Evergreen Oil, Inc.
- Spent oil filters and oily rags will be recycled.
- Spent SCR and oxidation catalysts will be recycled by the supplier, if possible, or disposed of by the supplier in a Class I landfill.

5.14.3.4 Facility Closure

When the AEC is closed, both nonhazardous and hazardous wastes must be handled properly according to applicable LORS. Closure can be temporary or permanent. Temporary closure would be for a period greater than the time required for normal maintenance, including overhaul or replacement of the combustion

turbines. Causes for temporary closure could be a disruption in the supply of natural gas, or damage to the plant from earthquake, fire, or other natural causes. Permanent closure would consist of a cessation in operations with no intent to restart operations and could result from factors such as the age of the plant, damage to the plant, or other currently unforeseeable reasons. Handling of wastes for these two types of closure are discussed below.

Temporary Closure. For a temporary closure, where there is no release of hazardous materials, facility security will be deployed on a 24-hour basis, and the CEC will be notified. Depending on the length of shutdown necessary, a contingency plan for the temporary cessation of operations will be implemented. This plan will be prepared as described in the plant closure section. The plan will be developed to ensure conformance with all applicable LORS and the protection of public health and safety and the environment. The plan, depending on the expected duration of the shutdown, could include draining 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 Section 5.14.5.

If the temporary closure is in response to facility damage, or where there is a release or threatened release of hazardous waste or materials into the environment, procedures will be followed as set forth in a risk management plan. Procedures include methods to control releases, notification of applicable authorities and the public, emergency response, and training for generating facility personnel in responding to and controlling releases of hazardous materials and hazardous waste. Once the immediate problem of hazardous waste and materials release is contained and cleaned up, temporary closure will proceed as described for a closure where there is no release of hazardous materials or waste.

Permanent Closure. The expected life of the generation facility is 30 years, although operation could be longer. When the facility is permanently closed, the handling of nonhazardous and hazardous waste and hazardous materials will be part of a general closure plan that will attempt to maximize the recycling of facility components. Unused chemicals will be sold back to the suppliers or other purchasers or users. All equipment containing chemicals will be drained and shut down to protect public health and safety and 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 applicable LORS. The site will be secured 24 hours per day during the AEC decommissioning activities.

Monitoring. Because the environmental impacts caused by demolition, construction, and operation of the facility are expected to be minimal, extensive monitoring programs will not be required. Generated waste, both nonhazardous and hazardous, will be monitored during project demolition, construction, and operation in accordance with the monitoring and reporting requirements mandated by the regulatory permits to be obtained for demolition, construction and operation.

5.14.4 Laws, Ordinances, Regulations, and Standards

Nonhazardous and hazardous waste handling at the AEC will be governed by applicable federal, state, and local LORS. Applicable LORS address proper waste handling, storage, and disposal practices to protect the environment, facility workers, and the surrounding community. Table 5.14-5 presents a summary of the LORS applicable to waste handling at the AEC.

TABLE 5.14-5

Laws, Ordinances, Regulations, and Standards for Waste Management

LORS	Requirements/Applicability	Administering Agency	SAFC Section Explaining Conformance
Federal			
RCRA Subtitle D	Regulates design and operation of nonhazardous solid waste landfills. The AEC solid waste will be collected and disposed of by a collection company in conformance with Subtitle D.	Department of Resources Recycling and Recovery (CalRecycle)	Sections 5.14.5.1, 5.14.4.1, 5.14.4.2.1, 5.14.1.2.2
RCRA Subtitle C	Controls storage, treatment, and disposal of hazardous waste. Hazardous waste will be handled by contractors in conformance with Subtitle C.	DTSC	Sections 5.14.5.1, 5.14.4.1.2, 5.14.4.2.2, 5.14.1.2.2
Clean Water Act	Controls discharge of wastewater to the surface waters of the United States.	Regional Water Quality Control Board	Sections 5.14.5.1, 5.14.4.1.1, 5.14.4.2.1
State			
California Integrated Waste Management Act (CIWMA)	Controls solid waste collectors, recyclers, and depositors. The AEC solid waste will be collected and disposed of by a collection company in conformance with the CIWMA.	CalRecycle	Sections 5.14.5.2, 5.14.4.1, 5.14.4.2.1, 5.14.1.2.2
Hazardous Waste Control Law (HWCL)	Controls storage, treatment, and disposal of hazardous waste. Hazardous waste will be handled by contractors in conformance with the HWCL.	DTSC	Sections 5.14.5.2, 5.14.4.1.2, 5.14.4.2.2, 5.14.1.2.2
Porter-Cologne Water Quality Control Act	Controls discharge of wastewater to surface waters and groundwaters of California.	Regional Water Quality Control Board	Sections 5.14.5.2, 5.14.4.1.1, 5.14.4.2.1
California Fire Code	Controls storage of hazardous materials and wastes and the use and storage of flammable/combustible liquids. Wastes will be accumulated and stored in accordance with Fire Code requirements. Permits for storage containers will be obtained, as needed, from the City of Long Beach Fire Department.	City of Long Beach Fire Department	Section 5.14.7, 5.14.5.4, 5.14.4.2.2
Local			
City of Long Beach Municipal Code Chapter 18.697, Ordinance Number ORD-13-0024	Construction and demolition recycling program and waste management plan for the City of Long Beach. The program requires that at least 60% of all material generated on a project must be diverted and a Waste Management Plan submitted.	City of Long Beach Development Services	Section 5.14.6.3
City of Long Beach Integrated Waste Management Plan	Provides guidance for local management of solid waste and household hazardous waste. Waste will be recycled in a manner consistent with applicable LORS.	City of Long Beach Department of Public Works Environmental Services Bureau	Section 5.14.6, 5.14.7, 5.14.5.3, 5.14.4.2.2
City of Long Beach Department of Health and Human Services, Environmental Health Bureau Hazardous Materials Programs, various programs	Long Beach Environmental Health Bureau (designated Certified Unified Program Agency (CUPA) and the City of Long Beach Fire Department (designated Participating Agency) for the City of Long Beach that regulate and conduct inspections of businesses that handle hazardous materials, hazardous wastes, and/or have aboveground or underground storage tanks. The AEC will comply with Long Beach Environmental Health Bureau (designated CUPA) and the City of Long Beach Fire	Long Beach Environmental Health Bureau (designated CUPA) and the City of Long Beach Fire Department (designated Participating Agency)	Section 5.14.6, 5.14.7, 5.14.5.3, 5.14.4.2.2

TABLE 5.14-5

Laws, Ordinances, Regulations, and Standards for Waste Management

LORS	Requirements/Applicability	Administering Agency	SAFC Section Explaining Conformance
	Department (designated Participating Agency) requirements concerning storage and handling of hazardous materials and wastes and will also cooperate with the agencies on resolution of any environmental issues at the site.		
City of Long Beach Municipal Code Chapters 8.87 and 8.88	Relates to storage, handling, transport, and generation of hazardous materials in the city	Long Beach Environmental Health Bureau (designated CUPA) and the City of Long Beach Fire Department (designated Participating Agency)	Section 5.14.6.3
Uniform Fire Code Articles 79 and 80	Require secondary containment, monitoring and treatment for accidental releases of toxic gases.	City of Long Beach Fire Department	Section 5.14.6.3

5.14.4.1 Federal LORS

EPA regulates wastewater under the Clean Water Act, though this authority is delegated to the appropriate Regional Water Quality Control Board (RWQCB). The federal statute that controls nonhazardous and hazardous waste is the RCRA 42 United States Code Section 6901, et seq. RCRA's implementing regulations are found in 40 Code of Federal Regulations Section 260, et seq. Subtitle D assigns responsibility for the regulation of nonhazardous waste to the states; federal involvement is limited to establishing minimum criteria that prescribe the best practicable controls and monitoring requirements for solid waste disposal facilities. Subtitle C controls the generation, transportation, treatment, storage, and disposal of hazardous waste through a comprehensive "cradle-to-grave" system of hazardous waste management techniques and requirements. It applies to all states and to all hazardous waste generators (above certain levels of waste produced). The AEC will conform to this law in its generation, storage, transport, and disposal of any hazardous waste generated at the facility. EPA has delegated its authority for implementing these laws to the appropriate State of California agencies with subject matter expertise.

5.14.4.2 State LORS

Wastewater is regulated by the State Water Resources Control Board (SWRCB) and RWQCBs under the Porter-Cologne Water Quality Control Act. Nonhazardous waste is regulated by the California Integrated Waste Management Act of 1989, found in Public Resources Code Section 40000, et seq. This law provides an integrated statewide system of solid waste management by coordinating state and local efforts in source reduction, recycling, and land disposal safety. Counties are required to submit Integrated Waste Management Plans to the state. This law directly affects Los Angeles County, the City of Long Beach, and the solid waste hauler and disposer that will collect the AEC solid waste.

RCRA allows states to develop their own programs to regulate hazardous waste. The programs must be at least as stringent as RCRA. California has developed its own program in the California HWCL (Health and Safety Code Section 25100, et seq.). Because California has elected to develop its own program, the HWCL performs essentially the same regulatory functions as RCRA through the federal delegate agency and is thus the law that will regulate hazardous waste at the AEC. The California HWCL also includes hazardous wastes that are not classified as hazardous waste under RCRA. Because State-regulated hazardous wastes will be generated at the AEC during construction and operation, the HWCL will require the project owner to adhere to State storage, recordkeeping, reporting, and training requirements for these wastes.

5.14.4.3 Local LORS

For solid nonhazardous waste, the state laws that would normally be administered and enforced primarily by the City of Long Beach Department of Public Works Environmental Services Bureau, City of Long Beach Development Services, and the California RWQCB are administered through the CEC's certified regulatory program. These programs are described below.

The City of Long Beach Department of Health and Human Services, Environmental Health Bureau (Long Beach Environmental Health Bureau) has overall responsibility for CUPA programs (Kerr, 2013 and City of Long Beach Certified Unified Program Agency, 2013). They are responsible for administering Hazardous Materials Business Plans (HMBP), Hazardous Materials Management Plans, and Resource Management Plans filed by businesses located in the city. In addition, the Long Beach Environmental Health Bureau ensures that businesses and industry store and use hazardous materials safely and in conformance with various regulatory codes, including Long Beach Municipal Code Chapters 8.87 and 8.88 (DuRee, 2013). These sections of the municipal code relate to storage, handling, transport, and generation of hazardous materials in the city. The Long Beach Environmental Health Bureau also administers hazardous waste generator and the California Accidental Release Prevention programs.

The City of Long Beach Fire Department is the Participating Agency responsible for other CUPA programs, including AST and UST permits and administers the business emergency plan program (DuRee, 2013). The Long Beach Environmental Health Bureau and City of Long Beach Fire Department jointly administer Spill Prevention, Control, and Countermeasure Plans. The Long Beach Environmental Health Bureau and City of Long Beach Fire Department perform inspections at established facilities to verify that hazardous materials are properly stored and handled and that the types and quantities of materials reported in a firm's HMBP are accurate (City of Long Beach Fire Department, 2013).

The CEC, Long Beach Environmental Health Bureau, and the City of Long Beach Fire Department will be contacted in the event of a release of hazardous wastes or materials to the environment.

Local agency requirements and LORS associated with the project will be addressed before the construction and operation of the facility, and the facility will conform to all local requirements. These include the need to prepare an HMBP, which will be reviewed and approved by the CEC in consultation with the Long Beach Environmental Health Bureau. Because the site has an existing HMBP, a revised HMBP will be filed with the Long Beach Environmental Health Bureau and will be updated annually in accordance with applicable regulations (Kerr, 2013).

The closest fire station to the AEC site is the City of Long Beach Fire Department Station No. 22, located at 6340 East Atherton Street, Long Beach, California, 90815. The station is approximately 1 mile away from the project site and would provide the first response to a fire, with an approximate 5-minute response time on average (DuRee, 2013). The project owner has engaged the City of Long Beach Fire Department in discussions regarding the project's fire protection needs and the City of Long Beach Fire Department's ability to respond. In addition, the facility will have an onsite fire suppression system, which is described in detail in Section 2.0, Project Description. Two existing electric fire pumps, connected to two independent power feeds from the SCE distribution system, will be provided to pump water from the onsite fire/service water storage tank. Fire protection water from the existing water supply connection and service water storage tank will be provided to a dedicated underground fire loop piping system.

If hazardous materials were involved in an incident, Fire Station No. 22 would be the first onsite responder, and able to request additional resources from the 22 other stations in the district (DuRee, 2013). If needed, City of Long Beach Fire Department has mutual aid and automatic aid agreements for additional response from the Los Angeles County Fire Department and the Orange County Fire Authority. The most likely scenario for use of mutual aid to the project site would come from Orange County Fire Authority resources at Orange County Stations 48, 17, and 42 (DuRee, 2013). All City of Long Beach Fire Department firefighters and stations are certified and capable of managing a hazardous materials-related incident. City of Long Beach Fire Department Station No. 24 and Station No. 19 house specialized equipment and personnel for

hazardous materials response, and these resources can be deployed city-wide when requested (DuRee, 2013). The hazardous materials response team will identify the type and source of the hazardous material, oversee evacuation of people, and confine the spilled material, if possible. Material cleanup is the responsibility of the facility causing the spill. A Hazardous Material Spill Response contractor may also respond for containment, cleanup, and remediation.

The City of Long Beach Municipal Code Chapter 18.67, Ordinance Number ORD-13-0024, details the construction and demolition (C&D) recycling program (City of Long Beach Planning, 2013). The program requires that at least 60 percent of all material generated on a project must be diverted. No more than 20 percent of the 60 percent diversion rate can be achieved through the recycling or reuse of inert materials, unless an applicant can demonstrate to the satisfaction of the Waste Management Plan Compliance Official that sufficient structural materials do not exist for recycling or that 40 percent diversion of total waste through noninert materials is not feasible (City of Long Beach Planning, 2013). C&D debris may be diverted to an approved mixed use recycling/recovery facility or to other disposal facilities based on the material type and handling method (i.e., recycled, reused, salvaged, disposed or transformed).

All wastes generated by the AEC will be managed in a manner consistent with applicable LORS.

5.14.4.4 Codes

The design, engineering, and construction of hazardous waste storage and handling systems will be in accordance with the following applicable codes and standards:

- Uniform Fire Code
- Uniform Building Code
- Uniform Plumbing Code
- California Building Code
- California Fire Code
- City of Long Beach Municipal Code

5.14.5 Agencies and Agency Contacts

Several agencies, including EPA at the federal level and DTSC and the California Environmental Protection Agency at the state level, regulate nonhazardous and hazardous waste. The regulations, however, are usually administered and enforced primarily through the City of Long Beach Department of Public Works Environmental Services Bureau, City of Long Beach Development Services, Long Beach Environmental Health Bureau, and the City of Long Beach Fire Department but for the CEC's exclusive jurisdiction. The persons to contact for nonhazardous and hazardous waste management are listed in Table 5.14-6.

TABLE 5.14-6

Agency Contacts for Waste Management

Issue	Agency	Contact
Nonhazardous Waste		
Solid Waste and Recycling	City of Long Beach Department of Public Works Environmental Services Bureau	Lisa Harris City of Long Beach Department of Public Works Environmental Services Bureau 2929 East Willow Street Long Beach, CA 90806 (562) 570-2876 lisa.harris@longbeach-recycles.org
Construction and Demolition Recycling Program	City of Long Beach Development Services, Office of Sustainability, Green Building	Theresa Woolheather City of Long Beach Development Services 333 West Ocean Boulevard Long Beach, CA 90802 (562) 570-6301 theresa.woolheather@longbeach.gov
Hazardous Waste		
Hazardous Waste Compliance and Inspections	Long Beach Environmental Health Bureau (CUPA)	Nelson Kerr, Manager City of Long Beach Department of Health and Human Services, Environmental Health Bureau 2525 Grand Avenue Long Beach, CA 90815 (562) 570-4131 nelson.kerr@longbeach.gov
Hazardous Waste Compliance and Inspections, and Hazardous Waste Emergency Response	City of Long Beach Fire Department (Participating Agency)	Mike DuRee, Fire Chief David Zinnen, Deputy Fire Marshal City of Long Beach Fire Department 3205 Lakewood Boulevard Long Beach, CA 90808 (562) 570-2579 michael.duree@longbeach.gov david.zinnen@longbeach.gov

5.14.6 Permits and Permit Schedule

As part of the CEC's certified regulatory program process, the temporary storage of hazardous wastes at the AEC will be included in the updates to the existing HMBP also submitted to the Long Beach Environmental Health Bureau as the designated CUPA, and the City of Long Beach Fire Department as the designated Participating Agency, as described in Section 5.5, Hazardous Materials Handling. No additional permits are required.

5.14.7 References

CalRecycle. 2015. Solid Waste Information System (SWIS) Database, Los Angeles County. Available online at: http://www.calrecycle.ca.gov/SWFacilities/Directory/Default.htm. June.

City of Long Beach Certified Unified Program Agency. 2013. City of Long Beach Department of Health and Human Services, Environmental Health Bureau, Long Beach Certified Unified Program Agency website. Available online at: http://www.longbeach.gov/health/eh/hazmat/cupa.asp. June.

City of Long Beach Department of Public Works. 2013. City of Long Beach Department of Public Works Environmental Services Bureau website. Available online at: http://www.longbeach-recycles.org/home/index.htm. June.

City of Long Beach Fire Department. 2013. City of Long Beach Fire Department Information. Available online at: http://www.longbeach.gov/fire/. June.

City of Long Beach Planning. 2007. City of Long Beach Municipal Code, Chapter 18.97, Construction and Demolition Recycling Program. Available online at: http://www.lbds.info/planning/advance_planning/green_building/default.asp#cd. May.

City of Long Beach Planning. 2013. City of Long Beach Development Services, Office of Sustainability, Green Building. Available online at: http://www.lbds.info/planning/advance_planning/green_building/default.asp#cd. June.

Clean Harbors. 2013. Buttonwillow Landfill Facility Fact Sheet. Available online at: http://www.cleanharbors.com/locations/index.asp?id=53. June.

Department of Toxic Substance Control (DTSC). 2015a. DTSC's Hazardous Waste and Substances Site List (Cortese List), Los Angeles County. Available online at: http://www.dtsc.ca.gov/SiteCleanup/Cortese_List.cfm. June.

Department of Toxic Substance Control (DTSC). 2013b. *California Commercial Offsite Hazardous Waste Management Facilities*. Available online at: http://www.envirostor.dtsc.ca.gov/public/commercial_offsite.asp. June.

DuRee, Mike/ City of Long Beach Fire Department, Fire Chief and David Zinnen/ City of Long Beach Fire Department, Deputy Fire Marshal. 2013. Personal communication with Beth Smoker/CH2M HILL. July.

Environmental Management Strategies (EMS). 2012. *Phase I Environmental Site Assessment, Alamitos Electrical Power Plant, 690 North Studebaker Road, Long Beach, CA*. February.

Environmental Management Strategies (EMS). 2013. *Phase I Environmental Site Assessment, Alamitos Electrical Power Plant, 690 North Studebaker Road, Long Beach, CA*. March.

Environmental Management Strategies (EMS). 2015. *Phase I Environmental Site Assessment, Alamitos Electrical Power Plant, 690 North Studebaker Road, Long Beach, CA*. July.

Henry, Bob/Waste Management – Kettleman Hills Landfill. 2012. Personal communication with Beth Smoker/CH2M HILL. January.

Kerr, Nelson/City of Long Beach Department of Health and Human Services, Environmental Health Bureau, Manager. 2013. Personal communication with Beth Smoker/CH2M HILL. June.

Linton, Ken/Clean Harbors. 2012. Clean Harbor's Buttonwillow Landfill. Personal communication with Beth Smoker/CH2M HILL. January.

5.15 Water Resources

This section provides a discussion of the existing water resources near the Alamitos Energy Center (AEC) site and assesses the potential effects of construction and operation of the AEC on water resources. Specifically, this chapter discusses the project and its potential effects in the following areas:

- Water supply and quality
- Disposal of wastewater
- Stormwater discharge
- Flooding

Section 5.15.1 discusses the existing hydrologic environment. Potential environmental effects of the construction and operation of the AEC on water resources are discussed in Section 5.15.2. A discussion of potential cumulative project effects is presented in Section 5.15.3. Section 5.15.4 discusses proposed mitigation measures that will avoid or minimize significant effects. Section 5.15.5 presents applicable laws, ordinances, regulations, and standards (LORS) related to water resources. Section 5.15.6 describes permits that relate to water resources, lists contacts with relevant regulatory agencies, and presents a schedule for obtaining permits. References cited are listed in Section 5.15.7.

5.15.1 Affected Environment

AES Alamitos Energy, LLC, will construct, own, and operate the Alamitos Energy Center (AEC), a natural- gas-fired, air-cooled, combined-cycle and simple-cycle, electrical generating facility in Long Beach, California. The proposed AEC will have a nominal generating capacity of 1,040 megawatts (MW). The AEC will be constructed on the site of the existing AES Alamitos Generating Station (AGS), located on an approximately 21-acre site within a larger, 71.1-acre parcel.

The AEC will feature two gas turbine power blocks. Combined-cycle power block will consist of two natural-gas-fired combustion turbine generators (CTG) in a combined-cycle configuration, two unfired heat recovery steam generators (HRSG), one steam turbine generators, an air-cooled condenser, an auxiliary boiler, and related ancillary equipment. Simple-cycle power block will consist of four simple-cycle LMS-100 CTGs with fin-fan coolers and ancillary facilities.

