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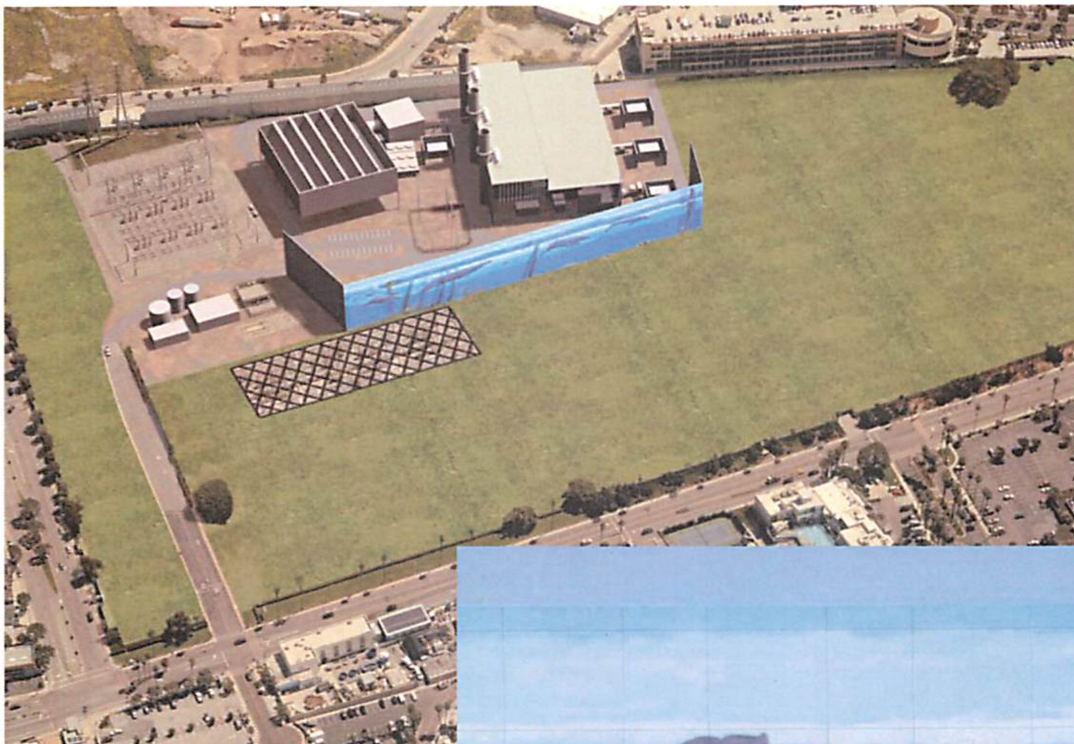
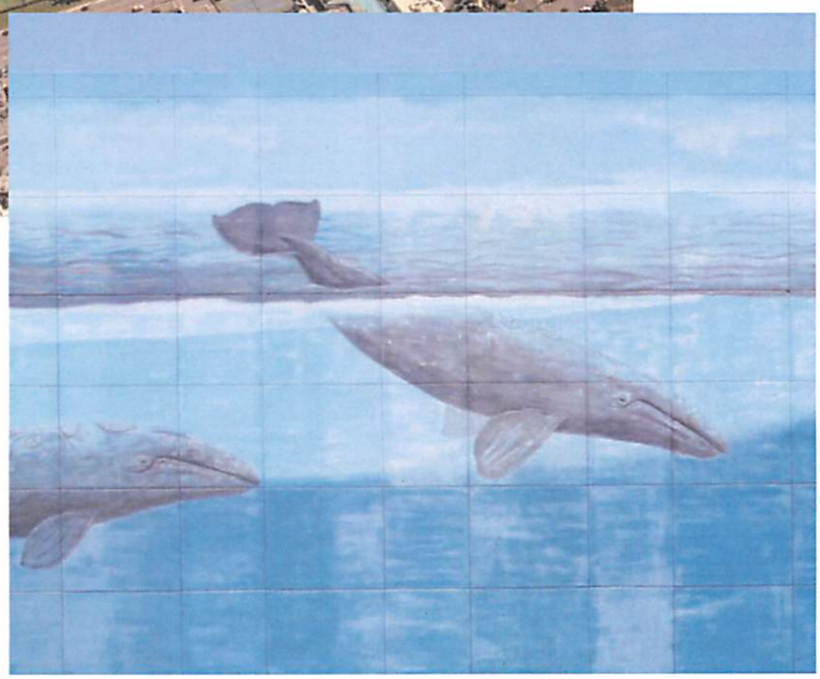
REDONDO BEACH ENERGY PROJECT

Preliminary Staff Assessment





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CALIFORNIA
ENERGY COMMISSION
Edmund G. Brown, Jr, Governor

DOCKET NUMBER 12-AFC-03

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REDONDO BEACH ENERGY PROJECT (12-AFC-03)
PRELIMINARY STAFF ASSESSMENT

EXECUTIVE SUMMARY

Patricia Kelly

INTRODUCTION

This Preliminary Staff Assessment (PSA) contains staff's independent evaluation of the Redondo Beach Energy Project (RBEP). AES, Southland Development, LLC (applicant), submitted an Application for Certification (AFC), (12-AFC-03) to the California Energy Commission (Energy Commission) to construct, own and operate the RBEP. The PSA examines environmental, public health and safety, and engineering aspects of the proposed RBEP, based on the information provided by the applicant, government agencies, interested parties, and other sources available at the time the PSA was prepared. The PSA includes analyses prepared to satisfy the requirements of the California Environmental Quality Act (CEQA).

The Energy Commission is the CEQA lead agency. In addition to CEQA analyses, the PSA must consider whether the project conforms to all applicable local, state, and federal laws, ordinances, regulations, and standards (LORS). The PSA also recommends measures to mitigate significant and potentially significant environmental effects, which take the form of conditions of certification for construction, operation, maintenance, and eventual closure of the project, if approved by the Energy Commission.

This PSA is not the decision document for these proceedings, nor does it contain findings of the Energy Commission related to environmental impacts or the project's compliance with local/state/federal legal requirements. The PSA will serve as pre-cursor to the Final Staff Assessment (FSA), which will act as staff's testimony in evidentiary hearings to be held by the RBEP Committee (composed of Commissioner and Presiding Member Karen Douglas, Commissioner and Associate Member Janea A. Scott, and Hearing Adviser Susan Cochran), who oversee this case. The Committee will hold evidentiary hearings and will consider the recommendations presented by staff, the applicant, tribes, intervenors, governmental agencies, and the public, prior to proposing its recommended decision to the full Commission. Energy Commissioners will make a final decision on RBEP, including findings, after the Committee's publication of the Presiding Member's Proposed Decision (PMPD).

PROPOSED PROJECT LOCATION, DESCRIPTION AND COMPONENTS

The RBEP would replace the existing Redondo Beach Generating Station (RBGS) that would be removed from the approximately 50-acre site owned by the applicant and located at 1100 North Harbor Drive in the city of Redondo Beach, Los Angeles County, California. The site for the proposed project is southeast and adjacent to the North Harbor Drive and Herondo Street intersection and would be located entirely within the approximately 50-acre footprint of the existing RBGS. The RBEP would require 10.5 acres in addition to a 2.2-acre existing switchyard and 17-acres of construction laydown and parking. Refer to the **PROJECT DESCRIPTION** section of this PSA (**Project Description Figure 3**).

As proposed, RBEP would consist of a three-on-one, combustion turbine combined-cycle power block with three Mitsubishi natural gas-fired combustion turbine generators (CTG), three supplemental-fired heat recovery steam generators (HRSG), one steam-turbine generator (STG), an air-cooled condenser, and related ancillary equipment. The RBEP would also include natural gas compressors, water treatment facilities, emergency services, and administration and maintenance buildings. No new offsite linear facilities are proposed as part of this project. **Project Description Figures 1, 2,** and **3,** provided in the **PROJECT DESCRIPTION** section of this PSA show the existing and virtual site appearance for the proposed project. **Project Description Figure 4** provides the general arrangement of equipment for the proposed project, and **Project Description Figure 5** is the project site plan map.

If permitted, the RBEP would require 60-months of construction and demolition that would start in the first quarter of 2016 and continue until the end of 2020. The dismantling and partial removal of existing units 1-4 are the first activities to occur on the project site. The generating equipment used by RBGS, including steam turbines, generators, boilers, and duct work, would be removed. The administration building and western portion of the building that houses units 1-4 would remain intact temporarily to provide screening between the construction site of the new power block and North Harbor Drive. Construction of the new power block would begin in the first quarter of 2017 and continue through the second quarter of 2019 when the RBEP would be ready for commercial operation. In 2019, RBEP operation of the new power block, (utilizing the existing control building), construction of the new control building, and the relocation of the Wyland Whaling Wall are planned. The existing units 5-8 and auxiliary boiler no. 17 would be demolished starting the first quarter of 2019 through the fourth quarter of 2020. During the demolition and removal of units 5-8, the Wyland Whaling Wall would be dismantled and moved to a new location directly in front of the new power block. The remaining RBGS buildings and structures would be demolished and removed by the end of 2020.

During the week of July 21, 2014, the applicant publicly announced the upcoming filing of a notice of intent with the city of Redondo Beach to begin gathering signatures for a ballot initiative that would give Redondo Beach voters the opportunity to vote on a development plan, referred to as the Harbor Village initiative. The plan would allow the RBGS site to be developed for a mixed use project consisting of 600 residential units, 250 hotel rooms, and 85,000 square feet of commercial space. This PSA has not considered the intended ballot initiative.

PROJECT FEATURES AND FACILITIES

Please see **Project Description Figure 1,** which shows the arrangement and layout of the existing RBGS facility. The RBGS currently has four operating steam-generating units (units 5-8) and auxiliary boiler no. 17, and four retired units (units1-4) Three of the eight exhaust stacks were removed between 1985 and 1987.Starting in 1999, AES began to dismantle some of the facility. In 2006, five large fuel tanks on the project site were removed.

Please see **Project Description Figure 4** which shows the general arrangement and layout of the RBEP. Primary access to the RBEP is located at the existing entrance off of North Harbor Drive, just south of the Herondo Street and North Harbor Drive intersection.

The major generating components would be housed in fully or partially enclosed buildings for safety purposes, the attenuation of noise, and to improve the aesthetic features of the project. The steam turbine generator would be fully enclosed in its own building while the CTGs and HRSGs would be housed in a separate, partially enclosed building. The west side of the CTG and HRSG building would be left open to facilitate air flow into the CTG air inlets and for the dissipation of heat from the CTGs and HRSGs.

Please see the **PROJECT DESCRIPTION** section of this PSA for specific discussions on the following project components: CTGs, HRSGs, steam turbine generator, site arrangement and layout, major electrical equipment and systems, and plant cooling systems.

The steam turbine cycle heat rejection system would consist of an air-cooled condenser (ACC), which would eliminate the once-through cooling (OTC) currently used at the existing RBGS, The State Water Resources Control Board (SWRCB) Resolution No. 2010-0020 and adoption of a Policy for the Use of Coastal and Estuarine Waters for Power Plant Cooling (OTC Plan), require all coastal power plants that utilize OTC to meet new performance requirements through a reduction in intake volume and velocity. The proposed project helps achieve the goals of the OTC Plan through dry cooling and reduced discharge. The balance of plant systems would be cooled by a closed-loop fluid cooler system utilizing water. The CTG, STG, gas compressors and other balance-of-plant auxiliary equipment requiring cooling would be integrated into the closed cooling water loop.

Water Supply and Use

The existing RBGS has various ancillary facilities that would support and be reused for RBEP, such as the Southern California (SoCal) Gas natural gas pipeline serving the project site; the existing onsite SCE 230-kV switchyard; the existing connections to the California Water Service Company’s onsite pipeline, and the city of Redondo Beach sanitary sewer system. Other existing infrastructure at the existing RBGS, such as the portions of the fire water distribution system, process water distribution and storage systems, wastewater discharge systems, and access roads, would be used as needed to support RBEP. Please refer to the **SOIL AND WATER RESOURCES** section of this PSA for more details.

As proposed, the project would use potable water provided by the California Water Service Company for process water. Process water would be used for the turbine compressor wash, evaporative cooling, HRSG blowdown and makeup water, emergency fire protection, and sanitary uses. Currently, California Water Service Company supplies the existing RBGS with potable water for process and domestic use via several pipeline interconnections. Only one of these water lines would be required to support the RBEP. The project would use the existing California Water Service Company pipeline (eight-inch diameter main) that enters the north boundary of the site along Herondo Street for potable water supply. The project water use would be approximately 41.7 gallons per minute and approximately 52.5 acre-feet per year (assuming 6,835 hours of operation).

Makeup water for the project would be fed directly from the California Water Service Company through metering equipment into the existing 210,000-gallon service water tank no. 1, and into the new 100,000-gallon service water tank no. 3. Water from the service water tank no. 1 would be used for fire protection and water from the new service tank no. 3 would 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.

Based on the assessment of the proposed RBEP, staff concludes that recycled water produced by the West Basin Municipal Water District and distributed by California Water Service Company is readily available and feasible for use in accordance with California Water Code Section 13550. Staff recommends that it be used for construction and industrial purposes during operations rather than currently proposed potable water. Use of recycled water would result in additional savings of 100 acre feet (AF) during the five-year construction period and about 52 AF annually during project operation. This would bring the total reduction in potable water during project operation to approximately 305 acre-feet per year that would be available for other beneficial uses. Staff understands the applicant may not have fully analyzed this potential supply and how it would affect project design. Therefore the applicant may not concur with staff that use of the recycled water is in compliance with LORS. Please see the **SOIL AND WATER RESOURCES** section of this PSA for specific discussion.

Process wastewater from RBEP would be collected in an onsite retention basin and then discharged to the Pacific Ocean via an existing RBGS permitted outfall. Discharge rates would range between 11 and 71 gpm, with average annual discharge equaling about 5.6 million gallons per year.

Sanitary wastewater generated by the RBEP would be discharged to the existing onsite sewer line connection to the existing city of Redondo Beach sewer. The city sewer system sends sanitary wastewater to the Sanitation Districts of Los Angeles County. The city of Redondo Beach will-serve letter indicates there is sufficient capacity to receive sanitary wastewater for the RBEP.

Electrical Transmission System

RBEP would be connected with the regional electrical grid using the existing, onsite, Southern California Edison (SCE) 230-kilovolt (kV) switchyard located on a parcel owned by SCE within the existing RBGS site. No new transmission lines would be needed for the project. RBEP would connect into the existing SCE switchyard via a new onsite single-circuit interconnection. Please see the **TRANSMISSION SYSTEM ENGINEERING** section of this PSA for specific discussions.

Natural Gas Supply System

Natural gas is delivered to the existing RBGS via an existing 20-inch diameter pipeline by Southern California Gas (SoCalGas) to an existing onsite gas metering station. The natural gas would flow from the existing SoCal Gas metering station to a new gas pressure control station and gas scrubber/filtering equipment. Natural gas would be distributed onsite to the combustion turbine fuel gas compressors and subsequently to the combustion turbines and directly to the duct burners of the HRSGs.

CUMULATIVE EFFECTS

Staff conducted an extensive search of past, present, and reasonably foreseeable “probable” future projects in Los Angeles County, the city of Redondo Beach, and the city of Hermosa Beach. (See the **Executive Summary Figure 1** of this section). Staff reviewed project tracking information and available environmental reports and notices through various resources, including websites of local, regional, and state jurisdictions. Additionally, staff queried various California public agencies to compile a comprehensive list of past, present, and probable future projects that resulted in its list of Cumulative Projects. **Executive Summary Table 1** below presents a master list of the projects considered part of the RBEP cumulative setting.

CEQA Guidelines[1] define cumulative impacts as “two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts.” (Cal. Code Regs., tit. 14 § 15355.) The Guideline continues: (a) “[t]he individual effects may be changes resulting from a single project or a number of separate projects” and (b) “[t]he 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 impacts can result from individually minor but collectively significant projects taking place over a period of time.” (*Ibid*.)

Accordingly, staff in each technical section of this PSA determined which of the projects from the Cumulative Projects list could create impacts specific to their technical area. Using unique sets of criteria specific to each area, staff then evaluated whether the cumulative effect was significant, and if so, whether the project’s contribution to that combined effect would be “cumulatively considerable[2]”. Therefore, this PSA identifies and analyzes the impacts of all aspects and phases of RBEP, including the combined effect the proposed project will have in conjunction with other projects.

[1] Any reference to CEQA Guidelines is Title 14, California Code of Regulations Chapter 3: Guidelines for Implementation of the CEQA.
[2] “Cumulatively considerable” means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects. (Cal. Code Regs., tit. 14, section 15064, subd. (h)(1).)

Executive Summary Table 1 –
Redondo Beach Energy Project Master List of Cumulative Projects

Projects referenced with a POINT					
Label ID	**Status**	**Project Name**	**Project Description**	**Location**	**Distance (Miles)**
1	**Planned/ Present**	Greenstreet Project	20,000- sq. ft. commercial development	901 N. Catalina Ave., Redondo Beach	0.17
2	**Planned/ Present**	Shade Hotel	Hotel with 54 rooms, conference space for up to 60 people, event/wedding space for up to 150 people, a rooftop Skydeck pool area and its own Zinc@Shade lounge featuring breakfast, lunch and dinner.	655 N. Harbor Drive, Redondo Beach	0.20
3	**Foreseeable**	E&B Oil Development Project	Proposed onshore drilling and production site using directional drilling of 30 wells to access the oil and gas reserves in the tidelands (granted by the State of California to the city) and in an onshore area known as the uplands. Both of these areas are located within the Torrance Oil Field beneath the city. Relocate the city maintenance yard to another site and installation of offsite underground pipelines for the transport of the processed crude oil and gas from the project site to purchasers. 30 oil wells, four water injection wells, and supporting production equipment.	555 6th Street, Hermosa Beach	0.56
4	**Foreseeable**	Civic Center/Metlox Development	Demolition and reconstruction of the existing police and fire department facilities to include a two-level (one level below grade), approx. 57,000 sq. ft. combined police and fire dept. public safety facility. The existing public library would be reconstructed by either adding on to the existing 12,100 sq. ft. public library or demolished and reconstructed with a new public library and cultural arts center for an approx. 40,000 sq. ft. structure with roughly 30,000 sq. ft. for library space and 10,000 sq. ft. for a 99-seat cultural arts center. The Metlox project consists of a mixed-use commercial development with subterranean parking, incl. some above-grade surface parking on the proposed 13th Street extension. The total floor area proposed is approx. 90,000 sq. ft. comprising retail, restaurant, a 40-room bed and breakfast lodging component, and office uses.	Site boundaries: 15th St. on north, Valley Dr. on east, Manhattan Beach Blvd. on south, and Highland Ave. and Morningside Dr. on west; Manhattan Beach	2.69
5	**Foreseeable**	Manhattan Village Shopping Center Enhancement Project	A net increase of approx. 123,672 sq. ft. restaurant and retail (approx. 194,644 sq. ft. new area and demolition of approx. 70,972 sq. ft. existing retail, restaurant, and cinema) to be developed within three components. The shopping center would include a total of approx. 696,509 sq. ft. An "equivalency program" is proposed that provides for the exchange between land uses based on P.M. peak traffic equivalency factors. A max. of 133,389 sq. ft. net new area (approx. 204,361 sq. ft. new area and demolition of approx. 70,972 sq. ft. existing retail, restaurant, and cinema) would be developed for a total of up to 706,226 sq. ft.. Approx, 544 parking spaces would be provided in surface parking areas and within multiple parking structures.	3200-3600 North Sepulveda Blvd., Manhattan Beach	3.35

Projects referenced with a POINT					
Label ID	**Status**	**Project Name**	**Project Description**	**Location**	**Distance (Miles)**
6	**Planned/ Present**	Marine Avenue Hotels project	Two hotels- Hyatt Place and Residence Inn by Marriott. Total between both hotels: 310 guest rooms and 35,000 sq. ft. of related meeting space with recreational vehicle parking and storage area. Hyatt Place is 92,672 sq. ft. with 155 rooms, restaurant, lounge, 1,500+ sq. ft. meeting space, outdoor pool and whirlpool, exercise room, business center, sundry shop and guest laundry. Four stories with max building height of approx. 61 feet. Residence Inn by Marriott is 116,146 sq. ft. with 154 rooms, breakfast dining area, 1,325+ sq. ft. meeting space, outdoor pool and whirlpool, exercise room, outdoor sport court, picnic area with grill, business center, sundry shop and guest laundry. Four stories with max building height of approx. 52 ft.	2410 Marine Ave. and 2420 Marine Ave., Redondo Beach	3.36
7	**Foreseeable**	EA-993, The Point	119,275 sq. ft. total. Shopping center (71,343 sq. ft.), restaurant (25,627 sq. ft.), and office (27,338 sq. ft.).	820-850 S. Sepulveda Blvd., El Segundo	3.83
8	**Planned/ Present**	SR-1 (PCH) at SR-107 Hawthorne Blvd. Intersection Project	Improve and reconfigure intersection of PCH and Hawthorne Blvd, with additional left-turn lanes to provide dual left-turn lanes and right-turn pocket along both the eastbound and westbound approaches along PCH.	PCH at SR-107 Hawthorne Blvd Intersection, Torrance	4.01
9	**Current/ Past**	El Segundo	Redevelopment of power plant Units 1 and 2.	301 Vista Del Mar, El Segundo	4.16
10	**Planned/ Present**	EA-1001	Creative office. 2355 Utah: Convert existing 42,548 sq. ft. to all office, add 1687 sq. ft. 2383 Utah: Convert existing 152,506 sq. ft. to all office, add 6,850 sq. ft.	2355 Utah and 2383 Utah Ave., El Segundo	4.23
11	**Foreseeable**	EA-905, Raytheon Campus Specific Plan	Approx. 2.1 million (2,142,457) square-foot Office Park Expansion (office, retail, warehouse, light industrial).	2100 El Segundo Boulevard, El Segundo	4.33
12	**Foreseeable**	El Segundo Energy Center	Natural gas fired air-cooled 440-megawatt electrical generating facility. Project would require demolition of existing power plant and construction of project.	El Segundo Energy Center	4.48
13	**Planned/ Present**	EA-996	2800 sq. ft. convenience store	2161 E. El Segundo Blvd. El Segundo	4.59
14	**Completed/Past**	Chevron Coke Drum Project	Removal of six existing coke drums and installation of six new coke drums with the same capacity and location in the Delayed Coker Unit.	324 West El Segundo Blvd., El Segundo	4.63
15	**Planned**	Cambria Suites, EA-844	152 room hotel – 71,000 sq. ft.	199 Continental Blvd., El Segundo	4.67

Projects referenced with a POINT					
Label ID	Status	Project Name	Project Description	Location	Distance (Miles)
16	**Planned/ Present**	EA-1003	Two new creative office and research and development buildings. 1,297 sq. ft. office, 7,803 sq. ft. research and development, 1,194 sq. ft. warehouse, total 10,294 sq. ft	130 Penn St., El Segundo	4.70
17	**Planned/ Present**	EA-1004	Two new creative office and research and development buildings. 1,297 sq. ft. office, 7,803 sq. ft. research and development, 1,194 sq. ft. warehouse, total 10,294 sq. ft.	134 Penn St., El Segundo	4.71
18	**Planned/ Present**	EA-959	Two office buildings; 30,660 sq. ft.	222 Kansas St. El Segundo	4.71
19	**Planned/ Present**	EA-961	386 sq. ft. office and 3,019 sq. ft. warehouse	130 Arena St., El Segundo	4.73
20	**Planned/ Present**	EA-974	Central Reliability Center, central tool room. New: 101,000 sq. ft.; existing to remain: 13,000 sq. ft.; new total is 114,000 sq. ft.	324 West El Segundo Blvd., El Segundo	4.73
21	**Planned/ Present**	EA-1020	New 5,127 sq. ft. office/research and development building	138 Eucalyptus Dr., El Segundo	4.76
22	**Planned/ Present**	Wiseburn High School	New high school, 180,000 to 240,000 sq. ft.	201 North Douglas, El Segundo	4.76
23	**Foreseeable**	EA-986, Mattel	R&D and office, 14 stories, 300,000 sq. ft., 810-space parking structure-eight-stories	455 Continental Blvd. and 19055 E. Grand Ave., El Segundo	4.86
24	**Planned/ Present**	EA-971	Data Center, addition of 75,435 sq. ft., demo of 11,769 sq. ft. out of existing for new total sq. ft. of 180,422.	444 N Nash St., El Segundo	4.95
25	**Planned/ Present**	EA-784	Data Center, 332,137 sq. ft.	445 N Douglas Street, El Segundo	4.96
26	**Foreseeable**	Scattergood Generating Station	The Los Angeles Dept. of Water and Power would construct four power-generating units at the Scattergood Generating Station. Some structures would be demolished and two full size units on the lower level and two smaller units on the middle level of the plant would be constructed. The project work force will utilize on-site parking.	12700 Vista Del Mar, Los Angeles	5.03
27	**Planned**	EA-958	Nine residential condo units	1700 E Mariposa Ave., El Segundo	5.04
28	**Foreseeable**	EA-1040	28,406 sq. ft. office, 33,475 sq. ft. light industrial, total 61,881 sq. ft.	400 Duley Rd. El Segundo	5.05
29	**Planned**	EA-912	New 3,714 sq. ft. restaurant with drive through; parking and landscaping redesign; outdoor dining	600 - 630 North Sepulveda Blvd., El Segundo	5.07

Projects referenced with a POINT					
Label ID	**Status**	**Project Name**	**Project Description**	**Location**	**Distance (Miles)**
30	**Foreseeable**	EA-1021	625,205 sq. ft. total; 611,545 sq. ft. office, 12,660 sq. ft. retail	710 North Nash St., El Segundo	5.18
31	**Foreseeable**	EA-1038	Four-unit condominium (6,963 sq. ft.), two stories, semi-subterranean parking.	711 Main St. El Segundo	5.33
32	**Planned/ Present**	EA-781	Seven-Unit Residential Condominium, 14,313 sq. ft.	301,303,305 Palm Ave., El Segundo	5.35
33	**Foreseeable**	EA-997, Hotel	Five-story, 190 room hotel, 107,090 sq. ft.	888 North Sepulveda, El Segundo	5.38
34	**Planned/ Present**	EA-981	Office, 194,119 sq. ft.	1700 East Imperial Ave., El Segundo	5.5
35	**Planned/ Present**	EA-1014	Two lot subdivision for two six-unit multi-family residential condos (12 total units)	115 East Walnut Ave., El Segundo	5.57
36	**Planned**	EA-890, El Segundo Unified School District	304 Senior housing/assisted living facility up to 175,000 sq. ft.	540 E. Imperial Ave., El Segundo	5.63
37	**Foreseeable**	West Aircraft Maintenance Area	Replace existing facilities and consolidate maintenance operations; paved area for aircraft parking, maintenance hangars, 300-space employee parking lot, storage, equipment related facilities, and ground run-up enclosure.	LAX, Los Angeles	5.95
		Midfield Satellite Concourse North	Phase 1 of the MSC Program (northern portion of the MSC facility and associated improvements). Project components include a concourse for up to 11 gates and assoc. facilities; improvements to taxiways and taxi lanes; ramp tower or FAA supplemental airport traffic control tower; and utilities to support the North MSC facility.		
		LAX Runway 7L/25R Runway Safety Area (RSA) Project & Associated Improvements	1) Extend Runway 7L/25R pavement; grade and compact the RSA; construct blast pad west of Runway 7L extension; several taxiways modifications as necessary; relocate existing localizer antenna and shelter to the west; replace existing Approach Lighting System (ALS) towers with in-pavement lights; and modify existing runway and taxiway lighting and markings in newly constructed pavements; 2) Reconstruct pavement of eastern portions of Runway 7L/25R and Taxiway B including connecting taxiways and installation of in-pavement approach lights; 3) Reconstruct pavement of aircraft parking apron west of Air Freight Building No. 8, including new markings.		

Projects referenced with a POINT					
Label ID	Status	Project Name	Project Description	Location	Distance (Miles)
		LAX Runway 6L-24R Safety Area & Associated Improvements	Improve Runway 6L-24R and service roads to bring runway into compliance with applicable FAA design criteria.		
38	**Planned/ Present**	Central Utility Plant Replacement	Replace the 50-year old existing Central Utility Plant (CUP) with a more modern and energy efficient facility	LAX, Los Angeles	5.96
		New Tom Bradley International Terminal	18 new gates to the west side of the Tom Bradley International Terminal, great hall for dining and retail shopping.		
		Elevator, Escalator, and Moving Walkway Modernization	Refurbish 212 outdated systems with new, modern units throughout the airport; new escalators, elevators, and walkways		
		Terminal 5 Renovation	Completed new in-line baggage screening system, expansion of passenger screening check points, and international passenger processing facilities. Renovate baggage claim areas, ticketing/check-in lobby, boarding gates, and other parts of passenger security screening area. Replace 13 bridges.		
		LAX Curbside Appeal Project	Phase 1: New Canopy, landscaping, light band, and new light poles in front of Tom Bradley International Terminal; Phase 2: Light band, light poles, and canopies in front of the terminal in the LAX Central Terminal Area		
		Runway Status Lights	With completion of the installation of the prototype runway status lights in 2009, the full system will be installed. Runway status lights use a series of red lights embedded in the pavement to warn pilots if it is unsafe to cross or enter a runway, or to take off.		
39	**Foreseeable**	Phillips 66 Los Angeles Refinery Carson Plant - Crude Oil Storage Capacity Project	Installation of one new 615,000-barrel crude oil storage tank with geodesic dome, increasing the annual permit throughput limit of two existing 320,000 bbl crude oil storage tanks. Project includes two new feed/transfer pumps and one 14,000 bbl water draw surge tank with associated pumps and pipelines. Also included is the installation of Tie-ins to the Pier "T" crude oil delivery pipeline from Berth 121 and construction of one new electrical power substation.	1520 East Sepulveda Boulevard, Carson	9.26

Projects referenced with a LINE					
Label ID	**Status**	**Project Name**	**Project Description**	**Location**	**Distance (Miles)**
1	**Planned/ Present**	Hawthorne Blvd. Rehabilitation			4.47
2	**Planned/ Present**	Western Ave. and Rolling Hills Rd. Water Main Replacement Project			4.89
3	**Planned/ Present**	Crenshaw/LA X Transit Corridor Project			5.39

PROPOSED RBEP PROJECT OBJECTIVES

The project objectives of the RBEP are based on applicant's stated project objectives, but modified to allow the reasonable range of alternatives required by CEQA, (see **ALTERNATIVES** section of this PSA):

- Provide the most efficient, reliable, and predictable generating capacity available by using combined-cycle, natural gas-fired combustion-turbine technology to replace the OTC generation, support the local capacity requirements of southern California's western Los Angeles Basin Local reliability Area and be consistent with SCAQMD Rule 1304(a)(2).
- Develop a 496[3] MW project that provides efficient operational flexibility with rapid-start and steep ramping capability to allow for the efficient integration of renewable energy source into the California electrical grid.
- Serve southern California energy demand with efficient and competitively priced electrical generation.
- Develop on a brownfield site of sufficient size and reuse existing onsite electrical, water, wastewater, natural gas infrastructure, and land to minimize terrestrial resource impacts.
- Site the project to serve the western Los Angeles Basin load center without constructing new transmission facilities.
- Assist in developing increased local generation projects, thus reducing dependence on imported power and associated transmission infrastructure.
- Ensure potential environmental impacts can be avoided, eliminated, or mitigated to less-than-significant.

CEQA PROCESS

The Energy Commission's siting regulations require Energy Commission staff to independently review the AFC and assess whether the list of environmental impacts contained is complete and additional or more effective mitigation measures are necessary, feasible, and available (Cal. Code Regs., tit. 20, §§ 1742 and 1742.5(a)).

In addition, Energy Commission staff must assess the completeness and adequacy of the measures proposed by the applicant to ensure compliance with health and safety standards and the reliability of power plant operations (Cal. Code Regs., tit. 20, § 1743(b)). Energy Commission staff is required to develop a compliance plan (coordinated with other agencies) to ensure that applicable laws, ordinances, regulations, and standards are met (Cal. Code Regs., title 20, § 1744(b)).

Energy Commission staff conducts its environmental analysis in accordance with the requirements of the California Environmental Quality Act (CEQA). No additional environmental impact report (EIR) is required because the Energy Commission's site certification program has been certified by the California Resources Agency as meeting all requirements of a certified regulatory program (Pub. Resources Code, § 21080.5 and Cal. Code Regs., tit. 14, § 15251 (j)).

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[3] The applicant described the RBEP as having a net generating capacity of 496 MW, and gross generating capacity of 511 MW, referenced to site ambient average temperature (SAAT) conditions of 63.3º Fahrenheit dry bulb and 58.5º Fahrenheit wet bulb temperature. At an ambient dry bulb temperature of 33º Fahrenheit RBEP is capable of a net generating capacity of 530.4 MW, and gross generating capacity of 546.4 MW

Energy Commission staff's impact assessment in the Final Staff Assessment (FSA), which will be published following the published PSA comment period and PSA public workshops, including the recommended conditions of certification, is an important piece of evidence that the Committee assigned to oversee this proposed RBEP project will consider in reaching a decision on the proposed project and making its recommendation to the full Energy Commission. But the staff assessment is only part of the evidence the Committee will consider.

At the public evidentiary hearing, all parties will be afforded an opportunity to present evidence to the Committee and to rebut the testimony of other parties, thereby creating a hearing record on which a final decision on the project can be based. The evidentiary hearing before the assigned Committee also allows for parties to argue their positions on disputed matters, if any, and it provides a forum for the Committee to receive comments from the public, other governmental agencies, and tribes.

PUBLIC NOTICES, OUTREACH, AND PUBLIC AND AGENCY INVOLVEMENT

PUBLIC COORDINATION

The Energy Commission collaborated with local, state, and federal agencies in order to facilitate public participation in the regulatory review of RBEP. To reach this goal, Energy Commission staff conducted two workshops during the 180-day discovery phase to informally discuss several technical issues related to the proposed project. These workshops, along with the applicant's responses to staff's data requests, formed the basis of discovery for the proceeding, and provided the public, parties to the proceeding (including applicant and interveners), as well as local, state, and federal agencies, and tribes the opportunity to ask questions about, and provide input on, the proposed project. The Energy Commission issued notices for these workshops prior to each meeting and posted them accordingly.

INITIAL PUBLIC NOTICE AND OUTREACH

On October 1, 2013, the Energy Commission held a publicly noticed Informational Hearing at the Redondo Beach Performing Arts Center in the city of Redondo Beach, Los Angeles County, California. The hearing followed a site visit and brief presentation at the proposed project site.

ENERGY COMMISSION STAFF'S PUBLIC OUTREACH

Energy Commission staff typically provides formal notices to property owners within 1,000 feet of the proposed site and within 500 feet of a linear facility (such as transmission lines, gas lines, and water lines). The RBEP notice of receipt was mailed on December 5, 2012 to all parties that requested placement on the mailing list during the pre-filing period, to property owners located within 1,000 feet and residents located within ½-mile (2,640 feet) of the proposed project site, and 500 feet of project linear features (e.g. pipeline). Each notice contained a link to the Commission-maintained RBEP project website (http://www.energy.ca.gov/sitingcases/redondo_beach/index.html).

LIBRARIES

On December 12, 2012, Energy Commission staff also sent paper copies of the Redondo Beach Energy Project AFC to the following libraries:

Redondo Beach Public Library
303 North Pacific Coast Highway
Redondo Beach, Ca 90277

Katy Geissert Civic Center Library
3301 Torrance Blvd.
Torrance, CA 90503

Manhattan Beach Library
1320 Highland Avenue
Manhattan Beach, CA 90266

Hermosa Beach Public Library
550 Pier Avenue
Hermosa Beach, CA 90254

Rancho Palos Verdes Estates
Public Library
29089 Palos Verdes Drive East
Rancho Palos Verdes, CA 90275

In addition to the local libraries listed above, copies of the AFC were also made available at the Energy Commission's Library in Sacramento, the California State Library in Sacramento, as well as libraries in Eureka, Fresno, Los Angeles, San Diego, and San Francisco.

ENERGY COMMISSION'S PUBLIC ADVISER'S OFFICE

The Energy Commission's outreach program is also facilitated by the Public Adviser's Office (PAO). The PAO requested public service announcements at a variety of organizations, distributed notices informing the public of the Commission's receipt of the RBEP AFC, and invited the public to attend the Public Site Visit (of the proposed RBEP site) and Informational Hearing on October 1, 2012, in the city of Redondo Beach(Los Angeles County), California.

PUBLIC WORKSHOPS

Staff from the Energy Commission organized and conducted two data request, data response workshops in the city of Redondo Beach, California. These two publicly-noticed workshops were conducted on December 5, 2013 and February 10, 2014. During each of these workshops, time for public participation was allocated, and public comments were taken. These workshops provided a public forum for the applicant, interveners, staff and cooperating agencies to interact regarding project issues. Specific information related to the RBEP proceeding, including details on public participation, as well as ongoing Committee notices and announcements, can be reviewed at the following Energy Commission website: http://www.energy.ca.gov/sitingcases/redondo_beach/index.html.

AGENCY COORDINATION

On December 6, 2012, the Energy Commission staff sent a notice of receipt and a copy of the RBEP Application for Certification to all local, state, and federal agencies that may have an interest in the proposed project. This notice sought cooperation and or comments from critical regulatory agencies that administer LORS which may be applicable to the proposed project.

These agencies included the U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service (USFWS), U.S. Army Corps of Engineers, Los Angeles Regional Water Quality Control Board, California Department of Fish and Wildlife (CDFW), California Coastal Commission (CCC), Native American Heritage Commission, the South Coast Air Quality Management District (SCAQMD), the cities of Redondo Beach and Hermosa Beach, among others. Staff has worked collaboratively with the SCAQMD, CCC, and the CDFW to evaluate the proposed RBEP project, and provided input that informed staff's analyses contained within this Preliminary Staff Assessment.

CONSULTATION WITH LOCAL NATIVE AMERICAN COMMUNITIES

Consultation With Local Native American Communities

Energy Commission staff sent letters to Native Americans interested in consulting on development projects in the project area on October 14, 2013, inviting them to comment on the proposed RBEP and offering to hold face-to-face consultation meetings, if any tribal entities so requested. Follow-up phone calls were made by staff on December 17, 2013. Subsequent email and phone conversations also occurred on December 18, 2013. Staff received one comment from tribal entities that the project area is known to contain cultural resources and tribal monitors should be required during project ground-disturbing activities. Consultation is an on-going process, and staff will remain in contact with the groups interested in the RBEP throughout the licensing process. These accounts are provided in the **CULTURAL RESOURCES** section of this PSA.

PUBLIC COMMENTS

Public agencies and members of the public who have not filed or become official intervenors in the RBEP proceeding have nonetheless submitted comments related to this project (see **Executive Summary Table 2** – Public Comments). While this PSA has 21 separate technical sections, for purposes of **Executive Summary Table 2**, topics were divided into nine categories, plus a column for those who "requested to participate" in the RBEP proceeding (i.e., they were added to the Energy Commission's "listserve" for the RBEP proceeding, which automatically alerts email recipients anytime new information is posted on the Energy Commission's RBEP webpage). Comments will be addressed within the respective technical sections of the forthcoming Final Staff Assessment (FSA). The FSA will also contain staff responses to PSA comments filed by the applicant, intervenors, and public agencies, as well as members of the public.

Executive Summary Table 2 – Public Comments

RBEP Comments	
Air Quality	127
Alternatives	24
Biological Resources	1
Compliance Conditions	2
Cultural Resources	4
Facility Design	3
Geology and Paleontology	2
Hazardous Materials Management	3
Land Use	64
Noise and Vibration	24
Power Plant Efficiency	1
Power Plant Reliability	10
Public Health	101
Socioeconomics	7
Soil and Water Resources	1
Traffic and Transportation	2
Transmission Line Safety and Nuisance	1
Transmission System Engineering	0
Visual Resources	53
Waste Management	2
Worker Safety and Fire Protection	0

ENVIRONMENTAL JUSTICE

Environmental justice communities are commonly identified as those where residents are predominantly minorities or low-income; where residents have been excluded from the environmental policy setting or decision-making process; where they are subject to a disproportionate impact from one or more environmental hazards; and where residents experience disparate implementation of environmental regulations, requirements, practices, and activities in their communities. Environmental justice efforts attempt to address the inequities of environmental protection in these communities. An environmental justice analysis is composed of three parts:

1. identification of areas potentially affected by various emissions or impacts from a proposed project;
2. a determination of whether there is a significant population of minority persons or persons below the poverty level living in an area potentially affected by the proposed project; and
3. a determination of whether there may be a significant adverse impact on a population of minority persons or persons below the poverty level caused by the proposed project alone, or in combination with other existing and/or planned projects in the area.

CALIFORNIA ENVIRONMENTAL JUSTICE LORS

California law defines environmental justice as “the fair treatment of people of all races, cultures and income with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies” (Gov. Code §65040.12; Pub. Resources Code, §72000). All departments, boards, commissions, conservancies and special programs of the Resources Agency must consider environmental justice in their decision-making process if their actions have an impact on the environment, environmental laws, or policies. Such actions that require environmental justice consideration may include:

- adopting regulations;
- enforcing environmental laws or regulations;
- making discretionary decisions or taking actions that affect the environment;
- providing funding for activities affecting the environment; and
- interacting with the public on environmental issues.

DEMOGRAPHIC SCREENING ANALYSIS

As part of its CEQA analysis for the Application for Certification for the RBEP, Energy Commission staff used demographic screening to determine whether a low-income and/or minority population exists within the potentially affected area of the RBEP site[4]. The demographic screening is based on information contained in two documents: Environmental Justice: Guidance Under the National Environmental Policy Act (Council on Environmental Quality, December, 1997) and Guidance for Incorporating Environmental Justice Concerns in EPA’s Compliance Analyses (U.S. Environmental Protection Agency, April, 1998), which provides staff with information on outreach and public involvement. The Council on Environmental Quality's (CEQ) document defines minority individuals as members of the following groups: American Indian or Alaskan Native; Asian or Pacific Islander; Black, not of Hispanic origin; or Hispanic.

[4] Demographic screening data is presented in the **SOCIOECONOMICS** section.

Based on the 2010 Census data presented in the **SOCIOECONOMICS** section of this PSA (**Socioeconomics Figure 1)**, the total population within the six-mile buffer of the project site was 534,348 persons with a minority population of 317,829 persons, or 59.48 percent of the total population. As the minority population is greater than 50 percent, this population constitutes an environmental justice population as defined by Environmental Justice: Guidance Under the National Environmental Policy Act, and would trigger further scrutiny for purposes of an environmental justice analysis. Staff's demographic screening also identifies the presence of below-poverty-level populations within a six-mile buffer of the proposed project site. The CEQ and US EPA guidance documents identify a fifty percent threshold to determine whether minority populations are considered environmental justice populations but do not provide a discrete threshold for below-poverty-level populations. Using census data, staff compares the below-poverty-level populations in the six-mile buffer to other appropriate geographies. Approximately 14 percent or 90,402 of the population within the six-mile buffer live below the federal poverty level, which is comparable to the below-poverty-level population in the comparison geographies. Staff from the 13 affected technical areas[5] have considered the potential for disproportionate impacts on the environmental justice population. Staff's analysis shows that the proposed RBEP would have no disproportionate impacts on the environmental justice population.

PRELIMINARY STAFF ASSESSMENT CONCLUSIONS

Based upon the information provided, discovery achieved, and analyses completed to date, staff concluded that the project complies with all laws, ordinances, regulations and standards (LORS), with key exceptions described below, and with the implementation of its recommended mitigation measures (described in each technical section's conditions of certification), potential environmental impacts of the RBEP will be mitigated to levels of less than significant. Therefore, in all of the 20 technical sections of this PSA, the proposed project complies with the requirements of CEQA. As indicated in **Executive Summary Table 3**, below, the technical disciplines where issues exist (with LORS compliance and/or significant impacts determinations and mitigation include):

[5] The 13 technical staff/areas are Air Quality, Alternatives, Hazardous Materials Management, Land Use, Noise and Vibration, Public Health, Socioeconomics, Soil and Water Resources, Traffic and Transportation, Transmission Line Safety and Nuisance, Visual Resources, Cultural Resources, and Waste Management.

LORS COMPLIANCE / ENVIRONMENTAL IMPACTS AND MITIGATION

Executive Summary Table 3 -- Summary of RBEP PSA Technical Analyses

Technical Area	Complies with local, state and federal LORS	Impacts mitigated to level below significant
Air Quality / GHG	Yes	Indeterminate
Alternatives	Not Applicable	Not Applicable
Biological Resources	Yes	Yes
Efficiency	Not Applicable	Not Applicable
Facility Design	Yes	Yes
Geology and Paleontology	Yes	Yes
Hazardous Materials Management	Yes	Yes
Land Use	Yes	Yes
Noise and Vibration	Yes	Yes
Public Health	Yes	Yes
Reliability	Not Applicable	Not Applicable
Socioeconomics	Yes	Yes
Soil and Water	Indeterminate	Indeterminate
Traffic and Transportation	Yes	Yes
Transmission Line Safety and Nuisance	Yes	Yes
Transmission System Engineering	Yes	Yes
Visual Resources	Indeterminate	Indeterminate
Waste Management	Yes	Yes
Worker Safety and Fire Protection	Yes	Yes

Air Quality

Staff concludes that with the adoption of conditions of certification **AQ-SC1** through **AQ-SC5** provided in the **AIR QUALITY** section of this PSA, the proposed RBEP would not result in significant air quality related impacts during project operation, and that the RBEP would comply with all applicable federal, state, and South Coast Air Quality Management District (SCAQMD or District) air quality laws, ordinances, regulations and standards (LORS). However, staff is waiting for the applicant's submittal of the cumulative impact assessment to determine whether the combined air quality impacts of the proposed project, neighboring electric generating facilities, and other reasonably foreseeable local projects would result in significant air quality related impacts during operation.

Staff concludes that mitigation would be provided in the form of Regional Clean Air Incentives Market (RECLAIM) Trading Credits (RTCs) and emission reduction credits (ERCs) as required by district rules that would fully mitigate emissions of all nonattainment pollutants and their precursor pollutants at a minimum ratio of one-to-one and to reduce the potential operational impacts of the proposed project to less than significant.

Conditions of Certification **AQ-SC1** through **AQ-SC5** implement control measures for short-term construction impacts. Compliance with these conditions is expected to greatly reduce or eliminate the potential for significant adverse air quality impacts during construction of the RBEP, except for PM10 and PM2.5. The PM10 and PM2.5 impacts during the approximately five-year project construction period could cause exceedances of health-based ambient air quality standards and thus these impacts could be significant. The duration and complexity of construction that contributes to these potential impacts are due in part to the desire of the project owner and the California Independent System Operator to have continuity of generation and/or reactive power available from the site. There would be concurrent operation, demolition, commissioning, and construction, activities throughout the construction period. Therefore, staff includes **AQ-SC6**, which requires the applicant to provide a Construction Particulate Matter Mitigation Plan (CPMMP) that details the steps to be taken and the reporting requirements necessary to provide emission reductions during the construction period that would mitigate impacts to a level of insignificance.

Alternatives

Staff has evaluated alternatives that have either been eliminated from further consideration or evaluated against the RBEP to determine if they meet the basic objectives of the RBEP and would reduce or avoid any adverse environmental impacts of the RBEP. As discussed in the **ALTERNATIVES** section of this PSA, only the No-Project Alternative was determined to warrant detailed analysis and comparison to the RBEP at this time. Alternatives eliminated from detailed analysis are also discussed in the **ALTERNATIVES** section, including the reason for their elimination.

Under the No-Project Alternative, the existing Redondo Beach Generating Station (RBGS) would not employ a means to comply with the State Water Resources Control Board's once-through-cooling (OTC) policy to reduce the impacts of using seawater. Therefore, on December 31, 2020, the RBGS would cease all operations. The No-Project Alternative consists only of RBGS shutdown and the site remaining un-operational in its existing state at that time. **Alternatives Table 2** in the **Alternatives** section provides a summary comparison of the RBEP environmental impacts and those of the No-Project Alternative. Based upon staff's analysis, the No-Project Alternatives' impacts would be similar to, less than, and in some instances greater than those of the RBEP. The reductions in impacts stem from the elimination of RBEP construction and cessation of RBGS operations. However, staff analysis found the No-Project Alternative would increase the following impacts when compared to the RBEP: land use conflict with applicable land use policies; visual resources impacts that substantially degrade the existing visual character or quality of the site and its surroundings; and potential waste management impacts on human health and the environment related to past or present soil or water contamination. Furthermore, the No-Project Alternative does not meet RBEP objectives of providing efficient, reliable, and flexible generation. While the No-Project Alternative would avoid construction impacts of the RBEP, staff acknowledges that at some point beyond the known extent of the No-Project Alternative, similar construction-related impacts would likely occur from demolition and/or construction of future facilities.

Noise and Vibration

Staff concluded that if the proposed RBEP is built and operated in conformance with the proposed conditions of certification, the project would comply with all applicable noise and vibration LORS. Staff concludes that the project would produce no significant adverse noise impacts under CEQA guidelines on people within the project area, including the minority populations, directly, indirectly, or cumulatively.

Staff recommends and includes in the **NOISE AND VIBRATION** section of this PSA conditions of certification addressing worker and employee protection. Conditions of Certification **NOISE-3**, Employee Noise Control, and **NOISE-5**, Occupational Noise Survey, require measurement and verification that noise performance criteria are met at the proposed project's noise-sensitive residential receptors. Condition of Certification **NOISE-4**, Operational Noise Restrictions**,** requires restrictions on construction activities. Conditions of Certification **NOISE- 6**, Construction Noise Restrictions, **NOISE-7**, Steam Blow Restrictions**,** and **NOISE-8**, Pile Drive Management**,** provide detail specifications pertaining to construction activities. Also, Condition of Certification **NOISE-9,** Concrete Pour Noise Control, requires verification that nighttime concrete pouring activities remain within the required noise limits. Finally, Conditions of Certification **NOISE-1,** Public Notification Process**,** and **NOISE-2,** Noise Complaint Process**,** describe the process of complaint investigation and resolution.

Regarding the staff's retention of responsibility to monitor the enforcement of these conditions of certification, staff recognizes its obligation to work under the authority of the Energy Commission's compliance project manager (CPM) to monitor and review the reporting of plant performance during construction and the full term of operation, including facility closure.

Soil and Water

Based on the assessment of the proposed RBEP, staff concludes that the project would not have any significant impacts to soil and water resources. As recycled water produced by the West Basin Municipal Water District (WBMWD) and distributed by California Water Service Company (Cal-Water) is readily available, staff recommends that it be used for construction and industrial purposes during operations rather than currently proposed potable water. Use of recycled water would result in additional savings of 100 acre feet (AF) of potable water during the five-year construction period and about 52 AF annually during project operation would bring the total reduction in potable water during project operation to about 305 acre feet per year (AFY).

The proposed site has a long industrial history and would require minimal additional soil disturbance for the new facilities and as such would result in minimal losses to soil resources. Though some small losses in topsoil are expected during construction and operation from wind and water erosion, onsite management of stormwater runoff and sediment erosion, as proposed by staff in the **SOIL AND WATER RESOURCES** section of this PSA, Conditions of Certification **SOIL&WATER-1** and **SOIL&WATER-3** would ensure soil loss is kept to a minimum. Condition of Certification **SOIL&WATER-1** would require the proposed project to comply with the Clean Water Act and obtain discharge permits for construction through the State Water Resources Control Board and the city of Redondo Beach wet weather erosion control requirements. This condition would ensure that the impacts to waters of the United States from construction would be less than significant. Condition of Certification **SOIL&WATER-2** would require the proposed project to comply with Permit Order No. R4-2009-0068, NPDES NO. CAG674001, if hydrostatic testing waters are discharged to waters of the United States. This condition would ensure that the impacts to waters of the US from hydrostatic testing would be less than significant. Groundwater at the site is relatively shallow and potentially contaminated by petroleum by-products. Trench and foundation excavations would likely encounter shallow groundwater and dewatering would be required for stabilization. If dewatering is required for any construction activities, staff recommends the applicant comply with Condition of Certification **SOIL&WATER-3**, which would require the applicant to apply for coverage under a Regional Water Quality Control Board permit that would allow for the discharge of petroleum-contaminated groundwater from dewatering activities. Staff proposes Condition of Certification **SOIL&WATER-4,** which would require the proposed project to comply with the Clean Water Act and obtain discharge permits for operation through the State Water Resources Control Board. This condition would ensure that the impacts to waters of the United States from construction would be less than significant. Staff proposes Condition of Certification **SOIL&WATER-5**, which would require the proposed project to comply with the city of Redondo Beach code, Title 5 Chapter 4 article 5 – Wastewater System, Schedule of Fees and Charges. This condition would ensure that connections to the city's sewer system are completed appropriately and that annual fees are paid to the city. Staff proposes Condition of Certification **SOIL&WATER-7**, which would require the applicant to install water meters on site for accurate reporting of water use. Staff reviewed the Federal Emergency Management Agency (FEMA) Redondo Beach (06037C1907F) Flood Insurance Rate Map (FIRM). The proposed project is not located within the 100-year flood zone as defined by FEMA. The site is located in Zone X, which is a zone of moderate flood potential (usually the area between 100-year and 500-year floods' boundaries).

Projected sea-level rise has the potential to reduce the effectiveness of local flood control measures by increasing the 100-year flood stage. The local protection from inundation is projected to be reduced up to 30 centimeters (1.0 foot) by 2030 and 61 centimeters (2.0 feet) by 2050 (relative to 2000 levels) (CEC, 2009; NAS, 2012). The site geotechnical report (Ninyo & Moore, 2011) acknowledges potential future sea-level rise.

Storm surge is usually defined by increased ocean water levels that occur during storms. Much like precipitation events and rainfall runoff events, storm surge events can be assigned recurrence intervals, e.g., 10-year, 100-year, etc. Storms may result in ocean water level increases that create increased threats of local flooding for shoreline property.

Coastal ecosystems, development, and public access are most at risk from short term storm events, including the confluence of large waves, storm surges, and high astronomical tides during a strong El Niño climatic event (OPC 2013).

Over the next few decades, episodes of heightened sea level associated with large winter storms and anomalous short period climate patterns will be of greater concern to infrastructure and development in coastal areas than the relatively slow increases that are projected in association with global sea-level rise alone (OPC 2013).

Tebaldi et al. (2012) modeled the impacts of global sea level rise from climate change on storm surges and reported on the history and expected trends of storms at the Los Angeles Harbor (Gauge 9410660). The 100-year return level storms in this area result in about one meter (three feet) of local sea-level rise. Projections for local sea-level rise do not indicate that local sea-level rise has any relative influence on the magnitude of the 100-year storm surge. Therefore the 100-year storm surge in 2050 is expected to be the same as current conditions, about one meter, or three feet.

Storm surge is taken into account when FEMA conducts coastal zone flood analyses. The Base Flood Elevations (BFEs) are the sum of storm surge, wave run-up, and tidal effects. The site is not currently classified as being within the 100-year floodplain. Based on estimates stated above, the site classification could change by the year 2050. The site is vulnerable to flooding from extreme weather events and its protection may decrease in the future. However, even with high-end estimates of storm surge by 2050 (relative to 2000) (Tebaldi et al. 2012), the site would still be at least 3.0 feet above the current (2012) 100-year floodplain (FEMA, 2012). This vertical separation should be sufficient to protect the project from flooding impacts.

The proposed site is within the zone identified by California Emergency Management Agency (CEMA) as a tsunami inundation zone and would be located adjacent to an enclosed bay or harbor that could be subject to seiches caused by tsunamis. While the offshore area of Los Angeles County area contains many faults and fault scarps capable of producing tsunamis, seismically induced sea waves are uncommon or rare. Therefore, inundation by tsunami or seiche, while possible, is unlikely and project implementation would not increase the potential for inundation. Furthermore, the site is above the expected inundation elevation and as such tsunami events are not expected to damage the facility or result in potentially significant impacts to the environment. A more detailed discussion of hazards posed by tsunami and seiche is included in the **GEOLOGY AND PALEONTOLOGY** section of this PSA.

Refer to the **SOIL AND WATER RESOURCES** section of this PSA for a complete analysis pertaining to flooding, storm surge and wave run-up and Tsunami and seiche analysis.

Staff concludes that implementation of Conditions of Certification **SOIL&WATER-1** through **7** for the proposed RBEP would satisfy the applicable requirements of all local LORS.

Visual Resources

Impacts on visual resources were assessed based on the magnitude of the anticipated incremental changes to the visual environment, considering the appropriate baseline conditions (i.e., existing conditions), and the estimated effects of those changes on sensitive viewer groups.

Because of the five-year schedule for the proposed demolition of RBGS structures and construction of the RBEP, staff concludes that demolition, construction, and commissioning activities would substantially degrade the existing visual character and quality of the site and its surroundings. Staff proposes Condition of Certification **VIS-1,** requiring preparation and implementation of a Demolition, Construction, and Commissioning Screening Plan to reduce this impact to less than significant.