The AEC will meet the demand for new generation in the Los Angeles basin local electrical reliability area. The demand is caused in large part by the closure of the San Onofre Nuclear Generating Station and the anticipated retirement of the older, natural-gas-fired generation currently using once-through ocean water-cooling (OTC). As a result of the promulgation of the California State Water Resources Control Board's (SWRCB) *Water Quality Control Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling* (SWRCB, 2010), more than 4,000 MW of OTC generation are expected to be retired in the Los Angeles local electrical reliability area by December 31, 2020.

The AEC will use water provided by the City of Long Beach Water Department (LBWD) for construction, operational process, and sanitary uses but at substantially lower volumes than the existing AGS historically has used. This water will be supplied through existing, onsite water lines. The AEC will include a new, 1,000-foot process/sanitary wastewater pipeline to the first point of interconnection with the existing LBWD sewer system, the potential upgrade of an additional 4,000 feet of existing pipeline downstream from the first point of interconnection, and the elimination of the current practice of treatment and discharge of process/sanitary wastewater to the San Gabriel River. Stormwater runoff from the power block areas will be directed to oil/water separators and to an existing retention basin and then ultimately discharged to the Los Cerritos channel via existing stormwater outfalls.

The AEC will interconnect to the existing, Southern California Edison (SCE) 230-kilovolt (kV) switchyard adjacent to the north side of the AGS. Natural gas will be supplied to the AEC via the existing, offsite, 30-inch-diameter pipeline owned and operated by Southern California Gas Company (SoCalGas) that

currently serves Units 5 and 6 of the AGS. The AEC will require construction of new natural gas-metering facilities and construction of two new natural gas compressor buildings within the AEC footprint.

The AEC is designed to serve both peak and intermediate loads with the added capabilities of rapid startup, significant turndown capability (ability to turn down to a low load), and fast ramp rates. As California's intermittent renewable energy portfolio continues to grow, operating in either load-following or partial shutdown mode will become necessary to maintain electrical grid reliability, thus placing an increased importance upon the rapid startup, high turndown, steep ramp rate, and superior heat rate employed at the AEC.

As an in-basin generating asset, the AEC will provide local generating capacity, voltage support, and reactive power that are essential for transmission system reliability in the Western Los Angeles basin subarea and larger Los Angeles basin local reliability area. The AEC will be able to provide system stability by supplying reactive power, voltage support, frequency stability, and rotating mass in the heart of the critical Western Los Angeles local reliability area. By virtue of its location in a transmission constrained load center, the AEC also helps to avoid potential transmission line overloads and can provide reliable local energy supplies when electricity from more distant generating resources is unavailable. In recognition of its critical grid reliability benefits, the AEC combined-cycle CTGs were selected by SCE in its Local Capacity Requirements Request for Offer on November 5, 2014, and the simple-cycle CTGs will meet the capacity needs anticipated to be identified in future California Public Utilities Commission Long-term Procurement Plans.

Owing to the critical need for generating capacity at the AEC site at all times, existing Units 1 through 6 will remain in operation through much of the AEC development and construction. Given that the removal of existing Units 1 through 6 is not required for construction of the AEC, the continued operation of the AGS will not impede AEC construction. Demolition of the retired and decommissioned turbine peaking generating Unit 7 and fuel tank, ancillary equipment, small maintenance shops, and two retention basins will be required for site preparation for the construction of the AEC. Construction and site preparation activities at the AEC site are anticipated to last 56 months, from the first quarter of 2017 until the third quarter of 2021. The project will commence construction with the removal of former Unit 7's building and ancillary equipment, fuel storage tank, tank berms, small maintenance shops, and two wastewater retention basins in January 2017 to make room for construction and laydown area for the AEC CCGT. Construction of the AEC CCGT will commence during the second quarter of 2017 and will be completed by the second quarter of 2020. The AEC CCGT is expected to commence commercial operation before May 1, 2020. Construction of the AEC SCGT is scheduled to proceed from the second quarter of 2020 through the third quarter of 2021, and Power Block 2 is expected to commence commercial operation in the third quarter of 2021. A temporary construction access road may be constructed offsite beginning at the intersection of Studebaker Road and Loynes Drive traveling southeast to the AEC site. Construction of the AEC will require the use of onsite laydown areas (approximately 8 acres dispersed throughout the existing site) and an approximately 10-acre laydown area located adjacent to the existing site.

5.15.1.1 Water Features, Rainfall, and Drainage

The San Gabriel River is immediately adjacent to the east of the site. The Los Cerritos channel, connected to Alamitos Bay, a marina owned by the City of Long Beach, is located to the west of the site. There are several freshwater ponds, estuarine and emergent wetland areas, and human-made channels south and west of the project area (Figure 5.15-1). There are three existing retention basins on the site, of which two are in operation for storm and waste water control. These lined retention basins are along the eastern boundary of the site and are used for onsite runoff from storm drains, boilers, and sumps as well as process water discharge.

The Regional Water Quality Control Boards (RWQCB) make water quality decisions for their designated region, including setting standards, issuing waste discharge requirements (WDR), determining compliance with those requirements, and taking appropriate enforcement actions. Each RWQCB adopts Water Quality Control Plans, or Basin Plans, that establish water quality objectives to ensure the reasonable protection of

beneficial uses and a program of implementation for achieving water quality objectives within the basin. For waters not attaining water quality standards, the RWQCB establishes total maximum daily loads (TMDL) and a program of implementation to meet the TMDLs.[55]

The AEC site is within the boundaries of the Los Angeles RWQCB. Water quality objectives for Long Beach are contained in the Basin Plan for the Los Angeles Region (Los Angeles RWQCB, 1994). San Gabriel River Estuary, Alamitos Bay, and Los Cerritos Channel are considered impaired water bodies on the 2010 TMDL list approved by the U. S. Environmental Protection Agency. Table 5.15-1 lists the pollutants for which the San Gabriel River Estuary, Alamitos Bay, and Los Cerritos Channel are listed as impaired and the proposed TMDL completion dates.

TABLE 5.15-1
Clean Water Act Section 303(d) List of Water Quality Impairments

Pollutant/Stressor	Potential Sources	Water Body Type	Proposed TMDL Completion
San Gabriel River Estuary			
Copper	Source Unknown	River & Stream	N/A
Dioxin	Source Unknown	River & Stream	2021
Nickel	Source Unknown	River & Stream	2021
Dissolved Oxygen	Source Unknown	River & Stream	2021
Alamitos Bay			
Indicator Bacteria	Source Unknown	Bay & Harbor	2019
Los Cerritos Channel			
Ammonia	Source Unknown	Tidal Wetland	2015
Bis(2ethylhexyl)phthalate (DEHP)	Source Unknown	Tidal Wetland	2019
Chlordane (sediment)	Source Unknown	Tidal Wetland	2019
Coliform Bacteria	Nonpoint Source	Tidal Wetland	2019
Copper	Nonpoint Source	Tidal Wetland	2019
Lead	Nonpoint Source	Tidal Wetland	2019
Trash	Source Unknown	Tidal Wetland	2019
Zinc	Nonpoint Source	Tidal Wetland	2019
pH	Unknown Nonpoint Source	Tidal Wetland	2021

Source: State Water Resources Control Board (SWRCB), 2015

Long Beach experiences mild summers and cool winters. August is the warmest month of the year, with an average maximum temperature of 84.0°F. January is the coldest month of the year, with an average maximum temperature of 66.9°F. Annual average precipitation in Long Beach is 12.03 inches. Most rainfall occurs during November through March. The wettest month of the year is February, with an average rainfall of 2.85 inches (Western Regional Climate Center [WRCC], 2013). Table 5.15-2 provides average historical

[55] Section 303(d) of the Clean Water Act requires that the states make a list of waters that are not attaining water quality standards. For waters on this list, the states are to develop total maximum daily loads or TMDLs. A TMDL must account for all sources of the pollutants that caused the water to be listed. Federal regulations require that the TMDL, at a minimum, account for contributions from point sources (federally permitted discharges) and contributions from nonpoint sources. TMDLs are established at the level necessary to implement the applicable water quality standards. In California, the State Water Resources Control Board (SWRCB) has interpreted state law (Porter-Cologne Water Quality Control Act, California Water Code Section 13000 et. seq.) to require that implementation be addressed when TMDLs are incorporated into Basin Plans. The Porter-Cologne Act requires each RWQCB to formulate and adopt Basin Plans for all areas within its region. It also requires that a program of implementation be developed that describes how water quality standards will be attained. TMDLs can be developed as a component of the program of implementation, thus triggering the need to describe the implementation features, or alternatively as a water quality standard. When the TMDL is established as a standard, the program of implementation must be designed to implement the TMDL.

rainfall from the nearby meteorological station at Long Beach Municipal Airport, which is approximately 4.3 miles from the AEC.

TABLE 5.15-2
Rainfall near the AEC Site (1958–2012)

Precipitation	Annual	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average	12.03	2.60	2.85	1.81	0.70	0.20	0.06	0.02	0.06	0.19	0.42	1.21	1.81
Maximum	27.67	12.76	12.09	8.75	4.42	2.32	0.86	0.34	2.03	1.45	5.34	6.05	10.41
Minimum	2.63	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Source: WRCC, 2013

5.15.1.2 Groundwater

The AEC site is in the Central Subbasin of the Coastal Plain of Los Angeles Groundwater Basin, which lies inland, adjacent to the West Coast Subbasin, and has a surface area of 277 square miles (Figure 5.15-2). The total capacity of the Central Basin is 13,800,000 acre-feet (Department of Water Resources [DWR], 2004). The main productive freshwater-bearing sediments are contained within Holocene alluvium and the Pleistocene Lakewood and San Pedro Formations. The main additional productive aquifers in the subbasin are the Gardena and Gage aquifers within the Lakewood Formation and the Silverado, Lynwood, and Sunnyside aquifers within the San Pedro Formation. Historically, groundwater flow in the Central Basin has been from recharge areas in the northeast part of the subbasin, toward the Pacific Ocean on the southwest. However, pumping has lowered the water level in the Central Basin and water levels in some aquifers are about equal on both sides of the Newport-Inglewood uplift, decreasing subsurface outflow to the West Coast Subbasin (DWR, 2004).

Groundwater enters the Central Basin through surface and subsurface flow and by direct percolation of precipitation, stream flow, and applied water; and replenishes the aquifers in the forebay areas where permeable sediments are exposed at ground surface. Natural replenishment of the subbasin's groundwater supply is largely from surface inflow through Whittier Narrows (and some underflow) from the San Gabriel Valley. Imported water purchased from Metropolitan Water District of Southern California (MWD) and recycled water from Whittier and San Jose Creek Treatment Plants are used for artificial recharge in the Montebello Forebay at the Rio Hondo and San Gabriel River spreading grounds. Saltwater intrusion is a problem in areas where recent or active river systems have eroded through the Newport Inglewood uplift. A mound of water to form a barrier is formed by injection of water in wells along the Alamitos Gap (DWR, 2004).

LBWD serves as the regional wholesaler and developer of local water supplies, as well as providing recycled water. LBWD has the right to pump over 30,000 acre-feet per year of groundwater from the Central Basin. Groundwater extracted from the Central Subbasin satisfies up to 60 percent of the LBWD's water demand. Underground water in the Central Basin, from which groundwater is produced for Long Beach, has the San Gabriel Mountains via the San Gabriel River as its primary source. Increased water demand in the San Gabriel Valley by the mid-1900s significantly reduced the southerly flows to the Central Basin, which further contributed to the falling water tables. To protect this source of local water supply, in 1959, the Board of Water Commissioners instituted a lawsuit against major water producers in the upper San Gabriel Valley to guarantee water supplies to Central Basin producers. Parties to the lawsuit negotiated a settlement that provided the basis of stipulation for judgment (the "Long Beach Judgment") rendered by the Superior Court on October 8, 1965. This judgment guarantees the replenishment waters will continue in perpetuity (LBWD, 2013).

Beneficial uses for the Central Subbasin groundwater include: Municipal and Domestic Supply, Agricultural Supply, Industrial Process Supply, and Industrial Service. As a source of municipal and domestic water

supply, groundwater wells generally meet most drinking water standards subject to some localized impairments (Table 5.15-3).

TABLE 5.15-3
Water Quality in Public Supply Wells

Constituent Group[a]	Wells Sampled[b]	Wells with a Concentration above Maximum Contaminant Level (MCL)[c]
Central Subbasin		
Inorganics - Primary	316	15
Radiological	315	1
Nitrates	315	2
Pesticides	322	0
VOCs and SVOCs	344	43
Inorganics – Secondary	316	113

[a] A description of each member in the constituent groups and a generalized discussion of the relevance of these groups are included in California's Groundwater – Bulletin 118 by DWR (2004).

[b] Represents distinct number of wells sampled as required under the Title 22 program from 1994 through 2000.

[c] Each well reported with a concentration above an MCL was confirmed with a second detection above an MCL. This information is intended as an indicator of the types of activities that cause contamination in a given basin. It represents the water quality at the sample location. It does not indicate the water quality delivered to the consumer. More detailed drinking water quality information can be obtained from the local water purveyor and its annual Consumer Confidence Report.

Notes:

SVOC = semivolatile organic compound
VOC = volatile organic compound

Source: DWR, 2004

5.15.1.3 Flooding Potential

The AEC site is outside the 100-year floodplain, in Zone X as defined by the Federal Emergency Management Agency (FEMA), which means it is an area of moderate flood hazard, usually the area between the limits of the 100-year and 500-year floods (FEMA, 2008). The FEMA floodplains are shown on Figure 5.15-3.

The AEC site is adjacent to an area mapped for tsunami susceptibility run-up hazard (California Emergency Management Agency, 2013). Tsunamis are seismically induced ocean waves with very long periods (the duration between waves). Tsunamis may be manifested in the form of wave bores or a gradual upwelling of sea level and can be caused by landslides or earthquakes. The offshore area of Los Angeles County area contains many faults and fault scarps capable of producing tsunamis; however, seismically induced sea waves are uncommon. Seven tsunamis have been recorded in California. In southern California, a significant tsunami was associated with the 1960 Chile Earthquake. Damage occurred in the Long Beach–Los Angeles harbor, where 5-foot-high waves surged back and forth in channels, causing damage to small boats and yachts. Tsunami tidal surge occurred in the Long Beach Harbor from the magnitude 8.8 Chile Earthquake in February 2010, and minor effects were reported in the Long Beach Harbor from the March 2011 Japan tsunami.

Seiches are defined as oscillations in confined or semi-confined bodies of water due to earthquake shaking. The AEC site is adjacent to the San Gabriel River channel and within 0.5-mile of an enclosed bay or harbor that could be subject to seiches caused by tsunamis that are captured and reflected within the enclosed area of an inner harbor.

Flooding potential in the project vicinity also may be associated with predicted sea level rise as a result of climate change. The AEC site is approximately 12 to 15 feet above existing mean sea level. The California Energy Commission (CEC) forecasts that by 2030 the mean sea level in southern California could rise

between 4 and 30 centimeters (cm), or approximately 1.5 inches to 1 foot, because of climate change (CEC, 2009). By 2050, the CEC's forecasted mean sea level in southern California may rise by 0.5 meter (approximately 1.5 feet) (CEC, 2009, page 8, Figure 2). Additionally, with the predicted rise in sea level, wave-induced storm surges and higher wave run-up may affect coastal areas. The CEC 2009 report includes a forecast of wave-induced storm surges in California of up to 1.5 meters (approximately 5 feet).

Depending on several factors, the AEC has a projected operational expectancy of approximately 30 years, or until approximately 2050, based on an expected commercial operation date (COD) of 2019 to 2025. The combination of predicted sea level rise (approximately 1.5 feet) and increased wave-induced storm surges (approximately 5 feet) in southern California could result in an increased depth of inundation in the project area of approximately 6.5 feet from wave-induced storm surges; however, as the AEC site's existing elevation is approximately 12 to 15 feet above existing mean sea level, there would still be a buffer of at least 5.5 feet on the AEC site through its expected operational period of approximately 2050 (based on a COD of 2019 to 2025 and 30 years of site operations).

The design and engineering of the AEC will meet applicable LORS, including those related to flood protection, such as California and federal building code requirements and applicable LORS of the City of Long Beach and Los Angeles County. The design and engineering of the AEC will also address any applicable LORS related to predicted sea level rise, storm surge/wave run-up inundation, and site flooding protection.

5.15.1.4 Water Supply

This section describes the quantity of water required for the project, the sources of the water supply, and water quality of the source water.

Process Water. The AEC will use water provided by the LBWD for process water. Process water will be used for the turbine compressor wash, evaporative cooling, HRSG blowdown and makeup water, emergency fire protection and domestic and sanitary uses. Currently, LBWD supplies the existing AGS with water for process via an existing pipeline interconnection. The project will use the existing LBWD pipeline that enters the site along Studebaker Road for potable water supply.

The annual water requirements for operation of the AEC at maximum permit loads will be substantially less than the actual historical water consumption of the existing AGS as demonstrated from a comparison of actual water use at the AGS for 2013 and 2014. Figures 2.1-5a and 2.1-5b provide the water balances for the AEC, representing two operating conditions. Figure 2.1-5a represents AEC operations under average ambient temperature conditions with the turbines operating at 100 percent load with the inlet air evaporative cooling operating. For these conditions, AEC water use will be approximately 55 gallons per minute for the CCGT power block and 13 gallons per minute for the SCGT power block (see Table 5.15-4). Figure 2.1-5b shows AEC operations at peak temperature conditions with the turbines operating at 100 percent load with the inlet evaporative cooling operating. Under these conditions water use will be approximately 195 gallons per minute for the AEC CCGT and 162 gallons per minute for the AEC SCGT. The maximum annual water use is expected to be 130 acre-feet per year. Based on water volumes from 2012 through 2014, the AGS has historically used an average of approximately 441 acre-feet per year.

LBWD has provided a will-serve letter (see Appendix 2E) indicating there is sufficient supply of water to accommodate the project. Information about the feasibility of other water supply sources is presented in Section 6.6.3. As noted in Section 6.6.3, water supply alternatives including the potential use of reclaimed water to support the AEC were analyzed and determined to be infeasible.

The City of Long Beach's water supply, which is provided by LBWD, uses a combination of groundwater, imported surface water, and recycled water. Groundwater extracted from the Central Subbasin satisfies up to 60 percent of the LBWD's water demand (LBWD, 2013). Approximately one-quarter of the LBWD's potable water supply is treated surface water purchased from MWD. This water originates from two sources: the Colorado River, via the 242-mile Colorado River Aqueduct and Northern California's Bay-Delta region, via the 441-mile California Aqueduct. LBWD also accommodates nearly 15 percent of Long Beach's

water demand through reclaimed water supplies. Reclaimed water originates from the Long Beach Water Reclamation Plant on the east side of the city. Table 5.15-5 shows the expected water quality for AEC uses.

TABLE 5.15-4
Estimated Daily and Annual Water Use for AEC Operations

Water Use	Average Daily Use Rate (gpm)	Peak Use Rate (gpm)	Maximum Annual Use[a] (acre-feet per year)
Combined-Cycle Process Water	54.43	194	--
Combined-Cycle Sanitary Water	0.57	0.57	--
Combined-Cycle Total	55	195	--
Simple-Cycle Process Water	12.4	161.3	--
Simple-Cycle Sanitary Water	0.34	0.34	--
Simple-Cycle Total	12.8	161.6	--
Total Potable water	67.8	356.8	130

[a] Assumes 4,600 hours of combined-cycle operation and 2,000 hours of simple-cycle operation, included start-up and shutdowns.

Note:

gpm = gallon(s) per minute

TABLE 5.15-5
Expected Water Quality from Long Beach Water Department (Blended Zone Quality)

Parameter	Units	MCL	Range of Detections Blended Water	Amount Detected Blended Water	MCL Violation
Aluminum	mg/L	1	0.069-0.137	0.092	No
Arsenic	µg/L	10	ND – 3.0	2.0	No
Bromate[a,d]	µg/L	10	ND-2.2	<2.0	No
Chloramines[b]	mg/L	4.0 as Cl2	0.48-2.88	2.1	No
Haloacetic Acids (HAAs)-Stage 2[a]	µg/L	60	7-19	17	No
TTHMs[a]	µg/L	80	34-69	61	No
Total Coliform Bacteria[c]	%pos. samples	>5% of monthly	0-0.44%	0.044%	No
Fluoride	mg/L	2	0.81-0.91	0.86	No
Nitrate as Nitrite	mg/L	45	ND-0.22	0.08	No
Chloride	mg/L	500[f]	35-84	46	No
Color	color units	15[f]	ND – 4	1	No
Odor[e]	odor units	3[f]	NA	1	No
Specific Conductance	µmho/cm	1,600[f]	401-737	486	Yes[g]
Sulfate	mg/L	500[f]	20-120	46	No
Total Dissolved Solids	mg/L	1,000[f]	232-424	289	Yes[g]
Turbidity	NTU	5[f]	0.08-0.11	0.11	No
Boron	µg/L	Not Regulated	NA	130	NA
Calcium	mg/L	Not Regulated	19-43	26	NA
Hardness, total	mg/L	Not Regulated	60-184	93	NA
Magnesium	mg/L	Not Regulated	2.4-18	6.8	NA
pH	pH units	Not Regulated	7.79-8.22	8.07	NA
Sodium	mg/L	Not Regulated	61-74	69	NA

TABLE 5.15-5

Expected Water Quality from Long Beach Water Department (Blended Zone Quality)

Parameter	Units	MCL	Range of Detections Blended Water	Amount Detected Blended Water	MCL Violation
Nitrosodimethylamine (NDMA)	ng/L	Not Regulated	<2.0-3.5	<2.0	NA
Potassium	mg/L	Not Regulated	1.4-3.6	1.9	No
Silica	mg/L	Not Regulated	8.1-20	16	No
Uranium	pCi/L	20	3.0-9.4	1.6-3.7	No

[a] Citywide sample, byproducts of disinfection

[b] Citywide sample, disinfectant added

[c] Citywide sample, naturally present in environment

[d] Imported water supplied with detectable levels of bromate

[e] Single value from annual monitoring

[f] Contaminant is regulated as a secondary standard

[g] Specific conductance and total dissolved solids (TDS) were detected above their respective Secondary MCLs in one well. Secondary MCLs are established for various compounds to protect against unpleasant aesthetic effects, such as taste and color. Exceeding Secondary MCLs for these compounds does not pose a health risk.