Lighting of the project site and structures during demolition, construction, commissioning, and operation, would create new sources of substantial light or glare that would adversely affect day and nighttime views in the area. Staff proposes Conditions of Certification **VIS-2** and **VIS-3** to reduce the effects of light and glare on visual resources, including preparation and implementation of a Lighting Management Plan. Condition of Certification **VIS-4** is proposed to require preparation and implementation of a Surface Treatment Plan to reduce the effects of daytime glare from project structure surfaces to less than significant.

Section 30251 of the California Coastal Act requires that the scenic and visual qualities of coastal areas be considered and protected as a resource of public importance. Permitted development must be sited and designed to restore and enhance visual quality in visually degraded areas where feasible. However, with the exception of relocating the Wyland Whaling Wall to screen the west side of the RBEP power block, staff determined the applicant has not yet adequately proposed any specific, detailed, or enforceable measures to restore and enhance visual quality at the project site. Its proposed Landscape Concept Plan does not adequately address the proposed project's impacts to visual resources located north, east, and south of the site (see KOPs 5, 8, and 9).

The proposed siting of the RBEP structures in the northeast portion of the project site without adequate screening presents acute visual impacts due to their close proximity to differing adjacent uses; their scale, mass, and industrial aesthetic is visually incompatible with said uses, resulting in a continued degradation of the visual character and quality of the coastal environment. To reduce the visual impacts of the proposed power plant to less than significant, staff proposes to work with the project owner to prepare and present a site screening and landscape concept plan that would effectively screen the major facilities and structures of the RBEP from public view, create a gradual visual transition between the project site and its adjacent uses, and ensure greater visual compatibility between the project site and its surrounding coastal environment. The site screening and landscape concept plan would be reviewed by staff and the public, and a condition of certification requiring a final site screening and landscape plan to be prepared and implemented based on an acceptable concept plan will be proposed in the FSA.

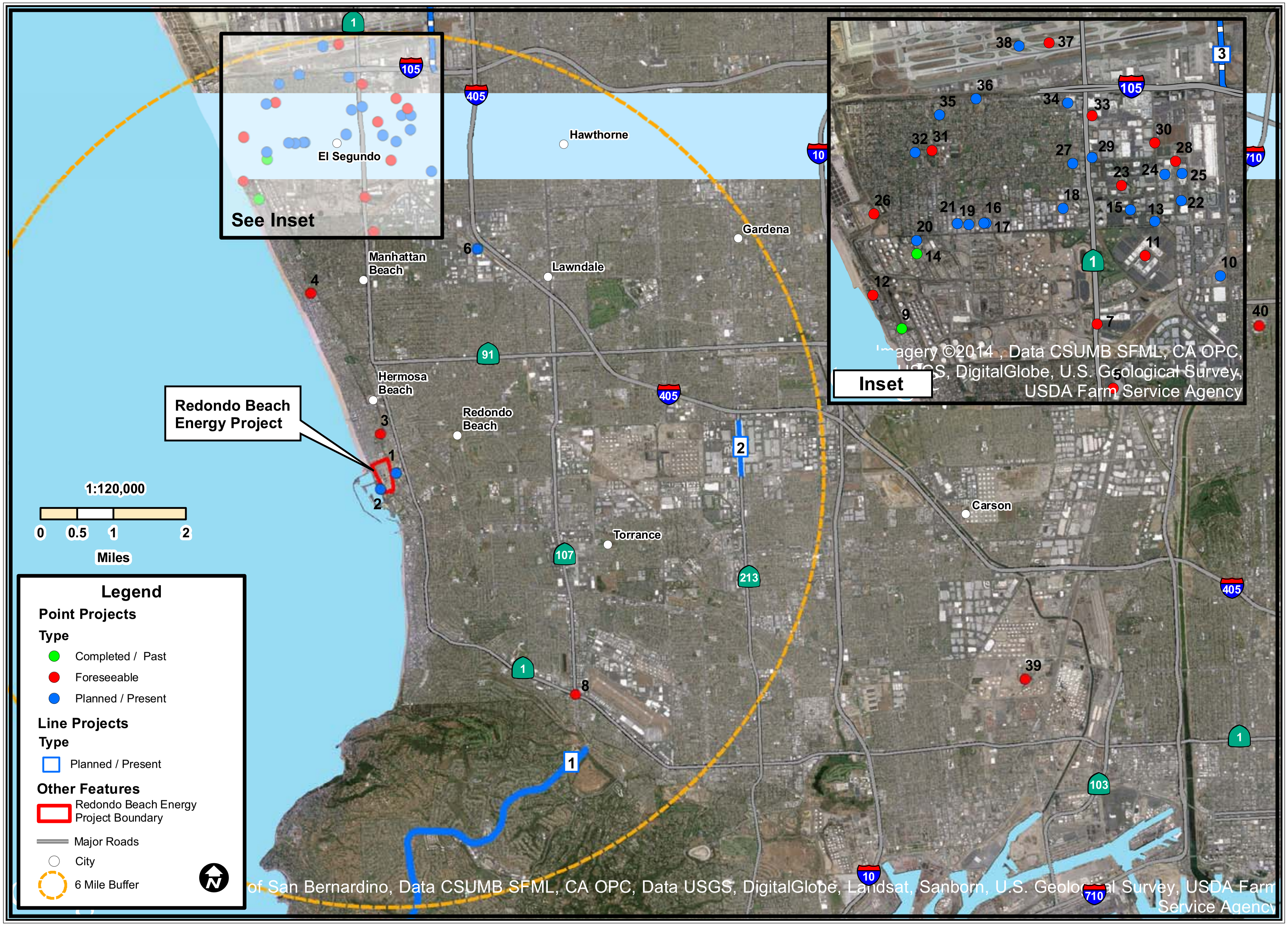
Staff concludes that implementation of Conditions of Certification **VIS-1** through **VIS-4** for the proposed RBEP would satisfy the applicable requirements of all local LORS.

SUMMARY

This Preliminary Staff Assessment is a document of the Energy Commission staff that has been developed and written with input from other governmental agencies, including the city of Redondo Beach, U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers, Los Angeles Regional Water Quality Control Board, California Department of Fish and Wildlife, California Coastal Commission, Native American Heritage Commission, and the South Coast Air Quality Management District among others. In summary, this PSA finds the RBEP is in conformance with all LORS with the exception of Air Quality, Soil and Water, and Visual Resources, and where project impacts were identified, suggested mitigation will offset direct, indirect, and cumulative impacts to a level of less than significant.

EXECUTIVE SUMMARY - FIGURE 1

Redondo Beach Energy Project - Cumulative Projects



CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE:Google Aerial Imagery

INTRODUCTION

Patricia Kelly

PURPOSE OF THIS REPORT

The Preliminary Staff Assessment (PSA) is the California Energy Commission (Energy Commission) staff independent analysis of the proposed Redondo Beach Energy Project (RBEP). This PSA is a staff document. It is not a Committee document, nor a draft decision. The PSA describes the following:

- the proposed project;
- the existing environment;
- staff's analysis of whether the facilities can be constructed and operated safely and reliably in accordance with applicable laws, ordinances, regulations, and standards (LORS);
- the environmental consequences of the project including potential public health and safety impacts;
- the potential impacts of the project in conjunction with other existing and known planned developments;
- mitigation measures proposed by the applicant, interested agencies, interveners, local organizations, and staff, which may lessen or eliminate potential impacts;
- staff's proposed conditions of certification (conditions) under which the project should be constructed and operated, if it is certified; and
- project alternatives.

Information for the analysis contained in this PSA comes from the following:

- the Application for Certification (AFC);
- responses to data requests;
- supplementary information from the local, state, federal agencies, interested organizations, and individuals;
- existing documents and publications;
- independent research; and
- comments made at public workshops or submitted in writing.

Using the information from above, the PSA presents preliminary conclusions about possible environmental impacts and conformity with LORS, as well as proposed conditions that apply to the design, construction, operation, and closure of the facility. The analyses for most technical sections include discussions of proposed conditions. The conditions contain staff's recommended measures to mitigate the project's environmental impacts and to ensure conformance with LORS. Each proposed condition is followed by a proposed means of verification to ensure the conditions are implemented.

The Energy Commission analysis was prepared in accordance with Public Resources Code section 25500 et seq. and Title 20, California Code of Regulations section 1701 et seq., and the California Environmental Quality Act (CEQA) (Pub. Resources Code § 21000 et seq.).

ORGANIZATION OF THE PSA

The PSA starts with an Executive Summary, this Introduction, and a Project Description. The report then discusses 21 environmental and engineering technical sections, which include air quality, public health and safety, noise, traffic and transportation and potential project alternatives. Finally, the report will conclude with a discussion of facility closure, project demolition, construction, and operation compliance monitoring plans, and a list of staff that assisted in preparing this report.

Each section of the environmental and engineering assessment includes:

- applicable laws, ordinances, regulations and standards (LORS);
- the regional and site-specific setting;
- project specific and cumulative impacts;
- mitigation measures;
- closure requirements;
- conclusions and recommendations;
- conditions for both construction and operation, if applicable.

ENERGY COMMISSION SITING PROCESS

The Energy Commission has the exclusive authority to certify the construction, modification, and operation of thermal electric power plants 50 megawatts (MW) or larger. The Energy Commission certification is in lieu of any permit required by state, regional, or local agencies, and federal agencies to the extent permitted by federal law (Pub. Resources Code, § 25500). The Energy Commission must review thermal power plant applications for certification (AFC) to assess potential environmental impacts including potential impacts to public health and safety, potential measures to mitigate those impacts, and compliance with applicable governmental laws or standards (Pub. Resources Code, § 25519 and § 25523(d)).

The Energy Commission's siting regulations require staff to independently review the AFC, assess whether all of the potential environmental impacts have been properly identified, and whether additional mitigation or other more effective mitigation measures are necessary, feasible, and available (Cal. Code Regs., tit. 20, § 1742 and § 1742.5(a)). In addition, staff must assess the completeness and adequacy of the measures proposed by the applicant to ensure compliance with health and safety standards, and the reliability of power plant operations (Cal. Code Regs., tit. 20, § 1743(b)). Staff is required to develop a compliance plan (coordinated with other agencies) to ensure that applicable laws, ordinances, regulations, and standards are met (Cal. Code Regs., tit. 20, § 1744(b)).

Staff conducts its environmental analysis in accordance with the requirements of CEQA. No additional Environmental Impact Report (EIR) is required because the Energy Commission's site certification program has been certified by the Secretary of the California Natural Resources Agency as meeting all requirements of a certified regulatory program (Pub. Resources Code, § 21080.5 and Cal. Code Regs., tit. 14, § 15251 (j). The Energy Commission is the CEQA lead agency.

Staff prepares a PSA that presents for the applicant, interveners, organizations, agencies, other interested parties, and members of the public the staff's analysis, conclusions, and recommendations. Where it is appropriate, the PSA incorporates comments received from agencies, the public, and parties to the siting case and comments made at the workshops.

Staff will provide a public comment period that follows the publication of the PSA. The comment period is also used to resolve issues between the parties and to narrow the scope of adjudicated issues in preparation for evidentiary hearings to be held later in the process. During this time, Energy Commission staff will conduct one or more workshops to discuss its conclusions, proposed mitigation, and proposed verification measures. Based on the workshop dialogue and any written comments received, staff may refine its analysis, correct any errors, and finalize conditions of certification to reflect any changes agreed to between the parties. These revisions and changes will be presented in a Final Staff Assessment (FSA) that will be published and made available to the public and all interested parties.

The FSA is only one piece of evidence that will be considered by the Committee (two Energy Commission Commissioners who have been assigned to this project) in reaching a decision on whether or not to recommend that the full Energy Commission approve the proposed project. At the public evidentiary hearings that follow the FSA, all parties will be afforded an opportunity to present evidence and to rebut the testimony of other parties, thereby creating a hearing record on which a decision on the project can be based. The hearing before the Committee also allows all parties to argue their positions on disputed matters, if any, and it provides a forum for the Committee to receive comments from the public and other governmental agencies.

Following the hearings, the Committee's recommendation to the full Energy Commission on whether or not to approve the proposed project will be contained in a document entitled the Presiding Member's Proposed Decision (PMPD). Following publication, the PMPD is circulated in order to receive written public comments. At the conclusion of the comment period, the Committee may prepare a revised PMPD. At the close of the comment period for the revised PMPD, the PMPD is submitted to the full Energy Commission for a decision.

AGENCY COORDINATION

As noted above, the Energy Commission certification is in lieu of any permit required by state, regional, or local agencies and federal agencies to the extent permitted by federal law (Pub. Resources Code, § 25500). However, staff typically seeks comments from, and works closely with, other regulatory agencies that administer LORS that are applicable to proposed projects. The agencies associated with the RBEP include the

U.S. Environmental Protection Agency, U.S. Fish and Wildlife Service, U.S. Army Corps of Engineers, California Coastal Commission, State Water Resources Control Board/Regional Water Quality Control Board, California Department of Fish and Wildlife, Caltrans, the California Air Resources Board, the South Coast Air Quality Management District, the city of Redondo Beach, the city of Hermosa Beach, and the Redondo Beach Fire Department.

OUTREACH

The Energy Commission's outreach program is primarily facilitated by the Public Advisor's Office (PAO). This is an ongoing process that provides a consistent level of public outreach, regardless of outreach efforts conducted by the applicant or other parties.

LIBRARIES

On December 10, 2012, staff sent the RBEP AFC to libraries in Redondo Beach, Hermosa Beach, Torrance, Manhattan Beach, Rancho Palos Verdes, Sacramento, Eureka, San Francisco, Fresno, Los Angeles, and San Diego.

INITIAL OUTREACH EFFORTS

The PAO reviewed related information available from the Applicant and others and then conducted its own, extensive outreach efforts to identify certain local officials, as well as interested entities, within a six-mile radius around the proposed site for the RBEP. These entities include, but were not limited to, schools and community facilities; as well as business, environmental, governmental, and ethnic organizations. By means of e-mail the PAO notified these entities of the Informational Hearing and Site Visit for the project, held on October 1, 2014, at the Redondo Beach Performing Arts Center.

The PAO also identified and similarly notified local officials with jurisdiction in the project area. Notices directed the public to the website for more information. In addition, the PAO placed a notice in the Redondo Beach Daily Breeze newspaper announcing the Informational Hearing and Site Visit.

Energy Commission regulations require staff to notice, at a minimum, property owners within 1,000 feet of a project and 500 feet of a linear facility (such as transmission lines, gas lines, and water lines). However, for this project residences located within ½ mile (2,640 feet) were provided a notice of receipt for the RBEP and instructed to sign up on the e-mail list serve or request future notices to be sent in the mail. Staff's ongoing public and agency coordination activities for this project are discussed under the Public and Agency Coordination heading in the **EXECUTIVE SUMMARY** section of the PSA.

ENVIRONMENTAL JUSTICE

Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," focuses federal attention on the environment and human health conditions of minority communities and calls on federal agencies to achieve environmental justice as part of their mission. The order requires the U.S. Environmental Protection Agency (U.S. EPA) and all other federal agencies (as well as state agencies receiving federal funds) to develop strategies to address this issue. The agencies are required to identify and address any disproportionately high and adverse human health or environmental effects of their programs, policies, and activities on minority and/or low-income populations.

For all siting cases, staff conducts an environmental justice screening analysis in accordance with the *Final Guidance for Incorporating Environmental Justice Concerns in EPA's NEPA (National Environmental Policy Act) Compliance Analysis,* dated April 1998. The purpose of the screening analysis is to determine whether a minority or low-income population exists within the potentially affected area of the proposed site.

California Statute section 65040.12(c) of the Government Code defines *environmental justice* to mean "fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies." Staff's specific activities, with respect to environmental justice for RBEP, are discussed in the **EXECUTIVE SUMMARY**.

PROJECT DESCRIPTION

Patricia Kelly

INTRODUCTION

On November 20, 2012, AES Southland Development, LLC, submitted an Application for Certification (12-AFC-03) to the California Energy Commission (Energy Commission) to construct, own, and operate the Redondo Beach Energy Project (RBEP). The RBEP would replace the existing Redondo Beach Generating Station (RBGS) that would be decommissioned and removed from the site located at 1100 North Harbor Drive in the city of Redondo Beach, Los Angeles County, California. The site for the proposed project is southeast of and adjacent to the North Harbor Drive and Herondo Street intersection and would utilize 10.5 acres in addition to a 2.2-acre existing switchyard located entirely within the approximately 50-acre footprint of the existing RBGS. During the early 1900s, the first power plant was built on the project site by the Pacific Light and Power Corporation. The project site is relatively flat with an approximate elevation of 17 feet above mean sea level and has been graded in a manner to allow site drainage to flow into an onsite stormwater system. The project site borders residential areas to the north, a storage facility and office buildings to the east, mixed use residential and commercial areas to the south, and the King Harbor Marina and Pacific Ocean to the west.

The RBEP would consist of one three-on-one, combustion turbine combined-cycle power block with three Mitsubishi natural gas-fired combustion turbine generators (CTG), three supplemental-fired heat recovery steam generators (HRSG), one steam-turbine generator (STG), an air-cooled condenser, and related ancillary equipment. The RBEP would also include natural gas compressors, water treatment facilities, emergency services, and administration and maintenance buildings. No new offsite linear facilities are proposed as part of this project. The Wyland Whaling Wall would be dismantled and moved to a new location directly in front of the proposed power block. **Project Description Figures 1, 2,** and **3,** show the existing and virtual site appearance for the proposed project. **Project Description Figure 4** provides the general arrangement of equipment for the proposed project and **Project Description Figure 5** is the project site plan map.

STATE JURISDICTION

The Energy Commission has exclusive permitting jurisdiction for the siting of thermal power plants of 50 MW or more and related facilities in California. The Energy Commission also has responsibility for ensuring compliance with the California Environmental Quality Act (CEQA) through the administration of its certified regulatory program and is the lead agency under CEQA.

PROJECT FACILITY FEATURES, DESIGN AND OPERATION

Project Description Figure 1 shows the arrangement and layout of the existing RBGS facility. The RBGS currently has four operating steam generating units (units 5-8) and auxiliary boiler no. 17, and four retired units (units1-4) Three of the eight exhaust stacks were removed between 1985 and 1987.Starting in 1999, AES began to dismantle some of the facility. In 2006, five large fuel tanks on the project site were removed.

Project Description Figure 4 shows the general arrangement and layout of the RBEP. Primary access to the RBEP is located at the existing entrance off of North Harbor Drive, just south of the intersection of Herondo Street and North Harbor Drive.

MAJOR GENERATING FACILITY COMPONENTS

The major generating components would be housed in fully or partially enclosed buildings for safety purposes, the attenuation of noise, and to improve the aesthetic features of the project. The steam turbine generator would be fully enclosed in its own building while the CTGs and HRSGs would be housed in a separate, partially enclosed building. The west side of the CTG and HRSG building would be left open to facilitate air flow into the CTG air inlets and for the dissipation of heat from the CTG and HRSG.

Combustion Turbine Generators

Thermal energy would be produced in the Mitsubishi Power Systems Americas (MPSA*)* 501DA CTGs through the combustion of natural gas, which would be converted into mechanical energy required to drive the combustion turbine compressors and the remaining mechanical energy is then converted into electrical energy by the generators. Each CTG system would generate approximately 119MW (gross) of electricity, and include supporting systems and associated auxiliary equipment.

The combustion turbine would drive a totally enclosed water-to-air cooled (TEWAC) synchronous generator. Using a TEWAC, the closed cooling fluid cooler would reject the generator's heat load.

Heat Recovery Steam Generators

The HRSG would transfer heat from the exhaust gases of the CTGs to the feed water to produce high-pressure steam. The HRSGs would be single-pressure, natural circulation units equipped with, duct firing inlet and outlet ductwork, insulation, lagging, and separate exhaust stacks.

High pressure steam will be delivered to the high-pressure inlet section of the steam turbine. The high-pressure steam is expanded as it passes through the STG and exits as low-pressure steam. The low-pressure steam enters the air-cooled condenser, which removes heat from the low-pressure steam (causing the steam to condense to water) and releases the heat to the ambient air. The condensed water, or condensate, will be returned to the HRSG feed water system for reuse.

The HRSGs are equipped with two emission control systems located in the HRSG evaporator region. The first system is an oxidation catalyst to control carbon dioxide (CO) and volatile organic compound (VOC) emissions. The second is a selective catalytic reduction (SCR) emission control system that uses 19 percent aqueous ammonia in the presence of a catalyst to reduce the NO_x concentration in the exhaust gases. Ammonia is injected into the exhaust gas steam through a grid of nozzles located upstream of the SCR catalyst module. The subsequent chemical reaction will reduce almost all of the nitrogen and water. Both catalysts begin removing their respective emissions at approximately 400°F.

Steam turbine System

The steam turbine system would consist of a condensing steam turbine, gland steam system, lubricating oil system, hydraulic system, and steam admission/induction valves. The steam turbine would be an MPSA single-casing, single-flow, impulse axial exhaust condensing turbine for outdoor installation. The steam turbine would produce 151 MW with steam from all three HRSGs. The steam turbine can operate with one, two or three of the CTGS operating.

The steam turbine will drive a TEWAC synchronous generator. The closed-loop cooling system design accounts for the TEWAC's heat load and will reject the generator's heat through the cooling fluid cooler. Steam from the HRSG high-pressure super heaters will enter the steam turbine through the inlet steam system. The steam will expand through the turbine blades, driving the generator. On exiting the turbine, the steam will flow into the air-cooled condenser. A bypass valve, vent, and noise attenuator will be installed on the main steam line to release steam to the atmosphere in the event of a system upset condition.

SITE ARRANGEMENT AND LAYOUT

The main project features would consist of an approximately 50-acre power plant site, which would require onsite laydown and construction parking. Approximately 17 acres of construction laydown would be required. Construction workers would park at the project laydown area within the approximately 50-acre project site. There would be no impact to existing public parking capacity.

The power plant, transmission lines, SCE switchyard, onsite water pipeline, city of Redondo Beach sanitary sewer system and natural gas connection are located within the city of Redondo Beach in which the city's General Plan permits development of public utilities[1].

MAJOR ELECTRICAL EQUIPMENT AND SYSTEMS

The bulk of the electric power produced by RBEP would be transmitted to the electrical grid through the 230-kV generation tie line connecting the project to the existing onsite Southern California Edison (SCE) 230-kV switchyard. A small amount of electric power would be used onsite to power gas compressors, pumps and fans, control systems, and

[1] The city of Redondo Beach approved Urgency Ordinance No. 3120-14 on January 14, 2014 which imposed a moratorium until November 2015 on the approval of any conditional use permit, coastal development permit or any other discretionary city permit or approval for the construction, expansion, replacement, modification or alteration of any facilities for the on-site generation of electricity on any property located within the coastal zone, as designated by the California Coastal Act, within the city of Redondo Beach.

general facility direct current (DC) voltage as backup power for control systems and other critical uses.

Plant Cooling Systems

The steam turbine cycle heat rejection system would consist of an air-cooled condenser, which would eliminate the need for once through cooling (OTC) which is the method currently used at the existing RBGS. The heat rejection system would receive exhaust steam from the low-pressure section of the steam turbine and condense it to water for reuse.

Balance of plant systems would be cooled by a closed-loop fluid cooler system utilizing water. The CTG, STG, gas compressors and other balance-of-plant auxiliary equipment requiring cooling would be integrated into the closed cooling water loop.

Natural Gas Supply Pipeline

Natural gas is delivered to the existing RBGS via an existing 20-inch diameter pipeline by Southern California Gas (SoCalGas) to an existing onsite gas metering station. The natural gas would flow from the existing SoCalGas metering station to a new gas pressure control station and gas scrubber/filtering equipment. Natural gas would be distributed onsite to the combustion turbine fuel gas compressors and subsequently the combustion turbines and directly to the duct burners.

Water Supply and Use

The existing RBGS has various ancillary facilities that would support and be reused for RBEP, such as the SoCal Gas natural gas pipeline serving the project site; the existing onsite SCE 230-kV switchyard; the existing connections to the California Water Service Company's onsite pipeline, and the city of Redondo Beach sanitary sewer system. Other existing infrastructure at the existing RBGS, such as the portions of the fire water distribution system, and process water distribution and storage systems, wastewater discharge systems, and access roads, would be used as needed to support RBEP. Please refer to the **SOIL AND WATER RESOURCES** section of this PSA for more details.

The project would use potable water provided by the California Water Service Company for process water. Process water would be used for the turbine compressor wash, evaporative cooling, HRSG blowdown and makeup water, emergency fire protection, and sanitary uses. Currently, California Water Service Company supplies the existing RBGS with potable water for process and domestic use via several pipeline interconnections. Only one of these water lines would be required to support the RBEP. The project would use the existing California Water Service Company pipeline (eight-inch diameter main) that enters the north boundary of the site along Herondo Street for potable water supply. The project water use would be approximately 41.7 gallons per minute and approximately 52.5 acre-feet per year (assuming 6,835 hours of operation).

Makeup water for the project would be fed directly from the California Water Service Company through metering equipment into the existing 210,000-gallon service water tank number 1, and into the new 100,000-gallon service water tank no. 3. Water from the service water tank no. 1 would be used for fire protection and water from the new service tank no. 3 would 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.

Process wastewater from RBEP would be collected in an onsite retention basin and then discharged to the Pacific Ocean via an existing permitted outfall. Discharge to the outfall would be approximately 11.2-gallons per minute and 14.1 acre-feet per year (assuming 6,835 hours of operation per year) with a maximum daily discharge rate of 71.3-gallons per minute.

Sanitary wastewater generated by the RBEP would be discharged to the existing onsite sewer line connection to the existing city of Redondo Beach sewer. The city sewer system sends sanitary wastewater to the Sanitation Districts of Los Angeles County. The city of Redondo Beach will-serve letter indicates there is sufficient capacity to receive sanitary wastewater for the RBEP.

Storm Drainage System

Stormwater would be collected in a new onsite retention basin and then discharged to the Pacific Ocean via the existing permitted outfall for the RBGS. The majority of the existing onsite storm drains would remain in place. New inlets and storm drains would be installed in the eastern portion of the project site to convey rainwater to the new retention pond for the RBEP. Stormwater that falls within the process equipment containment areas would be collected and discharged to the process drain system that consists of oil/water separation sumps and one retention basin. Stormwater that falls within the plant in pavement areas and outside the process equipment containment areas would be routed to the new retention basin. The oil-free stormwater from the process areas and from the pavement areas collected in the retention basin would be discharged to the Pacific Ocean. The residual oil-containing sludge would be collected by a vacuum truck and disposed of as hazardous waste.

FIRE PROTECTION

The existing RBGS fire protection system would be modified for RBEP. The primary source of fire protection water would be a connection to the existing potable water distribution system. A new onsite fire water loop and hydrants would be constructed; however, no new offsite linears would be needed for fire protection. The second source of fire protection water would be an existing 210,000- gallon onsite fire/service water storage tank, which would be modified to provide two hours of protection for an onsite worst-case single fire. Please refer to the **WORKER SAFETY AND FIRE PROTECTION** and **SOCIOECONOMICS** sections of this PSA for more specifics related to fire response and emergency services for the RBEP demolition, construction and operation.

HAZARDOUS MATERIALS

There would be a variety of hazardous materials used and stored during demolition, construction and operation of the project. The storage, handling and use of all chemicals would be conducted in accordance with applicable laws, ordinances, regulations and standards (LORS). Hazardous materials that would be used during demolition and construction include gasoline, diesel fuel, oil, lubricants, solvents and paints. All hazardous materials used during demolition, construction and operation would be stored on site in storage tanks, vessels and containers specifically designed for the characteristics of the materials to be stored; when appropriate, the storage facilities would include the secondary containment in case of tank/vessel failure. The **HAZARDOUS MATERIALS MANAGEMENT** section of this PSA provides additional data on the hazardous materials that would be used during demolition, construction and operation, including quantities, associated hazards and permissible exposure limits, storage methods, and special handling precautions.

EMISSIONS CONTROL AND MONITORING

Air emissions from the combustion of natural gas in the CTGs and duct burners in the HRSGs would be controlled by using appropriate air emissions control devices. To ensure that the system perform correctly, continuous emission monitoring would include stack exhaust flow rate, temperature, oxygen, NO_x and carbon monoxide as well as the natural gas heat input, generator output and ammonia injection rate into the pollution control system as required by the South Coast Air Quality Management District (SCAQMD). The **AIR QUALITY** section of this PSA discusses in detail the anticipated emissions resulting from project demolition, construction and operation, the types of equipment proposed to limit emissions, as well as mitigation measures that would ensure emissions are at levels consistent with required LORS.

WASTE MANAGEMENT

Waste Management is the process whereby all wastes produced at the project site are properly collected, treated (if necessary), and disposed. Wastes include process and sanitary wastewater, nonhazardous waste, and hazardous waste, both liquid and solid. The RBEP waste would include oily rags, broken and rusted metal and machine parts, defective or broken electrical materials, empty containers, and other solid wastes, including the typical municipal refuse generated by workers. The **WASTE MANAGEMENT** section of this PSA details the types of waste generated by the project and the process by which both hazardous and nonhazardous wastes from the RBEP demolition, construction and operation would be appropriately stored, transferred and disposed. The **WASTE MANAGEMENT** section of this PSA details the types of waste generated by the project and the process by which both hazardous and nonhazardous wastes from the RBEP demolition, construction and operation would be appropriately stored, transferred and disposed.

PROJECT CONSTRUCTION AND DEMOLITION PHASE

Construction and demolition activities at the project site are anticipated to last 60 months. The demolition, laydown, and construction parking for RBEP would be available within the existing RBGS fence line. Of the approximately 50-acre project site, approximately 17-acres would be used for demolition, laydown, and construction parking. All construction equipment and supplies would be trucked directly to the project site laydown area. **Project Description Figure 3** shows the virtual site appearance for the proposed aboveground facilities, laydown area and parking for the proposed Redondo Beach Energy Project.

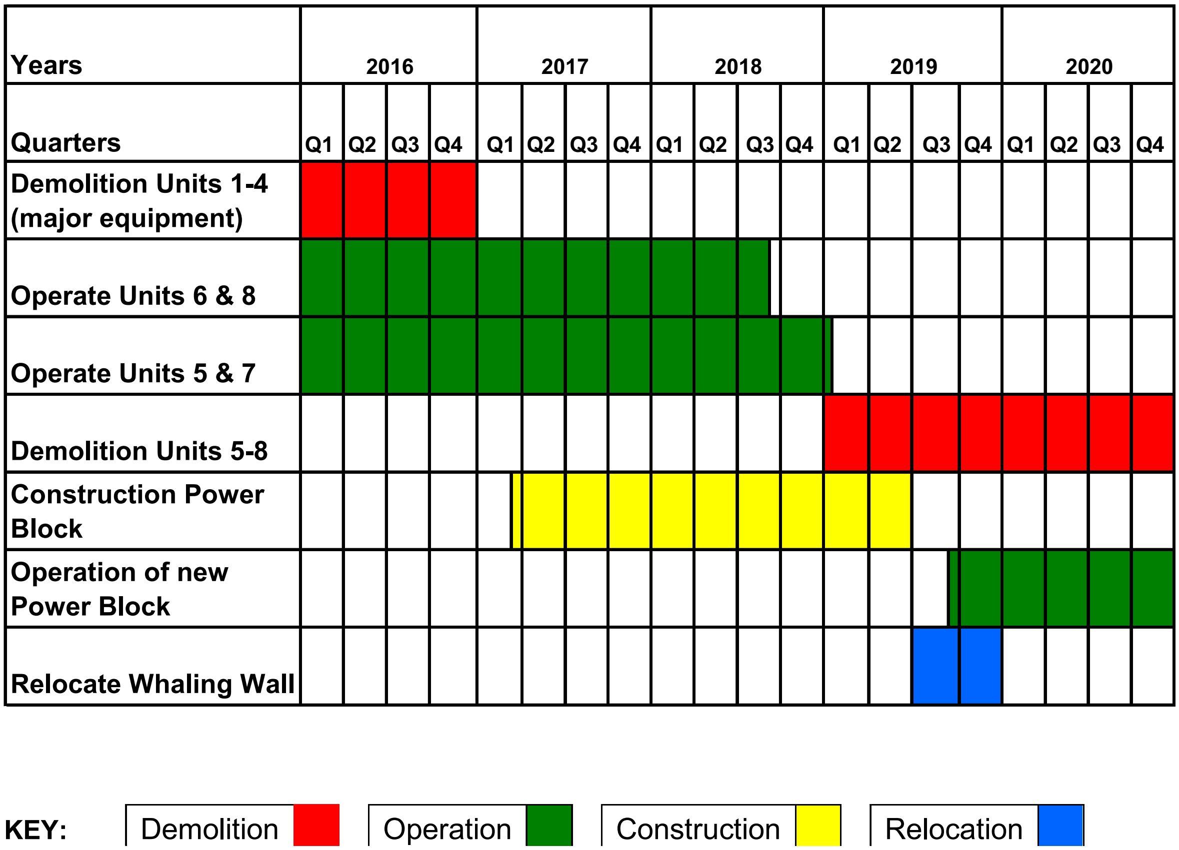
A 230-kV transmission interconnection would connect the RBEP power block to the existing onsite SCE 230-kV switchyard. No new offsite facilities are needed for RBEP operation.

PROJECT DEMOLITION AND CONSTRUCTION SCHEDULE

The 60-months of construction and demolition would start in the first quarter of 2016 and continue until the end of 2020. The dismantling and partial removal of existing units 1-4 are the first activities to occur on the project site. The generating equipment, including steam turbines, generators, boilers, and duct work, would be removed. The administration building and western portion of the building that houses units 1-4 would remain intact. These buildings would remain in place temporarily to provide screening between the construction site of the new power block and Harbor Drive. Construction of the new power block would begin in the first quarter of 2017 and continue through to the end of the second quarter of 2019 when the RBEP would be ready for commercial operation. In 2019, while RBEP is operational, construction of the new control building and the relocation of the Wyland Whaling Wall are planned. The existing units 5-8 and auxiliary boiler no. 17 would be demolished starting the first quarter of 2019 through the fourth quarter of 2020. During the demolition and removal of units 5-8, the Wyland Whaling Wall would be dismantled and moved to a new location directly in front of the new power block. The remaining RBGS buildings and structures would be demolished and removed by the end of 2020.

Synchronization of the overlapping demolition and construction activities as well as the continued operation of the RBGS plant are key elements that extend the overall schedule of the project. Construction and demolition would be scheduled as shown in the **Project Description Table 1**.

Project Description - Table 1
Demolition/Construction Activity



Based on the approximate 60-month demolition and construction period, there would be an average and peak workforce of approximately 149 and 338, respectively, of construction and demolition craft people, supervisory, support, and construction management personnel. The peak construction and demolition site workforce level is expected to occur during the first quarter of 2019 through the fourth quarter of 2019.

REFERENCES

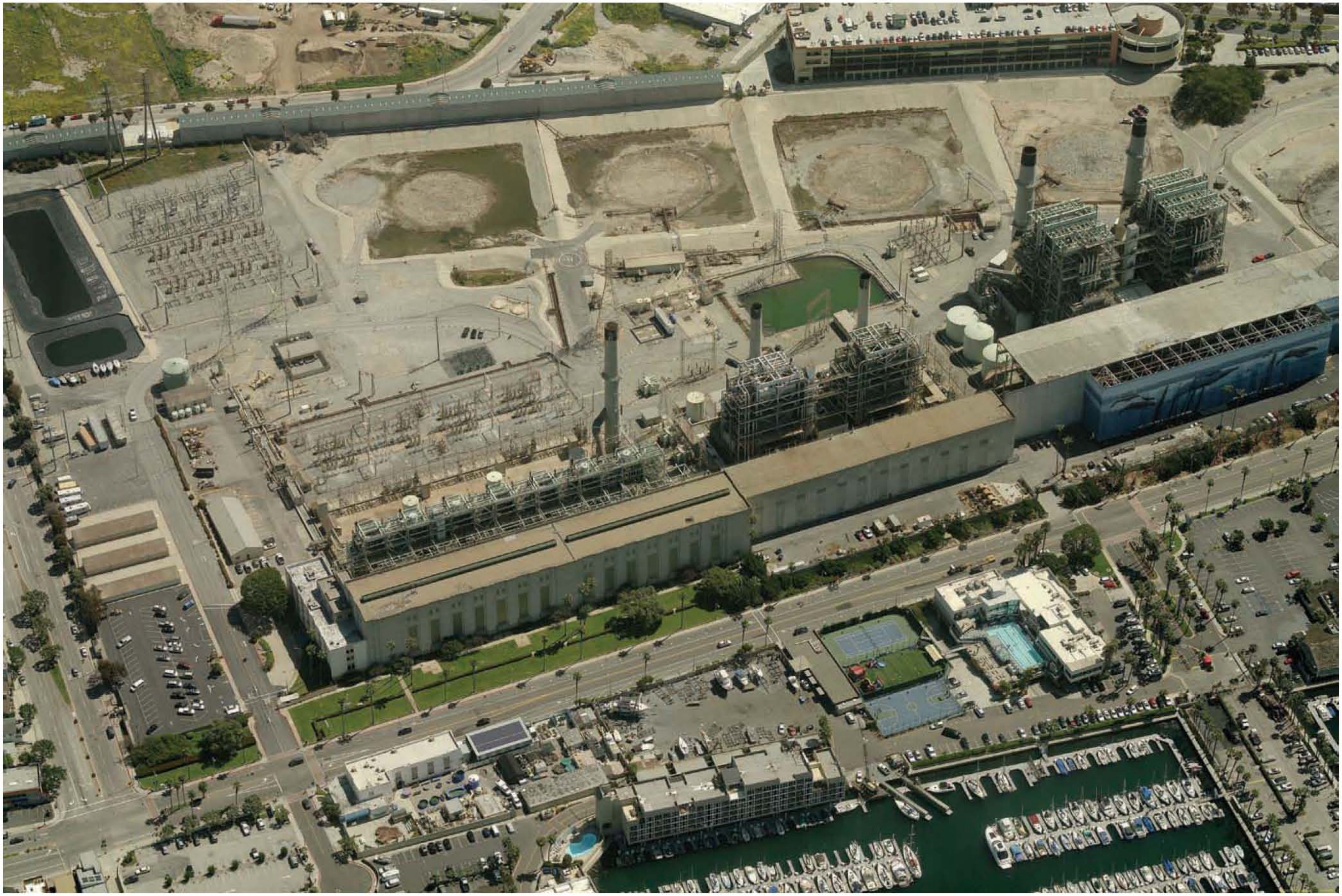
RBEP 2012a – AES Southland Development (TN 68597). Application for Certification for the Redondo Beach Energy Project Volumes 1 and 2, dated November 20, 2012. Submitted to CEC/Robert Oglesby on November 21, 2012.

RBEP 2013r – Applicant/CH2MHill, Sarah Madams (TN 201383). Data Response Set 1A (Response to Data Requests 8, 10, 13, and 20-24), dated December 6, 2013. Submitted to CEC/Docket Unit/Patricia Kelly on December 6, 2013.

RBEP 2014p – Applicant/AES, Stephen O'Kane (TN201688). Alamitos Energy Center Air Permit Application Completeness Response (Facility ID 115394), dated February 7, 2014.

PROJECT DESCRIPTION - FIGURE 1

Redondo Beach Energy Project - Existing Redondo Beach Generating Station Site



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: AFC Figure 1.1-4

PROJECT DESCRIPTION - FIGURE 2
Redondo Beach Energy Project - Conceptual Drawing

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION
SOURCE: AFC Figure 1.1-1

PROJECT DESCRIPTION - FIGURE 3

Redondo Beach Energy Project - Existing Redondo Beach Generating Station and Proposed Redondo Beach Energy Project

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

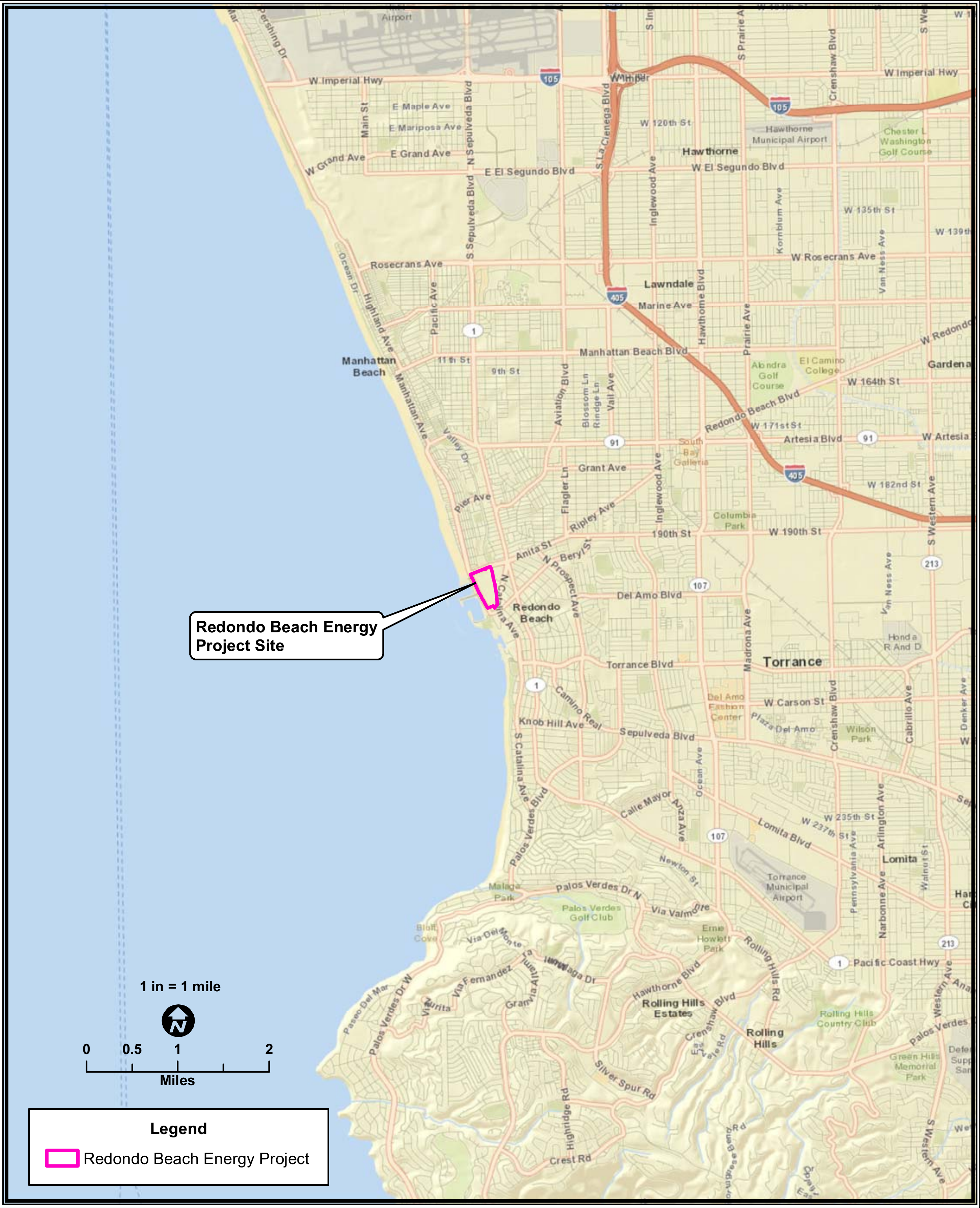
SOURCE: AFC Figure 2.1-1

1	COMBUSTION GAS TURBINE (CGT)	100'x32'x34'	16	SFC. ENCLOSURE
2	CGT GENERATOR ENCLOUSURE	16'x39'x34'	17	SFC. TRANSFORMER
3	CGT/HRSG TRANSITION DUCT	14'x32'x31'	18	SEC. TRANSFORMER
4	CGT ENCLOSURE	61'x32'x25'	19	UNIT TRANSFORMER
5	FUEL GAS SKID	20' x 12'x15'	20	GENERATOR MAIN CIRCUIT BREAKER
6	CGT CONTROL/LUBE OIL SKID	50' x 14.5'x12'	21	FUEL GAS COMPRESSOR ENCLOSURE
7	STG STEP UP TRANSFORMER	35' x 23'x 15'	22	BOILER FEEDPUMP ENCLOSURE
8	TURBINE COOLING AIR SKID	10' x 8' x 24'	23	CEMS
9	CGT STEP UP TRANSFORMER	35' x 22'x15'	24	BOP FIN FAN COOLER
10	CO2 F/F (LP TANK)	19'-6"x15'-6"	25	STEAM TURBINE GENERATOR
11	STG ENCLOSURE	77' x 73' x 40'	26	STG CONTROL/LUBEOIL SKID
12	HEAT RECOVERY STEAM GENERATOR	96'x45'x70'	27	FUEL GAS CONDITIONING SKID
13	STACK	18' DIA.	28	EXIST. SERVICE WTR. TNK 1
14	CGT AIR INTAKE SYSTEM	40' x 38'	29	EXIST.FIRE WATER PUMP ENCLOSURE
15	ELECTRICAL/CONTROL PACKAGE	20' x 40'X 15'	30	EXISTING GAS METERING STATION

PLOT LAYOUT

PROJECT DESCRIPTION - FIGURE 5

Redondo Beach Energy Project -Site Plan Map



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

Source: ESRI Basemap, CH2MHILL

Environmental Assessment

AIR QUALITY

Joseph Hughes

SUMMARY OF CONCLUSIONS

Staff concludes that with the adoption of the attached conditions of certification, the proposed Redondo Beach Energy Project (RBEP) would not result in significant air quality related impacts during project operation, and that the RBEP would comply with all applicable federal, state, and South Coast Air Quality Management District (SCAQMD or District) air quality laws, ordinances, regulations and standards (LORS). However, staff is waiting for the applicant's submittal of the cumulative impact assessment to determine whether the combined air quality impacts of the proposed project, neighboring electric generating facilities, and other reasonably foreseeable local projects would result in significant air quality related impacts during operation. The cumulative impact assessment will be addressed in the Final Staff Assessment.

Staff concludes that mitigation would be provided in the form of Regional Clean Air Incentives Market (RECLAIM) Trading Credits (RTCs) and emission reduction credits (ERCs) as required by district rules that would fully mitigate emissions of all nonattainment pollutants and their precursor pollutants at a minimum ratio of one-to-one and to reduce the potential operational impacts of the proposed project to less than significant.

Staff includes staff Conditions of Certification **AQ-SC1** through **AQ-SC5** to implement control measures for short-term construction impacts. Compliance with these conditions is expected to greatly reduce or eliminate the potential for significant adverse air quality impacts during construction of the RBEP except for PM10 and PM2.5. The PM10 and PM2.5 impacts during the approximately five-year project construction period could cause exceedances of health-based ambient air quality standards and thus these impacts could be significant. The duration and complexity of construction that contributes to these potential impacts are due in part to the desire of the project owner and the California Independent System Operator to have continuity of generation and/or reactive power available from the site. There would be concurrent operation, demolition, commissioning and construction activities throughout the construction period. Therefore, staff includes **AQ-SC6**, which requires the applicant to provide a Construction Particulate Matter Mitigation Plan (CPMMP) that details the steps to be taken and the reporting requirements necessary to provide emission reductions during the construction period that would mitigate impacts to a level of insignificance.

Global climate change and greenhouse gas emissions from the project are discussed and analyzed in **AIR QUALITY APPENDIX AIR-1**. The RBEP would comply with SB 1368 (Perata, Chapter 598, Statutes of 2006) and the greenhouse gas Emission Performance Standard for base load power plants seeking contracts with California's utilities. The RBEP would emit approximately 0.482 metric tonnes of carbon dioxide per megawatt hour (MTCO2/MWh). Mandatory reporting of the GHG emissions would occur while the Air Resources Board implements greenhouse gas regulations and/or trading markets. The project would be subject to GHG reduction or trading requirements as the GHG regulations continue to be implemented and refined.

INTRODUCTION

This analysis evaluates the expected air quality impacts of the emissions of criteria air pollutants from the demolition, construction, and operation associated with the proposed Redondo Beach Energy Project (RBEP) by AES Southland Development, LLC (applicant). The proposed RBEP would be a combined cycle natural gas facility, with a gross generating capacity of 546.4-megawatt (MW) and net generating capacity of 530.4 MW[1], operating up to 6,370 hours per year with 624 startups and shutdowns. The project would be located on the site of, and replace, the existing Redondo Beach Generating Station, an operating power plant, at 1100 North Harbor Drive, Redondo Beach, CA 90277. The RBEP would occupy approximately 10.5 acres of the existing 50-acre site.

Criteria air pollutants are defined as air contaminants for which the state and/or federal government has established an ambient air quality standard to protect public health. The criteria pollutants analyzed are nitrogen dioxide (NO_2), sulfur dioxide (SO_2), carbon monoxide (CO), ozone (O_3), inhalable particulate matter less than ten microns in diameter (PM10), and fine particulate matter less than 2.5 microns in diameter (PM2.5). In addition, nitrogen oxides (NOx, consisting primarily of nitric oxide (NO) and NO_2), sulfur oxides (SOx), and volatile organic compounds (VOC), also known as precursor organic compounds (POC), are also analyzed. NOx and VOC readily react in the atmosphere as precursors to ozone. NOx and SOx readily react in the atmosphere to form particular matter and are major contributors to acid rain. Global climate change and greenhouse gas (GHG) emissions from the project are discussed and analyzed in the context of cumulative impacts (**AIR QUALITY APPENDIX AIR-1**).

In carrying out this analysis, the Energy Commission staff evaluated the following major points:

- Whether RBEP is likely to conform with applicable federal, state, and South Coast Air Quality Management District (SCAQMD or District) air quality laws, ordinances, regulations and standards (Cal. Code of Regs., tit. 20, section 1744 (b));
- Whether RBEP is likely to cause significant air quality impacts, including new violations of ambient air quality standards or substantial contributions to existing violations of those standards (Cal. Code of Regs. tit. 20, section 1743); and
- Whether the mitigation measures proposed to the project are adequate to lessen the potential impacts to a level of insignificance (Cal. Code of Regs., tit. 20, section 1742 (b)).

[1] The applicant described the RBEP as having a net generating capacity of 496 MW, and gross generating capacity of 511 MW, referenced to site ambient average temperature (SAAT) conditions of 63.3º Fahrenheit dry bulb and 58.5º Fahrenheit wet bulb temperature. At an ambient dry bulb temperature of 33º Fahrenheit RBEP is capable of a net generating capacity of 530.4 MW, and gross generating capacity of 546.4 MW.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

The following federal, state, and local laws, ordinances, regulations, and standards (LORS) and policies pertain to the control of criteria pollutant emissions and the mitigation of air quality impacts. Staff's analysis examines the project's compliance with these requirements, shown in **Air Quality Table 1**.

Air Quality Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable LORS	Description
Federal	**U.S. Environmental Protection Agency**
Federal Clean Air Act Amendments of 1990 (CAAA), Title 40 Code of Federal Regulations (CFR) Part 50	National Ambient Air Quality Standards (NAAQS).
Clean Air Act (CAA) § 160-169A and implementing regulations, Title 42 United State Code (USC) §7470-7491, 40 CFR 51 & 52 (Prevention of Significant Deterioration Program)	Requires prevention of significant deterioration (PSD) review and facility permitting for construction of new or modified major stationary sources of pollutants that occur at locations that are in attainment of the NAAQS.
CAA §171-193, 42 USC §7501 et seq., 40 CFR 51 Appendix S (New Source Review)	Requires new source review (NSR) facility permitting for construction or modification of specified stationary sources. Federal NSR applies to sources of designated nonattainment pollutants. This requirement is addressed through compliance with SCAQMD Regulation XIII, Rules 1300-1325.
40 CFR 60, Subpart KKK	New Source Performance Standard (NSPS) for Stationary Combustion Turbines. Requires each proposed combustion turbine to achieve 15 parts per million (ppm) NOx or 0.43 pounds NOx per megawatt-hour (lb/MWh), achieve fuel sulfur standards, and provide reporting.
40 CFR 72 (Acid Rain Program)	Requires reductions in NOx and SO_2 emissions, implemented through the Title V Federal Operating Permit program. This program is within the jurisdiction of the SCAQMD with U.S. EPA oversight [SCAQMD Regulation XXXI, Rules Subpart A-1].
CAA §501 (Title V), 42 USC §7661, 40 CFR 70 (Federal Operating Permits Program)	Establishes comprehensive federal operating permit program for major stationary sources. Title V permit application required within one year following start of operation. This program is within the jurisdiction of the SCAQMD with U.S. EPA oversight [SCAQMD Regulation XXX, Rules 3000-3008]
State	**California Air Resources Board and Energy Commission**
California Health & Safety Code (H&SC) §41700 (Nuisance Regulation)	Prohibits discharge of such quantities of air contaminants that cause injury, detriment, nuisance, or annoyance.
H&SC §40910-40930	Permitting of source needs to be consistent with approved clean air plan. The SCAQMD New Source Review program is consistent with regional air quality management plans.
California Public Resources Code §25523(a); 20 CCR §1752, 2300-2309 (Memorandum of Understanding)	Requires that Energy Commission decision on AFC include requirements to assure protection of environmental quality consistent with Air Resources Board (ARB) programs.

Applicable LORS	Description
Airborne Toxic Control Measure for Idling (ATCM, 13 CCR §2485)	ATCM to Limit Diesel-Fueled Commercial Motor Vehicle Idling – Generally prohibits idling longer than five minutes for diesel-fueled commercial motor vehicles.
Local	**South Coast Air Quality Management District (SCAQMD)**
Regulation II – Permits	This regulation sets forth the regulatory framework of the application for issuance of construction and operation permits for new, altered and existing equipment.
Regulation IV – Prohibitions	This regulation sets forth the restrictions for visible emissions, odor nuisance, fugitive dust, various air emissions, and fuel contaminants. This regulation also specifies additional performance standards for stationary gas turbines and other internal combustion engines.
Regulation VII: Emergencies	Establishes the procedures for reporting emergencies and emergency variances.
Regulation IX: Standards of Performance for New Stationary Sources (NSPS)	Regulation IX incorporates provisions of 40 CFR Part 60, Chapter I, and is applicable to all new, modified, or reconstructed sources of air pollution. Sections of this regulation apply to stationary gas turbines (40 CFR Part 60 Subpart KKKK) as described above in the Federal LORS description. Subpart KKKK established limits of NO_x and SO_2 emissions from the facility as well as monitoring and test method requirements. SCAQMD is delegated enforcement authority for these NSPS through their authority to issue and enforce the Title V permit for this proposed Title V source.
Regulation XI: Source Specific Standards	Specifies the performance standards for stationary gas turbines and electric power generating equipment.
Regulation XIII: New Source Review	Establishes the pre-construction review requirements for new, modified or relocated facilities to ensure that these facilities do not interfere with progress in attainment of the national ambient air quality standards and that future economic growth in the SCAQMD is not unnecessarily restricted.
Regulation XVII: Prevention of Significant Deterioration	This regulation sets forth the preconstruction requirement for stationary sources to ensure that the air quality in clean air areas does not significantly deteriorate while maintaining a margin for future industrial growth.
Regulation XX: Regional Clean Air Incentives Market (RECLAIM)	RECLAIM is designed to allow facilities flexibility in achieving emission reduction requirements for NOx and SOx through controls, equipment modifications, reformulated products, operational changes, shutdowns, other reasonable mitigation measures or the purchase of excess emission reductions.
Regulation XXX: Title V Permits	The Title V federal program is the air pollution control permit system required by the federal Clean Air Act as amended in 1990. Regulation XXX defines permit application and issuance as well as compliance requirements associated with the program. Any new or modified major source which qualifies as a Title V facility must obtain a Title V permit prior to construction, operation or modification of that source. Regulation XXX also integrates the Title V permit with the RECLAIM program such that a project cannot proceed without both.
Regulation XXXI Acid Rain Permits	Title IV of the federal Clean Air Act provides for the issuance of acid rain permits for qualifying facilities. Regulation XXXI integrates the Title V program with the RECLAIM program. Regulation XXXI requires a subject facility to obtain emission allowances for SOx emissions as well as monitoring SOx, NOx, and carbon dioxide (CO2) emissions from the facility.

SETTING

METEOROLOGICAL CONDITIONS

The climate of the South Coast Air Basin (basin) is strongly influenced by the local terrain and geography. The basin is a coastal plain with connecting broad valleys and low hills, bounded by the Pacific Ocean on the west, and relatively high mountains forming the north, south, and east perimeters. The climate is mild, tempered by cool sea breezes and is dominated by the semi-permanent high pressure of the eastern Pacific.

Across the 6,600-square-mile basin there is little variation in the annual average temperature of 63°F. However, the eastern portion of the basin (generally described as the Inland Empire area), experiences greater variability in annual minimum and maximum temperatures as this area is farther from the coast and the moderating effect on climate from the ocean is weaker. All portions of the basin have recorded temperatures above 100°F. December is usually the coldest month, while the months of July and August are usually the hottest. The majority of the rainfall in the basin falls during the period from November through April. Annual rainfall values averaged 13-16 inches per year from 1996 to 2008 at the Los Angeles International Airport (LAX). Monthly and annual rainfall totals can vary considerably from year to year. Cloud cover, in the form of fog or low stratus, is often caused by persistent low inversions and the cool coastal ocean water. Downtown Los Angeles experiences sunshine approximately 73 percent of the time during daylight hours, while the inland areas experience a slightly higher amount of sunshine, and the coastal areas a slightly lower value (WRCC 2013).