Notes:

µg/L = micrograms per liter
µmho/cm = micromhos per centimeter
MCL = Maximum Contaminant Level
mg/L = milligrams per liter
NA = Not Applicable
ND = Not Detected
ng/L = nanograms per liter
NTU = nephelometric turbidity unit
pCi/L = picocuries per liter
ppb = parts per billion
ppm = parts per million
ppt = parts per trillion
TTHM = total trihalomethanes

Source: LBWD, 2012

AEC makeup water will be fed directly from LBWD service connections through metering equipment into a 600,000-gallon service water tank, of which 228,000 gallons will be dedicated solely to firefighting supply. The remaining volume will be used as plant service water, irrigation water, makeup to the combustion turbine inlet air evaporative coolers, and raw feed to the steam cycle makeup water treatment system. A new 340,000-gallon deionized water tank will be added to the project to provide operational service water storage. A new 130,000-gallon wastewater and a new 130,000-gallon condensate storage tanks will also be included in the project design.

Domestic and Sanitary Water Use. Water will be supplied to the AEC via an existing LBWD pipeline. Because the AEC's combined-cycle technology requires much less potable water than the existing AGS's boiler systems, the AEC's water requirements are significantly lower than the existing generating station's current use. All the existing connections will be used to support the AEC. No new offsite water supply pipelines will be required for the project. The AEC will employ a staff of 36 to operate the facility. Staff will include power plant operators, supervisors, administrative personnel, mechanics, and electricians. The facility will be capable of operating 24 hours per day, 7 days per week. A minimal amount of potable water will be used for sanitary use, drinking, eye wash, safety showers, and fire protection water (less than 1 gallon per minute, as needed).

5.15.1.5 Wastewater Collection, Treatment, Discharge, and Disposal

Process wastewater from the AEC will be discharged to the public sewer system via a new 1,000-foot process/sanitary wastewater pipeline to the first point of interconnection with the existing LBWD sewer system and will eliminate the current practice of treatment and discharge of process/sanitary wastewater to the San Gabriel River. Discharge to LBWD would be approximately 16 gallons per minute and 11 acre-feet per year at the average annual temperatures with a maximum discharge rate of 99 gallons per minute, as

shown in Table 5.15-6. Table 5.15-7 lists the expected process wastewater quality at the AEC point of connection.

TABLE 5.15-6

Estimated Daily and Annual Wastewater Discharge for AEC Operations

Wastewater Use	Average Daily Discharge Rate (gpm)	Maximum Daily Discharge Rate (gpm)	Average Annual Discharge[a] (acre-feet per year)
Wastewater to City Sewer	16	99	11

[a] Assumes 4,600 hours of combined-cycle operation and 2,000 hours of simple-cycle operation, included start-up and shutdowns.

TABLE 5.15-7

Expected AEC Process Wastewater Quality

Parameter	Units	Concentration
Calcium	mg/L as Ca	99.52
Magnesium	mg/L as Mg	30.72
Sodium	mg/L as NA	217.79
Potassium	mg/L as K	9.38
Total Alkalinity	mg/L as $CaCO_3$	300.31
Chloride	mg/L as Cl	173.73
Sulfate	mg/L as SO_4	300.48
Nitrate	mg/L as NO_3	0.83
Silica	mg/L as SiO_2	34.10
Phosphorous	mg/L as P	2.52
Phosphate	mg/L as PO_4	7.64
Conductivity	µmho/cm	1768.21
Total Organic Carbon	mg/L	0.00
Total Dissolved Solids	mg/L	1080.62
Aluminum	µg/L as Al	242.94
Arsenic	µg/L as	3.27
Boron	µg/L	355.49
Bromate	µg/L	8.11
Copper	µg/L as Cu	332.43
Fluoride	mg/L	2.23
Lead	µg/L as Pb	0.54
Total Hardness	mg/L as $CaCO_3$	409.70
Alpha Radiation	pCi/L	3.94
Uranium	pCi/L	2.93

Notes:

µg/L = micrograms per liter
µmho/cm = micromhos per centimeter
pCi/L = picocuries per liter
mg/L = milligrams per liter

General plant drains will collect containment area wash down, sample drains, and drainage from facility equipment drains. Water from these areas will be collected in a system of floor drains, hub drains, sumps,

and piping, and routed to the process drain collection system. Drains that potentially could contain oil or grease will first be routed through an oil/water separator. The AEC will have a total of two oil/water separators, one for each power block. Wastewater streams that are unlikely to contain oil and grease, including CTG inlet air evaporative cooler blowdown, HRSG blowdown, blowdown from the auxiliary cooling system fin-fan fluid cooler, and reverse osmosis reject will bypass the oil/water separator. Miscellaneous wastewaters, including those from combustion turbine water washes and from some water treatment membrane-based system's cleaning operations, will be collected in holding tanks or sumps and will be trucked offsite for disposal at an approved wastewater disposal facility. Information about the feasibility of alternative wastewater disposal options is presented in Section 6.5.6. As described in Section 6.5.6, alternatives were analyzed and determined to be infeasible.

Sanitary wastewater from sinks, toilets, showers, dishwashers, and other sanitary facilities will be conveyed via the new 1,000-foot wastewater pipeline to the first point of interconnection with the existing LBWD sewer system and will eliminate the current practice of treatment and discharge of process/sanitary wastewaster to the San Gabriel River.[56] The LBWD delivers sanitary wastewater to the Sanitation Districts of Los Angeles County (LACSD). The water balance diagrams, Figures 2.1-5a and 2.1-5b, show the expected sanitary wastewater streams. The sanitary wastewater flows would be 0.91 gpm under both the annual average and peak summer conditions.

A will-serve letter from LBWD indicating there is sufficient capacity to receive sanitary and industrial wastewater from the AEC is included in Appendix 2E. An Industrial Wastewater Discharge Permit is required from the City of Long Beach. AEC discharges will be required to meet standards for industrial waste discharge pursuant to the LACSD Wastewater Ordinance and City of Long Beach rules and regulations, including numeric standards for constituents of concern. Issuance of an Industrial Wastewater Discharge Permit also will require payment of a sewer capacity charge and implementation of a discharge sampling and monitoring program.

5.15.1.6 Stormwater

Stormwater will be collected in a single existing retention basin and then discharged to the San Gabriel River via the existing permitted outfall for the existing AGS. A portion of the existing onsite storm drains will remain in place. New inlets and storm drains will be installed in the eastern portion of the site to convey rainwater to the new retention pond. Drainage plans showing existing and proposed drainage basins, and calculations for the proposed drainage basins, are included in Appendix 5.15A. Stormwater that falls within process equipment containment areas will be collected and discharged to a process drain system, which will consist of oil/water separators and two retention basins. The residual oil-containing sludge will be collected via vacuum truck and disposed of as hazardous waste. Stormwater that falls within the plant in pavement area and outside the process equipment containment areas will either percolate directly into the soil or drain over the surface into the retention basins to assist with the removal of suspended solids.

5.15.1.7 Construction and Demolition

The project will commence construction in January 2017 with the demolition of retired, decommissioned AGS Unit 7 and other ancillary structures to make room for the construction of AEC. The construction of the CCGT power block is scheduled to commence in the second quarter of 2017 and be operational the first quarter of 2020. The SCGT power block is schedule to commence construction the second quarter of 2020 and operational by the third quarter of 2021.

Parking for construction workers and laydown areas will be available onsite with the adjacent 10 acres of offsite laydown. These areas will provide adequate parking space for construction personnel, as well as visitors during construction.

[56] The 1,000-foot pipeline references the installation of a new pipeline to the first point of interconnection with the LBWD sanitary system. LBWD has indicated that upgrade of the remainder of this pipeline (another 4,000 feet) may be required and this analysis assumes the entire 5,000-foot pipeline is included as part of the project.

During construction of the project, water will be required primarily for dust suppression. Construction activities will require a relatively limited amount of water. Average daily use of water is expected to be approximately 18,000 gallons during the construction period. Construction water will be from the LBWD. During the commissioning period, when activities such as hydrostatic testing, cleaning and flushing and steam blows of the HRSGs, and steam cycles will be conducted, average water usage is estimated at 24,000 gallons per day with a maximum daily use of 130,000 gallons. Hydrostatic test water and cleaning water will be tested and disposed of in accordance with applicable LORS.

5.15.2 Environmental Analysis

Appendix G of the California Environmental Quality Act (CEQA) is a screening tool, not a method for setting thresholds of significance. Appendix G is typically used in the Initial Study phase of the CEQA process, asking a series of questions. The purpose of these questions is to determine whether a project requires an Environmental Impact Report, a Mitigated Negative Declaration, or a Negative Declaration. As the Governor's Office of Planning and Research stated, "Appendix G of the Guidelines lists a variety of potentially significant effects, but does not provide a means of judging whether they are indeed significant in a given set of circumstances." The answers to the Appendix G questions are not determinative of whether an impact is significant or less than significant. Nevertheless, the questions presented in CEQA Appendix G are instructive.

In terms of potential effects on water resources, Appendix G asks, in part, whether the project would:

- Substantially alter the existing drainage pattern of the site or area, including the alteration of the course of a stream or river, in a manner which will result in substantial erosion or siltation on- or offsite, or in flooding on- or offsite.
- Create or contribute runoff water that will exceed the capacity of existing or planned stormwater drainage systems, or provide substantial additional sources of polluted runoff.
- Violate any water quality standards or WDRs, or otherwise substantially degrade water quality.
- Substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there will be a net deficit in aquifer volume or a lowering of the local groundwater table level (for example, the production rate of preexisting nearby wells will drop to a level that will not support existing land uses or planned uses for which permits have been granted).
- Place within a 100-year flood hazard area structures that will impede or redirect flood flows.
- Cause inundation by seiche, tsunami, or mudflow.

5.15.2.1 Construction and Demolition Impacts

Drainage. The AEC general site grading will establish a working surface for construction and plant operating areas, and will provide positive drainage from buildings and structures. The AEC site grading and drainage will be designed to comply with all applicable LORS. During construction and demolition, approximately 21 acres of land associated with the AEC will be graded.

Potential surface water impacts are anticipated to be related primarily to short-term construction activity and would consist of increased turbidity from erosion of newly excavated or placed soils. However, complying with engineering and construction specifications and following approved grading and drainage plans will effectively mitigate these short-term impacts. Furthermore, as required under the General Permit for Discharges of Storm Water Associated with Construction Activity Construction General Permit Order 2009-0009-DWQ (Construction General Permit), a Stormwater Pollution Prevention Plan (SWPPP) will be prepared for the construction site and will include best management practices (BMP) for erosion and sediment control. The SWPPP will be prepared prior to project construction and demolition to prevent the offsite migration of sediment and other pollutants and to reduce the effects of runoff from the construction site to offsite areas. AEC construction and demolition is not expected to increase the amount of impervious

surfaces on the AEC site because of the impervious surfaces already present on the existing AGS property. Implementation of the SWPPP and BMPs, described in Section 5.15.4, will mitigate construction impacts on drainage to a less-than-significant level.

Potential impacts on soil resources during AEC construction and demolition can include increased soil erosion. Soil erosion causes the loss of topsoil and can increase the sediment load in surface water bodies near the construction site. The magnitude, extent, and duration of construction-related impacts depend on the erodibility of the soil; the proximity of the construction activity to the receiving water; and the construction methods, duration, and season.

Because conditions that could lead to excessive soil erosion via water are not present at the AEC site, relatively little soil erosion from rain events is expected during the construction and demolition period. Additionally, construction BMPs will be implemented during AEC construction and demolition in accordance with a site-specific SWPPP that is required under the Clean Water Act (CWA) for all construction projects over 1 acre in size. The CEC also requires project owners to develop and implement a drainage, erosion, and sediment control plan (DESCP) to reduce the impact of runoff from the construction site. Monitoring will involve inspections to ensure that the BMPs described in the SWPPP and DESCP are properly implemented and effective. Therefore, impacts from soil erosion via water are expected to be less than significant.

Water Quality. Potential construction-related water quality impacts include impacts on surface water runoff during excavation and construction. Additionally, construction materials could contaminate runoff or groundwater if not properly stored and used. Such construction impacts will be less than significant with implementation of a SWPPP and associated BMPs, including practicing proper housekeeping at the construction site. A SWPPP is required under the General Permit for Stormwater Discharges Associated with Construction Activity for projects resulting in one or more acres of soil disturbance. SWPPP procedures include submitting a Notice of Intent (NOI) to the Los Angeles RWQCB and developing the SWPPP prior to the start of construction activities.

Potential surface water quality impacts are anticipated to be related primarily to short-term construction activity and would consist of increased turbidity from erosion of newly excavated or placed soils. However, complying with engineering and construction specifications and following approved grading and drainage plans will effectively mitigate these short-term potential impacts. Furthermore, as required under the Construction General Permit, a SWPPP will be prepared for the construction site and will include BMPs for erosion and sediment control. The SWPPP will be prepared prior to construction of the AEC to prevent the offsite migration of sediment and other pollutants and to reduce the effects of runoff from the construction site to offsite areas. Implementation of the SWPPP and BMPs, described in Section 5.15.4, will mitigate construction impacts on water quality to a less-than-significant level.

Water used for dust control and soil compaction during AEC construction will not result in discharge because only a minimal amount of water will be used for this purpose. Therefore, no impact on water quality would occur as a result of dust control and soil compaction during construction. During the construction period, sanitary waste will be collected in portable toilets supplied by a licensed contractor for collection and disposal at an appropriate receiving facility resulting in no onsite discharge. Equipment wash water will be collected and disposed of offsite. With the implementation of the SWPPP and BMPs, described in Section 5.15.4, construction effects on water quality will be less than significant.

It is expected that the construction laydown and construction worker parking areas that are not already graveled or paved will be covered by gravel or paving immediately after site preparation to prevent subsequent wind erosion losses.

5.15.2.2 Operational Impacts

Drainage. The AEC site is currently developed with many impervious surfaces. Stormwater runoff from the site will be captured by a stormwater drainage system, which includes the use of an existing retention pond, and discharged to the San Gabriel River outfall. AEC construction is not expected to increase the amount of

impervious surfaces onsite. Because stormwater would be collected and discharged via a stormwater drainage system and outfall, the AEC would not result in substantial erosion, siltation, or flooding onsite or offsite. Therefore, operational impacts on drainage patterns are less than significant.

Water Quality/Waste Discharge Requirements. Process and sanitary wastewater from the AEC will be discharged to the LBWD sanitary system and conveyed to LACSD facilities for treatment and ultimate disposal. AEC wastewater discharge quality (see Table 5.15-7) will comply with the narrative and numeric standard required by the LACSD Wastewater Ordinance and the City of Long Beach rules and regulations. Additionally, a will-serve letter from the City of Long Beach indicating there is sufficient capacity to receive process and sanitary wastewater from the AEC is included in Appendix 2E. As a customer of LBWD, the AEC will not violate any WDRs and will not negatively affect water quality.

Stormwater runoff from the building roofs and parking areas will be collected and ultimately discharged to the San Gabriel River. No impact on the quantity of impervious surface as a result of AEC construction is expected. However, if the new/replaced impervious surface area is greater than 50 percent of the total project area, pretreatment will be required. Potential stormwater quality impacts during operation include discharge of heavy metals (e.g., brake dust) and oil and grease from parking areas. These impacts will be less than significant with implementation of an Industrial SWPPP and associated BMPs, including practicing proper housekeeping at the site. A SWPPP is required under the General Permit for Stormwater Discharges Associated with Industrial Activity for steam-electric power plant projects. SWPPP procedures include submitting an NOI to the SWRCB and developing the Industrial SWPPP prior to the start of operations. The AEC includes an oil/water separator to treat the stormwater.

Groundwater. The AEC will pump no groundwater and will have no effect on groundwater quantity or quality.

Flooding Potential. The AEC site is not in the 100-year floodplain as defined by FEMA. Therefore, project implementation will not result in any structures that will impede or redirect flood flows and no impacts will occur.

The AEC site is adjacent to an area mapped for tsunami susceptibility run-up hazard and is adjacent to a river channel and within 0.5 mile of an enclosed bay or harbor that could be subject to seiches caused by tsunamis. Although the offshore area of Los Angeles County area contains many faults and fault scarps capable of producing tsunamis, seismically induced sea waves are uncommon. Therefore, inundation by tsunami or seiche, while possible, is unlikely and project implementation would not increase the potential for inundation.

The combination of predicted sea level rise (approximately 1.5 feet) and increased wave-induced storm surges (approximately 5 feet) in southern California potentially could result in an increased depth of inundation in the vicinity of the AEC site of approximately 6.5 feet from wave-induced storm surges; however, because the site's existing elevation is approximately 12 to 15 feet above existing mean sea level, there would still be a buffer of at least 5.5 feet on the AEC site through its expected operational period of approximately 2050 (based on a COD of 2019 to 2025 and 30 years of site operations).

To provide adequate flood protection that incorporates predicted sea level rise, the design and engineering of the AEC will meet applicable LORS, including those related to flood protection, California and federal building code requirements, and applicable LORS of the City of Long Beach and Los Angeles County. The design and engineering will address any applicable LORS related to sea level rise, storm surge/wave run-up inundation, and site flooding protection. Therefore, flooding caused by sea level rise is unlikely, and no adverse impacts will occur as a result of project implementation.

5.15.3 Cumulative Effects

A cumulative impact refers to a proposed project's incremental effect together with other closely related past, present, and reasonably foreseeable future projects whose impacts may compound or increase the

incremental effect of the proposed project (Public Resources Code Section 21083; California Code of Regulations, Title 14, Sections 15064(h), 15065I, 15130, and 15355).

As required under the General Permit for Stormwater Discharges Associated with Construction Activity, a SWPPP will be prepared for the AEC and will include BMPs for erosion and sediment control. Implementation of the SWPPP and BMPs will prevent the offsite migration of sediment and other pollutants and reduce runoff from the construction site to offsite areas. Therefore, the AEC would be very unlikely to cause cumulative impacts when its effects are considered in combination with those of other construction projects.

The AEC would have little or no adverse impact on water quality or WDRs, sanitary waste discharge capacity, flooding potential, or groundwater resources. Therefore, the project would be very unlikely to cause cumulative impacts when its effects are considered in combination with those of other projects.

5.15.4 Mitigation Measures

With the features incorporated into the project design, the AEC will have no significant adverse impacts on water resources. The following measure will be implemented, as prescribed by stormwater and erosion control management programs mandated under the National Pollution Discharge Elimination System (NPDES):

- Implement BMPs designed to minimize soil erosion and sediment transport during construction of the AEC in compliance with the statewide General Construction Permit.
- Design appropriate erosion and sediment controls for slopes, catch basins, culverts, stream channels, and other areas prone to erosion in compliance with both the statewide General Construction Permit and General Industrial Permit.

This program has been in place for several years, and the prescribed measures have proven effective. Under the General NPDES Permits for Construction and Industrial Stormwater, various specific measures are prescribed and a monitoring program is required. Compliance with this program should ensure that residual impacts associated with the AEC will be at a less-than-significant level. As part of the General NPDES Permit for Construction, prior to construction, the Project Owner will develop a Construction SWPPP to prevent the offsite migration of sediment and other pollutants and to reduce the effects of runoff from the AEC site to offsite areas.

5.15.5 Laws, Ordinances, Regulations, and Standards

Federal and state LORS applicable to water resources and anticipated compliance are discussed in this section and summarized in Table 5.15-8.

TABLE 5.15-8
Laws, Ordinances, Regulations, and Standards for Water Resources

LORS	Requirements/Applicability	Administering Agency	AFC Section Explaining Conformance
Federal			
Clean Water Act/Water Pollution Control Act. P.L. 92-500, 1972; amended by Water Quality Act of 1987, P.L. 100-4 (33 USC 466 et seq.); NPDES (CWA, Section 402)	Prohibits discharge of pollutants to receiving waters unless the discharge is in compliance with an NPDES permit. Applies to all point-source discharges, including stormwater runoff from construction (including demolition). Applies to nonpoint sources through municipal NPDES permits.	Los Angeles RWQCB	Compliance with existing statewide NPDES permit for construction stormwater (Section 5.15.5.2) Compliance with existing statewide NPDES permit (Industrial General Permit) for continued stormwater discharges to the existing outfall (Section 5.15.5.2)

TABLE 5.15-8

Laws, Ordinances, Regulations, and Standards for Water Resources

LORS	Requirements/Applicability	Administering Agency	AFC Section Explaining Conformance
State			
Porter-Cologne Water Quality Control Act	Controls discharge of wastewater to surface water and groundwater of California.	Los Angeles RWQCB	Compliance with existing statewide NPDES permit for construction stormwater discharges (Section 5.15.5.2) Compliance with existing statewide NPDES permit (Industrial General Permit) for continued stormwater discharges to the existing outfall (Section 5.15.5.2)
California State Constitution, Article X, Section 2	Prohibits waste or unreasonable use of water.	SWRCB	The AEC will not waste or make unreasonable use of potable water. The AEC will use water for plant processes at rates significantly below historical usage for the site (Section 6.6.3)
California Water Code, Section 13550	States that use of potable water for nonpotable purposes is an unreasonable use of water if recycled water is available that meets specified conditions.	SWRCB	The AEC will use potable water for plant processes because recycled water is not available that meets the conditions of 13550. (See Section 6.0, Alternatives)

5.15.5.1 Federal LORS

In California, discharges of wastewater and stormwater to surface waters are regulated by the SWRCB and RWQCBs pursuant to the CWA and the Porter-Cologne Water Quality Control Act. Relevant NPDES permits for industrial discharges and stormwater quality management are discussed under state LORS.