Wind and sunlight affect dispersion of onsite air pollutant emissions and the transport of air pollution to and from the site. Wind roses and wind frequency distribution data collected at LAX Station, about six miles north of the project site, were provided in the Application for Certification (AFC) (RBEP 2012a). The most predominant annual wind direction at this monitoring site is from the southwest. There are also less frequent northeast winds occurring all year around. The annual calm wind is about 5 percent and the annual average speed is 2.2 meters/second (m/s).

Along with the wind flow, atmospheric stability and mixing heights are important factors 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. In general, mixing is more limited at night and in the winter in the basin when there is a higher potential for lower level inversion layers being present along with low speed surface winds.

AMBIENT AIR QUALITY STANDARDS

The United States Environmental Protection Agency (U.S. EPA) and the California Air Resource Board (ARB) have both established allowable maximum ambient concentrations of criteria air pollutants. These ambient air quality standards are set to avoid potential public health impacts. These are based upon public health impacts and are called ambient air quality standards. The California Ambient Air Quality Standards (CAAQS), established by ARB, are typically lower (more stringent) than the federally established National Ambient Air Quality Standards (NAAQS).

The primary health effects of the criteria air pollutants are as follows:

- Ozone (O_3): aggravation of respiratory and cardiovascular diseases; impairment of cardiopulmonary function; and eye irritation. Ozone can also affect sensitive plant species by interfering with photosynthesis, and is therefore a threat to California agriculture and native vegetation.
- Particulate matter (PM10 and PM2.5): increased risk of chronic respiratory disease such as bronchitis, emphysema, and asthma; reduced lung function; increased cough and chest discomfort; and particulates may lodge in and/or irritate the lungs.
- Carbon monoxide (CO): impairment of oxygen transport in the bloodstream; aggravation of cardiovascular disease; impairment of central nervous system function; fatigue, headache, confusion, dizziness; death at high levels of exposure; and aggravation of some heart diseases (angina).
- Nitrogen dioxide (NO_2): risk of acute and chronic respiratory disease.
- Sulfur dioxide (SO_2): aggravation of respiratory diseases (asthma, emphysema); reduced lung function; and irritation of eyes.

Ambient air quality standards are designed to protect people who are most susceptible to respiratory distress such as asthmatics, the elderly, very young children, people already weakened by other disease or illness, and people engaged in strenuous work or exercise. The ambient air quality standards are also set to protect public welfare, including protection against decreased visibility, and damage to animals, crops, vegetation, and buildings.

Current state and federal air quality standards are listed in **Air Quality Table 2**. The averaging times for the various ambient air quality standards range from one hour to one year. The standards are read as a concentration, in parts per million (ppm), or as a weighted mass of material per unit volume of air, in milligrams (mg or 10^{-3} g) or micrograms (µg or 10^{-6} g) of pollutant in a cubic meter (m^3) of ambient air, drawn over the applicable averaging period.

Air Quality Table 2
Federal and State Ambient Air Quality Standards

Pollutant	Averaging Time	California Standard	Federal Standard
Ozone (O_3)	One Hour	0.09 ppm (180 μg/m^3)	None
	Eight Hour	0.070 ppm (137 μg/m^3)	0.075 ppm (147 μg/m^3)
Respirable Particulate Matter (PM10)	24 Hour	50 μg/m^3	150 μg/m^3
	Annual	20 μg/m^3	None
Fine Particulate Matter (PM2.5)	24 Hour	None	35 μg/m^3
	Annual	12 μg/m^3	12 μg/m^3
Carbon Monoxide (CO)	One Hour	20 ppm (23 mg/m^3)	35 ppm (40 mg/m^3)
	Eight Hour	9 ppm (10 mg/m^3)	9 ppm (10 mg/m^3)
Nitrogen Dioxide (NO_2)	One Hour	0.18 ppm (339 μg/m^3)	0.100 ppm (188 μg/m^3)[a]
	Annual	0.030 ppm (57 μg/m^3)	0.053 ppm (100 μg/m^3)
Sulfur Dioxide (SO_2)	One Hour	0.25 ppm (655 μg/m^3)	0.075 ppm (196 μg/m^3)[b]
	24 Hour	0.04 ppm (105 μg/m^3)	None[c]

Source: ARB (http://www.arb.ca.gov/research/aaqs/aaqs2.pdf), October 2013 and EPA (http://www.epa.gov/air/criteria.html), October 2013.
Notes:
a. The one-hour NO_2 NAAQS is based on the three-year average of the 98th percentile of the one-hour daily maximum concentrations.
b. On June 2, 2010, the U.S. EPA established a new federal one-hour SO_2 standard. The one-hour SO_2 NAAQS is based on the three-year average of the 99 percentile of the one-hour daily maximum concentrations.
c. On August 23, 2010, the U.S. EPA revoked both the existing Federal 24-hour SO_2 standard of 0.14 ppm and the annual primary SO_2 standard of 0.030 ppm.

The California Air Resources Board and the U.S. EPA designate regions where ambient air quality standards are not met as “nonattainment areas.” Where a pollutant exceeds standards, the federal and state Clean Air Acts both require air quality management plans and rules to achieve these standards. These requirements also provide the basis for implementing agencies to develop mobile and stationary source performance standards.

EXISTING AMBIENT AIR QUALITY

The federal and state attainment status of criteria pollutants in the South Coast Air Basin are summarized in **Air Quality Table 3**. The South Coast Air Basin comprises a single air district, the SCAQMD. Although air quality improvements have occurred, violations and exceedances of the State ozone and PM standards continue to persist in the South Coast Air Basin, and still pose challenges to state and local air pollution control agencies.

Air Quality Table 3
Attainment Status of San Coast Air Basin

Pollutants	State Classification	Federal Classification
Ozone (One-hr)	Nonattainment	No Federal Standard
Ozone (Eight-hr)	Nonattainment	Nonattainment
PM10	Nonattainment	Attainment
PM2.5	Nonattainment	Nonattainment
CO	Attainment	Attainment
NO_2	Attainment	Attainment
SO_2	Attainment	Attainment

Source: ARB (http://www.arb.ca.gov/desig/adm/adm.htm), May 2014 and EPA (http://www.epa.gov/oar/oaqps/greenbk/index.html), October 2013.

The RBEP site is located at 1100 North Harbor Drive, Redondo Beach, which is just south of Hermosa Beach in the northwestern portion of the city of Redondo Beach. The monitoring stations closest to the proposed site with long-term records of ozone, NO_2, PM10, PM2.5, SO_2 and CO are the Los Angeles – Westchester station, Compton – 700 North Bullis Road station, and North Long Beach station. **Air Quality Table 4** provides the approximate distance and direction of each monitoring station from the proposed project site, and describes what criteria pollutants are monitored at each station.

Air Quality Table 4
Nearest Monitoring Stations to RBEP

Monitoring Station	Distance from RBEP	Direction from RBEP	Criteria Pollutants Monitored					
			Ozone	NO2	PM10	PM2.5	SO2	CO
Los Angeles – 7201 W. Westchester	7.3 miles	North	X	X	X		X	X
Compton - 700 North Bullis Road	11.3 miles	East-Northeast	X	X		X		X
North Long Beach – 3648 N. Long Beach Blvd.	11 miles	East	X	X	X	X	X	X

Source: ARB, Air Quality Data Statistics (http://www.arb.ca.gov/adam/welcome.html), accessed October 2013.
Note: “X” denotes monitoring station monitors for that criteria pollutant.

Staff considers the Los Angeles – Westchester monitoring station the most representative of the nearest monitoring stations due to: (1) the proximity to the project site; (2) proximity and orientation to the ocean with respects to the proposed project site; and (3) similarities in surrounding topography compared to the proposed project site. Therefore, staff selected background concentrations for all criteria pollutants from this monitoring station, except PM2.5 data, to represent background concentrations for the RBEP. The nearest monitoring stations that monitor and record PM2.5 data are the Compton – 700 North Bullis Road motoring station and the North Long Beach – 3648 N. Long Beach monitoring station.

Nonattainment Criteria Pollutants

This section summarizes the existing ambient monitoring data for nonattainment criteria pollutants (ozone and particulate matter) collected by ARB from monitoring stations closest to the project site. Data from multiple stations near the project site are provided to show air quality trends for nonattainment criteria pollutants in the surrounding area from 2005 to 2012. Data marked in **bold** and shaded indicates that the most-stringent current standard was exceeded. Note that an exceedance is not necessarily a violation of the standard, and that only persistent exceedances can lead to designation of an area as nonattainment.

Ozone

Ozone is not directly emitted from stationary or mobile sources, but the contaminant is formed as the result of chemical reactions in the atmosphere between precursor air pollutants. The primary ozone precursors are NOx and VOC (also known as POC), which interact in the presence of sunlight and warm air temperatures to form ozone. Ozone formation is highest in the summer and fall, when abundant sunshine and high temperatures trigger the necessary photochemical reactions, and lowest in the winter. The days with the highest ozone concentrations tend to occur between June and August.

Air Quality Table 5 summarizes the ambient ozone data collected from the monitoring stations closest to the project site. These data show only minor spatial (station-to-station) or temporal (year-by-year) variations from site to site.

Air Quality Table 5
Background Ozone Air Quality Data (ppm)

Location, Year	Maximum 1-hour Ozone Concentration	Days Above CAAQS	Maximum 8-hour Ozone Concentration	Days Above NAAQS	Days Above CAAQS
Los Angeles – 7201 W. Westchester					
2005	0.086	0	**0.076**	1	2
2006	0.084	0	0.067	0	0
2007	0.087	0	**0.075**	0	1
2008	0.086	0	**0.075**	0	1
2009	0.077	0	0.070	0	0
2010	0.089	0	0.070	0	0
2011	0.078	0	0.067	0	0
2012	**0.106**	1	**0.075**	0	1
Compton – 700 North Bullis Road					
2005	--	--	--	--	--
2006	--	--	--	--	--
2007	--	--	--	--	--
2008	--	--	--	--	--
2009	**0.104**	2	**0.087**	1	1
2010	0.081	0	0.062	0	0
2011	0.082	0	0.066	0	0
2012	0.086	0	**0.071**	0	1

Location, Year	Maximum 1-hour Ozone Concentration	Days Above CAAQS	Maximum 8-hour Ozone Concentration	Days Above NAAQS	Days Above CAAQS
North Long Beach – 3648 North Long Beach Blvd.					
2005	**0.091**	1	0.069	0	0
2006	0.081	0	0.059	0	0
2007	**0.099**	1	**0.074**	0	1
2008	**0.093**	1	**0.074**	0	1
2009	0.089	0	0.067	0	0
2010	**0.101**	1	**0.084**	1	1
2011	0.073	0	0.062	0	0
2012	0.084	0	0.067	0	0

Source: ARB 2013a, Air Quality Data Statistics (http://www.arb.ca.gov/adam/welcome.html), accessed April 2013.
Notes:
a. An exceedance is not necessarily a violation.
b. Dashes indicate that there was insufficient data to determine value, or data were not available during high periods.

Respirable Particulate Matter (PM10)

PM10 is a mixture of particles and droplets that vary in size and chemical composition, depending upon the origin of the pollution. An extremely wide range of sources, including natural causes, most mobile sources, and many stationary sources, cause emissions that directly and indirectly lead to increased ambient particulate matter. This makes it an extremely difficult pollutant to manage. Particulate matter caused by any combustion process can be generated directly by burning the fuel, but it can also be formed downwind when various precursor pollutants chemically interact in the atmosphere to form microscopic, solid precipitates. These solids are called secondary particulate matter since the contaminants are not directly emitted, but the particles are indirectly formed as a result of precursor emissions. Gaseous contaminants such as NOx, SOx, organic compounds, and ammonia (NH_3) from natural or man-made sources can form secondary particulate nitrates, sulfates, and organic solids. Secondary particulate matter is mostly finer PM10, whereas particles from dust sources tend to be the coarser fraction of PM10.

Air Quality Table 6 summarizes the maximum PM10 concentration data collected from the closest monitoring stations near the project site. PM10 is primarily a winter problem, however high regional PM10 levels can occur at other times of the year as well. This is because ammonium nitrate and ammonium sulfate particles tend to form most readily in colder weather and at times of low wind speeds, high humidity, and stable conditions, whereas high levels of summertime PM10 tend to be caused by direct sources, including wildfires. Some of the highest concentrations presented occurred during times of heavy wildfire activity nearby as shown in October of 2007.

Air Quality Table 6
Background PM10 Air Quality Data (µg/m^3)

Location, Year	Maximum 24-hr PM10 Concentration	Month of Maximum 24-hr Concentration	Estimated Days Above CAAQS[a]	Estimated Days Above NAAQS[a]	Annual Average PM10 Concentration
Los Angeles – 7201 W. Westchester					
2005	44.0	MAR	--	0	**22.9**
2006	45.0	OCT	--	--	**23.5**
2007	**128.0**	OCT	--	--	**29.3**
2008	50.0	DEC	0	0	**25.5**
2009	**52.0**	OCT	6.5	0	**25.5**
2010	37.0	AUG	0	0	**26**
2011	41.0	APR	0	0	**21.4**
2012	30.0	MAR	0	0	19.6
North Long Beach – 3648 North Long Beach Blvd.					
2005	**66.0**	NOV	23.6	0	**29.5**
2006	**78.0**	DEC	29.3	0	**30.9**
2007	**232.0**[c]	OCT	--	6.1	**33.5**
2008	**61.0**	NOV	--	0	**27.6**
2009	**62.0**	JAN	19.2	0	**30.2**
2010	44.0	JAN	--	0	**22.0**
2011	43.0	NOV	0	0	**24.1**
2012	45.0	JAN	0	0	**23.2**

Source: ARB 2013a, Air Quality Data Statistics (http://www.arb.ca.gov/adam/welcome.html), accessed October 2013.
Notes:
a. The number of days above the CAAQS (50 µg/m^3) is calculated by ARB. Because PM10 is monitored approximately once every six days, the potential number of violation days is calculated by multiplying the actual number of days of violations by six.
b. Where California measurements are not available the National measurements are shown. California measurements are based on California approved samplers, whereas national measurements are based on samplers using federal reference or equivalent methods. State and national statistics may therefore be based on different samplers.
c. This event was excluded as exceptional events by U.S. EPA. There was a large fire in San Diego starting October 20, 2007.
d. Dashes indicate that there was insufficient data to determine value, or data were not available during high periods.

PM10 concentrations show more temporal and spatial variation than ozone data and the more easterly and downwind North Long Beach station has persistently higher values.

Fine Particulate Matter (PM2.5)

Particles and droplets with an aerodynamic diameter less than or equal to 2.5 microns (PM2.5) penetrate more deeply into the lungs than PM10, so can therefore be much more damaging to public health than larger particles.

PM2.5 is mainly a product of combustion and includes nitrates, sulfates, organic carbon (ultra-fine dust), and elemental carbon (ultra-fine soot). Almost all combustion-related particles, including those from wood smoke and cooking, are smaller than 2.5 microns. Nitrate and sulfate particles are formed through complex chemical reactions in the atmosphere. Particulate nitrate (mainly ammonium nitrate) is formed in the atmosphere from the reaction of nitric acid and ammonia. Nitric acid in turn originates from NOx emissions from combustion sources. The nitrate ion concentrations during the winter make up a large portion of the total PM2.5. Ammonium sulfate is also a concern because of the ready availability of ammonia in the atmosphere.

Air Quality Table 7 summarizes the maximum PM2.5 concentration data collected from the monitoring stations near the project site.

Air Quality Table 7
Background PM2.5 Air Quality Data (µg/m³)

Location, Year	Federal 24-hr PM2.5 Concentration	Maximum 24-hr PM2.5 Concentration	Month of Maximum 24-hr PM2.5 Concentration	Estimated Days Maximum Above NAAQS	Annual Average PM2.5 Concentration
Compton - 700 North Bullis Road					
2005	--	--	--	--	--
2006	--	--	--	--	--
2007	--	--	--	--	--
2008	--	--	--	--	--
2009	**37.7**	**69.2**	JAN	9.6	**14.7**
2010	31.8	**38.2**	DEC	3.4	**12.5**
2011	31.5	**35.3**	DEC	1	**13.0**
2012	30.3	**51.2**	DEC	3.3	11.7
North Long Beach – 3648 N. Long Beach					
2005	**41.4**	**53.8**	OCT	12	**15.9**
2006	34.9	**58.5**	FEB	5	**14.1**
2007	**40.7**	**82.8**	NOV	13.7	**14.6**
2008	**38.8**	**57.2**	NOV	8.2	**14.1**
2009	34.1	**63.0**	JAN	6	**12.8**
2010	27.3	35.0	DEC	0	10.3
2011	28.8	**39.7**	DEC	2	11.3
2012	26.5	**49.8**	DEC	4	10.4

Source: ARB 2013a, Air Quality Data Statistics (http://www.arb.ca.gov/adam/welcome.html), accessed October 2013.
Notes:
a. The Federal 24-hour NAAQS is based on the three-year average of the 98 percentile concentrations.
b. Dashes indicate that there was insufficient data to determine value, or data were not available during high periods.

Air Quality Table 7 shows that PM2.5 concentrations generally tend to exceed the standard in winter months, but not exclusively. During winter high particulate matter episodes, the contribution of ground level releases to ambient particulate matter concentrations is disproportionately high because of low wind speeds and relatively stable atmospheric conditions. The Compton station shows somewhat higher 24 hour values than does the North Long Beach station; however the North Long Beach Station shows somewhat higher annual values.

Attainment Criteria Pollutants

Air Quality Table 8 shows the maximum concentrations from the Los Angeles – Westchester monitoring station for the criteria pollutants that attain all ambient air quality standards.

Air Quality Table 8
Background Concentrations of Criteria Pollutants in Attainment (ppm)[a]

Pollutants	Averaging Time	2005	2006	2007	2008	2009	2010	2011	2012
NO_2	1-hour	0.091	0.099	0.084	0.094	0.077	0.075	0.097	--
	1-hour Federal[b]	0.071	0.072	0.069	0.076	0.069	0.061	0.065	--
	Annual	0.013	0.015	--	0.014	--	0.012	0.013	--
CO	1-hour	2.8	2.8	3.3	3.6	2.6	2.6	2.3	2.8
	8-hour	2.1	2.3	2.4	2.5	2.0	2.2	1.8	2.5
SO_2	1-hour	0.040	0.021	0.019	0.021	0.022	0.026	0.012	0.005
	1-hour Federal[c]	0.023	0.019	0.017	0.015	0.012	0.016	0.008	0.005
	24-hour	0.011	0.007	0.009	0.005	0.006	0.004	0.002	0.001

Source: ARB 2013a, Air Quality Data Statistics (http://www.arb.ca.gov/adam/welcome.html), accessed November 2013. EPA 2013a, Monitor Values Report (http://www.epa.gov/airdata/ad_rep_mon.html), accessed November 2013.

Notes:

a. Dashes indicate that there was insufficient data to determine value, or data were not available during high periods.

b. The federal one-hour NO_2 NAAQS is based on the three-year average of the 98 percentile of the yearly distribution of one-hour daily maximum concentrations.

c. The federal one-hour SO_2 NAAQS is based on the three-year average of the 99 percentile of the yearly distribution of one-hour daily maximum concentrations.

Nitrogen Dioxide

A majority of the NOx emitted from combustion sources is usually in the form of nitiric oxide (NO), while the balance is NO_2, although the percentage can vary by the type of fuel and the configuration of the combustion equipment. Once emitted from a stack, NO is oxidized in the presence of ozone to form NO_2, but some level of photochemical activity is needed for this conversion. High concentrations of NO_2 occur during the fall (not in the winter) when atmospheric conditions tend to trap ground-level releases but lack significant photochemical activity (less sunlight) to form ozone and nitric oxide. In the summer, the conversion rates of NO to NO_2 are high, but the relatively high temperatures and windy conditions (atmospheric unstable conditions) tend to engage the NO in reactions with VOC and POC to create ozone and also disperse the NO_2. The formation of NO_2 in the summer, with the help of the ozone, is according to the following reaction:

$$NO + O_3 \leftrightarrow NO_2 + O_2$$

Urban areas typically have relatively high daytime ozone concentrations that drop substantially at night as the above reaction takes place, and ozone scavenges the available NO. If ozone is unavailable to oxidize the NO, less NO_2 will form because the reaction is “ozone-limited.” This reaction explains why, in urban areas, ground-level ozone concentrations drop at night, while aloft and in downwind rural areas (without sources of fresh NO emissions), ozone concentrations can remain relatively high.

The current CAAQS for NO_2 became effective in early 2008, and the U.S. EPA adopted a new one-hour NAAQS of 0.100 ppm (188 μg/m^3) in early 2010. On February 29, 2012 the U.S. EPA designated all areas of the country as “unclassifiable/attainment” for the 2010 1-hour NO_2 NAAQS. The U.S. EPA is designating areas as “unclassifiable/attainment” to mean that available information does not indicate whether or not the air quality in these areas exceeds the 2010 NO_2 NAAQS. For the nearest monitoring station, current 2010 to 2012 ARB and EPA data reflect an existing maximum one-hour background concentration of 0.097 ppm (182.7 μg/m^3) and a 98th percentile of the daily highest hourly concentration of 0.065 ppm (122.2 μg/m^3). See **Air**

Quality Table 8 for maximum one-hour, 98th percentile of the maximum one-hour, and annual NO_2 concentrations at the closest monitoring station.

Carbon Monoxide

Carbon monoxide (CO) is a by-product of incomplete combustion common to any carbon-bearing fuel-burning source. Mobile sources are the main sources of CO emissions. Ambient concentrations of CO are highly dependent on motor vehicle activity, with highest concentrations usually found near traffic congested roadways and intersections. Ambient CO concentrations attain the air quality standards due to two state-wide programs: 1) the 1992 wintertime oxygenated gasoline program, and 2) Phase I and II of the reformulated gasoline program. New vehicles with oxygen sensors and fuel injection systems have also contributed to reduced CO emissions and long-term maintenance of the CO ambient air quality standards.

Sulfur Dioxide

Sulfur dioxide is typically emitted as a result of the combustion of fuels containing sulfur. When high levels are present in ambient air, SO_2 leads to sulfite particulate formation and acid rain. Natural gas contains very little sulfur and therefore results in low SO_2 emissions when burned. By contrast, high sulfur fuels like coal emit large amounts of SO_2 when burned. Sources of SO_2 emissions come from every economic sector and include a wide variety of gaseous, liquid, and solid fuels. The entire state is designated attainment for all SO_2 ambient air quality standards.

Summary of Existing Ambient Air Quality

The recent and local ambient air quality data show existing violations of ambient air quality standards for ozone, PM10, and PM2.5. Staff uses the highest local background ambient air concentrations from the last three years as the baseline for analyzing potential ambient air quality impacts for the proposed project. The highest background concentrations from the previous three years are shown in **Air Quality Table 9**.

The project impact modeling analysis was limited to the pollutants listed in **Air Quality Table 9**. Therefore, establishing background concentrations is not necessary for other criteria pollutants (ozone and lead).

Air Quality Table 9
Staff-Recommended Background Concentrations (μg/m^3)[a]

Pollutant	Averaging Time	Background[b]	Limiting Standard	Percent of Standard
PM10	24-hour	41	50	82
	Annual	**26**	20	**130**
PM2.5	24-hour Federal	31.8[c]	35	91
	Annual	**13**	12	**108**
CO	One-hour	3,220	23,000	14
	Eight-hour	2,778	10,000	28
NO_2	One-hour	182.7	339	54
	One-hour Federal	122.2[c]	188	65
	Annual	24.7	57	43
SO_2	One-hour	68	655	10
	One-hour Federal	42[d]	196	21
	24-hour	11	105	10

Source: ARB 2013a and EPA 2013a.
Notes:
a. Background concentrations for all criteria pollutants are presented in micrograms per cubic meter (μg/m^3) for consistency with the AERMOD output default units.
b. Background values represent the highest measured concentration from 2010 to 2012 from Los Angeles – 7201 W. Westchester (LAX) for all criteria pollutants, with the exception of PM2.5. Highest background concentrations for PM2.5 are from the Compton – 700 North Bullis Road monitoring station.
c. Three-year average of the 98th percentile concentration.
d. Three-year average of the 99th percentile concentration.

PROJECT DESCRIPTION AND PROPOSED EMISSIONS

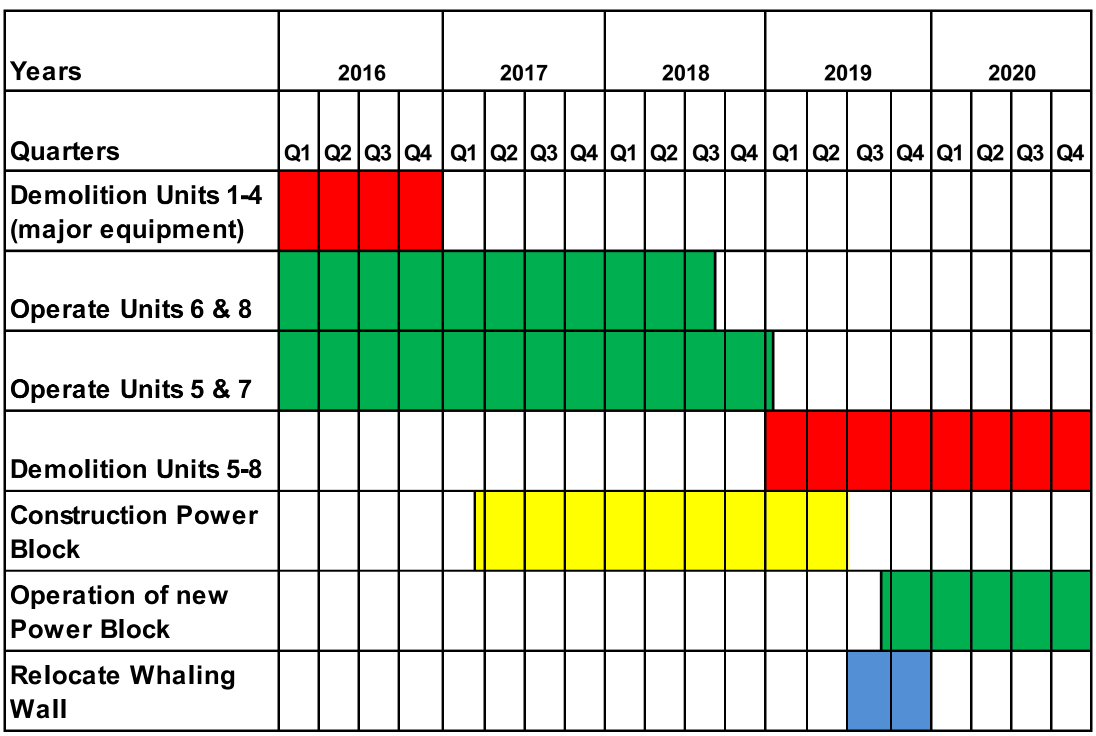
The proposed RBEP would include the following new stationary sources, capable of a gross generating capacity of 546.4 MW and net capacity of 530.4 MW (RBEP 2012a, Section 5.1 and Appendix 5.1B, and SCAQMD 2014a):

- Three Mitsubishi Power Systems America (MPSA) 501D CTGs with a gross rating of approximately 131.9 MW and net rating of 128 MW, each at 33 degrees Fahrenheit (F°). The CTGs would be equipped with evaporative coolers on the inlet air system and dry low oxides of nitrogen (NOx) combustors.
- One single-cylinder, single-flow, impulse, axial exhaust condensing Steam Turbine Generator (STG) with a gross rating of 150.7 MW and net rating of 146.4 MW.
- Three Heat Recovery Steam Generators (HRSGs) of the horizontal gas flow, single-pressure, natural-circulation type. Each HRSG has a natural gas-fired duct burner for supplemental firing in the HRSG inlet ductwork and an emission reduction system consisting of a selective catalytic reduction (SCR) unit in the outlet ductwork to control NOx emissions and an oxidation catalyst to control carbon monoxide (CO) and volatile organic compounds (VOC) emissions.
- One air-cooled condenser and one closed-loop cooling fin fan cooler (no emissions).
- One above ground, oil water separator (negligible VOC emissions).

The plant is being evaluated for an operational scenario of 5,900 hours per year (hr/yr) of steady-state base load operation without duct burner firing per turbine, plus 470 hr/yr with duct burner firing per turbine, including 624 startup and shutdowns per turbine per year.

Construction and demolition activities at the project site are expected to last 60 months, starting January 2016 until December 2020. The existing Units 5-8 would remain in service until the second quarter of 2018. Demolition of the existing Units 1-4 would begin January 2016 and is expected to last 12 months. As part of demolition of Units 1-4 the major generating equipment (e.g. steam turbines, generators, boilers, and duct work) would be removed, but the administration building, western portion of Units 1-4 housing, and the Wyland Whaling Wall would be left intact and would be removed or relocated during the final stages of construction of the proposed RBEP. Construction of proposed RBEP would begin March 2017 and is expected to last until December 2019. Units 5-8 and auxiliary boiler No. 17 would be demolished starting January 2019 through December 2020. RBEP is expected to be operational by the third quarter of 2019. **Air Quality Figure 1** provides the proposed demolition, construction, and operation schedule.