5.15.5.2 State LORS

California Ocean Plan. The SWRCB formulates and adopts a water quality control plan for California ocean waters. The 2009 California Ocean Plan regulates waste discharges, effluent discharges, and discharge locations (SWRCB, 2009a). The plan sets specific narrative and numeric water quality objectives for bacteriological, physical, and chemical characteristics. The plan applies to both point and nonpoint source discharges. The water quality objectives from the 2009 Ocean Plan (or as updated) will be met by the AEC, which will be demonstrated when a new NPDES permit is approved prior to the start of AEC operations in 2019 to 2025.

Statewide Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling. The SWRCB established technology-based standards to implement federal CWA Section 316(b), which requires that the location, design, construction, and capacity of cooling intake structures reflect the best technology available for minimizing adverse environmental impact. An implementation plan has been submitted pursuant to the requirements of the Once-Through Cooling (OTC) Policy (Revised Plan June 17, 2011).

Construction Stormwater NPDES Permit. The federal CWA effectively prohibits discharges of stormwater from construction sites unless the discharge is in compliance with an NPDES permit. The SWRCB is the permitting authority in California and has adopted a statewide General Permit for Stormwater Discharges Associated with Construction Activity (SWRCB Order 2009-0009-DWQ) that applies to projects resulting in 1 acre or more of soil disturbance (SWRCB, 2009b). The AEC would result in disturbance of more than 1 acre of soil. Therefore, the AEC will require the preparation of a construction SWPPP that would specify site management activities to be implemented during site development. These management activities will include construction stormwater BMPs, dewatering runoff controls, and construction equipment decontamination. The Los Angeles RWQCB requires an NOI to be filed prior to any stormwater discharge

from construction activities and that the SWPPP be implemented and maintained onsite. A Construction Drainage Erosion and Sediment Control Plan/SWPPP will be completed prior to the start of construction activities.

Industrial Stormwater NPDES Permit. The SWRCB implements regulations under the federal CWA requiring that point source discharges of stormwater (which is a flow of rainfall runoff in some kind of discrete conveyance such as a pipe, ditch, channel, or swale) associated with industrial activity that discharges either directly to surface waters or indirectly through municipal separate storm sewers must be regulated by an NPDES permit. The SWRCB has issued WDRs for discharges of stormwater associated with industrial activities (SWRCB Order 97-03-DWQ), excluding construction activities.

California Water Code Sections 10910 – 10915. Pursuant to Senate Bill 610 (enacted in 1995), the California Water Code requires public water systems to prepare a water supply assessment (WSA) for certain defined development projects. Lead agencies determine, based on the WSA, whether protected water supplies will be sufficient to meet project demands along with the region's reasonably foreseeable cumulative demand under normal-year, single dry-year, and multiple dry-year conditions.

The WSA provisions apply to projects as defined in Water Code section 10912, including: (1) industrial, manufacturing, or processing plants that would house more than 1,000 persons, occupy more than 40 acres of land, or have more than 650,000 square feet of floor area; and (2) projects that would demand an amount of water equivalent to that required by a 500 dwelling unit project.

As described in Chapter 2, the AEC would have an operations staff of 36. In addition, total project size would be 21 acres and 16,250 square feet of floor area. Water use from a 500-unit residential development was calculated using local water use numbers in gallons per capita per day (GPCD) and typical household size. As reported in the City of Long Beach 2010 Urban Water Management Plan, household water use is 109.5 gallons per day (City of Long Beach, 2011). Census data reports typical household size in Long Beach at 2.79 persons per household (U.S. Census Bureau, 2015). Based on this data, at typical household in Long Beach uses 305.5 gallons per day, and therefore a 500-unit residential development would use 152,750 gallons per day. As reported in Table 5.15-4, average AEC water use would be 66.5 gpm, or 95,760 gallons per day.

Because the AEC would be below the project thresholds in Water Code section 10912, it would not be considered a project subject to the Water Code. Therefore a WSA is not required.

5.15.6 Agency Contacts, Permits, and Permit Schedule

Agency contacts and required permits are listed in Table 5.15-9.

TABLE 5.15-9

Agency Contacts, Permits, and Permit Schedule for Water Resources

Permit	Contacted Agency	Schedule
NPDES Construction Activities Stormwater General Permit	Not Applicable (submit online using Stormwater Multiple Application and Report Tracking System [SMARTS])	Submit NOI to use the permit at least 30 days prior to construction.
NPDES Industrial Activities Stormwater General Permit	State Water Resources Control Board Division of Water Quality Attn. Stormwater Section P.O. Box 1977 Sacramento, CA 95812	Submit NOI to use the permit at least 30 days prior to operations.

TABLE 5.15-9

Agency Contacts, Permits, and Permit Schedule for Water Resources

Permit	Contacted Agency	Schedule
Statewide Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling	Joanna Jensen State Water Resources Control Board Division of Water Quality, 15th floor 1001 I Street Sacramento, CA 95814 jjensen@waterboards.ca.gov	Implementation Plan has already been submitted to meet these requirements. Revisions to the Implementation Plan will be issued as necessary. (Revised Plan June 17, 2011).
Industrial Wastewater Discharge Permit	Long Beach Water Department Engineering Bureau – Business Development 1800 E. Wardlow Road Long Beach, CA 90807	A minimum of 4 to 6 months is required for processing and approval.

5.15.7 References

California Energy Commission (CEC). 2009. The Impacts of Sea Level Rise on the California Coast, Final Paper. California Energy Commission, Docket CEC-500-2009-024-F.

California Emergency Management Agency. 2013. Tsunami Hazards. Available online at: http://myhazards.calema.ca.gov/

California Department of Water Resources (DWR). 2004. Coastal Plain of Los Angeles County Groundwater Basin, Central Subbasin. California's Groundwater Bulletin 118.

Federal Emergency Management Agency (FEMA). 2008. Flood Insurance Rate Online Maps. Available online at: http://map1.msc.fema.gov/idms/IntraView.cgi?KEY=78816084&IFIT=1

Long Beach Water Department. 2011. 2010 Urban Water Management Plan. Revised by the Board of Water Commissioners September 15, 2011.

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Los Angeles Regional Water Quality Control Board. 1994. Water Quality Control Plan for the Los Angeles Region.

State Water Resources Control Board (SWRCB). 2009a. *California Ocean Plan 2009 – Water Quality Control Plan Ocean Waters of California*.

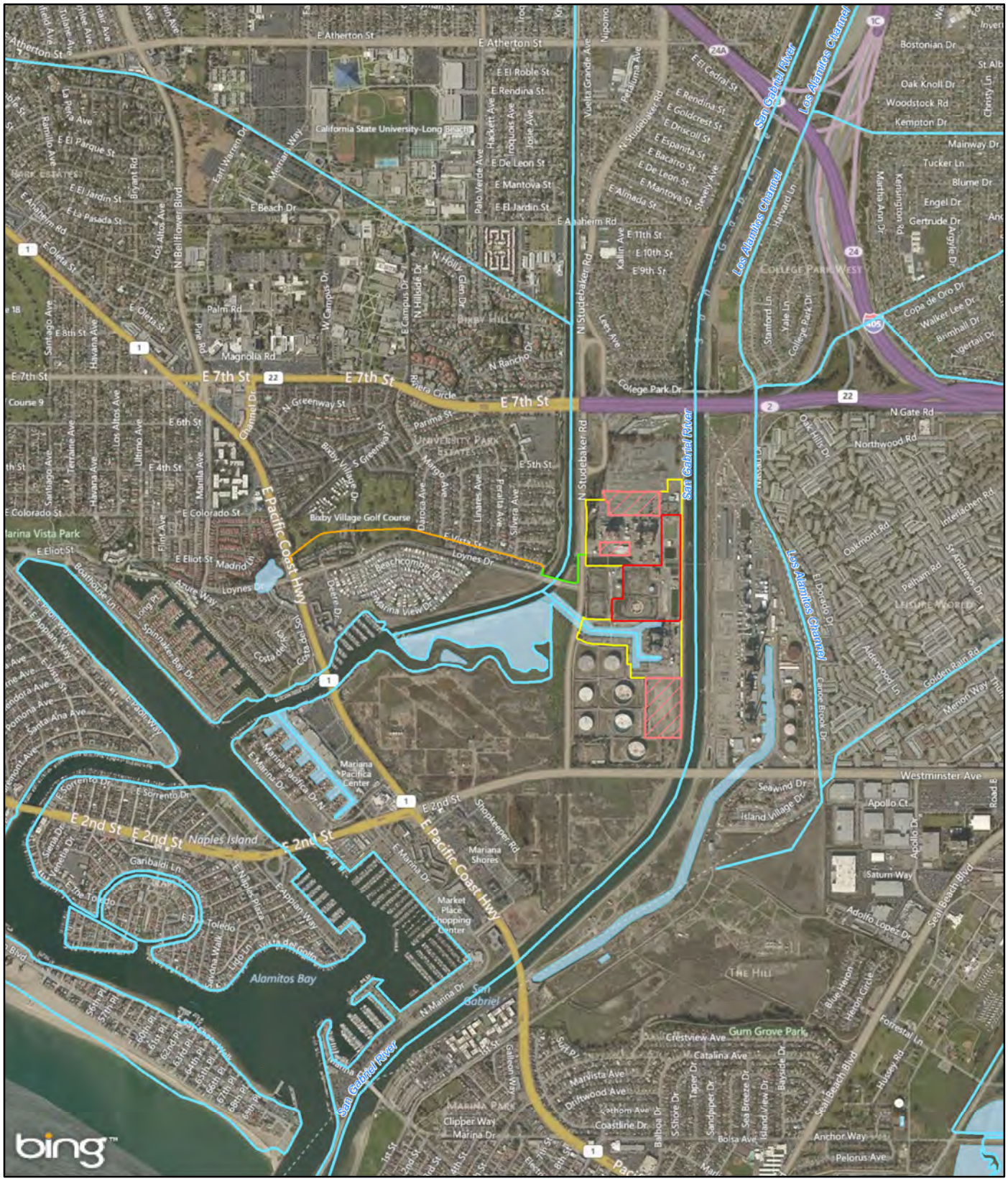
State Water Resources Control Board (SWRCB). 2009b. National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater Discharges Associated with Construction Activity (General Permit) Water Quality Order 2009-0009-DWQ.

State Water Resources Control Board (SWRCB). 2015. Approved 2012 California Integrated Report (Clean Water Act Section 303(d) List/305(b) Report). U.S. Environmental Protection Agency approval date July 30, 2015. Available online at: http://www.waterboards.ca.gov/water_issues/programs/tmdl/integrated2012.shtml

Western Regional Climate Center. 2013. Long Beach WSCMO General Climate Survey. Available online at: http://www.wrcc.dri.edu/cgi-bin/cliMAIN.pl?calong.

U.S. Census Bureau. 2015. State and County QuickFacts. Data derived from Population Estimates, American Community Survey, Census of Population and Housing, County Business Patterns, Economic Census, Survey

of Business Owners, Building Permits, Census of Governments. Online at: http://quickfacts.census.gov/qfd/states/06/0643000.html. Last Revised: Thursday, 24-Sep-2015 12:09:14 EDT.



Legend

- AGS Boundary
- AEC Site
- Parking/Laydown Construction Area
- Waterbody
- Water Features
- Proposed New Process/Sanitary Wastewater Pipeline to First Point of Interconnection
- Potential Sewer Upgrade

0 1,000 2,000 Feet

N

FIGURE 5.15-1
Surface Water Resources

Alamitos Energy Center
Long Beach, California
October 2015



Legend

- AGS Boundary
- AEC Site
- Parking/Laydown Construction Area
- Proposed New Process/Sanitary Wastewater Pipeline to First Point of Interconnection
- Potential Sewer Upgrade

Groundwater Basin

- Coastal Plain of Los Angeles
- Coastal Plain of Orange County

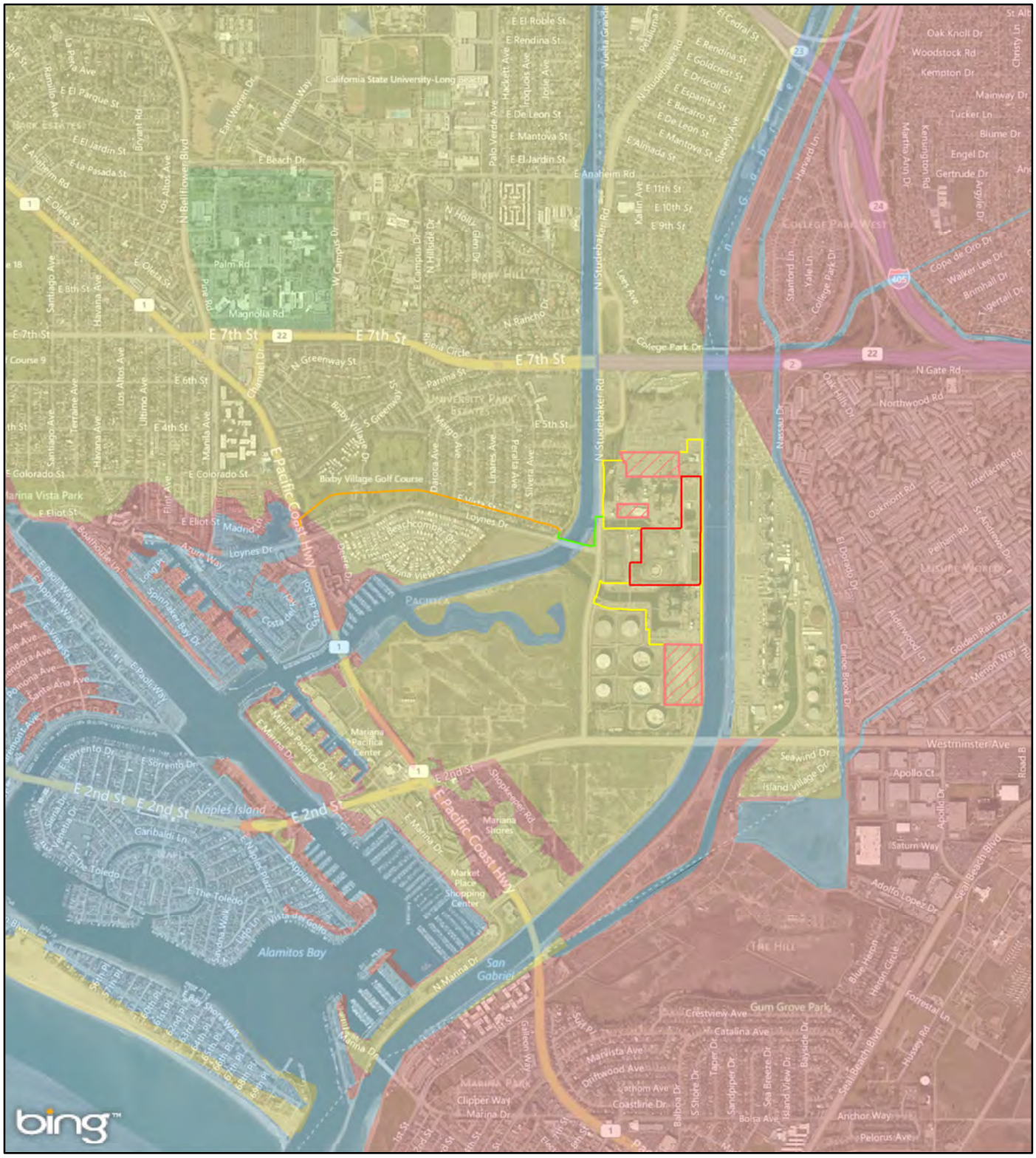
0 1,000 2,000 Feet

N

FIGURE 5.15-2
Groundwater Basins

Alamitos Energy Center
Long Beach, California
October 2015

CH2MHILL



Source: FEMA (1993).

Legend

- AGS Boundary
- AEC Site
- Parking/Laydown Construction Area
- Proposed New Process/Sanitary Wastewater Pipeline to First Point of Interconnection
- Potential Sewer Upgrade

FEMA Flood Zone

A	An area inundated by 1% annual chance flooding, for which no BFEs have been determined.
ANI	An area that is located within a community or county that is not mapped on any published FIRM.
X	Areas determined to be outside 500-year floodplain determined to be outside the 1% and 0.2% annual chance floodplains.
X500	Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood. An area inundated by 0.2% annual chance flooding.

N

0 1,000 2,000 Feet

FIGURE 5.15-3
FEMA Flood Plains

Alamitos Energy Center
Long Beach, California
October 2015

CH2MHILL

5.16 Worker Health and Safety

This section analyzes the potential worker health and safety issues that may be encountered during construction and operation of the Alamitos Energy Center (AEC). Because of the subject matter, this section follows a slightly different format than other sections in Section 5.0 of this AFC. Instead of a discussion of affected environment, followed by the project's environmental consequences and proposed mitigation measures for significant impacts, this section contains worker safety information, including the laws, ordinances, regulations, and standards (LORS) that apply to the construction and operation of the AEC and demolition of former Unit 7's remaining components. Section 5.16.1 is a description of the construction and demolition and the operation work environment and setting of the AEC. Section 5.16.2 describes the project's fuel handling system. Section 5.16.3 describes the health and safety programs in terms of analyses conducted to identify hazards and also the safety compliance and training programs that will be established onsite. Section 5.16.4 discusses the applicable LORS. Section 5.16.5 lists the regulatory agencies involved and key agency contacts, and Section 5.16.6 presents permits required and the permitting schedules. Section 5.16.7 provides the references used to prepare this section.

The Project Owner considers worker health and safety to be its number one priority. A cornerstone policy for of the Project Owner's parent, AES Southland Development (AES-SLD), is the delivery of all of the global projects and operations provides all workers, whether they are employees or contractors, with the right and responsibility to stop work on any job if unsafe conditions or behaviors are observed during the construction or operational phase of a project. The AEC will adhere to AES-SLD's corporate commitment and policies for worker health and safety, and safe work plans will be developed prior to the commencement of demolition, construction, and operational activities.

5.16.1 Setting

AES Alamitos Energy, LLC, will construct, own, and operate the Alamitos Energy Center (AEC), a natural- gas-fired, air-cooled, combined-cycle and simple-cycle, electrical generating facility in Long Beach, California. The proposed AEC will have a nominal generating capacity of 1,040 megawatts (MW). The AEC will be constructed on the site of the existing AES Alamitos Generating Station (AGS), located on an approximately 21-acre site within a larger, 71.1-acre parcel.

The AEC will feature two gas turbine power blocks. Combined-cycle power block will consist of two natural-gas-fired combustion turbine generators (CTG) in a combined-cycle configuration, two unfired heat recovery steam generators (HRSG), one steam turbine generators, an air-cooled condenser, an auxiliary boiler, and related ancillary equipment. Simple-cycle power block will consist of four simple-cycle LMS-100 CTGs with fin-fan coolers and ancillary facilities (AEC SCGT).

The AEC will meet the demand for new generation in the Los Angeles basin local electrical reliability area. The demand is caused in large part by the closure of the San Onofre Nuclear Generating Station and the anticipated retirement of the older, natural-gas-fired generation currently using once-through ocean water-cooling (OTC). As a result of the promulgation of the California State Water Resources Control Board's (SWRCB) *Water Quality Control Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling* (OTC Policy) (SWRCB, 2010), more than 4,000 MW of OTC generation are expected to be retired by December 31, 2020 in the Los Angeles local reliability area.

The AEC will use water provided by the City of Long Beach Water Department (LBWD) for construction, operational process, and sanitary uses but at substantially lower volumes than the existing AGS historically has used. This water will be supplied through existing, onsite water lines. The AEC will include a new, 1,000-foot process/sanitary wastewater pipeline to the first point of interconnection with the existing LBWD sewer system, the potential upgrade of an additional 4,000 feet of existing pipeline downstream from the first point of interconnection, and the elimination of the current practice of treatment and discharge of process/sanitary wastewater to the San Gabriel River. Stormwater runoff from the power block areas will be

directed to oil/water separators and to an existing retention basin and then ultimately discharged to the Los Cerritos channel via existing stormwater outfalls.

The AEC will interconnect to the existing, Southern California Edison (SCE) 230-kilovolt (kV) switchyard adjacent to the north side of the AGS. Natural gas will be supplied to the AEC via the existing, offsite, 30-inch-diameter pipeline owned and operated by Southern California Gas Company (SoCalGas) that currently serves Units 5 and 6 of the AGS. The AEC will require construction of new natural gas-metering facilities and construction of two new natural gas compressor buildings within the AEC footprint.

The AEC is designed to serve both peak and intermediate loads with the added capabilities of rapid startup, significant turndown capability (ability to turn down to a low load), and fast ramp rates. As California's intermittent renewable energy portfolio continues to grow, operating in either load-following or partial shutdown mode will become necessary to maintain electrical grid reliability, thus placing an increased importance upon the rapid startup, high turndown, steep ramp rate, and superior heat rate employed at the AEC.

As an in-basin generating asset, the AEC will provide local generating capacity, voltage support, and reactive power that are essential for transmission system reliability in the Western Los Angeles Basin subarea and larger Los Angeles basin local reliability area. The AEC will be able to provide system stability by supplying reactive power, voltage support, frequency stability, and rotating mass in the heart of the critical Western Los Angeles local reliability area. By virtue of its location in a transmission constrained load center, the AEC also helps to avoid potential transmission line overloads and can provide reliable local energy supplies when electricity from more distant generating resources is unavailable. In recognition of its critical grid reliability benefits, the AEC combined-cycle CTGs were selected by SCE in its Local Capacity Requirements Request for Offer (LCR RFO) on November 5, 2014, and the simple-cycle CTGs will meet the capacity needs anticipated to be identified in future California Public Utilities Commission (CPUC) Long-term Procurement Plans (LTPP).

Owing to the critical need for generating capacity at the AGS site at all times, existing Units 1 through 6 will remain in operation through much of the AEC development and construction. Given that the removal of existing Units 1 through 6 is not required for construction of the AEC, the continued operation of the AGS will not impede AEC construction. Construction and site preparation activities at the project site are anticipated to last 56 months, from the first quarter of 2017 until the third quarter of 2021. The project will commence construction with the removal of former Unit 7's building and ancillary equipment, fuel storage tank, tank berms, small maintenance shops and two waste water retention basins in January 2017 to make room for construction and laydown area for the AEC CCGT. Construction of the AEC CCGT will commence during the second quarter of 2017 and will be completed by the second quarter of 2020. The AEC CCGT is expected to commence commercial operation before May 1, 2020. The construction of simple-cycle Power Block 2 is scheduled to proceed from the second quarter of 2020 through the third quarter of 2021, and Power Block 2 is expected to commence commercial operation in the third quarter of 2021. A temporary construction access road may be constructed offsite beginning at the intersection of Studebaker Road and Loynes Drive traveling southeast to the AEC site. Construction of the AEC will require the use of onsite laydown areas (approximately 8 acres dispersed throughout the existing site) and an approximately 10-acre laydown area located adjacent to the existing site.

5.16.2 Fuel Handling System

The AEC CTGs will only combust natural gas. Natural gas will be delivered to the site via the existing SoCalGas natural gas pipeline that enters the Alamitos Generating Station on the northern side of the facility near the existing SCE 230-kV switchyard. Within the project boundaries, a valve, piping, and metering station is operated and maintained by SoCalGas from which gas is routed to the onsite combustion sources. The natural gas pipeline is a 30-inch-diameter line that operates at a nominal 145 pounds per square inch (psi). The existing natural gas metering station at the Alamitos Generating Station will remain in service for continued operation of Units 1 through 6 during AEC construction. SoCalGas will construct a new gas

metering station to support the AEC that will be located in the northeastern corner of the site as shown in Figure 2.1-2.

Natural gas will flow from the new SoCalGas metering station to onsite AEC gas pressure-control stations and gas scrubber/filtering equipment to be located in the northeastern corner of the site. Prior to being supplied to the CTGs, the natural gas will be compressed, scrubbed, and filtered consistent with standard industry practices. A new natural gas pipeline will be routed between each compressor building and each unit. The natural gas for the AEC building heating systems will flow through the metering station and gas pressure control station, and will not require compression or filtering. The natural gas handling system is also discussed in further detail in Section 4.0.

5.16.3 Health and Safety Programs

5.16.3.1 Environmental Checklist

Health and safety impacts analyzed in this AFC are evaluated with respect to the California Environmental Quality Act (CEQA) checklist. However, the CEQA checklist does not have specific questions for worker health and safety. The analysis below is consistent with the analysis routinely conducted by CEC staff related to worker health and safety. Related analyses are also included in Section 5.5, Hazardous Materials Handling, and Section 5.7, Noise.

5.16.3.2 Hazard Analysis

Workers will be exposed to potential demolition, construction, and operation safety hazards. A hazard analysis is included below to evaluate these hazards and assess control measures. The analysis identifies the potential hazards anticipated during demolition, construction, and operation, and indicates which safety programs will be developed and implemented to mitigate and appropriately manage those hazards. The hazard analysis for demolition and construction activities is presented in Table 5.16-1; the hazard analysis prepared for plant operation is presented in Table 5.16-2. Because the types of hazards anticipated during demolition, construction, and operation activities are similar, this likeness is reflected in the tables.

Programs are overall plans that set forth the method or methods that will be followed to achieve particular health and safety objectives. For example, the Fire Protection and Prevention Program will describe what is necessary to protect against and prevent fires. This will include equipment required, such as alarm systems and firefighting equipment, and procedures to follow to protect against fires. The Emergency Action Program/Plan will describe escape procedures, rescue and medical procedures, alarm and communication systems, and response procedures for every hazardous material handled onsite. The programs or plans are set forth in written documents that are kept at specific locations in the facility.

Each program or plan will contain minimum training requirements that are translated into detailed training courses for demolition, plant construction, and operating personnel, and will adhere to the Project Owner's corporate safety policy and all applicable federal Occupation Safety and Health Administration (OSHA) and California Occupational Safety and Health Administration (Cal/OSHA) regulations. Training will be provided to demolition, construction, and operating personnel as needed. For example, all plant operating personnel will receive training in escape procedures under the Emergency Action Program and Plan; however, only those personnel working with flammables will receive training under the Fire Protection and Prevention Program.

Tables 5.16-1 and 5.16-2 list demolition, construction, and operation activities and associated potential hazards; the "Control" column includes the programs designed to reduce the occurrence of each hazard.

TABLE 5.16-1

Hazard Analysis for the Demolition and Construction Activities

Activity	Potential Hazard*	Control
Motor vehicle and heavy equipment use	Employee injury and property damage from collisions between people and equipment	Motor Vehicle and Heavy Equipment Safety Program
Forklift operation	Same as motor vehicle and heavy equipment use	Forklift Operation Program
Trenching and excavation	Employee injury and property damage from the collapse of trenches and excavations or exposure to fumes or vapors that have collected in the trench/excavation	Excavation/Trenching Program
Working at elevated locations	Falls from the same level and elevated areas	Fall Prevention Program Scaffolding/Ladder Safety Program Articulating Boom Platforms Program
Use of cranes and derricks	Property damage from falling loads; employee injuries from falling loads; and injuries and property damage from contact with crane or derrick	Crane and Material Handling Program Crane Operator certification
Working with flammable and combustible liquids	Fire/spills	Fire Protection and Prevention Program Housekeeping and Material Handling and Storage Program
Hot work (including cutting and welding)	Employee injury and property damage from fire; exposure to fumes during cutting and welding; ocular exposure to ultraviolet and infrared radiation during cutting and welding	Hot Work Safety Program; Respiratory Protection Program; Employee Exposure Monitoring Program; Personal Protective Equipment (PPE) Program, Fire Protection and Prevention Program; Hexavalent Chromium Program
Inspection and maintenance of temporary systems used during construction activities	Employee injury and property damage from contact with hazardous energy sources (such as electrical, thermal, and mechanical)	Electrical Safety Program; Lock-Out/Tag-Out Program
Working on electrical equipment and systems	Employee contact with live electricity and energized equipment	Electrical Safety Program; PPE Program
Exposure to asbestos and lead	Personnel who are working with or have the potential to be exposed to asbestos and lead during demolition of existing facility	Asbestos and Lead Program
Exposure to hazardous waste	Personnel who are working with or have the potential to be exposed to contaminated soil, groundwater, or debris during construction and demolition	Hazardous Waste Program
Confined space entry	Employee injury from physical and chemical hazards	Permit-required, Confined-space Entry Program
General construction activity	Employee injury from hand and portable power tools	Hand and Portable Power Tool Safety Program; PPE Program; Powder-actuated Tools Program

TABLE 5.16-1

Hazard Analysis for the Demolition and Construction Activities

Activity	Potential Hazard*	Control
General construction activity	Employee injury/property damage from inadequate walking and work surfaces	Housekeeping and Material Handling and Storage Program
General construction activity	Employee exposure to occupational noise	Hearing Conservation Program; PPE Program
General construction activity	Employee injury from improper lifting and carrying of materials and equipment	Back Injury Prevention Program
General construction activity	Employee injury to head, eye/face, hand, body, foot, and skin	PPE Program
General construction activity	Employee exposure to hazardous gases, vapors, dusts, and fumes	Hazard Communication Program; Respiratory Protection Program; PPE Program; Air Monitoring Program
General construction activity	Employee exposure to various hazards; reporting of hazardous conditions during construction	Injury and Illness Prevention Program
General construction activity	Heat and cold stress	Heat and Cold Stress Monitoring and Control Program
Construction and testing of high-pressure steam and air systems	Employee injury and property damage due to failure of pressurized system components or unexpected release of pressure	Pressure Vessel and Pipeline Safety Program; Electrical Safety Program; Lock-Out/Tag-Out Program

*The hazards and hazard controls provided are generic to construction activities. During various phases of demolition and construction a task-specific hazard analysis will be performed to more specifically evaluate the relevant hazards and to develop appropriate controls.

TABLE 5.16-2

Hazard Analysis for the AEC Operation Activities

Activity	Potential Hazard*	Control
Motor vehicle and heavy equipment use	Employee injury and property damage from collisions between people and equipment	Motor Vehicle and Heavy Equipment Safety Program
Forklift operations	Same as heavy equipment	Forklift Operation Program
Trenching and excavation	Employee injury and property damage from the collapse of trenches and excavations	Excavation/Trenching Program
Working at elevated locations	Falls from the same level and elevated areas	Fall Protection Program; Scaffolding/Ladder Safety Program
Use of cranes or derricks	Property damage from falling loads; employee injuries from falling loads; injuries and property damage from contact with crane or derrick	Crane and Material Handling Program
Working with flammable and combustible liquids	Fire/spills	Fire Protection and Prevention Program
Working with hazardous materials	Employee injury due to ingestion, inhalation, and dermal contact	Hazard Communication Program

TABLE 5.16-2

Hazard Analysis for the AEC Operation Activities

Activity	Potential Hazard*	Control
Hot work (including cutting and welding)	Employee injury and property damage from fire; exposure to fumes during cutting and welding; ocular exposure to ultraviolet and infrared radiation during cutting and welding	Hot Work Safety Program; Respiratory Protection Program; Employee Exposure Monitoring Program; PPE Program; Fire Protection and Prevention Program; Hexavalent Chromium Program
Transformer Fires	Employee injury and property damage from fire	A transformer fire protection plan will be included within the Fire Protection and Prevention Program
Troubleshooting and maintenance of plant systems and general operational activities	Employee injury and property damage from contact with hazardous energy sources (such as electrical, thermal, and mechanical)	Electrical Safety Program; Lock-Out/Tag-Out Program
Working on electrical equipment and systems	Employee contact with live electricity	Electrical Safety Program; PPE Program
Confined space entry	Employee injury from physical and chemical hazards	Permit-required, Confined-space Entry Program
General plant operation activities	Employee injuries from hand and portable power tools	Hand and Portable Power Tool Safety Program; PPE Program
General plant operation activities	Employee injury and property damage from inadequate walking and work surfaces	Housekeeping and Material Handling and Storage Program
General plant operation activities	Employee overexposure to occupational noise	Hearing Conservation Program; PPE Program
General plant operation activities	Employee injury from improper lifting and carrying of materials and equipment	Back Injury Prevention Program
General plant operation activities	Employee injury and property damage from unsafe driving	Safe Driving Program
General plant operation activities	Employee overexposure to hazardous gases, vapors, dusts, and fumes	Hazard Communication Program; Respiratory Protection Program; PPE Program; Employee Exposure Monitoring Program
General plant operation activities	Reporting and repair of hazardous conditions	Injury and Illness Prevention Program
General plant operation activities	Heat and cold stress	Heat and Cold Stress Monitoring and Control Program
General plant operation activities	Ergonomic injuries	Ergonomic Awareness Program
Maintenance and repair of high-pressure steam and air systems	Employee injury and property damage due to failure of pressurized system components or unexpected release of pressure	Pressure Vessel and Pipeline Safety Program; Electrical Safety Program; Lock-Out/Tag-Out Program
Ammonia storage	Ammonia release	Emergency Action Program/Plan; Risk Management Plan (RMP)

*The potential hazards and hazard controls provided are generic to operational activities. Task-specific hazard analysis is required for all medium- and high-risk work activities in the operational phase.

5.16.3.3 Training and Safety Programs

To protect the safety and health of workers during the demolition of former Unit 7's remaining components and AEC construction and operation, health and safety programs designed to mitigate hazards and comply with applicable regulations will be implemented. Periodic internal audits will be performed by qualified individuals to determine whether proper work practices are being used to mitigate hazardous conditions and to evaluate regulatory compliance. A comprehensive Environmental, Health, and Safety audit will be conducted on an annual basis during the construction phase and every 3 years during the AEC operation.

Specific training program content for all demolition and construction employees will be required of all demolition and construction contractors. All demolition and construction workers will be required to attend an AEC site safety orientation prior to being allowed to work at the site and are required to follow all federal, state, and local employee safety rules and regulations, as well as the AEC safety programs while onsite. Demolition and construction worker safety-related certifications and licenses will be verified during the pre-qualification process using PICS[57] and/or an AEC internal validation process.

The following sections contain information on the anticipated content of the health and safety programs.

Demolition and Construction Health and Safety Program. Demolition and construction safety programs will be developed and implemented during demolition of former Unit 7's remaining components and construction of the AEC as outlined in the following lists.

Injury and Illness Prevention Program.

- Philosophy and safety commitment
- Safety leadership and responsibilities
- Accountability
- Specific core safety processes (see Construction Safety Programs later in this section)
- Employee communication
- Planning "job hazard analysis and pre-task"
- Compliance with work rules and safe work practices
- Measurement of compliance and effectiveness of prevention methods; inspections/audits
- Communication of performance and implementation of necessary improvements
- Training and other communication requirements

Fire Protection and Prevention Program.

- General requirements
- Housekeeping and proper material storage
- Employee alarm/communication system
- Portable fire extinguishers
- Fixed firefighting equipment
- Fire control and containment
- Transformer fire protection and prevention
- Flammable and combustible liquid storage
- Dispensing and disposal of flammable liquids
- Service and refueling areas
- Training

Personal Protective Equipment Program.

- Personal protective devices
- Hazard analysis
- Training

[57] PICS is a third-party contractor qualifying system for safety training, performance and work history.

- Head protection
- Eye/face protection
- Body protection
- Hand protection
- Foot protection
- Skin protection
- Fall protection
- Electrical arc flash protection
- Respiratory protection
- Hearing protection

First Aid, CPR, and Automated External Defibrillator.

- General requirements
- Written program
- Training
- Maintenance

Emergency Action Program/Plan.

Emergency procedures for the protection of personnel, equipment, the environment, and materials as follows:

- Fire and emergency reporting procedures
- Response actions for accidents involving personnel and/or property
- Bomb threat response procedures
- Site assembly and emergency evacuation route procedures
- Natural disaster response

Reporting and notification procedures for emergencies and contacts, including offsite and local authorities, as follows:

- Alarm and communication systems
- Spill response, prevention, and control action plan
- Emergency response equipment
- Emergency personnel (response team) responsibilities and notification roster
- Training requirements

Construction Safety Programs.

- Motor Vehicle and Heavy Equipment Safety Program:
  - Operation and maintenance of vehicles
  - Inspection
  - PPE
  - Training
- Forklift Operation Program:
  - Trained and certified operators
  - Fueling operations
  - Safe operating parameters
  - Training
- Excavation/Trenching Program:
  - Shoring, sloping, and benching requirements
  - Cal/OSHA permit requirements
  - Inspection

  - Air monitoring
  - Access and egress
- Fall Protection Program:
  - Evaluation of fall hazards
  - Protection devices
  - Training
- Scaffolding/Ladder Safety Program:
  - Construction and inspection of equipment
  - Proper use
  - Training
- Articulating Boom Platforms Program:
  - Inspection of equipment
  - Load ratings
  - Safe operating parameters
  - Operator training
- Crane and Material Handling Program:
  - Certified and licensed operators
  - Inspection of equipment
  - Load ratings
  - Safe operating parameters
  - Training
- Hazardous Waste Program:
  - Evaluation of hazard
  - Training
  - Air monitoring
  - Medical surveillance
  - Health and Safety Plan (HSP) preparation
- Hexavalent Chromium Program:
  - Exposure determination
  - Monitoring schedule requirements
  - Reporting of results (employee notification)
  - Recordkeeping
  - Establish regulated areas
  - Establish hygiene control areas
  - Controls implementation
  - Medical surveillance
  - Training
- Hot Work Safety Program:
  - Welding and cutting procedures
  - Acetylene and fuel gas safety procedures
  - Fire watch
  - Hot work permit
  - PPE
  - Training

- Employee Exposure Monitoring Program:
  - Exposure evaluation
  - Monitoring requirements
  - Reporting of results
  - Medical surveillance
  - Training
- Electrical Safety Program:
  - Grounding procedure
  - Overhead and underground utilities
  - Utility clearance
  - Assured Grounding Program/Ground Fault Circuit Interrupters (GFCI)
  - Training
- Lock-out/Tag-Out Program:
  - Allocation of devices (locks, tags, and adaptors)
  - Lock-out/tag-out sequencing
  - Types/magnitudes of energy
  - Types/locations of machines
  - Verification
  - Training
- Permit-required Confined-space Entry Program:
  - Air monitoring and ventilation requirements
  - Rescue procedures
  - Lock-out/tag-out and blocking, blinding, and blanking requirements
  - Permit completion
  - Training
- Hand and Portable Power Tool Safety Program:
  - Guarding and proper operation
  - Training
- Powder-actuated Tool Safety Program:
  - Operator qualification
  - Inspection requirements
  - Repair requirements
  - Storage requirements
  - Training
- Housekeeping and Material Handling and Storage Program:
  - Storage requirements
  - Walkways and work surfaces
  - Equipment handling requirements
  - Training
- Hearing Conservation Program:
  - Identifying high-noise environments
  - Exposure monitoring
  - Medical surveillance requirements
  - Hearing-protective devices
  - Training

- Back Injury Prevention Program:
  - Proper lifting and material handling procedures
  - Training
- Hazard Communication Program:
  - Labeling requirements
  - Storage and handling
  - Material Safety Data Sheets
  - Chemical inventory
  - Training
- Respiratory Protection Program:
  - Selection and use
  - Storage
  - Fit testing
  - Medical requirements
  - Inspection and repair
  - Training
- Heat and Cold Stress Monitoring and Control Program:
  - Monitoring requirements
  - Prevention and control
- Safe Driving Program:
  - Training
- Pressure Vessel and Pipeline Safety Program:
  - Line-breaking program
  - Equipment inspection and maintenance
  - Blocking, bleeding, and blanking
  - Training

Operation Health and Safety Program. Upon completion of construction and commencement of operations at the AEC, the demolition and construction Health and Safety Plan will transition into an operation-oriented program reflecting the potential hazards and controls to be employed during operation. The following outline sets forth the topics that will be included in the Operations Health and Safety Program.

Injury and Illness Prevention Program

- Personnel with the responsibility and authority for implementing the plan
- Safety and health policy
- Work rules and safe work practices
- System for ensuring that employees comply with safe work practices
- Employee communications
- Identification and evaluation of workplace hazards
- Methods and/or procedures for correcting unsafe or unhealthy conditions, work practices, and work procedures in a timely manner based on the severity of the hazards
- Specific safety procedures (see Plant Operation Safety Program)
- Training and instruction

First Aid, CPR, and Automated External Defibrillator.

- General requirements
- Written program
- Training
- Maintenance

Fire Protection and Prevention Program.

- General requirements
  - Fire hazard inventory, including ignition sources and mitigation
  - Housekeeping and proper materials storage
  - Employee alarm/communication system
  - Portable fire extinguishers
  - Fixed firefighting equipment
  - Fire control
  - Flammable and combustible liquid storage
  - Use of flammable and combustible liquids
  - Dispensing and disposal of liquids
  - Training
  - Personnel to contact for information on plan contents

Emergency Action Program/Plan.

- This program/plan is part of the Risk Management Plan and Process Safety Management Program:
  - Emergency escape procedures and emergency escape route assignments
  - Procedures to be followed by employees who remain to operate critical plant operations before they evacuate
  - Procedures to account for all employees after emergency evacuation has been completed
  - Rescue and medical duties for those employees performing rescue and medical duties
  - Fire and emergency reporting procedures
  - Alarm and communication system
  - Personnel to contact for information on plan contents
  - Response procedure for ammonia release
  - Training requirements

Personal Protective Equipment Program.

- Hazard analysis and prescription of PPE
- Personal protective devices
- Head protection
- Eye and face protection
- Body protection
- Hand protection
- Foot protection
- Skin protection
- Sanitation
- Safety belts and life lines for fall protection
- Protection for electric shock
- Medical services and first aid/blood borne pathogens
- Respiratory protective equipment

- Hearing protection
- Training

Plant Operation Safety Program.