Air Quality Figure 1
Demolition, Construction, and Operation Schedule



Emissions estimates for the proposed project during the construction, demolition, initial commissioning, and operation are each described next.

PROPOSED CONSTRUCTION EMISSIONS

Construction of the RBEP is expected to take about 60 months (RBEP 2012a, Section 5.1). As shown in **Air Quality Figure 1** construction and demolition activities would be broken up into several stages, some of which would overlap. A total of approximately 17 acres of the existing Redondo Beach Generating Station site would be used for construction laydown and for parking. All construction equipment and supplies would be trucked directly to the site. Onsite construction activities would consist of the installation of three new combined-cycle gas turbines, an air-cooled condenser, and various auxiliary equipment. A power block enclosure, multiple sound walls, and administrative structures would also be constructed. Construction and demolition activities would occur ten hours per day, 23 days per month.

Onsite and offsite project emissions from construction and demolition have been divided into three categories: (1) vehicle and construction equipment exhaust; (2) fugitive dust from vehicle and construction equipment, including grading and bulldozing during construction; and (3) fugitive dust from demolition activities such as the top-down removal of the boiler stack and loading waste haul trucks with the generated debris.

Different activities have maximum emissions at different times during the construction period. For example, maximum emissions associated with vehicle and construction equipment exhaust, fugitive dust from vehicle and construction equipment, and fugitive dust from demolition activities, may occur at different times. Staff uses the maximum summation of emissions from all activities that are assumed to occur at the same time for a respective criteria pollutant and averaging period to evaluate worst case impacts relative to CAAQS/NAAQS.

The maximum daily CO emissions occur in months 39 and 40, and maximum annual CO emissions occur from months 37 to 48. The maximum daily VOC emissions occur in month 26 and 27, and maximum annual VOC emissions occur from months 16 to 27. The maximum daily NOx emissions occur in month 23, and maximum annual NOx emissions occur from months 15 to 26. The maximum daily SOx emissions occur in month 42, and the maximum annual SOx emissions occur from months 37 to 48. The maximum daily PM10 emissions occur during months 15 to 17, and maximum annual PM10 emissions occur from months 43 to 54. The maximum daily PM2.5 emissions occur during months 15 to 17, and maximum annual PM2.5 emissions occur from months 15 to 26 (RBEP 2012, Revised Appendix 5.1A).

Estimates for the highest daily and annual emissions over the 60-month construction period are shown in **Air Quality Table 10** and **11**.

Air Quality Table 10
Construction Maximum Daily Emissions (pounds per day [lb/day])

	NOx	VOC	PM10	PM2.5	CO	SOx
Onsite Construction Emissions[a]						
Construction Vehicle Exhaust	0.243	0.04	0.005	0.004	0.16	0.0003
Construction Equipment Exhaust	90.84	8.96	4.68	4.34	48.44	0.11
Construction Fugitive Dust	--	--	17.73	4.41	--	--
Demolition Fugitive Dust	--	--	0[b]	0[b]	--	--
Total of Onsite Emissions[c]	**91.08**	**9.00**	**22.42**	**8.75**	**48.60**	**0.11**
Offsite Construction Emissions[a,c]	**18.48**	**0.98**	**8.19**	**2.34**	**31.29**	**0.12**

Source: RBEP 2013r, Revised Appendix 5.1A.
Notes:
a. Maximum onsite and offsite emissions do not necessarily occur on the same days.
b. Demolition activities do not occur during other activities that result in maximum daily PM10/PM2.5 emissions.
c. The maximum summations of emissions from all activities that are assumed to occur on the same day are shown. Individual activities may have had higher emissions on other days, but these did not contribute to the worst case day.

Air Quality Table 11
Construction Maximum Annual Emissions (tons per year [tpy])

	NOx	VOC	PM10	PM2.5	CO	SOx
Onsite Construction Emissions[a]						
Construction Vehicle Exhaust	0.04	0.01	0.001	0.0004	0.03	0.0001
Construction Equipment Exhaust	11.79	1.13	0.43	0.55	6.35	0.01
Construction Fugitive Dust	--	--	2.27	0.46	--	--
Demolition Fugitive Dust	--	--	0.08	0[b]	--	--
Total of Onsite Emissions[c]	**11.83**	**1.14**	**2.78**	**1.01**	**6.38**	**0.01**
Offsite Construction Emissions[a,c]	**1.78**	**0.11**	**1.01**	**0.28**	**3.81**	**0.01**

Source: RBEP 2013r, Revised Appendix 5.1A.
Notes:
a. Maximum onsite and offsite emissions do not necessarily occur during the same 12 month period.
b. Demolition activities do not occur during other activities that result in maximum daily PM2.5 emissions.
c. Maximum summations of emissions from all activities that are assumed to occur within the same 12 month period.

As shown in **Air Quality Figure 1**, demolition of Units 1-4 would be expected to take place during the first 12 months of the construction schedule and would occur simultaneously with ongoing operation of existing Units 5-8 (auxiliary boiler 17 does not operate; it was designated non-operational by the SCAQMD on November 19, 2013). Although maximum daily and annual construction emissions are not expected to occur during the first 12 months of the construction schedule (as shown in **Air Quality Table 10** and **11**, respectively), staff analyzed impacts from simultaneous demolition and existing operations to determine whether there was a potential for cumulative impacts that would cause a greater impact than that predicted for worst case construction. In addition, demolition of Units 1-4 would occur on the northwestern portion of the project site, and equipment activities would be concentrated to a smaller portion of the overall site. Construction period modeling accounts for these location differences. Therefore, demolition of Units 1-4 could impact receptors differently than worst case construction activity emissions. Worst case daily and annual emissions estimates during the first 12 months (demolition of Units 1-4) of the construction period are shown in **Air Quality Table 12** and **13**, respectively.

Air Quality Table 12
Demolition of Units 1-4 with Simultaneous Operation of existing Units 5-8 (lb/day)

Pounds per Day	NOx	VOC	PM10	PM2.5	CO	SOx
Units 5-8	140.87	81.64	24.22	23.78	2681.67	11.07
Demo Units 1-4 (Exhaust)	74.82	7.22	3.72	3.51	37.95	0.08
Demo Units 1-4 (Fugitive Dust)	--	--	9.05	0.94	--	--
Total	**215.69**	**88.86**	**36.99**	**28.23**	**2719.62**	**11.14**

Source: RBEP 2013p and RBEP 2013r.

Air Quality Table 13
Demolition of Units 1-4 with Simultaneous Operation of existing Units 5-8 (tpy)

Tons per Year	NOx	VOC	PM10	PM2.5	CO	SOx
Units 5-8	25.71	14.9	4.42	4.34	489.41	2.02
Demo Units 1-4 (Exhaust)	9.91	0.94	0.48	0.45	5.02	0.01
Demo Units 1-4 (Fugitive Dust)	--	--	1.25	0.13	--	--
Total	**35.62**	**15.84**	**6.16**	**4.92**	**494.42**	**2.03**

Source: RBEP 2013p and RBEP 2013r.

PROPOSED INITIAL COMMISSIONING EMISSIONS

New electrical generation facilities must go through initial commissioning phases before becoming commercially available to generate electricity. During this period, initial firing causes greater emissions than those that occur during normal operations because of the need to tune the combustor, conduct numerous startups and shutdowns, operate under low loads, and conduct testing before emission control systems are functioning or fine-tuned for optimum performance.

The total duration of the commissioning period is expected to be up to 180 days. During the commissioning period, each turbine would need to be operated for up to 491 hours without, or with partial, emission control systems in operation.

Air Quality Table 14 presents the applicant's anticipated maximum hourly and event commissioning emission rates of criteria pollutants. Maximum hourly emissions for NOx, VOC, and CO would occur with the gas turbine undergoing initial load tests before emission control systems are installed and operational. Emission rates for PM10, PM2.5, and SOx during initial commissioning are not expected to be higher than normal operating emissions. This is because PM10 and SOx emissions are proportional to fuel use.

As shown in **Air Quality Figure 1**, ongoing construction of the proposed RBEP (e.g. new control building and relocation of the Wayland Whaling Wall) and demolition of Units 5-8, and 17 would be expected to occur simultaneous to the commissioning period (months 43-48). Therefore, staff has evaluated potential emissions overlap from these activities. **Air Quality Table 14** includes the worst case emission estimates for construction and demolition during the commissioning period and subsequent routine operation (months 43-54) to address short term and annual impacts.

Air Quality Table 14
Maximum Initial Commissioning Emissions (lb/hr and tons/event), with Simultaneous Demolition of Units 5-8, and 17, and Ongoing Construction of RBEP (lb/hr, and tpy)

Source	NOx	VOC	PM10[a]	PM2.5[a]	CO	SOx
Maximum Hourly (lb/hr) (per turbine)	109.7	383.8	4.5	4.5	3,169	1.96
Total Commissioning Period (tons/event)	12.4	21.2	4.4	4.4	169	1.59
Demolition of Units 5-8,17 (lb/hr)	6.0	0.65	0.71	0.17	3.6	0.008
Demolition of Units 5-8, 17 (tpy)	0.95	0.86	2.56	0.58	5.22	0.012
Construction of RBEP (lb/hr)	1.67	0.20	0.14	0.04	0.94	0.002
Construction of RBEP (tpy)	1.15	0.14	0.23	0.07	0.65	0.001

Source: RBEP 2012a, Section 5.1 and Appendix 5.1B, and RBEP 2014f, Attachment DR67-1.
Notes:
a. Includes both fugitive dust and exhaust emissions for demolition and construction.

PROPOSED OPERATION EMISSION CONTROLS

NOx Controls

The CTGs would use natural gas and best combustion practices, along with dry low NOx combustors to maintain low levels of NOx formation and a selective catalytic reduction (SCR) system for post-combustion NOx control. Exhaust from each turbine would enter the SCR system before being released into the atmosphere. SCR refers to a process that chemically reduces NOx to nitrogen (N_2) and water vapor (H_2O) by injecting urea based ammonia (NH_3) into the flue gas stream in the presence of a catalyst and excess oxygen. The process is termed selective because the ammonia preferentially reacts with NOx rather than oxygen. The catalyst material most commonly used is titanium dioxide, but materials such as vanadium pentoxide, zeolite, or noble metals are also used. Regardless of the type of catalyst used, efficient conversion of NOx to nitrogen and water vapor requires the uniform mixing of ammonia into the exhaust gas stream and a catalyst surface large enough to ensure sufficient time for the reaction to take place.

VOC and CO Controls

Emissions of CO and unburned hydrocarbons, including VOC, would be controlled with an oxidation catalyst installed in conjunction with the SCR catalyst. An oxidation catalyst system chemically reacts with organic compounds and CO with excess oxygen to form carbon dioxide (CO_2) and water. Unlike the SCR system for reducing NOx, an oxidation catalyst does not require any additional chemicals.

PM10/PM2.5 and SOx Controls

The CTGs would fire exclusively pipeline-quality natural gas, a clean-burning fuel that contains very little sulfur or noncombustible solid residue, to limit the formation of SOx and particulate matter. Natural gas does contain small amounts of a sulfur-based scenting compound known as mercaptan as a safety measure, which results in some SOx emissions when burned. However, in comparison with other fossil fuels used in thermal power plants, such as coal and oil, SOx emissions from natural gas combustion are very low. Particulate matter emissions from natural gas combustion are also very low compared with other fossil fuels. The long term sulfur content of pipeline-quality natural gas proposed for this project is less than or equal to 0.25 grain of sulfur per 100 cubic feet at standard temperature and pressure (gr/100 scf) and short term sulfur content of 0.75 gr/100 scf. Inlet air filtration also helps to control particulate emissions by removing ambient particulate matter from incoming air.

Ammonia Emissions Resulting from NOx Controls

Aqueous ammonia, 19 percent by weight, is injected into the flue gas stream as part of the SCR system that controls NOx emissions. In the presence of the catalyst, the ammonia and NOx react to form harmless elemental nitrogen and water vapor. However, not all of the ammonia reacts with the flue gases to reduce NOx; a portion of the ammonia passes through the SCR system and is emitted unaltered from the stacks. These ammonia emissions are known as ammonia slip. The applicant proposes to limit ammonia slip (NH_3) emissions from each CTG emission control system to 5 ppmvd, as required by **AQ-32**.

PROPOSED OPERATION EMISSIONS

Air Quality Table 15 through **Air Quality Table 18** summarize the maximum (worst-case) criteria pollutant emissions associated with the RBEP project's normal and routine operation. Emissions for each engine are based upon:

- NOx emissions controlled to 2.0 parts per million by volume, dry basis (ppmvd) corrected to 15 percent oxygen, averaged over any one-hour period except during startups and combustor tuning;
- VOC, also known as POC, emissions controlled to 2.0 ppmvd at 15 percent O_2;
- CO emissions controlled to 2.0 ppmvd at 15 percent O_2 for any one-hour period;
- PM10/PM2.5 and SOx emissions would be kept to a minimum through the exclusive use of natural gas, inlet air filtration, and oxidation catalyst system.

A cold start event occurs when the combustion turbine and the steam generator system are all at ambient temperature at the time of the startup, which would typically occur if more than 49 hours elapse between a shutdown event and system startup event. For the cold start event, the time from fuel initiation until reaching the base load operating rate is expected to take up to 90 minutes. A warm start event would typically occur if the startup was initiated between nine and 49 hours from a shutdown event. A hot start event would typically occur if the startup was initiated within nine hours of a shutdown event. For the warm and hot start events, the time from fuel initiation until reaching the base load operating rate is expected to take up to 32.5 minutes. The duration of a shutdown event is approximately ten minutes. Since PM10 and SOx emissions are proportional to fuel use, PM10 and SOx emissions rates would be lower during any partial-load operation and only fluctuate slightly during startup and shutdown scenarios. **Air Quality Table 15** lists the maximum CTG startup and shutdown emission rates in pound per hour (lb/hr) and pound per event (lb/event) bases.

Air Quality Table 15
Facility Startup and Shutdown Emission Rates

Event	NOx	VOC	PM10/ PM2.5	CO	SOx
Cold Startup (lb/event/turbine)	28.7	27.9	--	115.9	--
Cold Startup (lb/hr/turbine)	25.4	27.3	<4.5	113.9	1.96
Warm Startup (lb/event/turbine)	16.6	21.0	--	46.0	--
Warm Startup (lb/hr/turbine)	23.1	22.1	<9.5	50.0	<2.63
Hot Startup (lb/event/turbine)	16.6	20.4	--	33.6	--
Hot Startup (lb/hr/turbine)	23.1	21.5	<9.5	37.6	<2.63
Shutdown (lb/event/turbine)	9.0	31.0	--	45.3	--
Shutdown (lb/hr/turbine)	17.8	32.5	<4.5	50.7	<1.96

Source: RBEP 2012a, Section 5.1 and Appendix 5.1B.

Air Quality Table 16 lists the maximum hourly emissions from the proposed equipment. Emissions for NOx, CO, and VOC during startup and shutdown events would have higher emissions than during steady-state operation. The applicant's proposed worst case hourly NOx and CO emissions occur during a cold start, while hourly VOC emissions are based on a shutdown event with the remainder of the hour operating in steady state.

Air Quality Table 16
Maximum Hourly Emissions (pounds per hour [lb/hr])

Source	NOx	VOC	PM10/ PM2.5	CO	SOx
Each CTG(steady-state, w/o duct burner)	10.6	3.67	4.5	6.4	1.96
Each CTG(steady-state, w duct burner)	14.3	4.96	9.5	8.7	2.63
Each CTG (worst case hour)	25.4	32.5	9.5	113.9	2.63
Total Maximum Hour (Three CTGs)	76.2	97.5	28.5[a]	341.7	7.89[b]

Source: RBEP 2012a, Section 5.1 and Appendix 5.1B.
Notes:
a. This emission rate was used in the worst case modeling impact assessment. However, duct burner firing would not be employed when all three CTGs are in operation (Section 2.0, p. 2-22), so this is a slight overestimation.

Air Quality Table 17 lists the worst-case emissions during any given day of operation of the proposed RBEP. The maximum daily emissions represent the maximum monthly total emissions divided by 30 days. Monthly emissions are based on five cold starts per turbine, 25 warm starts per turbine, 60 hot starts per turbine, 90 shutdowns per turbine, 489.5 hours of operation per turbine at 100 percent load and 63.3º F without duct burner firing, and 186 hours of operation per turbine at 100 percent load at 63.3º F with duct burner firing.

Air Quality Table 17
Maximum Daily Emissions (lb/day)

Source	NOx	VOC	PM10/ PM2.5	CO	SOx
Each CTG	339.37	246.58	142.59	419.32	52.77
Total Maximum Daily Emissions	**1,018.11**	**739.75**	**427.76**	**1,257.96**	**158.31**

Source: RBEP 2012a, Section 5.1 and Appendix 5.1B.

Air Quality Table 18 lists maximum potential annual emissions from the proposed project. The worst case annual emissions are based 624 startup and shutdowns per turbine per year, which includes; 24 cold starts per turbine, 150 warm starts per turbine, and 450 hot starts per turbine. The annual emissions also assumes 5,900 hours of base load operation without duct burner firing per turbine per year, and 470 hours of base load operation with duct burner firing per turbine per year.

Annual SOx emissions are based on an expected annual fuel sulfur content of 0.25 gr/100 scf.

Air Quality Table 18
Maximum Annual Emissions (tpy)

Source	NOx	VOC	PM10/ PM2.5	CO	SOx
Each CTG	40.5	27.43	16.55	46.2	2.15
Total Maximum Annual Emissions (Three CTGs)	**121.5**	**82.3**	**49.65**	**138.7**	**6.45**

Source: RBEP 2012a, Section 5.1 and Appendix 5.1B.

Worker trips and material deliveries cause emissions of criteria pollutants from mobile sources operating offsite. These are shown in **Air Quality Table 19** based on 21 plant employees commuting daily and about 22 deliveries of materials per month.

Air Quality Table 19
Annual Offsite Emissions (tpy)

Source	NOx	VOC	PM10	PM2.5	CO	SOx
Worker Commutes (Offsite)	0.017	0.003	0.005	0.003	0.184	0.001
Material Deliveries (Offsite)	0.020	0.002	0.001	0.001	0.007	<0.001
Total Annual Emissions (tpy)	**0.040**	**0.005**	**0.006**	**0.004**	**0.192**	**0.001**

Source: RBEP 2012a, Section 5.1 and Appendix 5.1B.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

Staff characterizes air quality impacts as follows: All project emissions of nonattainment criteria pollutants and their precursors (NOx, VOC, PM10, PM2.5, SOx, and NH_3) are considered significant and must be mitigated. For short-term construction activities that essentially cease before operation of the power plant, our assessment is qualitative and mitigation consists of controlling construction equipment tailpipe emissions and fugitive dust emissions to the maximum extent feasible. For operating emissions, the mitigation includes both the Best Available Control Technology (BACT) and emission reduction credits (ERC) or other valid emission reductions to offset emissions of both nonattainment criteria pollutants and their precursors.

The ambient air quality standards used by staff as the basis for characterizing project impacts are health-based standards established by the ARB and U.S. EPA. They are set at levels that contain a margin of safety to adequately protect the health of all people, including those most sensitive to adverse air quality impacts such as the elderly, persons with existing illnesses, children, and infants.

PROPOSED PROJECT IMPACTS AND MITIGATION

Ambient air quality impacts occur when project emissions cause the ambient concentration of a pollutant to increase. Project-related emissions are the actual mass of emitted pollutants, which are diluted in the atmosphere before reaching the ground. Analysis begins with quantifying the emissions, and then uses an atmospheric dispersion model to determine the probable change in ground-level concentrations caused by those emissions.

Dispersion models complete the complex, repeated calculations that analyze the emissions in the context of various ambient meteorological conditions, local terrain, and nearby structures that affect air flow. For the RBEP, the surface meteorological data (e.g. wind speed, wind direction, and temperature) used as an input to the dispersion model included five years (2005-2009) of hourly data collected at the LAX monitoring station. The surface data have also been coupled with upper air data from the San Diego Miramar National Weather Service station (Station #03190). The use of upper air data from San Diego is acceptable because these data represent large-scale effects and as such, these data are measured only at a few locations in California. The AERMET data files used for the modeling analysis were downloaded directly from the SCAQMD website and were approved by them for evaluating RBEP's air quality impacts.

The applicant conducted the air dispersion modeling based on guidance in the Guideline on Air Quality Models (40 CFR Part 51, Appendix W) and using the EPA approved American Meteorological Society/Environmental Protection Agency Regulatory Model, known as AERMOD (version 12345). The U.S. EPA designates AERMOD as a "preferred" model for refined modeling in all types of terrain including the vicinity of the proposed RBEP. Staff conducted and independent analysis using AERMOD to compare construction and operational impacts to the CAAQS and NAAQS. For determining impacts during inversion breakup fumigation and shoreline fumigation conditions, the applicant used the U.S. EPA SCREEN3 model.

The federal one-hour NO_2 and 24-hour PM2.5 standards are statistically based (i.e., three-year average 98th percentile values). In order to demonstrate compliance with these standards, the modeled impacts from the project were added to hourly background concentrations conservatively derived from the measured ambient levels. The resulting impacts were then evaluated following EPA guidance to demonstrate compliance with the statistical standard. The federal one-hour SO_2 standard is the maximum modeled concentration combined with the three-year average of the 99th percentile background concentration. To determine short-term (one-hour) and annual NO_2 impacts, the applicant used the EPA Tier 2 default Ambient Ratio Method (ARM) with a NOx to NO_2 ratio of 0.8 and 0.75, respectively. Project-related modeled concentrations for all other pollutants and averaging times are added to highest monitored background concentrations to arrive at the total project impact. The total impact is then compared with the ambient air quality standards for each pollutant to determine whether the project's emissions would either cause a new violation of the ambient air quality standards or contribute to an existing violation.

Construction Impacts and Mitigation

This section discusses the project's direct construction ambient air quality impacts assessed by the applicant and reviewed and approved by staff, with additional assessments as needed.

Air Quality Table 20 summarizes the results of the modeling analysis for construction activities. The modeled impacts are the results of modeling the highest emission rates from all construction activities for each respective criteria pollutant and averaging period that is expected to occur over the 60 month construction schedule, as shown in **Air Quality Tables 10** and **11**. The total impact is the sum of the existing background condition plus the maximum impact predicted by the modeling analysis for project activity. The values in **bold** and shaded in the Impact and Background columns represent the values that either equal or exceed the relevant ambient air quality standard.

Air Quality Table 20
Construction-Phase Maximum Impacts (µg/m³)

Pollutant	Averaging Time	Modeled Impact	Background	Total Impact	Limiting Standard	Percent of Standard
PM10	24 hour	22.4	41	**63.4**	50	**127**
	Annual	6.97	**26**	**32.97**	20	**165**
PM2.5	24 hour federal[a]	6.12	31.8	**37.92**	35	**190**
	Annual	1.73	**13**	**14.73**	12	**123**
CO	One hour	47.7	3,220	3,268	23,000	16
	Eight hour	37.2	2,778	2,815	10,000	28
NO_2[b]	One hour	95.9	182.7	278.6	339	82
	One hour federal[c]	--	--	180	188	96
	Annual	6.69	24.7	31.66	57	56
SO_2	One hour	0.11	68	68.1	655	10
	One hour federal[d]	0.11	42	42.1	196	21
	24 hour	0.025	11	11	105	11

Source: RBEP 2014f.
Notes:
a. Total predicted concentration for the federal 24-hour PM2.5 standard is the maximum modeled concentration combined with the three-year average of the 98th percentile background concentration.
b. The maximum one-hour and annual NO_2 concentraions include ambient ratios of 0.80 and 0.75, respectively.
c. Total predicted concentration is the high 8th high pairing of the modeled concentration with the three-year average of the 98th percentile seasonal, hourly background concentration, as provided by the SCAQMD.
d. Total predicted concentration for the federal one-hour SO_2 standard is the maximum modeled concentration combined with the three-year average of the 99th percentile background concentrations.

The construction-phase PM10 and PM2.5 impacts include both fugitive dust and exhaust from combustion. The modeling results show that construction activities could cause and contribute to violations of the PM10 and PM2.5 health-based ambient air quality standards. The maximum modeled project construction PM10 and PM2.5 24-hour and PM2.5 annual impacts would occur on the north-eastern property boundary fence line. The maximum modeled project construction PM10 annual impact would occur on the south-western property boundary fence line. The PM10 and PM2.5 concentrations decrease rapidly with distance.

Air Quality Table 21 summarizes the results of the modeling analysis for demolition of units 1-4 with simultaneous operation of existing units 5-8. The modeled impacts are the results of modeling the highest emission rates for each respective criteria pollutant and averaging period that is expected to occur during the 12 month schedule for demolition of Units 1-4 and continued operation of Units 5-8, as shown in **Air Quality Tables 12** and **13**. The total impact is the sum of the existing background condition plus the maximum impact predicted by the modeling analysis for project activity. The values in **bold** and shaded in the Impact and Background columns represent the values that either equal or exceed the relevant ambient air quality standard.

Air Quality Table 21
Demolition of Units 1-4 with Simultaneous Operation of existing Units 5-8
Maximum Impacts (µg/m^3)

Pollutant	Averaging Time	Maximum Modeled Impact: Demo Units 1-4	Maximum Modeled Impact: Operation Units 5-8	Maximum Modeled Impact: Combined	Background	Total Impact	Limiting Standard
PM10	24 hour	28.93	0.052	28.93	41	**69.93**	50
	Annual	8.11	0.022	8.11	**26**	**34.11**	20
PM2.5	24 hour federal[a]	4.11	0.039	4.11	31.8	**35.91**	35
	Annual	1.18	0.015	1.18	**13**	**14.18**	12
CO	One hour	72.0	12.8	72.0	3,220	3,292	23,000
	Eight hour	58.5	9.48	58.5	2,778	2,837	10,000
NO_2[b]	One hour	114	0.51	114	182.7	296.7	339
	One hour federal[c]	173	95.4	173	--	173	188
	Annual	6.65	0.067	6.65	24.7	31.35	57
SO_2	One hour	0.143	0.053	0.143	68	68.14	655
	One hour federal[d]	0.143	0.053	0.143	42	42.14	196
	24 hour	0.036	0.019	0.038	11	11.04	105

Source: RBEP 2014r, Data Response 8, and RBEP 2103s.
Notes:
a. Total predicted concentration for the federal 24-hour PM2.5 standard is the maximum modeled concentration combined with the three-year average of the 98th percentile background concentration.
b. The maximum one-hour and annual NO_2 concentrations include ambient ratios of 0.80 and 0.75, respectively.
c. Total predicted concentration is the high 8th high pairing of the modeled concentration with the three-year average of the 98th percentile seasonal, hourly background concentration, as provided by the SCAQMD.
d. Total predicted concentration for the federal one-hour SO_2 standard is the maximum modeled concentration combined with the three-year average of the 99th percentile background concentrations.

As shown in **Air Quality Table 21**, nearly all of the maximum impacts occur as result of demolition activities. The potential for any plume overlap resulting from demolition of Units 1-4 and simultaneous operation of existing Units 5-8 does not result in the worst case predicted combined impacts, other than for a small fraction of the 24-hour SO_2 impact. However, the table does show that although emissions during demolition of Units 1-4 are predicted to be less than emissions associated with other phases of the construction schedule (as shown in **Air Quality Tables 10** through **13**) the impacts were still slightly higher for some pollutants (as shown in **Air Quality Tables 20** and **21**). This is due to the demolition activities occurring on a different portion of the construction site and within a more concentrated area.

The PM10 and PM2.5 impacts associated with the demolition of Units 1-4 include both fugitive dust and exhaust from combustion. The maximum modeled project demolition and continued operation PM10 and PM2.5 24-hour and annual impacts would occur on the north-western property boundary fence line near the demolition activities of Units 1-4. The PM10 and PM2.5 concentrations decrease rapidly with distance.

Staff believes that directly-emitted particulate matter emissions from demolition and construction would cause a significant impact because they would cause new violations or contribute to existing violations of PM10 and PM2.5 ambient air quality standards, and additionally that those emissions can and should be mitigated to a level of insignificance. Although not modeled, significant secondary impacts caused by gas-to-particle conversion would also occur for PM10, PM2.5, and ozone because construction-phase emissions of particulate matter precursors (including SOx) and ozone precursors (NOx and VOC) would contribute to existing violations of these standards. The direct impacts of NO_2, in conjunction with worst-case background conditions, would not create a new violation of the applicable NO_2 ambient air quality standards. The direct impacts of CO and SO_2 would not be significant because construction of the project would neither cause nor contribute to a violation of these standards. Mitigation should be provided for construction emissions of PM10, PM2.5, SOx, NOx, and VOC to reduce PM10, PM2.5, and ozone impacts.