- Motor Vehicle and Heavy Equipment Safety Program:
  - Operation and maintenance of vehicles
  - Inspection
  - PPE
  - Training
- Forklift Operation Program:
  - Trained and certified operators
  - Fueling operations
  - Safe operating parameters
  - Training
- Excavation/Trenching Program:
  - Shoring, sloping, and benching requirements
  - Cal/OSHA permit requirements
  - Inspection
  - Air monitoring
  - Access and egress
- Fall Protection Program:
  - Evaluation of fall hazards
  - Protection devices
  - Training
- Scaffolding/Ladder Safety Program:
  - Construction and inspection of equipment
  - Proper use
  - Training
- Articulating Boom Platforms Program:
  - Inspection of equipment
  - Load ratings
  - Safe operating parameters
  - Operator training
- Crane and Material Handling Program:
  - Certified and licensed operators
  - Inspection of equipment
  - Load ratings
  - Safe operating parameters
  - Training
- Hot Work Safety Program:
  - Welding and cutting procedures
  - Acetylene and fuel gas safety
  - Fire watch
  - Hot work permit
  - PPE
  - Training

- Workplace Ergonomics Program:
  - Identification of personnel at risk
  - Evaluation of personnel
  - Workplace and job activity modifications
  - Training
- Employee Exposure Monitoring Program:
  - Exposure evaluation
  - Monitoring requirements
  - Reporting of results
  - Medical surveillance
  - Training
- Electrical Safety Program:
  - Grounding procedure
  - Overhead and underground utilities
  - Utility clearance
  - Training
- Lock-out/Tag-Out Program:
  - Allocation of lock-out/tag-out devices (locks, tags, and adaptors)
  - Machine specific lock-out/tag-out procedures
  - Steps for verification of isolation
  - Training (Affected and Authorized and Interaction with Energized Electrics)
  - Annual program review
- Permit-required Confined-space Entry Program:
  - Air monitoring and ventilation requirements
  - Rescue procedures
  - Lock-out/tag-out and blocking, blinding, and blanking requirements
  - Permit completion
  - Training
- Hand and Portable Power Tool Safety Program:
  - Guarding and proper operation
  - Training
- Housekeeping and Material Handling and Storage Program:
  - Storage requirements
  - Walkways and work surfaces
  - Equipment handling requirements
  - Training
- Hearing Conservation Program:
  - Identifying high-noise environments
  - Exposure monitoring
  - Medical surveillance requirements
  - Hearing-protective devices
  - Training
- Back Injury Prevention Program:
  - Proper lifting and material-handling procedures
  - Training

- Hazard Communication Program:
  - Labeling requirements
  - Storage and handling
  - Material Safety Data Sheets
  - Chemical inventory
  - Training
- Respiratory Protection Program:
  - Selection and use
  - Storage
  - Fit testing
  - Medical requirements
  - Inspection and repair
  - Training
- Heat and Cold Stress Monitoring and Control Program:
  - Monitoring requirements
  - Prevention and control
- Pressure Vessel and Pipeline Safety Program:
  - Line-breaking policy
  - Equipment inspection and maintenance
  - Blocking, bleeding, and blanking
  - Communication
  - Training
- Safe Driving Program:
  - Inspection and maintenance
  - Training

Safety Training. To ensure that employees recognize and understand how to protect themselves from potential hazards during this project, comprehensive training programs for demolition, construction, and operations personnel will be implemented as indicated in Tables 5.16-3 and 5.16-4. Each of the safety procedures developed to control and mitigate potential site hazards will require some form of training. Training will be delivered in various ways depending on the requirements of Cal/OSHA standards, the complexity of the topic, the characteristics of the workforce, and the degree of risk associated with each of the identified hazards. Training for demolition and construction personnel will be prepared and conducted by the Engineering, Procurement, and Construction (EPC) contractor, and operational training will be prepared and conducted by the Project Owner.

Additional details regarding what will be included in the training are located in Sections 5.16.3.3.1 and 5.16.3.3.2.

TABLE 5.16-3

Proposed Demolition and Construction Training Programs (to be prepared and conducted by EPC contractor)

Training Course	Target Employees
Injury and Illness Prevention Training	All
Emergency Action Program/Plan	All
PPE Training	All
Fire Protection and Prevention Plan	All
Motor Vehicle and Heavy Equipment Safety Training	Employees working on, near, or with heavy equipment or vehicles

TABLE 5.16-3

Proposed Demolition and Construction Training Programs (to be prepared and conducted by EPC contractor)

Training Course	Target Employees
Forklift Operation Training	Employees operating forklifts
Excavation/Trenching Safety Training	Employees involved with trenching or excavation
Fall Protection Training	Employees either working at heights greater than 6 feet or required to use fall protection
Scaffolding/Ladder Safety Training	Employees required to erect or use scaffolding
Crane Safety Training	Employees supervising or performing crane operations
Fire Protection and Prevention Training	Employees responsible for the handling and storage of flammable or combustible liquids or gases
Hazard Communication Training	Employees handling or working with hazardous materials
Hazardous Waste	Employees handling or excavating hazardous waste
Hot Work Safety Training	Employees performing hot work
Lock-out/Tag-out Training	Employees performing lock-out/tag-out or working on systems that require lock-out/tag-out activities
Electrical Safety Training	Employees required to work on electrical systems and equipment, or required to use electrical equipment and cords
Permit-required Confined-space Entry Training	Employees required to supervise or perform confined-space entry activities
Hand and Portable Power Tool Safety Training	Employees who will be operating hand and portable power tools
Powder-actuated Tool Safety Training	Employees who will be operating powder-actuated tools
Heat Stress and Cold Stress Safety Training	Employees who are exposed to temperature extremes
Hearing Conservation Training	All
Back Injury Prevention Training	All
Safe Driving Training	Employees supervising drivers or driving motor vehicles
Pressure Vessel and Pipeline Safety Training	Employees supervising or working on pressurized systems or equipment
Respiratory Protection Training	All employees required to wear respiratory protection
Fire Protection and Prevention Training	All
Fire Protection and Prevention Training	All
First Aid, CPR, and Automated External Defibrillator	All
Hexavalent Chromium Program	Employees handling or working with hazardous materials/waste containing hexavalent chromium
Articulating Boom Platforms Program	Employees supervising or performing articulating boom operations
Employee Exposure Monitoring Program	Employees handling or working with hazardous materials/waste
Housekeeping and Material Handling and Safety Program	All

TABLE 5.16-4

AEC Operations Training Programs (to be prepared and conducted by Project Owner)

Training Course	Target Employees
Injury and Illness Prevention Training	All
Emergency Action Plan	All
PPE Training	All
Fire Protection and Prevention Plan	All
Excavation/Trenching Safety Training	Employees involved with trenching or excavation
Scaffolding/Ladder Safety Training	Employees required to erect or use scaffolding
Fall Protection Training	Employees required to use fall protection
Forklift Operator Training	Employees operating forklifts
Crane Safety Training	Employees supervising or performing crane operations
Workplace Ergonomics	Employees performing repetitive activities
Fire Protection and Prevention Training	Employees responsible for the handling and storage of flammable or combustible liquids or gasses
Hot Work Safety Training	Employees performing hot work
Lock-out/Tag-out Training	Employees performing lock-out/tag-out activities
Electrical Safety Training	Employees required to work on electrical systems and equipment
Permit-required Confined-space Entry	Employees required to supervise or perform confined-space entry
Hand and Portable Power Tool Safety Training	Employees that will be operating hand and portable power tools
Heat Stress and Cold Stress Safety Training	Employees exposed to temperature extremes
Hearing Conservation Training	All
Back Injury Prevention Training	All
Safe Driving Training	Employees supervising drivers or driving motor vehicles
Hazard Communication Training	Employees handling or working around hazardous materials
Pressure Vessel and Pipeline Safety Training	Employees supervising or working on pressurized systems or equipment
Respiratory Protection Program	All employees required to wear respiratory protection
Fire Protection and Prevention Training	All
First Aid, CPR, and Automated External Defibrillator	Qualified Electrical Employees and Affected Emergency Responders
Motor Vehicle and Heavy Equipment Safety Program	All
Articulating Boom Platforms Program	Employees supervising or performing articulating boom operations
Employee Exposure Monitoring Program	Employees handling or working with hazardous materials/waste
Housekeeping and Material Handling and Storage Program	All

5.16.3.4 Fire Protection

The Long Beach Fire Department has 23 fire stations, including two Fireboat Stations and the Airport Station. The closest fire station to the AEC is Long Beach Fire Department's Station No. 22 at 6340 Atherton Street in Long Beach, California, 90815. The station is approximately 2 miles away and would provide the first response to a fire at the project site, with an approximate 5-minute response time on average (DuRee, 2013). Mutual and automatic aid response would come from the other fire stations in the Long Beach Fire Department and, if necessary, from nearby Los Angeles County Fire Department and the Orange County Fire Authority. The most likely scenario for use of mutual aid to the AEC would be with Orange County Fire Authority, which would draw resources from Orange County Stations 48, 17, and 42 if needed (DuRee, 2013). The Project Owner has engaged the Long Beach Fire Department in discussions regarding the

project's fire protection needs and the Long Beach Fire Department's ability to respond. The AEC's onsite fire suppression system is described in Section 2.0, Project Description, and in Appendix 2D, Engineering Design Criteria.

5.16.4 Laws, Ordinances, Regulations, and Standards

Demolition, construction, and operation will be conducted in accordance with all applicable LORS. Table 5.16-5 summarizes the federal, state, and local (Los Angeles County and Long Beach) LORS relating to worker health and safety. Table 5.16-5 also provides a summary of the applicable national consensus standards.

TABLE 5.16-5
Laws, Ordinances, Regulations, and Standards for Worker Health and Safety

LORS	Requirements/Applicability	Administering Agency	AFC Section Explaining Conformance
Federal			
Title 29 CFR Part 1910	Contains the minimum occupational safety and health standards for general industry in the United States	OSHA	Section 5.16.3
Title 29 CFR Part 1926	Contains the minimum occupational safety and health standards for the construction industry in the United States	OSHA	Section 5.16.3
State			
California Occupational Safety and Health Act, 1970	Establishes minimum safety and health standards for construction and general industry operations in California	Cal/OSHA	Section 5.16.3
8 CCR § 339	Requires list of hazardous chemicals relating to the Hazardous Substance Information and Training Act	Cal/OSHA	Section 5.16.3
8 CCR § 450	Addresses hazards associated with pressurized vessels	Cal/OSHA	Section 5.16.3
8 CCR § 750	Addresses hazards associated with high-pressure steam	Cal/OSHA	Section 5.16.3
8 CCR § 1509	Addresses requirements for construction, accident, and prevention plans	Cal/OSHA	Section 5.16.3
8 CCR § 1509, et seq., and § 1684, et seq.	Addresses construction hazards, including head, hand, and foot injuries and noise and electrical shock	Cal/OSHA	Section 5.16.3
8 CCR § 1528, et seq., and 3380, et seq.	Requirements for PPE	Cal/OSHA	Section 5.16.3
8 CCR § 1532, and § 5206	Addresses Chromium IV (Hexavalent Chromium)	Cal/OSHA	Section 5.16.3
8 CCR § 1597, et seq., and § 1590, et seq.	Requirements addressing the hazards associated with traffic accidents and earth-moving	Cal/OSHA	Section 5.16.3
8 CCR § 1604, et seq.	Requirements for construction hoist equipment	Cal/OSHA	Section 5.16.3

TABLE 5.16-5

Laws, Ordinances, Regulations, and Standards for Worker Health and Safety

LORS	Requirements/Applicability	Administering Agency	AFC Section Explaining Conformance
8 CCR § 1620, et seq., and 1723, et seq.	Addresses miscellaneous hazards	Cal/OSHA	Section 5.16.3
8 CCR § 1709, et seq.	Requirements for steel reinforcing, concrete pouring, and structural steel erection operations	Cal/OSHA	Section 5.16.3
8 CCR § 1920, et seq.	Requirements for fire protection systems	Cal/OSHA	Section 5.16.3
8 CCR § 2300, et seq., and § 2320, et seq.	Requirements for addressing low-voltage electrical hazards	Cal/OSHA	Section 5.16.3
8 CCR § 2395, et seq.	Addresses electrical installation requirements	Cal/OSHA	Section 5.16.3
8 CCR § 2700, et seq.	Addresses high-voltage electrical hazards	Cal/OSHA	Section 5.16.3
8 CCR § 3200, et seq., and § 5139, et seq.	Requirements for control of hazardous substances	Cal/OSHA	Section 5.16.3
8 CCR § 3203, et seq.	Requirements for operational accident prevention programs	Cal/OSHA	Section 5.16.3
8 CCR 3§ 270, et seq., and § 3209, et seq.	Requirements for evacuation plans and procedures	Cal/OSHA	Section 5.16.3
8 CCR § 3301, et seq.	Requirements for addressing miscellaneous hazards, including hot pipes, hot surfaces, compressed air systems, relief valves, enclosed areas containing flammable or hazardous materials, rotation equipment, pipelines, and vehicle-loading dock operations	Cal/OSHA	Section 5.16.3
8 CCR § 3360, et seq.	Addresses requirements for sanitary conditions	Cal/OSHA	Section 5.16.3
8 CCR § 3511, et seq., and § 3555, et seq.	Requirements for addressing hazards associated with stationary engines, compressors, and portable, pneumatic, and electrically powered tools	Cal/OSHA	Section 5.16.3
8 CCR § 3649, et seq., and § 3700, et seq.	Requirements for addressing hazards associated with field vehicles	Cal/OSHA	Section 5.16.3
8 CCR § 3940, et seq.	Requirements for addressing hazards associated with power transmission, compressed air, and gas equipment	Cal/OSHA	Section 5.16.3
8 CCR § 5109, et seq.	Requirements for addressing construction accident and prevention programs	Cal/OSHA	Section 5.16.3
8 CCR § 5110, et seq.	Requirements for the implementation of an ergonomics program	Cal/OSHA	Section 5.16.3
8 CCR § 5139, et seq.	Requirements for addressing hazards associated with welding, sandblasting, grinding, and spray-coating	Cal/OSHA	Section 5.16.3

TABLE 5.16-5

Laws, Ordinances, Regulations, and Standards for Worker Health and Safety

LORS	Requirements/Applicability	Administering Agency	AFC Section Explaining Conformance
8 CCR § 5150, et seq.	Requirements for confined space entry	Cal/OSHA	Section 5.16.3
8 CCR § 5155, et seq.	Requirements for use of respirators and for controlling employee exposure to airborne contaminants	Cal/OSHA	Section 5.16.3
8 CCR § 5160, et seq.	Requirements for addressing hot, flammable, poisonous, corrosive, and irritant substances	Cal/OSHA	Section 5.16.3
8 CCR § 5192, et seq.	Requirements for conducting emergency response operations	Cal/OSHA	Section 5.16.3
8 CCR § 5193, et seq.	Requirements for controlling employee exposure to blood-borne pathogens associated with exposure to raw sewage water and body fluids associated with first aid/CPR duties	Cal/OSHA	Section 5.16.3
8 CCR § 5194, et seq.	Requirements for employee exposure to dusts, fumes, mists, vapors, and gases	Cal/OSHA	Section 5.16.3
8 CCR § 5405, et seq.; § 5426, et seq.; § 5465, et seq.; § 5500, et seq.; § 5521, et seq.; § 5545, et seq.; § 5554, et seq.; § 5565, et seq.; § 5583, et seq.; and § 5606, et seq.	Requirements for flammable liquids, gases, and vapors	Cal/OSHA	Section 5.16.3
8 CCR § 5583, et seq.	Requirements for design, construction, and installation of venting, diking, valving, and supports	Cal/OSHA	Section 5.16.3
8 CCR § 6150, et seq.; § 6151, et seq.; § 6165, et seq.; 6170, et seq.; and § 6175, et seq.	Fire protection requirements	Cal/OSHA	Section 5.16.3
Title 24, Part 3, California Electrical Code	The Cal/OSHA electrical safety regulations incorporate the requirements of the Uniform Electrical Code located in Title 24, Part 3	Cal/OSHA	Section 5.16.3
8 CCR, Part 6	Provides health and safety requirements for working with tanks and boilers	Cal/OSHA	Section 5.16.3
Health and Safety Code Section 25531, et seq.	Requires that every new or modified facility that handles, treats, stores, or disposes of more than the threshold quantity of any of the listed regulated materials prepare and maintain an RMP	Cal/OSHA	Section 5.16.3
Health and Safety Code Sections 25500 through 25541	Requires the preparation of an HMBP that details emergency response plans for a hazardous materials emergency at the facility	Cal/OSHA	Section 5.16.3

TABLE 5.16-5

Laws, Ordinances, Regulations, and Standards for Worker Health and Safety

LORS	Requirements/Applicability	Administering Agency	AFC Section Explaining Conformance
Local			
Long Beach Municipal Code, Title 18, Chapter 18.48.240 and 18.48.580	Requirements pertaining to the storage, handling, transport, and generation of hazardous waste	Long Beach Fire Department	Section 5.16.3
Business Plan	Provides response agency with overview of the AEC's purpose and operations	Certified Unified Program Agency, administered by the Long Beach Fire Department	Section 5.16.3
National Standards			
Uniform Fire Code, Article 80	Addresses the prevention, control, and mitigation of dangerous conditions related to storage, dispensing, use, and handling of hazardous materials and information needed by emergency response personnel	Long Beach Fire Department	Section 5.16.3
NFPA 10, Standard for Portable Fire Extinguishers	Requirements for selection, placement, inspection, maintenance, and employee training for portable fire extinguishers	Long Beach Fire Department	Section 5.16.3
NFPA 11, Standard for Low-Expansion Foam and Combined Agent Systems	Requirements for installation and use of low-expansion foam and combined-agent systems	Long Beach Fire Department	Section 5.16.3
NFPA 11A, Standard for Medium- and High- Expansion Foam Systems	Requirements for installation and use of medium- and high-expansion foam systems	Long Beach Fire Department	Section 5.16.3
NFPA 12, Standard on Carbon Dioxide Extinguishing Systems	Requirements for installation and use of carbon dioxide extinguishing systems	Long Beach Fire Department	Section 5.16.3
NFPA 13, Standard for Installation of Sprinkler Systems	Guidelines for selection and installation of fire sprinkler systems	Long Beach Fire Department	Section 5.16.3
NFPA 13A, Recommended Practice for the Inspection, Testing, and Maintenance of Sprinkler Systems	Guidance for inspection, testing, and maintenance of sprinkler systems	Long Beach Fire Department	Section 5.16.3
NFPA 14, Standard for the Installation of Standpipe and Hose Systems	Guidelines for selection and installation of standpipe and hose systems	Long Beach Fire Department	Section 5.16.3
NFPA 15, Standard for Water Spray Fixed Systems	Guidelines for selection and installation of water spray fixed systems	Long Beach Fire Department	Section 5.16.3
NFPA 17, Standard for Dry Chemical Extinguishing Systems	Guidance for selection and use of dry chemical extinguishing systems	Long Beach Fire Department	Section 5.16.3
NFPA 20, Standard for the Installation of Centrifugal Fire Pumps	Guidance for selection and installation of centrifugal fire pumps	Long Beach Fire Department	Section 5.16.3

TABLE 5.16-5

Laws, Ordinances, Regulations, and Standards for Worker Health and Safety

LORS	Requirements/Applicability	Administering Agency	AFC Section Explaining Conformance
NFPA 22, Standard for Water Tanks for Private Fire Protection	Requirements for water tanks for private fire protection	Long Beach Fire Department	Section 5.16.3
NFPA 24, Standard for the Installation of Private Fire Service Mains and Their Appurtenances	Requirements for private fire service mains and their appurtenances	Long Beach Fire Department	Section 5.16.3
NFPA 26, Recommended Practice for the Supervision of Valves Controlling Water Supplies	Supervision guidance for valves controlling water supplies	Long Beach Fire Department	Section 5.16.3
NFPA 30, Flammable and Combustible Liquid Code	Requirements for storage and use of flammable and combustible liquids	Long Beach Fire Department	Section 5.16.3
NFPA 37, Standard for the Installation and Use of Stationary Combustion Engines and Gas Turbines	Fire protection requirements for installation and use of combustion engines and gas turbines	Long Beach Fire Department	Section 5.16.3
NFPA 50A, Standard for Gaseous Hydrogen Systems at Consumer Sites	Fire protection requirements for hydrogen systems	Long Beach Fire Department	Section 5.16.3
NFPA 54, National Fuel Gas Code	Fire protection requirements for use of fuel gases	Long Beach Fire Department	Section 5.16.3
NFPA 59A, Standard for the Storage and Handling of Liquefied Petroleum Gases	Requirements for storage and handling of liquefied petroleum gases	Long Beach Fire Department	Section 5.16.3
NFPA 68, Guide for Explosion Venting	Guidance in design of facilities for explosion venting	Long Beach Fire Department	Section 5.16.3
NFPA 70, National Electric Code	Guidance on safe selection and design, installation, maintenance, and construction of electrical systems	Long Beach Fire Department	Section 5.16.3
NFPA 70B, Recommended Practice for Electrical Equipment Maintenance	Guidance on electrical equipment maintenance	Long Beach Fire Department	Section 5.16.3
NFPA 70E, Standard for Electrical Safety Requirements for Employee Workplaces	Employee safety requirements for working with electrical equipment	Long Beach Fire Department	Section 5.16.3
NFPA 71, Standard for the Installation, Maintenance, and Use of Central Station Signaling Systems	Requirements for installation, maintenance, and use of central station signaling systems	Long Beach Fire Department	Section 5.16.3

TABLE 5.16-5

Laws, Ordinances, Regulations, and Standards for Worker Health and Safety

LORS	Requirements/Applicability	Administering Agency	AFC Section Explaining Conformance
NFPA 72A, Standard for the Installation, Maintenance, and Use of Local Protective Signaling Systems for Guard's Tour, Fire Alarm, and Supervisory Service	Requirements for installation, maintenance, and use of local protective signaling systems	Long Beach Fire Department	Section 5.16.3
NFPA 72E, Standard on Automatic Fire Detection	Requirements for automatic fire detection	Long Beach Fire Department	Section 5.16.3
NFPA 72F, Standard for the Installation, Maintenance, and Use of Emergency Voice/Alarm of Communication Systems	Requirements for installation, maintenance, and use of emergency and alarm communications systems	Long Beach Fire Department	Section 5.16.3
NFPA 72H, Guide for Testing Procedures for Local, Auxiliary, Remote Station, and Proprietary Protective Signaling Systems	Testing procedures for types of signaling systems anticipated for facility	Long Beach Fire Department	Section 5.16.3
NFPA 75, Standard for the Protection of Electronic Computer/Data Processing Equipment	Requirements for fire protection systems used to protect computer systems	Long Beach Fire Department	Section 5.16.3
NFPA 78, Lightning Protection Code	Lightning protection requirements	Long Beach Fire Department	Section 5.16.3
NFPA 80, Standard for Fire Doors and Windows	Requirements for fire doors and windows	Long Beach Fire Department	Section 5.16.3
NFPA 90A, Standard for the Installation of Air Conditioning and Ventilating Systems	Requirements for installation of air conditioning and ventilating systems	Long Beach Fire Department	Section 5.16.3
NFPA 101, Code for Safety to Life from Fire in Buildings and Structures	Requirements for design of means of exiting the facility	Long Beach Fire Department	Section 5.16.3
NFPA 291, Recommended Practice for Fire Flow Testing and Marking of Hydrants	Guidelines for testing and marking of fire hydrants	Long Beach Fire Department	Section 5.16.3
NFPA 850, Recommended Practice for Fire Protection for Fossil Fuel Steam Electric Generating Plants	Requirements for fire protection in fossil-fuel steam electric generating plants	Long Beach Fire Department	Section 5.16.3
NFPA 1961, Standard for Fire Hose	Specifications for fire hoses	Long Beach Fire Department	Section 5.16.3
NFPA 1962, Standard for the Care, Maintenance, and Use of Fire Hose Including Connections and Nozzles	Requirements for care, maintenance, and use of fire hoses	Long Beach Fire Department	Section 5.16.3

TABLE 5.16-5
Laws, Ordinances, Regulations, and Standards for Worker Health and Safety

LORS	Requirements/Applicability	Administering Agency	AFC Section Explaining Conformance
NFPA 1963, Standard for Screw Threads and Gaskets for Fire Hose Connections	Specifications for fire hose connections	Long Beach Fire Department	Section 5.16.3
ANSI/ASME, Boiler and Pressure Vessel Code	Specifications and requirements for pressure vessels	N/A	Section 5.16.3
ANSI, B31.2, Fuel Gas Piping	Specifications and requirements for fuel gas piping	N/A	Section 5.16.3

Notes:
ANSI = American National Standards Institute
ASME = American Society of Mechanical Engineers
CCR = California Code of Regulations
CFR = Code of Federal Regulations
HMBP = Hazardous Material Business Plan
NFPA = National Fire Protection Association

Sources: City of Long Beach, 2013; DuRee, 2013

5.16.5 Agencies and Agency Contacts

Agency contacts relative to worker health and safety and fire protection are shown in Table 5.16-6.

TABLE 5.16-6
Agency Contacts for Worker Health and Safety

Issue	Agency	Persons Contacted
CUPA Participating Agency for Hazardous Materials Inventory and Emergency Business Plan and Risk Management Plan, Fire Department Permits, Hazardous Materials Response, SPCC, Aboveground and Underground Storage Tank Permits	Long Beach Fire Department and Long Beach Health Department	Mike DuRee, Fire Chief City of Long Beach 3205 Lakewood Blvd, Long Beach, CA 90808 (562) 570-2579 Michael.DuRee@longbeach.org
Worker Health and Safety	Cal/OSHA, Torrance District Office	Marissa Cordeta, Officer on Duty 680 Knox Street, Suite 100 Torrance, CA 90502 (310) 516-3734
Fire Protection	Long Beach Fire Department	Mike DuRee, Fire Chief City of Long Beach 3205 Lakewood Blvd, Long Beach, CA 90808 (562) 570-2579 Michael.DuRee@longbeach.org

5.16.6 Permits and Permit Schedule

Table 5.16-7 lists applicable permits related to the protection of worker health and safety for the AEC.

TABLE 5.16-7

Permits and Permit Schedule for Worker Health and Safety

Permit	Agency Contact	Schedule/Steps
Trenching and excavation permit	Any Cal/OSHA district or field office	Submit completed permit application to any Cal/OSHA district or field office prior to commencing construction
Permit to erect a fixed tower crane	Any Cal/OSHA district or field office	Submit completed permit application to any Cal/OSHA district or field office at least 24 hours prior to initiation of activity
Pressure vessel permit	Any Cal/OSHA district or field office	Submit completed permit application to any Cal/OSHA district or field office prior to commencing construction

5.16.7 References

California State Water Resources Control Board (SWRCB). 2010. *Water Quality Control Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling*.

City of Long Beach. 2013. City of Long Beach Fire Department Information. Available online at: http://www.longbeach.gov/fire/. Accessed July 1, 2013.

Cordeta, Marissa/CalOSHA Torrance District Office, Officer on Duty. 2012. Personal communication with Jessica Brandt/CH2M HILL. May 30.

DuRee, Mike/Long Beach Fire Department, Fire Chief. 2013. Personal Communication with Beth Smoker/CH2M HILL. July 11.

SECTION 6

Alternatives

This section discusses alternatives to the Alamitos Energy Center (AEC) as proposed in this Application for Certification (AFC). The alternatives analyzed include the "no project" alternative, technology alternatives, water supply alternatives, and wastewater disposal alternatives. These alternatives are discussed in relation to the environmental, public policy, and business considerations involved in developing the project.

This section evaluates reasonable alternatives to the AEC that could feasibly attain most of the project objectives and reduce or eliminate any significant effects of the project. As demonstrated by the analyses contained in this AFC, the project will not result in any significant environmental impacts. Therefore, as detailed in the following sections, there are no alternatives that would be preferred over the proposed project.

6.1 Project Objectives

The primary project objective is to design a project that provides local area capacity that will utilize the applicant's existing assets (real property, personal property and industry expertise) to meet the demand for new generation in the Los Angeles basin local electrical reliability area caused in large part by the closure of the San Onofre Nuclear Generating Station and anticipated retirement of older, natural-gas-fired generation currently using once-through ocean water cooling (OTC).

The basic project objectives include but are not limited to the following:

- Develop a project capable of providing energy, generating capacity and ancillary electrical services (voltage support, spinning reserve, inertia) to satisfy Los Angeles Basin Local Reliability Area requirements and transmission grid support, particularly in the western sub-area of the Los Angeles Basin.
- Provide fast starting and stopping, flexible, controllable generation with the ability to ramp up and down through a wide range of electrical output to allow the integration of the renewable energy into the electrical grid in satisfaction of California's Renewable Portfolio Standard, displacing older and less-efficient generation
- Utilize the existing brownfield power plant site and infrastructure, including the existing Alamitos Generating Station (AGS) switchyard and related facilities, the Southern California Edison (SCE) switchyard and transmission facilities, the Southern California Gas Company (SoCalGas) natural gas pipeline system, the Long Beach Water Department (LBWD) water connections, process water supply lines, existing fire suppression and emergency service facilities, and the administration, maintenance, and certain warehouse buildings.
- Use qualifying technology under the South Coast Air Quality Management District's (SCAQMD) Rule 1304(a)(2) that allows for the replacement of older, less-efficient electric utility steam boilers with specific new generation technologies on a megawatt to megawatt basis (that is, the replacement megawatts are equal or less than the megawatts from the electric utility steam boilers).

6.2 Project Overview

6.2.1 General Project Description

AES Alamitos Energy, LLC, will construct, own, and operate the Alamitos Energy Center (AEC), a natural- gas-fired, air-cooled, combined-cycle and simple-cycle, electrical generating facility in Long Beach, California. The proposed AEC will have a nominal generating capacity of 1,040 megawatts (MW). The AEC will be

constructed on the site of the existing AGS, located on an approximately 21-acre site within a larger, 71.1-acre parcel.

The AEC will feature two gas turbine power blocks. The AEC CCGT will consist of two natural-gas-fired combustion turbine generators (CTG) in a combined-cycle configuration, two unfired heat recovery steam generators (HRSG), one steam turbine generators, an air-cooled condenser, an auxiliary boiler, and related ancillary equipment. The AEC SCGT will consist of four simple-cycle LMS-100 CTGs with fin-fan coolers and ancillary facilities.

The AEC will meet the demand for new generation in the Los Angeles basin local electrical reliability area. The demand is caused in large part by the closure of the San Onofre Nuclear Generating Station and the anticipated retirement of the older, natural-gas-fired generation currently using once-through ocean water-cooling (OTC). As a result of the promulgation of the California State Water Resources Control Board's (SWRCB) *Water Quality Control Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling* (SWRCB, 2010), more than 4,000 MW of OTC generation are expected to be retired in the Los Angeles local electrical reliability area by December 31, 2020.

The AEC will use water provided by the City of Long Beach Water Department (LBWD) for construction, operational process, and sanitary uses but at substantially lower volumes than the existing AGS historically has used. This water will be supplied through existing, onsite water lines. The AEC will include a new, 1,000-foot process/sanitary wastewater pipeline to the first point of interconnection with the existing LBWD sewer system, the potential upgrade of an additional 4,000 feet of existing pipeline downstream from the first point of interconnection, and the elimination of the current practice of treatment and discharge of process/sanitary wastewater to the San Gabriel River. Stormwater runoff from the power block areas will be directed to oil/water separators and to an existing retention basin and then ultimately discharged to the Los Cerritos channel via existing stormwater outfalls.

The AEC will interconnect to the existing, Southern California Edison (SCE) 230-kilovolt (kV) switchyard adjacent to the north side of the AGS. Natural gas will be supplied to the AEC via the existing, offsite, 30-inch-diameter pipeline owned and operated by Southern California Gas Company (SoCalGas) that currently serves Units 5 and 6 of the AGS. The AEC will require construction of new natural gas-metering facilities and construction of two new natural gas compressor buildings within the AEC footprint.

The AEC is designed to serve both peak and intermediate loads with the added capabilities of rapid startup, significant turndown capability (ability to turn down to a low load), and fast ramp rates. As California's intermittent renewable energy portfolio continues to grow, operating in either load-following or partial shutdown mode will become necessary to maintain electrical grid reliability, thus placing an increased importance upon the rapid startup, high turndown, steep ramp rate, and superior heat rate employed at the AEC.

As an in-basin generating asset, the AEC will provide local generating capacity, voltage support, and reactive power that are essential for transmission system reliability in the Western Los Angeles basin subarea and larger Los Angeles basin local reliability area. The AEC will be able to provide system stability by supplying reactive power, voltage support, frequency stability, and rotating mass in the heart of the critical Western Los Angeles local reliability area. By virtue of its location in a transmission constrained load center, the AEC also helps to avoid potential transmission line overloads and can provide reliable local energy supplies when electricity from more distant generating resources is unavailable. In recognition of its critical grid reliability benefits, the AEC combined-cycle CTGs were selected by SCE in its Local Capacity Requirements Request for Offer on November 5, 2014, and the simple-cycle CTGs will meet the capacity needs anticipated to be identified in future California Public Utilities Commission Long-term Procurement Plans.

Owing to the critical need for generating capacity at the AEC site at all times, existing Units 1 through 6 will remain in operation through much of the AEC development and construction. Given that the removal of existing Units 1 through 6 is not required for construction of the AEC, the continued operation of the AGS

will not impede AEC construction. Demolition of the retired and decommissioned turbine peaking generating Unit 7 and fuel tank, ancillary equipment, small maintenance shops, and two retention basins will be required for site preparation for the construction of the AEC. Construction and site preparation activities at the AEC site are anticipated to last 56 months, from the first quarter of 2017 until the third quarter of 2021. The project will commence construction with the removal of former Unit 7's building and ancillary equipment, fuel storage tank, tank berms, small maintenance shops, and two wastewater retention basins in January 2017 to make room for construction and laydown area for the AEC CCGT. Construction of the AEC CCGT will commence during the second quarter of 2017 and will be completed by the second quarter of 2020. The CCGT is expected to commence commercial operation before May 1, 2020. Construction of the AEC SCGT is scheduled to proceed from the second quarter of 2020 through the third quarter of 2021, and Power Block 2 is expected to commence commercial operation in the third quarter of 2021. A temporary construction access road may be constructed offsite beginning at the intersection of Studebaker Road and Loynes Drive traveling southeast to the AEC site. Construction of the AEC will require the use of onsite laydown areas (approximately 8 acres dispersed throughout the existing site) and an approximately 10-acre laydown area located adjacent to the existing site.

6.2.2 Need for New Generation

In recognition of its critical grid reliability benefits, the AEC combined-cycle CTGs were selected by SCE in its Local Capacity Requirements Request for Offer (LCR RFO) on November 5, 2014, and the simple-cycle CTGs will meet the capacity needs anticipated to be identified in the next California Public Utilities Commission (CPUC) Long-term Procurement Plan (LTPP).

6.3 Alternatives Analysis Regulatory Requirements

The Energy Facilities Siting Regulations (Title 20, California Code of Regulations [CCR], Appendix B) guidelines titled *Information Requirements for an Application* require:

> A discussion of the range of reasonable alternatives to the project, including the no project alternative…which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project, and an evaluation of the comparative merits of the alternatives.

The regulations also require:

> A discussion of the applicant's site selection criteria, any alternative sites considered for the project and the reasons why the applicant chose the proposed site.

The California Environmental Quality Act's Guidelines for Implementation, 14 CCR Section 15126.6(a), requires an evaluation of project alternatives based on the comparative merits of "a range of reasonable alternatives to the project, or to the location of the project, which would feasibly attain most of the basic objectives of the project but would avoid or substantially lessen any of the significant effects of the project." The analysis must also address the "no project" alternative (14 CCR Section 15126.6 (e)). The Guidelines further state that the range of alternatives is governed by the "rule of reason," which requires consideration only of those alternatives necessary to permit a reasoned choice and to foster informed decision making and public participation (14 CCR Section 15126.6 (f) (3)). Further, as discussed below, the Legislature has determined that an off-site alternatives analysis is not required for a project like AEC that "has a strong relationship to the existing industrial site." (Public Resources Code Section 25540.6(b).)

6.4 No Project Alternative

The no project alternative is the scenario where the project is not approved. The no project alternative is the existing conditions at the time the application is accepted by the CEC as well as what would be reasonably expected to occur in the foreseeable future if the project were not approved, based on current plans and consistent with available infrastructure and community services (14 CCR 15126.6(e)).

Under the no project alternative, the AEC would not be built and the associated benefits of the AEC would not materialize, including critically needed energy and electrical generating capacity to support grid reliability in the Los Angeles Basin and western sub-area and increased abilities to integrate renewable resources with the electrical grid. The no project alternative would not be preferable to the AEC because of the need for economical, reliable, and environmentally sound generation resources in the region. The no project alternative would not meet the basic project objectives, would eliminate the AEC's benefits, and would not avoid potential significant impacts. The AEC will not result in any significant impacts, therefore, the no project alternative was rejected in favor of the AEC.

If the AEC is not approved, the existing conditions and infrastructure would remain in place and continue to operate. Under the no project alternative, the existing AGS would still need to comply with the SWRCB's OTC policy, by either (1) replacing the present ocean water OTC system with a closed-loop cooling system, (2) employing other engineered solutions to reduce impingement and entrainment of marine life through the OTC system, or (3) operating only during electric system emergencies or during any extension of the target date for replacement of OTC systems.

The existing plant could be retrofitted with a closed-loop cooling system, which would not use ocean water. Such a system could consist of a cooling tower using wet-cooling technology, or a dry-cooling system. Wet-cooling technology would employ cooling towers that would take up significant space at the current site. A wet cooling system would have a visible plume and require substantial water to operate. Because the availability of Title 22 reclaimed water is limited, cooling tower water requirements would have to be met with LBWD water.

A dry-cooling system would employ an air-cooled condenser, which would have to be large enough to meet the cooling demand of the existing steam generator units. An air-cooled condenser large enough for the existing plant is not feasible on the limited land available at the existing AGS. Given the large capital costs associated with such a cooling system and given the high heat rates of the existing units, the retrofitted gas would also be economically infeasible. A replacement closed-loop cooling system, using either wet- or dry-cooling technology was rejected as a feasible option because these options would either place a significant demand on local water supplies, cause local visibility issues, would be economically infeasible or would not be possible on the limited land available at the site.

Other engineered solutions for the ocean water intake include technology and systems that have not yet been demonstrated beyond the conceptual or pilot-scale. There has been some progress made with certain efforts to limit the impacts from impingement and entrainment into intake systems on rivers; however, none of these systems has been demonstrated at the scale of the 2,000-MW AGS or to the level of impingement and entrainment mortality reduction as required by the OTC Policy.

Based on CAISO's 2021 projection, and the CPUC findings of the need for OTC replacement generation, decommissioning existing OTC facilities such as the AGS units without adequate replacement generation would create reliability concerns. Therefore, if the AEC is not approved and if the AGS were unable to find an engineering solution to replace the OTC system, the AGS could either operate only during electric system emergencies or during any extension of the target date for replacement of OTC systems. Alternatively, if electrical generation from the AGS site were to cease operations entirely to comply with the OTC policy, the Los Angeles local electrical reliability area would be prone to energy shortfalls and electricity blackouts which would subsequently force business and commercial users and essential services such as hospitals, emergency services, airports, ports etc. to rely on diesel emergency generation to maintain critical service. Less efficient diesel generation would emit greater amounts of air contaminants and greenhouse gases into the Los Angeles air basin than new natural gas turbine based technology.

The no project alternative would limit the integration of the renewable energy into the electrical grid in satisfaction of California's Renewable Portfolio Standard, displacing older and less-efficient generation. The no project alterative would not provide up to 1,040 MW of operationally flexible, and efficient generating capacity to the Los Angeles Basin Local Reliability Area in general, and specifically to the western Los Angeles

Basin sub-area. The no project alternative will not provide local capacity for reliability needs, serve peak southern California energy demand, and will not provide flexible generation to allow the integration of the ever-increasing contribution of variable renewable energy into the electrical grid.

Further, the no project alternative foregoes the AEC's capital cost for power plant equipment, estimated to be approximately between $0.940 billion and $1.11 billion. The no project alternative would not result in approximately $132 million in local purchases of materials and supplies during construction and approximately $8.3 million per year of local operational expenditures. In addition, the AEC is expected to bring increased property tax revenue to the City of Long Beach.

In summary, the no project alternative would not meet the basic project objectives, would eliminate the proposed project's benefits, could increase emissions of air contaminants and greenhouse gases in Los Angeles basin and would not avoid any significant impacts that would arise from the project since the proposed AEC project does not result in any significant impacts.

6.5 Power Plant Site Alternatives

Because the AEC will be located within the boundaries of an existing power plant property (the AGS) with operating power plant units, a discussion of site alternatives is not required for this SAFC. Public Resources Code Section 25540.6(b) reads, in part:

> (b). . . The commission may also accept an application for a noncogeneration project at an existing industrial site without requiring a discussion of site alternatives if the commission finds that the project has a strong relationship to the existing industrial site and that it is therefore reasonable not to analyze alternative sites for the project.

The AEC has a strong relationship to the existing industrial site. The AEC will use the existing infrastructure and ancillary facilities of an existing power plant, to the extent feasible, on a site zoned for a power plant, at a location that has been used for a power plant for nearly 60 years. One primary objective of the AEC project is to design a project capable of meeting the demand for new generation in the Los Angeles basin local electrical reliability area caused in large part by the closure of the San Onofre Nuclear Generating Station and anticipated retirement of older, natural-gas-fired generation currently using once-through ocean water cooling (OTC) while using the existing brownfield, power plant site and existing infrastructure. For example, the AEC will utilize the existing high-voltage electric transmission interconnection point.

Relocating or duplicating the electrical interconnection and associated transmission system to support an alternative location in this densely populated and highly urbanized area would not be feasible. The transmission system that serves the western Los Angeles Basin was designed, built, and subsequently expanded around the existing power plant locations as the area became further urbanized and more densely populated. The AEC has been designed to fit within the existing electrical system and serve the current and future needs of the urban development which now constrains further expansion, replacement, or relocation of the existing electrical transmission and distribution system. Therefore, in enacting Public Resources Code Section 25540.6, the Legislature determined that it is reasonable not to analyze offsite alternatives for projects, such as the AEC, with such a strong relationship to an existing industrial site.

Public Resources Code Section 25520 states that the applicant is tasked with providing the Commission with all of the information it needs in the Application to certify the facility. Public Resources Code Section 25540.6, which just be harmonized with Section 25520, unambiguously provides that a noncogeneration project at an existing industrial site with a strong relationship to the existing industrial site, the applicant need not provide information to analyze alternative. Accordingly, since the applicant is not tasked with providing information, the Commission's decision need not consider alternatives sites for projects like AEC with a strong relationship to an existing industrial site.

Furthermore, constructing AEC's 1,040 MWs at another existing AES-owned site within the Western LA Basin is not feasible due to pending regulatory changes proposed by the South Coast Air Quality Management

District, which will reduce the major source threshold for $PM_{2.5}$ from 100 tons per year to 70 tons per year as the existing sites have submitted air permit applications with $PM_{2.5}$ emissions that exceed 70 percent of this proposed new major source threshold.

6.6 Alternative Project Design Features

This section addresses alternatives to some of the AEC design features, such as the locations of the natural gas supply pipeline, electrical transmission interconnection, and water supply pipeline.

6.6.1 Alternative Natural Gas Supply Pipeline Routes

The AEC will connect to the existing natural gas pipeline; therefore, there will be no significant impacts associated with the AEC. Thus, no further discussion of alternatives is required.

6.6.2 Electrical Transmission System Alternatives

The AEC will connect to the existing onsite electric switchyard, which connects the existing facilities to the SCE electrical system; therefore, there will be no significant impacts associated with the AEC. Thus, no further discussion of alternatives is required.