Applicant Proposed Construction Mitigation

The applicant proposes the following mitigation measures to reduce the exhaust emissions from the diesel heavy equipment and fugitive dust emissions during the construction of the project:

- Watering unpaved roads and disturbed areas
- Limiting onsite vehicle speeds to 10 mph and post the speed limit
- Frequent watering during periods of high winds when excavation/grading is occurring
- 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 two weeks
- Use of Tier III construction equipment where feasible
- Maintaining all diesel-fueled equipment per manufacturer's recommendations to reduce tailpipe emissions
- Limiting diesel heavy equipment idling to less than five minutes, to the extent practical
- Using electric motors for construction equipment to the extent feasible.

Adequacy of Proposed Mitigation

Staff generally concurs with the applicant's proposed mitigation measures, which mirror many of the staff's mitigation recommendations from previous siting cases. But staff proposes additional fugitive dust mitigation, such as requiring the use of soil binders or paving to reduce emissions on unpaved roads, considered necessary to reduce the high fugitive dust emission potential during construction. Staff incorporates off-road equipment mitigation measures beyond those proposed by the applicant to fully implement current staff recommendations.

The PM10 and PM2.5 impacts during the approximately five-year project construction period would cause exceedances of health-based ambient air quality standards and thus these impacts would be significant. Staff recommends that the applicant consider further staggering of construction activities to reduce concurrent emissions, and implement additional mitigation measures to reduce construction emissions and potential impacts.

Staff Proposed Mitigation

Staff recommends specific additional construction mitigation measures to ensure enforceable reductions of the potential impacts. Measures recommended by staff would reduce construction-phase impacts to a less than significant level by reducing construction emissions of particulate matter and combustion contaminants. The variable nature of construction activities warrants a qualitative approach to mitigation. Construction emissions and the effectiveness of mitigation varies widely depending on variable levels and timing of activity, the specific work taking place, the specific equipment, soil conditions, weather conditions, and other factors, making precise quantification difficult. Despite this variability, there are a number of feasible control measures that can be implemented to significantly reduce construction emissions. Staff has determined that the use of oxidizing soot filters is a viable emissions control technology for all heavy diesel-powered construction equipment that does not use an ARB-certified low emission diesel engine. Staff includes proposed staff Conditions of Certification **AQ-SC1** through **AQ-SC5** to implement these requirements. These conditions are consistent with both the applicant's proposed strategy and the conditions of certification adopted in similar prior licensing cases. Compliance with these conditions would substantially reduce the potential for significant air quality impacts during construction of the RBEP project.

However, the modeling results in **Air Quality Tables 20** and **21** show that PM10 and PM2.5 24-hour impacts during the approximately five-year project construction period would cause exceedances of health-based ambient air quality standards and because staff determined that these impacts would be significant, staff recommends that additional mitigation measures need to be employed to further reduced construction period emissions and potential impacts to a level of insignificance. **Air Quality Table 22** shows the emission reductions needed to maintain compliance with the AAQS.

Air Quality Table 22
Emission Reductions Required for Compliance with Ambient Limiting Standards

Phase	Averaging Period	Modeled Emission Rate (lb/day)	Modeled Impact (μg/m³)	Background Concentration (μg/m³)	Limiting Standard (μg/m³)	Maximum Impact to Maintain Compliance (μg/m³)[a]	Maximum Emission Rate to Maintain Compliance (lb/day)[b]	Required Emission Reductions for Compliance (lb/day)[c]
Construction	PM10 (24-hr)	22.42	22.4	41	50	9	9.01	13.41
Construction	PM2.5 (24-hr)	8.76	6.12	31.8	35	3.2	4.58	4.18
Demolition Units 1-4	PM10 (24-hr)	12.86	28.93	41	50	9	4.00	8.86
Demolition Units 1-4	PM2.5 (24-hr)	4.56	4.11	31.8	35	3.2	3.55	1.01

Notes:
a. The difference of the limiting standards and the background concentrations.
b. Values extrapolated by dividing the modeled emission rate by modeled impact and multiplying by the maximum impact to maintain compliance with AAQS.
c. The difference of modeled emission rate and maximum emission rate to maintain compliance with AAQS.

Staff proposes that, prior to beginning construction, the applicant provide a Construction Particulate Matter Mitigation Plan (CPMMP) that details the steps to be taken and the reporting requirements necessary to provide the equivalent of at least 13.41 lbs/day of PM10 and 4.18 lbs/day of PM2.5 emission reductions during the construction phase of the project. Staff includes proposed staff condition **AQ-SC6** to implement this requirement.

Operation Impacts and Mitigation

The following section discusses ambient air quality impacts that were estimated by the applicant and subsequently evaluated by Energy Commission staff. The applicant performed a number of direct impact modeling analyses, including both fumigation modeling and modeling for impacts during commissioning.

Routine Operation Impacts

A refined dispersion modeling analysis was performed by the applicant to identify off-site criteria pollutant impacts that would occur from routine operational emissions throughout the life of the project. The worst case impacts reflect startup and shutdown, and steady-state operation as described in **Air Quality Table 15** through **Air Quality Table 18,** which summarizes the worst case operating profile. 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, the applicant conducted a screening level dispersion modeling analysis which included 70, 80, 90, and 100 percent CTG loads with and without duct burner firing at 33 degrees Fahrenheit (°F), 63.3°F, and 106°F.

The modeled impacts are extremely conservative, since the maximum impacts are evaluated under a combination of highest allowable emission rates and the most extreme meteorological conditions, which are unlikely to occur simultaneously with the highest background levels. The predicted maximum concentrations of criteria pollutants are summarized in **Air Quality Table 23**. PM10 and PM2.5 values are shown in **bold** and shaded because they exceed ambient air quality standards due to high background levels.

Air Quality Table 23
Routine Operation Maximum Impacts (µg/m^3)

Pollutant	Averaging Time	Modeled Impact	Background	Total Impact	Limiting Standard	Percent of Standard
PM10	24 hour	1.73	41	42.73	50	85
	Annual	0.21	**26**	**26.21**	20	**131**
PM2.5	24 hour federal[a]	1.73	31.8	33.53	35	96
	Annual	0.21	**13**	**13.21**	12	**110**
CO	One-hour	179	3,220	3,399	23,000	15
	Eight hour	38.0	2,778	2,816	10,000	28
NO_2[b]	One hour	32.1	182.7	214.8	339	63
	One hour federal[a]	32.1	122.2	154.3	188	82
	Annual	0.32	24.7	25	57	44
SO_2	One hour	3.35	68	71.4	655	11
	One hour federal[c]	3.35	42	45.4	196	23
	24 hour	0.48	11	11.5	105	11

Source: 2013f and RBEP 2013o.
Notes:
a. Total predicted concentrations for the Federal one-hour NO_2 and 24-hour PM2.5 standard are the respective maximum modeled concentrations combined with the three-year average of the 98th percentile background concentrations.
b. The maximum one-hour and annual NO_2 concentrations include ambient NO_2 ratios of 0.80 and 0.75, respectively.
c. Total predicted concentrations for the Federal one-hour SO_2 standard is the maximum modeled concentration combined with the three-year average of the 99th percentile background concentrations.

The maximum modeled PM10 and PM2.5 annual impacts from operation of the RBEP are approximately 1 percent and 2 percent of the limiting standards, respectively, and are expected to occur approximately 400 meters east of the eastern boundary project fence line.

Staff believes that directly-emitted particulate matter emissions from operation would cause a significant impact because they would contribute to existing violations of PM10 and PM2.5 ambient air quality standards, and additionally that those emissions can and should be mitigated to a level of insignificance. Although they cannot be modeled, secondary impacts would also occur for PM10, PM2.5, and ozone because operational emissions of particulate matter precursors (including SOx) and ozone precursors (NOx and VOC) would contribute to existing violations of these standards. The direct impacts of NO_2, in conjunction with worst-case background conditions, would not create a new violation of the applicable NO_2 ambient air quality standards. The direct impacts of CO and SO_2 would not be significant because operation of the project would neither cause nor contribute to a violation of these standards. Mitigation should be provided for operational emissions of PM10, PM2.5, SOx, NOx, and VOC to reduce PM10, PM2.5, and ozone impacts.

Secondary Pollutant Impacts

The project's gaseous emissions of NOx, SOx, VOC, and ammonia are precursor pollutants that can contribute to the formation of secondary pollutants, including ozone, PM10, and PM2.5. Gas-to-particulate conversion in ambient air involves complex chemical and physical processes that depend on many factors, including local humidity, pollutant travel time, and the presence of other compounds. Currently, there are no agency-recommended models or procedures for estimating ozone or particulate nitrate or sulfate formation from a single project or source. However, because of the known relationships of NOx and VOC to ozone and of NOx, SOx, and ammonia emissions to secondary PM10 and PM2.5 formation, unmitigated emissions of these pollutants would likely contribute to higher ozone and PM10/PM2.5 levels in the region. Significant impacts of ozone and PM10/PM2.5 precursors would be mitigated with offsets that would be provided in compliance with Rule 1303(b)(2) and Rule 2005.

Ammonia (NH_3) is a particulate precursor but not a criteria pollutant because there is no air quality standard for ammonia. Reactive with sulfur and nitrogen compounds, ammonia can be found from natural sources, agricultural sources, and as a byproduct of tailpipe controls on motor vehicles and stack controls on power plants. Mitigating SOx and NOx emissions would both avoid significant secondary PM10/PM2.5 impacts and reduce secondary pollutant impacts to a less than significant level.

Energy Commission staff recommends limiting ammonia slip emissions to the extent feasible to avoid unnecessary ammonia emissions, consistent with staff policy to reduce emissions of all nonattainment pollutant precursors to the lowest feasible levels. The feasibility of reducing ammonia slip depends on the power plant technology, the design of the NOx control system, the expected operating profile, and the cost-effectiveness. **AQ-32** limits ammonia slip to 5 ppmvd; this level is considered by staff to be the achievable performance standard to avoid unnecessarily high levels of ammonia emissions.

Fumigation Impacts

There is the potential that higher short-term concentrations of pollutants may occur during shoreline or inversion breakup fumigation conditions. 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 and is then mixed to the surface as a result of advection of the air masses 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. Fumigation conditions are short-term in nature and are only compared to one-hour standards.

The analysis of fumigation impacts considered the maximum allowable hourly emissions from the facility under any mode of routine operation using the EPA SCREEN3 model (version 96043). The fumigation impacts are presented in **Air Quality Table 24**.

Air Quality Table 24
Operation Fumigation Impacts (µg/m^3)

Pollutant	Averaging Time	Modeled Impact	Background	Total Impact	Limiting Standard	Percent of Standard
CO	One hour	306	3,220	3,526	23,000	15
NO_2	One hour[a]	60.7	182.7	243.4	339	72
SO_2	One hour	6.98	68	74.98	655	11

Source: RBEP 2012a, Section 5.1.
Notes:
a. One-hour NO_2 result includes a NO_2 to NOx equilibrium ratio of 0.9 (i.e., in stack ratio of 0.5 and out-of-stack equilibrium of 0.8, or 0.5 + (0.8 x 0.5) = 0.9.

Commissioning-Phase Impacts

Commissioning impacts would occur over short-term periods lasting approximately 180 days. Maximum hourly emissions for NOx, VOC, and CO would occur with the gas turbine undergoing initial load tests before emission control systems are installed and operational. Emission rates for PM10, PM2.5, and SOx during initial commissioning are not expected to be higher than normal operating emissions. This is because PM10 and SOx emissions are proportional to fuel use. The worst case commissioning estimates assume a maximum of three engines operating simultaneously. The applicant conducted a screening level dispersion modeling analysis which included 5, 40, 50, and 100 percent loads to evaluate the worst case commissioning impacts. **Air Quality Table 25** provides the commissioning, demolition, and construction (commission-phase) maximum impacts by activity. **Air Quality Table 26** provides the worst case combined impacts plus the background values relative to the limiting standards.

Ongoing construction of the proposed RBEP (e.g. new control building and relocation of the Wayland Whaling Wall) and demolition of Units 5-8, and 17 would be expected to occur simultaneous to the commissioning period (months 43-48).Therefore, the maximum commissioning-phase impacts include these activities. Commissioning, demolition, and construction emissions estimates are provided in **Air Quality Table 14**.

Air Quality Table 25
Commissioning-Phase with Demolition of RBGS Units 5-8 and 17, and Construction of RBEP Maximum Impacts by Activity (µg/m^3)

Pollutant	Averaging Time	Maximum Modeled Impact by Activity			
		Demo Units 5-8, and 17	Construction	Commissioning	Worst Case Combined
PM10	24 hour	18.9	3.23	1.53	19.9
	Annual	0.25	6.74	0.24	7.0
PM2.5	24 hour federal	2.38	0.45	1.53	2.9[a]
	Annual	0.23	0.70	0.24	0.96
CO	One hour	47.6	12.4	6,337	6,342
	Eight hour	34.1	8.09	2,647	2,794
NO_2[b]	One hour	63.5	17.6	175	182.4
	Annual	4.02	0.65	0.44	4.43
SO_2	One hour	0.11	0.022	3.92	6.60
	24 hour	0.023	0.0044	0.67	1.12

Source: RBEP 2014f and staff revised modeling.
Notes:
a. This value was corrected by staff. The applicants modeling analysis showed the worst case impact included three stacks at 40% load, one stack at 100% load, and one stack with 50% load, plus construction and demolition sources. There should be no more than three stacks included in the commission-phase impact assessment.
b. The maximum one-hour and annual NO_2 concentrations include ambient ratios of 0.80 and 0.75, respectively.

As shown in **Air Quality Table 25**, the commissioning-phase PM10 and PM2.5 impacts are dominated by demolition and construction activities. The PM10 and PM2.5 24-hour and annual impacts are shown to occur on the southwestern property boundary fence line near the demolition of Units 5-8, and 17. The PM10, PM2.5, and SO_2 impacts from commissioning the three CTGs are similar to the impacts from routine operation. The NO_2 and CO impacts are higher during commissioning, because initial load testing is completed before emission control systems are installed and operational. **Air Quality Table 26** provides the commissioning-phase maximum impact resulting from commissioning, and concurrent demolition and construction activities, compared to the limiting ambient air quality standards.

Air Quality Table 26
Commissioning-Phase with Demolition of RBGS Units 5-8 and 17, and Construction of RBEP Maximum Impacts (μg/m³)

Pollutant	Averaging Time	Modeled Impact	Background	Total Impact	Limiting Standard	Percent of Standard
PM10	24 hour	19.9	41	**60.9**	50	**122**
	Annual	7.0	**26**	**33**	20	**165**
PM2.5	24 hour Federal[a]	2.9	31.8	34.7	35	99
	Annual	0.96	**13**	**13.96**	12	**116**
CO	One hour	6,342	3,220	9,562	23,000	42
	Eight hour	2,794	2,778	5,572	10,000	56
NO_2[b]	One hour	182.4	182.7	**365.1**	339	**108**
	Annual	4.43	24.7	29.1	57	51
SO_2	One hour	6.6	68	75.6	655	11
	24 hour	1.12	11	12.12	105	12

Source: RBEP 2014f.
Notes:
a. Total predicted concentration of the federal 24-hour PM2.5 standard is the maximum modeled concentration combined with the three-year average of the 98th percentile background concentrations.
b. The maximum one-hour and annual NO_2 concentrations include ambient ratios of 0.80 and 0.75, respectively.

Maximum NO_2 impacts occur from three turbines commissioning at 50 percent load with concurrent demolition and construction activities. **Air Quality Table 26** shows that under this scenario the maximum modeled NO_2 impact, in addition with the background concentration, would exceed the CAAQS. Therefore, staff evaluated NO_2 impacts from only two turbines commissioning at the same time with 50 percent load with concurrent demolition and construction activities. **Air Quality Table 27** provides the impacts from that assessment.

Air Quality Table 27
Commission-Phase 1-hour NO_2 Maximum Impacts from Two Turbines

Turbines in commissioning	Modeled Impact[a]	Background	Total Impact
1 and 2	181.6	182.7	**364.3**
1 and 3	128.8	182.7	311.5
2 and 3	105.6	182.7	288.3

Source: Independent staff modeling impact assessment.
Notes:
a. The maximum one-hour and annual NO_2 concentrations include ambient ratios of 0.80 and 0.75, respectively.

The total impact would exceed the CAAQS if stacks 1 and 2 underwent commissioning at the same time at 50 percent load with concurrent construction and demolition activities. The maximum impact would occur at the eastern property boundary fence line. Staff is proposing Condition of Certification **AQ-SC9** to limit commissioning emissions to ensure compliance with AAQS.

Mitigation for Routine Operation

Applicant's Proposed Mitigation

The proposed RBEP would mitigate air quality impacts by limiting emissions to the maximum extent feasible with the Best Available Control Technology. The equipment description, equipment operation, and proposed emission control devices are provided in Air Quality Project Description. The project would also be required to mitigate all non-attainment and non-attainment precursor emissions by providing emission offsets.

Emission Controls

RBEP proposes the use of dry low NOx combustors with SCR to control NOx to 2.0 ppmvd (one-hour average) with and without duct burning. The BACT for CO and VOC emissions is best available combustion design and the installation of an oxidation catalyst system to reduce CO and VOC to 2.0 ppmvd (one-hour average) with and without duct burning. Best combustion practice, use of pipeline-quality natural gas, and use of inlet air filtration limit PM10 and PM2.5 emissions to 4.5 lb/hr without duct burning and 9.5 lb/hr with duct burning. Operating exclusively on low sulfur, pipeline quality natural gas with a fuel sulfur content of no more than 0.75 grains per 100 standard cubic feet limits SO_2 emissions. Generally, the actual sulfur content is about 0.25 grains per 100 standard cubic feet of fuel.

Emission Offsets

SCAQMD Rule 1303(b)(2) requires that all increases in emissions be offset unless exempt from offset requirements pursuant to SCAQMD Rule 1304.

SCAQMD Rule 1304(a)(2) – Electric Utility Steam Boiler Replacement states that if the electric boilers are replaced by advanced gas turbine, including combined cycle and simple cycle configurations, the project would be exempt from emissions offset requirements unless there was a basin-wide electricity generation capacity increase on a per-utility basis. If there is an increase in basin-wide capacity, only the increased capacity must be offset via traditional offset rules and regulations. SCAQMD Rule 1135 defines advanced combustion sources as those which emit NOx at no greater than 0.10 lb/net MWh on a daily average basis, excluding commissioning, start-up and shutdown periods, if the source is located within the South Coast Air Basin. The MPSA 501DA gas turbine would be operated in combined cycle configuration and would comply with this rule.

The language of this exemption allows for exemptions from offset and modeling normally required if the in-basin megawatt capacity of the utility receiving the facility's energy does not increase. The purpose was to facilitate the replacement of less efficient boiler/steam turbine technology with cleaner gas turbine technology. Since the advent of the Regional Clean Air Incentives Market (RECLAIM), the exemption was expanded to include modifications conducted for compliance with Regulation XX rules.

The PDOC shows that the total power generating capacity from the proposed replacement units is 546.4 MW for the RBEP. In order to qualify for the exemption, the applicant is proposing to shut down existing Boiler Nos. 6 through 8. Specifically, 480 MW would come from the shutdown of Boiler No. 7 (480 MW) and 66.4 MW would come from the shutdown of Boilers Nos. 6 and 8 (655 MW combined). Therefore there would be no net megawatt increase and the new power generating system would qualify for the Rule 1304(a)(2) exemption. Thus, the facility does not have to provide emission reduction credits for PM10, SOx, and VOC emissions of the new gas turbines. Instead, the PM10, SOx, and VOC emissions of the new gas turbines would be fully offset from SCAQMD's internal account.

SCAQMD Rule 1304.1 – electric Generating Fee for Use of Offset Exemption requires electrical generating facilities which use the specific offset exemption described in Rule 1304(a)(2) [Electric Utility Steam Boiler Replacement] to pay fees for up to the full amount of offsets provided by the SCAQMD in accordance with Rule 1304. RBEP would be required to demonstrate compliance with the specific requirements of this rule prior to issuance of the Permits to Construct for the proposed facility.

Under Rule 2005, the RBEP would be subjected to the RECLAIM program for NOx emissions. The facility has demonstrated that it holds sufficient RECLAIM Trading Credits (RTCs) to offset the annual NOx emission increase for the first compliance period using a 1-to-1 offset ratio.

Air Quality Table 28 shows the California Environmental Quality Act (CEQA) mitigation that is provided for the emission impacts from the proposed project, which is based on the new source review (NSR) offsets/emissions identified in the SCAQMD PDOC (SCAQMD 2014a) and staff's own analysis.

Air Quality Table 28
Offset Requirements (tpy)

Source	NOx	VOC	PM10/ PM2.5	CO	SOx
Maximum Year Annual Emissions[a]	133.9	103.5	54.05	307.7	8.04
RECLAIM Trading Credits	133.9	0	0	0	0
1304 Exemption Credits	0	254.2	77	0	28.5
Staff Recommended Mitigation for CEQA Only	133.9	103.5	54.05	0	8.04
Fully Offset?	**Yes**	**Yes**	**Yes**	**N/A[b]**	**Yes**

Source: SCAQMD 2014a and independent staff assessment.
Notes:
a. Maximum year estimates are based on total commissioning emissions plus maximum routine annual operating emissions.
b. Carbon monoxide offsets are not required.

The area is designated as attainment for CO, so the district NSR regulations do not require ERCs for mitigation. In addition, staff does not require mitigation under CEQA other than the installation of BACT and modeling to show that the proposed facility would not cause a violation of any CO ambient air quality standard.

Adequacy of Proposed Mitigation

Staff believes that the NOx RTCs are a valid mechanism to mitigate the NOx emissions due to the extensive monitoring and reporting requirements for the RECLAIM program.

Commission staff have long recommended that mitigation be provided by projects certified by the Energy Commission to address adverse air quality impacts. Emission reductions of nonattainment pollutants and their precursors at a minimum overall one-to-one ratio of annual operating emissions can provide this mitigation. For RBEP, the district would provide emission offsets from its internal account that would meet or exceed a one-to-one offset ratio for all ozone and particulate matter precursors. Staff concludes that adverse impacts are mitigated for CEQA purposes by these emissions reductions. These offsets are required before commencement of operation.

Energy Commission staff's position for CEQA mitigation in this region is that all nonattainment polluatnt and precursor emissions must be reduced by a ratio of at least one-to-one. As discussed above, the relationship of PM10/PM2.5 precursors to PM is well known, although the conversion process is complex. Staff concludes that providing CEQA mitigation at a minimum ratio of one-to-one would reduce secondary PM10/PM2.5 impacts to less than significant for the proposed RBEP.

Staff's evaluation of the adequacy of the project mitigation was determined soley based on the merits of the case, including the district offset requirements, the project's emission limits, the specific ERCs proposed, and ambient air quality considerations of the region, and does not in any way provide a precedence or obligation for the acceptance of offset proposals for any other current or future licensing cases.

Staff Proposed Mitigation

Staff proposes Conditions of Certification **AQ-SC7** to ensure that the license is amended as necessary to incorporate future changes to the air quality permits and **AQ-SC8** and **AQ-SC9** to ensure ongoing compliance during commissioning and routine operation through quarterly reports.

CUMULATIVE IMPACTS AND MITIGATION

"Cumulative impacts" are defined as "two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts" (CEQA Guidelines, §15355). Such impacts can be relatively minor and incremental yet still be significant because of the existing environmental background, particularly when considering other closely related past, present, and reasonably foreseeable future projects.

Criteria pollutants have impacts that are usually (though not always) cumulative by their nature. Rarely will a project itself cause a violation of a federal or state criteria pollutant standard. However, many new sources contribute to violations of criteria pollutant standards because of elevated background conditions. Air districts attempt to reduce background criteria pollutant levels by adopting attainment plans, which are multi-faceted programmatic approaches to attainment. Attainment plans typically include new source review requirements that provide offsets and use Best Available Control Technology, combined with more stringent emissions controls on existing sources.

The discussion of cumulative air quality impacts includes the following three analyses:

- a summary of projections for criteria pollutants by the local air quality management district and the programmatic efforts to abate such pollution;
- an analysis of the project's "localized cumulative impacts" caused by direct emissions when combined with other local major emission sources; and
- a discussion of greenhouse gas impacts (in **Air Quality Appendix AIR-1**).

SUMMARY OF PROJECTIONS

The SCAQMD is the agency with principal responsibility for analyzing and addressing cumulative air quality impacts, including the impacts of ambient ozone and particulate matter. The SCAQMD has summarized the cumulative impact of ozone and particulate matter on the air basin from the broad variety of its sources. Analyses of these cumulative impacts, as well as the measures the SCAQMD proposes to reduce impacts to air quality and public health, are summarized in four publicly available documents that the SCAQMD has adopted. These adopted air quality plans are summarized below.

- **Final 2012 Air Quality Management Plan** (adopted 12/07/2012)

  Link: http://www.aqmd.gov/aqmp/2012aqmp/index.htm
- **Final 2007 Air Quality Management Plan** (adopted 06/01/2007)

  Link: http://www.aqmd.gov/aqmp/07aqmp/index.html
- **Final Socioeconomic Report for the Final 2012 AQMP** (adopted 12/07/2012)

  Link: http://www.aqmd.gov/aqmp/2012aqmp/Final/FinalSocioeconomicReport.pdf
- **State of California's SIP for the new federal PM2.5 and 8-hour ozone standards** (adopted June 20, 2011)

  Link: http://www.arb.ca.gov/planning/sip/2007sip/2007sip.htm

2012 Air Quality Management Plan

(The following paragraphs are excerpts from the Executive Summary of the 2012 Air Quality Management Plan adopted by the SCAQMD December 7, 2012)

The SCAQMD adopted (December 7, 2012) the 2012 Air Quality Management Plan (AQMP) primarily in response to changes in the federal Clean Air Act (CAA). The CAA requires a 24-hour PM2.5 non-attainment area to prepare a State Implementation Plan (SIP) revision by December 14, 2012. The SIP must demonstrate attainment with the 24-hour PM2.5 standard by 2014, with the possibility of up to a five-year extension to 2019, if needed. U.S. EPA approval of any extension request is based on the lack of feasible control measures to move forward the attainment date by one year. The District's attainment demonstration shows that, with implementation of all feasible controls, the earliest possible attainment date is 2014, and thus no extension of the attainment date is needed. In addition, the U.S. EPA requires that transportation conformity budgets be established based on the most recent planning assumptions (i.e., within the last five years) and approved motor vehicle emission models. The Final Plan is based on the most recent assumptions provided by both CARB and Southern California Association of Governments (SCAG) for motor vehicle emissions and demographic updates and includes updated transportation conformity budgets.

The Final 2012 AQMP outlines a comprehensive control strategy that meets the requirement for expeditious progress towards attainment with the 24-hour PM2.5 NAAQS in 2014 with all feasible control measures. The Plan also includes specific measures to further implement the ozone strategy in the 2007 AQMP to assist attaining the 8-hour ozone standard by 2023. The control measures contained in the Final 2012 AQMP can be categorized as follows:

> *1) Basin-wide Short-term PM2.5 Measures - Measures that apply Basin-wide, have been determined to be feasible, will be implemented by the 2014 attainment date, and are required to be implemented under state and federal law. The main short-term measures are episodic, in that they only apply during high PM2.5 days and will only be implemented as needed to achieve the necessary air quality improvements.*
>
> *2) Contingency Measures - Measures to be automatically implemented if the Basin fails to achieve the 24-hour PM2.5 standard by 2014.*
>
> *3) 8-hour Ozone Measures - Measures that provide for necessary actions to maintain progress towards meeting the 2023 8-hour ozone NAAQS, including regulatory measures, technology assessments, key investments, and incentives.*
>
> *4) Transportation Control Measures - Measures generally designed to reduce vehicle miles travelled (VMT) as included in SCAG's 2012 Regional Transportation Plan.*

Many of the control measures proposed are not regulatory in form, but instead focus on incentives, outreach, and education to bring about emissions reductions through voluntary participation and behavioral changes needed to complement regulations.