6.6.3 Water Supply Alternatives

The AEC will use air-cooled condenser (dry cooling) rather than the ocean water OTC system used for the existing AGS. An air-cooled plant typically uses less than 7 percent of the total water use of a comparable wet-cooled plant. Water demand at the AEC will be limited to makeup water for the new generating units' steam cycle, water for cooling of the air intake into the CTG and water for domestic and sanitary uses onsite. AEC is expected to use a maximum of 130 acre-feet per year (AFY) of water for process water, fire protection, and other uses. The water will be provided by the LBWD, which supplies all of the city's residential, commercial, industrial, irrigation and municipal water needs using a mix of groundwater pumped from the Central Groundwater Basin and purchased surface water that is imported by the Metropolitan Water District of Southern California from the Colorado River or the State Water Project. AEC's annual water use of 130 AFY is approximately 29 percent of the historical use by the existing AGS units of 441 AFY (2013 to 2014).

Potential alternatives to the LBWD water supply sources for the AEC include:

- Continued use of ocean water from the Pacific Ocean;
- Secondary treated wastewater from the Sanitation Districts of Los Angeles County's Joint Water Pollution Control Plant (JWPCP) in the city of Carson, more than 13 miles northwest of the AEC site;
- Tertiary treated wastewater from the Los Coyotes Water Reclamation Plant (LCWRP) approximately 8.2 miles to the north of the AEC site; or
- Tertiary treated (CCR, Title 22) wastewater from the City of Los Angeles Terminal Island Water Reclamation Plant (TIWRP) more than 12 miles to the west of the AEC site at the Port of Long Beach.

Ocean water, as well as secondary treatment or recycled water, would need to be further treated at the power plant site to meet water quality requirements for use within the plant. The California Energy Commission's (CEC) 2003 Integrated Energy Policy Report (IEPR) states, "Consistent with the Board [SWRCB] policy and the Warren-Alquist Act, the Energy Commission will approve the use of fresh water for cooling purposes by power plants which it licenses only where alternative water supply sources and alternative cooling technologies are shown to be 'environmentally undesirable' or 'economically unsound.'" (CEC, 2003). The AEC will efficiently use water in its dry-cooling system, thereby eliminating OTC. Use of water for power plant cooling was not considered further.

Ocean water could be used as makeup water for a saltwater cooling system, or could be desalinated to be used as a water supply. Use of ocean water in the cooling tower system is discussed in Section 6.7.2, Power Plant Cooling Alternatives.

Regional sources of secondary treated wastewater includes the JWPCP. Using secondary treated reclaimed water from the JWPCP would require construction of an approximately 13-mile-long pipeline from the AEC site to the JWPCP site located in the city of Carson. The JWPCP does not currently produce secondary treated wastewater for reuse, but rather discharges its effluent through a series of outfalls into the Pacific Ocean. This is because the JWPCP is designed to accept the effluent from 10 other treatment plants operating at higher elevations that is considered too salty for use as reclaimed water. Use of treated wastewater from the JWPCP would require additional treatment to meet tertiary treatment influent standards, in addition to construction of a pipeline of at least 13 miles in length through a heavily urban area. Use of secondary treated wastewater from the JWPCP would require construction of a treatment facility at the JWPCP site to further treat its wastewater to the standards required for power plant use, as well as storage facilities to ensure sufficient treated water is on hand at all times, and an approximately 13-mile-long pipeline connecting the two facilities. Construction and operation of the tertiary treatment facility and the connecting pipeline would create their own environmental impacts, including those associated with disposal of the waste products created during the treatment process. Therefore, considering the potential environmental impacts, secondary treated wastewater from the JWPCP is not a viable source of makeup water for AEC.

Regional sources of tertiary treated wastewater (treated to Title 22 standards) include the LCWRP and the TIWRP. Using tertiary treated reclaimed water from the LCWRP would require construction of an approximately 8.2-mile-long pipeline, and use of tertiary treated water from the TIWRP would require construction of a pipeline longer than 12 miles. Construction of these pipelines would be through heavily urban areas and would result in their own environmental impacts. As of 2012, the LCWRP had the capacity for approximately 11.6 mgd of tertiary treated water to be made available for sale, more than enough for the 1.3 mgd than the AEC would require (Hall, pers. comm., 2012).

In addition to having sufficient quantities, recycled water must also be “available” for use. The criteria for determining the availability of recycled water include: 1) the source of recycled water is of adequate quality and is available for these uses; 2) the recycled water may be furnished for these uses at a reasonable cost to the user (considering all relevant factors including the present and projected costs and if the cost of supplying the treated recycled water is comparable to, or less than, the cost of supplying potable domestic water); 3) the use is not detrimental to public health; 4) the use will not adversely affect downstream water rights, degrade water quality, or cause injury to plant life, fish and wildlife (California Water Code Section 13550).

Although sufficient quantity of tertiary treated wastewater would be available, the costs of such water call into question whether it is indeed “available” as defined in the California Water Code and the construction of an 8.2-mile pipeline would have greater environmental impacts than use of dry-cooling as proposed by the project.

6.7 Technology Alternatives

The AEC configuration was selected from a wide array of technology alternatives. These include generation technology alternatives, fuel technology alternatives, combustion turbine alternatives, storage alternatives, and nitrogen oxide (NO_x) control alternatives.

6.7.1 Generation Technology Alternatives

Selection of the power generation technology focused on those technologies that can use the natural gas readily available from the existing gas pipeline system, and meet the requirements of SCAQMD’s Rule 1304(a)(2), which limits the generation technology options for the replacement of existing utility steam boilers to either combined-cycle technology or other use of advanced turbine technology, or a renewable energy resource while continuing to meet the project’s objectives. Following is a discussion of the suitability of such technologies for application to the AEC that were rejected for failing to meet the AEC’s project objectives.

6.7.1.1 Conventional Boiler and Steam Turbine

This technology burns fuel in the furnace of a conventional boiler to create steam. The steam is used to drive an STG, and the steam is then condensed and returned to the boiler. This technology can achieve thermal efficiencies up to approximately 36 percent when using natural gas, although efficiencies are somewhat higher when using oil or coal. Several conventional boiler/steam turbine technologies were reviewed but rejected because of regulatory prohibitions, economic infeasibility and public acceptance. Specifically, the technologies rejected were oil, coal, and municipal solid waste generation.

Because of this technology's low efficiency and large space requirement, and because it would not meet the requirements of SCAQMD Rule 1304(a)(2), conventional boiler and steam turbine technology was eliminated from further consideration.

6.7.1.2 Nuclear

California law prohibits new nuclear plants until the scientific and engineering feasibility of disposal of high-level radioactive waste has been demonstrated. To date, the CEC is unable to make the findings of disposal feasibility required by law for this alternative to be viable in California. The technology, therefore, is not feasible.

6.7.1.3 Kalina Combined-cycle

This technology is similar to the conventional combined-cycle, except a mixture of ammonia and water is used in place of pure water in the steam cycle. The Kalina cycle could potentially increase combined-cycle thermal efficiencies by several percentage points. This technology is still in the development phase and has not been commercially demonstrated; therefore, it was eliminated from consideration.

6.7.1.4 Internal Combustion Engines

Internal combustion engine designs are also available for small peaking power plant configurations. These are based on the design for large marine diesel engines, fitted to burn natural gas. Advantages of internal combustion engines are that they use very little water for cooling because they use a closed-loop coolant system with radiators and fans; provide quick-start capability (online at full power in 10 minutes); and are responsive to load-following needs because they are deployed in small units (for example, 10 to 14 engines in one power plant) that can be started up and shut down at will. Disadvantages of this design include higher emissions than comparable combustion turbine technology. Additionally, an internal combustion engine installation is generally deployed at less than 150 MW and do not qualify as replacement generation technology under SCAQMD Rule 1304(a)(2). Because internal combustion engines would not meet the project objective to generate 1,040 MW of electricity and emission offsets are not available as required under New Source Review, this technology was eliminated from consideration.

6.7.2 Power Plant Cooling Alternatives

Wet-cooling technology was evaluated for the AEC as an alternative to the use of an air-cooled condenser system, using either LBWD water, reclaimed water, or ocean water as the water makeup source. With a wet-cooled plant, water is pumped through a condenser, where it is exposed to pipes carrying steam from the steam turbine. The steam condenses to water and is recycled through the HRSG. Heated water cycling through the condenser is then pumped to a cooling tower, where large fans draw air through the heated water droplets, cooling the water, which is cycled back to the condenser, with evaporative losses of approximately 5 percent.

As described in Section 6.6.3, Water Supply Alternatives, wet cooling using potable water is disfavored by SWRCB and CEC policy, though such use can be considered reasonable and beneficial use of water under California law. Wet cooling using recycled water is acceptable under state policy so long as the water quality meets Title 22 standards as approved by the California Department of Health Services, but the choice of this cooling method depends on the availability of an adequate supply of tertiary treated recycled water of sufficient water quality consistent with state law. Such recycled water is not currently available at the AEC site. As discussed above (see Section 6.6.3), while tertiary treated water is available near the AEC site, use of

tertiary recycled water would require construction of a new pipeline that would be at least 8 miles long. Similarly, although secondary treated water is available at the JWPCP facilities and could be used as a possible source of cooling water makeup, use of this water source would require construction of a 13-mile-long pipeline and additional facilities to treat the wastewater to the tertiary standards required for power plant use. The infrastructure required makes these sources economically infeasible and unavailable as defined in Water Code Section 13350[58]. Wet cooling using ocean water in the cooling towers is another possibility, though this method would require taking suction off of an ocean intake structure for makeup supplies, creating project-related environmental impacts associated with once through cooling (entrainment and impingement) Maintenance and operating costs for a cooling tower system using ocean water are also significantly higher than for systems using LBWD or reclaimed water due, in part, to corrosive nature of ocean water, dissolved and suspended solids, biofouling, and other impurities. The use of ocean water as cooling tower makeup water typically imposes a 4 to 8 percent performance penalty through loss of efficiency and a 35 to 50 percent cost penalty in comparison to towers of comparable cooling capability using non-ocean water supplies (Maulbetsch and DiFilippo, 2010).

The major drawback of wet cooling is that it takes large amounts of water to cool a large, combined-cycle power plant: approximately 16 times as much as a dry-cooled design. Therefore, because of the uncertainty in obtaining reliable and cost-effective water supply in sufficient quantities to allow use of wet cooling, and additional environmental impacts the AEC has been designed as a dry-cooled plant using an air-cooled condenser. No other technologies are currently available that are capable of adequately cooling the AEC without these additional costs and impacts.

6.7.3 Fuel Technology Alternatives

Technologies based on fuels other than natural gas were eliminated from consideration because they do not meet the AEC's objective of using natural gas available from the existing gas piping system. Additional factors rendering alternative fuel technologies unsuitable for use at the AEC are as follows:

- No geothermal or hydroelectric resources exist in Los Angeles County.
- Biomass fuels such as wood waste are not locally available in sufficient quantities to make them a practical alternative fuel, emissions associated with combustion of biomass, and space is limited at the AEC site.
- The AEC site does not experience sufficient wind resources to make a wind project feasible at the site. Additionally, wind technologies are not flexible and dispatchable resources because of their variable nature. Also, space is limited at the AEC site and these technologies require large expanses of land, and a wind power installation would not be compatible with surrounding land uses. Because wind resources are insufficient, and only a single 2 MW wind turbine could be installed at the site, wind energy was rejected as a viable energy alternative.
- Utility-scale solar technologies need to be sited in an area with high solar radiation[59] and require very large amounts of land (up to 10 acres per megawatt). Los Angeles County is not a viable location for concentrating solar technologies or utility-scale photovoltaic power plants because it lacks the large and open expanses of land necessary and is not a strong solar energy resource area. These resources are also available only during the daytime and have reduced availability on cloudy days. Approximately 26 MW of photovoltaic panels could be installed at the AGS site considering the specific site orientation

[58] Section 13550(a)(2) states: " The recycled water may be furnished for these uses at a reasonable cost to the user. In determining reasonable cost, the state board shall consider all relevant factors, including, but not limited to, the present and projected costs of supplying, delivering, and treating potable domestic water for these uses and the present and projected costs of supplying and delivering recycled water for these uses, and shall find that the cost of supplying the treated recycled water is comparable to, or less than, the cost of supplying potable domestic water."

[59] Measured in terms of kWh per square meter of land. See the National Renewable Energy Laboratory for additional information about solar energy and maps of solar resource distribution (http://www.nrel.gov/gis/solar.html). The project area solar radiation is rated at approximately 5 to 5.25 kWh per square meter. Utility-scale solar energy plants are not currently being proposed for areas with solar radiation at levels this low.

and setback requirements. The solar resource available at the site is also limited, considering the marine layer and fog, which is common in the area. Only 56,800 megawatt-hours per year of electricity could be generated with photovoltaic panels, as compared to the over 3,744 gigawatt-hours that could be available from the AEC.

The availability of the natural gas resource provided by SoCalGas and the environmental and operational advantages of natural gas technologies make natural gas the logical and environmentally preferable choice for the AEC.

6.7.4 NO_x Control Alternatives

To minimize NO_x emissions from the AEC, the CTGs will be equipped with dry low-NO_x combustors and selective catalytic reduction (SCR) using 19 percent aqueous ammonia as the reducing agent. The following combustion turbine NO_x control alternatives were considered:

- Steam injection (capable of 25 parts per million [ppm] NO_x)
- Water injection (capable of 25 ppm NO_x)
- Dry low-NO_x combustors (capable of 9 to 25 ppm NO_x)

Dry low-NO_x combustors were selected because these allow for lower NO_x emission rate from the combustion turbine over either water or steam (wet) injection. Furthermore, dry low-NO_x combustors result in a slight improvement in thermal efficiency over wet injection NO_x control alternatives, and will reduce AEC's water consumption.

Two post-combustion NO_x control alternatives were considered:

- SCR
- SCONO$_x$

SCR is a proven technology and is commonly used in combustion turbine electrical generating applications. Ammonia is injected into the exhaust gas upstream of a catalyst. The ammonia reacts with NO_x in the presence of the catalyst to form nitrogen and water.

SCONO$_x$ consists of an oxidation catalyst, which oxidizes carbon monoxide to carbon dioxide and nitric oxide to nitrogen dioxide. The nitrogen dioxide is adsorbed onto the catalyst, and the catalyst is periodically regenerated.

While SCONOx has been used on smaller turbines, it has not been "scaled-up" to operate on turbines of the size that will be used for the AEC project. Even assuming that SCONOx could be scaled-up, the level of emission control effectiveness between the SCONO$_x$ and SCR technologies is approximately equivalent. However, the SCONO$_x$ technology does not use ammonia to reduce air emissions. The CEC recently summarized in the U.S. Environmental Protection Agency's opinion (CEC, 2007) "that SCONO$_x$ is no more effective for reducing air quality impacts than selective catalytic reduction…, and it also found SCONO$_x$ to be significantly more expensive and arguably less reliable, particularly for larger facilities." Therefore, SCONO$_x$ was not considered further for use at the AEC.

The following reducing agent alternatives were considered for use with the SCR system:

- Anhydrous ammonia
- Aqueous ammonia
- Urea conversion

Anhydrous ammonia is used in many combustion turbine facilities for NO_x control, but is more hazardous than diluted forms of ammonia. Aqueous ammonia (an ammonia-water solution) is proposed for the AEC because of its safety characteristics.

Urea conversion technology uses solid urea (prill) in a reactor with steam to convert the urea to aqueous ammonia, which is typically stored in a tank for use by the SCR system during upsets in the process and plant

startup activities. Although the urea conversion technology has been employed for power plants for a number of years, it only eliminates the need to truck aqueous ammonia to the site, because onsite ammonia storage is always included in the system design. Furthermore, the urea conversion process has a higher energy demand over an aqueous ammonia system as a result of consuming steam as part of the process. Finally, the urea process has proven to have poor reliability and slow response times, and it produces an inconsistent concentration of ammonia. The AEC combustion turbines are designed to be fast-start and fast-ramp units that require precise control of ammonia concentrations for emissions control. Therefore, urea conversion was considered and rejected.

6.7.5 Energy Storage

Energy storage options currently available include electrochemical energy storage, thermal energy storage, hydrogen production, and mechanical energy storage. Electrochemical storage includes several types of batteries and capacitors that meet specific needs and requirements in certain applications. However, at this time, these devices have not been deployed at a scale that would effectively substitute the 1,040 MW of generating capacity of this project for extended periods of time. Utility scale battery energy storage systems at scales in the 100's of MWs are limited in capacity to 4 to 8 hour duration. Natural gas turbine technology can provide generating capacity constantly.

Thermal energy storage generally is limited to heat energy storage from solar thermal applications for later use, such as steam for power production during evening hours, or for water or building heating purposes, and, therefore, would not meet the AEC objectives. Hydrogen production involves “storing” energy by using inexpensive or surplus energy (that is, off-peak energy from all sources, or surges of wind power during the night) to create hydrogen through hydrolysis, and then use the hydrogen to create energy for other purposes, including on-peak generation, as well as transportation purposes. However, hydrogen production has not yet been demonstrated as a cost-effective alternative to generation services that the AEC would provide.

Compressed air technology also stores energy by using inexpensive or surplus electrical energy to operate compressors that store high-pressure air for later release through an air-powered turbine, while flywheel technology uses off-peak power to accelerate large rotors (flywheels) to very high speeds, and then use the energy stored as angular momentum to spin a generator during on-peak power periods. While promising, compressed air and flywheel technology have not yet been demonstrated to be cost-effective methods for storing energy on a large scale and do not satisfy most of the basic project objectives.

Existing utility-scale energy storage technology in California is pumped-storage hydroelectricity, in which energy is stored by pumping water from a lower reservoir to a higher reservoir when inexpensive or surplus energy is available, and then released through a turbine-generator when additional generating capacity and energy is needed. These projects require two reservoirs at significantly different elevations, plus a pumping/generating station and connecting penstock, and therefore have very specific siting requirements not generally found in the population centers of the greater Los Angeles Basin (CEC, 2011). The recent SCE Local Capacity Requirements Request for Offer[60] process (concluded in November 2014) authorized procurement of four energy storage projects (one thermal and three battery storage) for a total of 260.6 MWs[61]. However, as stated above, energy storage cannot be deployed for extended duration that would effectively substitute the 1,040 MW of generating capacity of the AEC, and cannot meet the project objectives of the AEC.

[60] https://www.sce.com/wps/portal/home/procurement/solicitation/lcr/!ut/p/b1/hc_BCoJAEAbgZ-kBcsY2TI9rbjoimRloewkN2wRzwyR7_AzqWM1t4PuH-UFCDrIt7rUq-lq3RfPapXUIyeOmP59R7JoCeUq2JwKBaWyNYD8C_DIc_-UzkL_IMrLewLR9HlCKhIvIQXI3W-HsHGYv2Bs4PoogjJH8XcKQWILrlHOG-Lnw48kQpGp0ORbOXJBlKPCRvKrxtmS2AtlVp6qrOuOsbz3kwzAYSmvVVMZRX-B6ybGmqVypyeQJ9jg2tw!!/dl4/d5/L2dBISEvZ0FBIS9nQSEh/

[61] One project authorized is an AES Battery Storage Project located at the AGS.

6.7.6 Waste Discharge Alternatives

The AEC will discharge process wastewaters to the LBWD via a new, 1,000-foot-long process/sanitary wastewater pipeline to the first point of interconnection with the existing LBWD sewer system and the potential upgrade of an additional 4,000 feet of existing pipeline downstream from the first point of interconnection. Similar to the existing AGS, stormwater from the AEC will be captured in onsite stormwater retention basins, processed through an oil/water separator as necessary, then discharged through the existing AGS's stormwater outfalls. The Project Owner met with the staff of the California Regional Water Quality Control Board (RWQCB) Santa Ana Region on May 23, 2012, to discuss the discharge of AEC stormwater through the existing AGS's stormwater outfall. At this meeting, the RWQCB staff representative concurred with the approach for the continuation of discharging stormwater from the AEC through the existing outfalls, providing the project obtains a new National Pollutant Discharge Elimination System permit and the discharge meets all applicable water quality standards. The AEC will be designed to meet the current requirements of Los Angeles County for stormwater drainage design and discharge (see Section 5.15, Water Resources).

The alternative discharge method for process wastewater would be to construct a zero liquid discharge (ZLD) system in which concentrators and crystallizers are used to evaporate process wastewater and to remove the residual salts and other contaminants such that little or no water is discharged, and residual salt is trucked as a "salt cake" byproduct to a landfill. The CEC, as stated in the 2003 IEPR, has encouraged power plant developers to incorporate ZLD facilities into their power plant designs as a way of reducing discharges and maintaining the quality of state waters. The 2003 IEPR states:

> Additionally, as a way to reduce the use of fresh water and to avoid discharges in keeping with the Board's policy, the Energy Commission will require zero-liquid discharge technologies unless such technologies are shown to be "environmentally undesirable" or "economically unsound."

The use of a ZLD design was considered for the AEC and was eliminated from consideration for the following reasons:

- It is not necessary to use a ZLD system to control wastewater discharge in a plant using dry cooling because discharge volumes using dry cooling are relatively small, approximately one-sixteenth those of a wet-cooled plant.
- ZLD systems are technologically complex and expensive to construct, operate, and maintain, adding to the project's capital cost and reducing its return on investment, with no or marginal benefit in this case.
- ZLD systems have been found to be relatively unreliable, often resulting in plant outages that affect operating ability, the availability of power, and grid reliability.

To summarize, using ZLD for a dry-cooled plant of this nature would not support the AEC objectives of providing easily dispatchable, reliable, and economically viable power to the California grid. The initial construction, operations, and maintenance costs of a ZLD system, and the associated lost production costs, would be out of proportion to the environmental benefits of eliminating the low volume of wastewater expected to be generated by the AEC. The use of a ZLD system would be economically unfeasible, offer little or no environmental benefit, and would not eliminate the need to construct the wastewater pipeline required for AEC process/sanitary wastewater disposal. Moreover, ZLD would not avoid or minimize any potentially significant effects of AEC, since all discharge related effects are mitigated to level of less than significant by project design and implementation of best practices.

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