The Basin faces several ozone and PM attainment challenges, as strategies for significant emission reductions become harder to identify and the federal standards continue to become more stringent. California's Greenhouse Gas reductions targets under AB32 add new challenges and timelines that affect many of the same sources that emit criteria pollutants. In finding the most cost-effective and efficient path to meet multiple deadlines for multiple air quality and climate objectives, it is essential that an integrated planning approach is developed. Responsibilities for achieving these goals span all levels of government, and coordinated and consistent planning efforts among multiple government agencies are a key component of an integrated approach. To this end, and concurrent with the development of the 2012 AQMP, the District, the Air Resources Board, and San Joaquin Valley Air Pollution Control District engaged in a joint effort to take a coordinated and integrated look at strategies needed to meet California's multiple air quality and climate goals, as well as its energy policies. California's success in reducing smog has largely relied on technology and fuel advances, and as health-based air quality standards are tightened, the introduction of cleaner technologies must keep pace. More broadly, a transition to zero- and near-zero emission technologies is necessary to meet 2023 and 2032 air quality standards and 2050 climate goals. Many of the same technologies will address air quality, climate and energy goals. As such, strategies developed for air quality and climate change planning should be coordinated to make the most efficient use of limited resources and the time needed to develop cleaner technologies.

2007 Air Quality Management Plan

(The following paragraphs are excerpts from the Executive Summary of the 2007 Air Quality Management Plan adopted by the SCAQMD June 1, 2007)

The SCAQMD adopted (June 1, 2007) the 2007 Air Quality Management Plan (AQMP) primarily in response to changes in the federal Clean Air Act (CAA). The CAA requires an 8-hour ozone non-attainment area to prepare a State Implementation Plan (SIP) revision by June of 2007 (which has been completed) and a PM2.5 non-attainment area to submit a SIP revision by late 2007 (which has been completed). The SCAQMD has decided that it is most prudent to prepare a single comprehensive and integrated SIP revision that satisfies both the ozone and PM2.5 requirements. Additionally, the U.S.EPA requires that transportation conformity budgets be established based on the most recent planning assumptions and approved motor vehicle emission model. The AQMP is based on assumptions provided by both the California Air Resources Board (CARB) and the Southern California Association of Governments (SCAG) reflecting their upcoming model (EMFAC) for motor vehicle emissions and demographic updates.

The AQMP relies on a comprehensive and integrated control approach to achieve the PM2.5 standard by 2015 through implementation of short-term and midterm control measures and achieve the 8-hour ozone standard by 2021/2024 based on implementation of additional long-term measures. In order to demonstrate attainment by the prescribed deadlines, emission reductions needed for attainment must be in place by 2014 and 2020/2023 timeframe.

The AQMP control measures consist of four components: 1) the District's Stationary and Mobile Source Control Measures; 2) CARB's Proposed State Strategy; 3) District Staff's Proposed Policy Options to Supplement VARB's Control Strategy; and 4) Regional Transportation Strategy and Control Measures provided by SCAG.

In order to achieve necessary reductions for meeting air quality standards, all four agencies (i.e., SCAQMD, ARB, U.S. EPA, and SCAG) would have to aggressively develop and implement control strategies through their respective plans, regulations, and alternative approaches for pollution sources within their primary jurisdiction. Even though SCAG does not have direct authority over mobile source emissions, it will commit to the emission reductions associated with implementation of the 2004 Regional Transportation Plan and 2006 Regional Transportation Improvement Program which are imbedded in the emission projections. Similarly, the Ports of Los Angeles and Long Beach have authority they must utilize to assist in the implementation of various strategies if the region is to attain clean air by federal deadlines.

Although the SCAQMD has completely met its obligations under the 2003 AQMP and stationary sources subject to the District's jurisdiction account for only 12% of NOx and 37% of SOx emissions in the Basin in 2014, the Final 2007 AQMP contains several short-term and mid-term control measures aimed at achieving further NOx and SOx reductions (as well as VOC and PM2.5 reductions) from these already regulated sources. These strategies are based on facility modernization, energy conservation measures and more stringent requirements for existing equipment (e.g., space heaters, ovens, dryers, furnaces).

Clean air for this region requires CARB to aggressively pursue reductions and strategies for on-road and off-road mobile sources and consumer products. In addition, considering the significant contribution of federal sources such as marine vessels, locomotives, and aircraft in the Basin (i.e., 72% of SOx and 34% of NOx), it is imperative that the U.S. EPA pursue and develop regulations for new and existing federal sources to ensure that these sources contribute their fair share of reductions toward attainment of the federal standards. Unfortunately, regulation of these emission sources has not kept pace with other source categories and as a result, these sources are projected to represent a significant and growing portion of emissions in the Basin. Without a collaborative and serious effort among all agencies, attainment of the federal standards would be seriously jeopardized.

Final Socioeconomic Report for the Final 2012 AQMP

(The following are excerpts from the Final Socioeconomic Report for the Final 2012 AQMP adopted by the SCAQMD December, 2012)

The 2012 AQMP has been prepared to meet the challenge of achieving healthful air quality in the South Coast Air Basin (Basin) and the Coachella Valley. This report accompanies the 2012 AQMP and presents the potential socioeconomic impacts resulting from implementation of this Plan. The information contained herein is considered by the South Coast Air Quality Management District (District) Governing Board when taking action on the Plan.

The 2012 AQMP control strategy is comprised of a traditional command-and-control approach, voluntary/incentive programs, and advanced technologies. Short- and near-term control strategies are proposed and will be implemented by the District, local and regional governments (e.g., transportation control measures provided in the 2012 Regional Transportation Plan), and the California Air Resources Board (CARB). These strategies include basin-wide short-term PM2.5 measures, episodic control measures for high PM2.5 days, measures to partially implement the Section 182(e)(5) commitment in the 2007 ozone SIP toward meeting the 8-hour ozone standard by 2024, and transportation control measures (TCM) adopted by the Southern California Association of Governments (SCAG). Many of the measures require behavioral changes and voluntary participation through outreach, incentive, and education. Implementation of these control strategies has potential effects on the region's economy.

The District relies on a number of methods, tools, and data sources to assess the impact of proposed control strategies on the economy. The involved applications include: integration of air quality data and concentration-response relationships to estimate benefits of clean air; capital, operating and maintenance expenditures on control devices and emission reductions to assess the cost of the Plan; and REMI (Regional Economic Models, Inc.) model to assess potential employment and other socioeconomic impacts (e.g., population and competitiveness).

Over the years, there has been an overall trend of steady improvement in air quality in the Basin. Additional emission reductions are still needed in order to bring the Basin into compliance with the federal 24-hour PM2.5 standard. Complying with the air quality standard would allow the District to avoid potential sanctions that could increase offset ratios for major sources and result in suspension of highway transportation funding. The benefits of better air quality through implementation of the 2012 AQMP include reductions in morbidity and mortality, visibility improvements, reduced expenditures on refurbishing building surfaces, and reduced traffic congestion.

The Draft 2012 Plan is projected to comply with the federal PM2.5 standard with an average annual benefit of $10.7 billion between 2014 and 2035. The $10.7 billion includes approximately $7.7 billion for congestion relief for all TCMs in the 2012 RTP, $2.2 billion for averted illness and higher survival rates, $696 million for visibility improvements, and $14 million for reduced damage to materials.

The analysis contained herein estimates that the benefits for the Plan significantly outweigh the anticipated costs. The measurement of clean air benefits is performed indirectly since clean air is not a commodity purchased or sold in a market. This often results in incomplete and underestimated benefits. The benefits of clean air (based on the total emission reductions required for attainment) for which a monetary figure can be applied are estimated to be $10.7 billion (including congestion relief benefits for all the TCMs) as compared to the estimated costs of $448 million on an average annual basis. There are, however, many benefits which are still unaccounted for, such as reductions in chronic illness and lung function impairment in human beings, reduced damage to livestock and plant life, erosion of building materials, and the value of reduced vehicle hours traveled for personal trips.

The Plan is designed to bring northwest Riverside (the Mira Loma area), the only area in exceedance of the federal PM2.5 standard, into attainment. However, PM2.5 air quality benefits occur throughout the Basin. The San Fernando Valley, southern Los Angeles County, and the northwest Riverside County would experience the highest shares of air quality benefits. The western portions of Los Angeles and Orange Counties and the eastern and northern portions of San Bernardino County are projected to have the highest shares of health benefits.

Implementation of PM2.5 and ozone measures would impose costs on various communities. The sub-regions with the highest costs are the central, southeast, and San Fernando areas of Los Angeles County. These three areas are projected to have the highest cost shares from SCAG TCMs and relative higher cost shares from ozone measures.

All sub-regions are projected to have additional jobs created from cleaner air. The eastern, southern, and San Fernando sub-regions in Los Angeles County and Riverside County are projected to have more jobs created than other sub-regions resulting from clean air benefits. Implementation of quantified control measures would result in jobs forgone between 2013 and 2035. Orange County is projected to have the highest share of jobs forgone from implementation of control measures. This is because the majority of SCAG transportation control measures (TCM) in Orange County would be financed by development fees, which would have a heavy burden on one single sector of the economy—the construction sector. For the entire Plan, all sub-regions would show positive job impacts as the four-county area becomes more competitive and attractive with the progress in clean air.

Job gains from cleaner air would benefit all wage groups. Conversely, all five groups would experience jobs forgone from control measures. However, there is no significant difference in impacts expected for high- versus low-paying jobs. The same is observed for impacts on the price of consumption goods from one income group to another. These findings will be further evaluated during individual rule development.

State of California SIP for the new federal PM2.5 and 8-hour ozone standards *(adopted June 20, 2011)*

On April 28, 2011, the Air Resources Board considered revisions to the South Coast (and San Joaquin Valley) State Implementation Plans (SIPs) for PM2.5 that accounted for reductions of emissions that contribute to PM2.5 levels. The revisions were formally adopted by the ARB's Executive Officer on May 18, 2011, when Executive Order S-11-010 was signed. The April 2011 PM2.5 SIP revisions accounted for recent regulatory actions and recessionary impacts on emissions that occurred after the South Coast (and San Joaquin Valley) PM2.5 SIPs were adopted. Those revisions accounted for the impact the economic recession has had on emissions and the benefits of ARB's in-use diesel truck and off-road equipment regulations. The revisions updated the PM2.5 SIP's reasonable further progress calculations, transportation conformity budgets, and ARB's rulemaking calendar.

LOCALIZED CUMULATIVE IMPACTS

AES is in the process of preparing an assessment on the combined air quality impacts of the proposed project, neighboring electric generating facilities, and other reasonably foreseeable local projects. The analysis for localized cumulative impacts depends upon identifying which present and future projects are not included in the background conditions.

Reasonably foreseeable future projects in the area are those that are either currently under construction or in the process of being approved by a local air district or municipality. Projects that have not yet entered the approval process do not normally qualify as "foreseeable" since the detailed information needed to conduct this analysis is not available. Sources that are presently operational are included in the background concentrations. Stationary source projects located up to six miles from the proposed project site usually need to be included in the analysis. Background conditions take into account the effects of non-stationary (mobile and area) sources.

The applicant is continuing to request emissions data from the SCAQMD and will provide the cumulative impact assessment once all necessary information to perform the assessment has been obtained. The cumulative impact assessment will be addressed in the Final Staff Assessment.

COMPLIANCE WITH LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

The Preliminary Determination of Compliance (PDOC) for RBEP was released and dated June 11, 2014 (SCAQMD 2014a). Compliance with all district rules and regulations was demonstrated to the district's satisfaction in the PDOC, and the PDOC conditions are presented in the conditions of certification located near the end of this section.

FEDERAL

40 CFR 51, Nonattainment New Source Review

The PDOC includes conditions that would implement the federal nonattainment New Source Review (NSR) permit for RBEP.

40 CFR 52, Prevention of Significant Deterioration

The RBEP project is subject to permit requirements under the Prevention of Significant Deterioration (PSD) program. The PDOC includes a PSD evaluation.

40 CFR 60 Subpart KKKK - NSPS for Stationary Gas Turbines

The turbines are subject to Subpart KKKK because their heat input is 1,492 MMBtu/hr, which is greater than the applicability limit of 10 MMBtu/hr (10.7 gigajoules per hour) at peak load, based on the higher heating value of the fuel fired. The standards applicable for a natural gas turbine greater than 850 mmbtu/hr is: NOx 15 ppm at 15% O_2 (0.43 lbs/MWh), SOx 0.90 lbs/MWh discharge, or 0.060 lbs/mmbtu potential SO2 in the fuel. In addition, this regulation requires that the fuel consumption and water-to-fuel ratio be monitored and recorded on a continuous basis, or alternatively, that a NOx and O_2 CEMS be installed.

For this project, monitoring of the emissions from each combustion turbine and associated duct burner would be achieved with a CEMS certified in accordance with Rule 2012. Since the CTGs with associated duct burners will meet the BACT NOx limit of 2.0 ppmv @ 15% O_2, compliance with this section is expected. For Sox, if the operator can provide supplier data showing the sulfur content of the fuel is less than 20 grains/100cf (for natural gas), then daily fuel monitoring is not required. Rule 431.1 limits pipeline natural gas to 16 ppmv sulfur limit (calculated as H_2S) specified in this rule. The 16 ppmv sulfur is equivalent to 1.0 grain/100 SCF (0.0626285 grain/100 SCF per 1 ppm), which is significantly less than 20 grains/100 SCF. Compliance with the requirements of this rule is expected.

40 CFR 64, Compliance Assurance Monitoring (CAM)

The CAM regulation applies to emission units at major stationary sources required to obtain a Title V permit, which use control equipment to achieve a specified emission limit and which have emissions that are at least 100 percent of the major source thresholds on a pre-control basis. The RBEP is a major source and the turbine emissions are greater than the major source thresholds for NOx, CO, and VOC and the turbines will be subject to an emission limit for each of these pollutants.

For each turbine, a continuous emission monitoring system (CEMS) will be installed for NOx and for CO. The NOx CEMS will be certified in accordance with Rule 2012 requirements, and the CO CEMS will be certified in accordance with Rule 218 requirements. Since the NOx and CO CEMS qualify as continuous compliance determination methods, the CEMS provide an exemption from this subpart for NOx and CO.

This subpart also applies to the VOC emissions because the VOC BACT limit is achieved with the assistance of the oxidation catalyst. The oxidation catalyst is primarily installed to control CO emissions, but also controls VOC emissions somewhat. The CO catalyst is located at the outlet of the turbine and designed to provide the required control efficiency at the expected turbine exhaust temperature range. There are no operational requirements for the CO catalyst. To assure that the catalyst is not exhausted, each turbine is required to be source tested every three years for VOC pursuant to condition **AQ-15**.

40 CFR 72, Acid Rain Provisions

Acid Rain provisions are designed to control SO_2 and NOx emissions that could form acid rain from fossil fuel fired combustion devices in the electricity generating industry. Facilities are required to cover SO_2 emissions with "SO_2 allowances" or purchase of SO_2 offsets on the open market. The facility is also required to monitor SO_2 emissions through use of fuel gas meters and gas constituent analysis (use of emission factors is also acceptable in certain cases), or with the use of exhaust gas CEMS. The RBEP facility will comply with the monitoring requirements of the acid rain provisions with the use of gas meters in conjunction with natural gas default sulfur data as allowed by the Acid Rain regulations (Appendix D to 40 CFR Part 75). If additional SO_2 credits are needed, RBEP will obtain the credits from the SO_2 trading market. Based on the above, compliance with this rule is expected.

STATE

RBEP has demonstrated that the project would comply with Section 41700 of the California State Health and Safety Code, which restricts emissions that would cause nuisance or injury. Conditions required in the SCAQMD's preliminary determination of compliance (PDOC, SCAQMD 2014a) and the Energy Commission staff's Conditions of Certification enable staff's affirmative finding.

LOCAL

The applicant provided an air quality permit application to the SCAQMD and the district has issued a PDOC (SCAQMD 2014a), which states that the proposed project is expected to comply with all applicable district rules and regulations. The SCAQMD will also issue a final determination of compliance (FDOC) after considering comments submitted during the comment period.

The district rules and regulations specify the emissions control and offset requirements for new sources such as the RBEP. Best Available Control Technology would be implemented, and RECLAIM trading credits (RTCs) for NOx and SOx emissions are required by district rules and regulations based on the permitted emission levels for this project. Compliance with the district's new source requirements would ensure that the project would be consistent with the strategies and future emissions anticipated under the district's air quality attainment and maintenance plans.

As part of the Energy Commission's licensing process, in lieu of issuing a construction permit to the applicant for the RBEP, the district has prepared and presented to the Energy Commission the PDOC, and will issue the FDOC after a public comment period. The DOCs evaluate whether and under what conditions the proposed project would comply with the district's applicable rules and regulations, as described below. A Permit to Construct would be issued by the SCAQMD only after the Energy Commission approves the AFC, as long as the decision includes all SCAQMD requirements.

Compliance with specific SCAQMD rules and regulations is discussed below via excerpts from the PDOC (SCAQMD 2014a). For a more detailed discussion of the compliance of the proposed facility modifications, please refer to the PDOC (SCAQMD 2014a).

Regulation II – Permits

Rule 212 – Standards for Approving Permits

This project is subject to Rule 212 public notice requirements because the daily maximum VOC, NOx, PM10, SOx, and CO emissions from the project would all exceed the emissions thresholds specified in subdivision (g) of this rule. The District will prepare the public notice and it will contain sufficient information to fully describe the project. In accordance with subdivision (d) of this rule, the applicant will be required to distribute the public notice to each address within ¼ mile radius of the project.

Rule 218 – Continuous Emission Monitoring System (CEMS)

A CO CEMS would be required to be installed on each CTG to verify compliance with the CO emission limits. In accordance with paragraphs (c), (e), (f), the facility is required to submit an "Application for CEMS" for each CO CEMS and to adhere to retention of records requirements and reporting requirements once approval to operate the CO CEMS is granted. Compliance with this rule is expected.

Regulation IV – Prohibitions

Rule 401 – Visible Emissions

This rule prohibits the discharge of visible emissions for a period aggregating more than three minutes in any one hour which is as dark as or darker in shade than Ringelmann No. 1. Visible emissions are not expected from the gas turbines because they will be firing exclusively on pipeline quality natural gas.

Rule 402 – Nuisance

This rule requires that a person not discharge from any source whatsoever such quantities of air contaminants or other material which cause injury, detriment, nuisance, or annoyance to any considerable number of persons or to the public, or which cause, or have a natural tendency to cause injury or damage to business or property. Nuisance problems are not expected from the CTGs and auxiliary equipment under normal operation.

Rule 403 – Fugitive Dust

The provisions of this rule apply to any activity or man-made condition capable of generating fugitive dust. This rule prohibits emissions of fugitive dust beyond the property line of the emission source. The applicant will be taking steps to prevent and/or reduce or mitigate fugitive dust emissions from the project site. In addition, the applicant will need to implement all Best Available Control Measures listed in Table 1 of the rule. The installation and operation of the turbines and associated equipment is expected to comply with this rule.

Rule 407 – Liquid and Gaseous Air Contaminants

This rule limits the gas turbines to 2000 ppmv CO. The CO emissions from the turbines would be controlled by an oxidation catalyst to the BACT/LAER limit of 2 ppmvd at 15 percent O2. The SO_2 portion of the rule does not apply per subdivision (c)(2), because the natural gas fired in the CTGs will comply with the sulfur limit in Rule 431.1. Therefore, compliance with this rule is expected.

Rule 409 – Combustion Contaminants

This rule restricts the discharge of contaminants from the combustion of fuel to 0.23 grams per cubic meter (0.1 grain per cubic foot) of gas, calculated to 12 percent CO_2, averaged over 15 minutes. The turbines have a grain loading of 0.009 grains/scf at the maximum firing load and therefore are expected to meet this limit. Compliance will be verified through the initial performance test.

Rule 431.1 – Sulfur Content of Gaseous Fuels

The natural gas supplied to the gas turbine is expected to comply with the 16 ppmv sulfur limit (calculated as H_2S) specified in this rule, because commercial grade natural gas has an average sulfur content of 4 ppm.

Rule 475 – Electric Power Generating Equipment

This rule applies to power generating equipment greater than 10 MW installed after May 7, 1976. Requirements are that the equipment meets a limit for combustion contaminants of 11 lbs/hr or 0.01 gr/scf. Compliance is achieved if either the mass limit or the concentration limit is met. Mass PM10 emissions from each turbine are estimated at 9.5 lbs/hr, and 0.0033 gr/scf during natural gas firing at maximum firing load. Therefore, compliance is expected. Compliance will be verified through the initial performance test as well as ongoing periodic testing.

REGULATION XIII – New Source Review (NSR)

The SCAQMD new source review rules are based on both the National Ambient Air Quality Standards (NAAQS) and the California Ambient Air Quality Standards (CAAQS). The NAAQS referenced here are the primary NAAQS, which are the levels of air quality necessary, with an adequate margin of safety, to protect the public health.

- **Rule 1303(a)(1) – BACT/LAER (PM10, SOx, VOC, CO)**
- **Rule 2005(c)(1)(A) – BACT/LAER (NOx)**

  Best Available Control Technology (BACT) for a new or modified source which results in an emission increase of any nonattainment air contaminant, any ozone depleting compound, or ammonia, with the SCAQMD interpreting the emission increase to be 1 lb/day or greater. BACT is based on the increase of uncontrolled emissions and does not apply to commissioning, startups, or shut downs. SCAQMD has determined that BACT for combined cycle gas turbines is 2.0 ppmdv @ 15% O_2 (1-hr averaging) for NOx, CO, and VOC, and the use of natural gas fuel with fuel sulfur content of no more than 1 grain/100 scf for PM10 and SOx, and 5.0 ppmdv @ 15% O_2 (1-hr averaging) for NH_3. Compliance with BACT requirements are verified in the PDOC.

- **Rule 1303(b)(1) - Modeling**
- **Rule 2005(c)(1)(B) - Modeling**

  The applicant performed dispersion modeling for NO_2, CO, SO_2, and PM. Modeling evaluations were performed using the American Meteorological Society/USEPA AERMOD (version 12345) model and representative meteorological data from the SCAQMD's LAX meteorological station coupled with upper air data from the San Diego Miramar National Weather Service station. Modeling analysis was performed for turbine startups, normal turbine operation, and turbine commissioning operations. The results of the modeling show that the project would not cause a violation, or make significantly worse an existing violation, of any state or national ambient air quality standard.

- **Rule 1303(b)(2) - Offsets**

  Rule 1303(b)(2) requires a net emission increase in emissions of any nonattainment air contaminant from a new or modified source to be offset unless exempt from offset requirements pursuant to Rule 1304. Since CO is an attainment pollutant and not a precursor to any nonattainment pollutant, offset requirements are not applicable. The RBEP has been evaluated under Rule 1304(a)(2) for PM10, VOC, and SOx, and Rule 2005(c)(2) for NOx.

- **Rule 1303(b)(3) - Sensitive Zone Requirements**
- **Rule 2005(e) – Trading Zone Restrictions**

  Both rules provide that credits shall be obtained from the appropriate trading zone. Rule 1303(b)(3) is not applicable because offsets will not be required to be purchased. Rule 2005(e) is applicable for any RTC purchases.

- **Rule 1303(b)(4) - Facility Compliance**

  RBEP will comply with all applicable rules and regulations of the District, as required by this rule.

- **Rule 1303(b)(5) – Major Polluting Facilities**
- **Rule 2005(g) – Additional Federal Requirements for Major Stationary Sources**

  Any major modification at an existing major polluting facility shall comply with the following provisions. RBGS is an existing major polluting facility as defined by Rule 1302(s), and its replacement by RBEP is a major modification under Rule 1302(r).

- **Rule 1303(b)(5)(A) – Alternative Analysis**
- **Rule 2005(g)(2)—Alternative Analysis**
- **Rule 1303(b)(5)(D) – Compliance through CEQA**

- **Rule 2005(g)(3)—Compliance through CEQA**

  The project is subject to the California Energy Commission licensing procedure. Under this procedure, a full analysis of the proposal is conducted, including project alternatives. Please refer to the Alternative section of staff assessment for discussion of alternatives.

- **Rule 1303(b)(5)(B) – Statewide Compliance**
- **Rule 2005(g)(1) – Statewide Compliance**

  The applicant has submitted a statement certifying that all AES's stationary sources are currently in compliance with applicable state and federal environmental regulations.

- **Rule 1303(b)(5)(C) –Protection of Visibility**
- **Rule 2005(g)(4)—Protection of Visibility**

  Net Increase in emissions from the proposed project exceed the 15 tons per year PM10 and 40 tons per year NOx thresholds, but the site is not within the specified distance of any Class I areas.

Rule 1304.1 – Electrical Generating Facility Fee for Use of Offset Exemption

The purpose of this rule is to require electrical generating facilities (EGFs) which use the specific offset exemption described in Rule 1304(a)(2) [Electric Utility Steam Boiler Replacement] to pay fees for up to the full amount of offsets provided by the SCAQMD. The project would utilize the offset exemption of Rule 1304(a)(2) for PM10, SOx, and VOC, and is therefore subject to a fee under this rule. AES has preliminarily selected the annual payment option. As such, the owner/operator is required to remit the first year annual offset fee payment prior to the issuance of the permits to construct.

Rule 1325 – Federal PM2.5 New Source Review

This rule applies to major polluting facilities, which have actual emissions, or a potential to emit, 100 tons per year of PM2.5, or its precursors (40 tons per year of NOx or SO_2). A major polluting facility is required to comply with the following requirements: 1) use lowest achievable emissions rate (LAER), 2) offset PM2.5 emissions at the offset ratio of 1.1:1, 3) certify compliance with emission limits and 4) conduct an alternative analysis of the project. Rule 1325 is not applicable to SO_2 and PM2.5 because RBEP is not a major polluting facility for these pollutants, but the rule is applicable to NOx. The RBEP meets the NOx requirements of Rule 1325 and is discussed in more detail in the PDOC.

REGULATION XVII – Prevention of Significant Deterioration (PSD)

The federal Prevention of Significant Deterioration (PSD) program has been established to protect deterioration of air quality in those areas that already meet the primary NAAQS. This regulation sets forth preconstruction review requirements for stationary sources to ensure that air quality in clean air areas do not significantly deteriorate while maintaining a margin for future industrial growth. Specifically, the PSD program establishes allowable concentration increases for attainment pollutants due to new or modified emission sources that are classified as major stationary sources. The South

Coast Basin where the project would be located is in attainment for NO_2, SO_2, CO, and PM10 emissions. However, only NOx and PM10 are subject to PSD review because the emissions increases and net emissions increases for both NOx and PM10 constitute significant increases.

The applicant performed modeling which indicated that the maximum 24-hour PM10 and annual NO_2 impacts from turbine operations are below the corresponding US EPA Significant Impact Levels (SILs) and Class II PSD Increment Standards. Therefore, 24-hour PM10 and annual NO_2 PSD analyses are not required.

The maximum predicted one-hour NO_2 impact of 31.91 $\mu g/m^3$ exceed the Class II SIL of 7.52 $\mu g/m^3$, with a radius of impact with predicted concentrations greater than 7.52 micrograms per cubic meter (µg/m3) of 0.9 kilometers (km). Consequently, the applicant was required to assess the cumulative impacts of the RBEP and nearby sources for all receptors where RBEP impacts alone exceeded the one-hour NO_2 SIL, instead of merely adding the predicted modeling impacts from RBEP to the background concentration for comparison to the ambient air quality standard. For the cumulative impact assessment, four facilities, Exxon Mobile Oil Corporation, Chevron Products Corporation, LADWP's Scattergood Generating Station, and El Segundo Power were selected to be included based on their facility emissions and distance to the project. Seasonal, by hour-of-day background concentrations from SRA 3, Southwest Coastal LA County (No. 820) monitoring station were used in the modeling. Following the form of the standard, the one-hour NO_2 impact from the project plus cumulative sources plus background is 142.62 ug/m^3, which is less than the Federal one-hour standard of 188 ug/m^3. Therefore, no additional PSD analysis is necessary.

Regulation XX – Regional Clean Air Incentives Market (RECLAIM)

Rule 2005 – New Source Review for RECLAIM

This rule requires RECLAIM facilities to hold sufficient RTCs to offset the first year of operation's emissions increase from a new, relocated, or modified source before commencement of such operation. Conditions of certification **AQ-24** through **AQ-29** ensure compliance with this requirement. The facility is also required to purchase additional RTCs each year.

Rule 2012 – NOx RECLAIM, Monitoring Recording and Recordkeeping Requirements

The turbines and duct burners will be classified as major NOx sources under NOx RECLAIM. As such, they are required to measure and record NOx concentrations and calculate mass NOx emissions with a continuous emissions monitoring system (CEMS). The CEMS would include in-stack NOx and O2 analyzers, a fuel flow meter, and a data recording and handling system. NOx emissions are to be reported to SCAQMD on a daily basis. The CEMS system would be required to be installed within 90 days of start up. Compliance is expected.

REGULATION XXX – Title V

The proposed project is considered as a "significant permit revision" to the RECLAIM/Title V permit for this facility. Rule 3000(b)(31) specifies that a "significant permit revision" includes "installation of new equipment subject to a New Source Performance Standard (NSPS) pursuant to 40 CFR Part 60, or a National Emission Standard for Hazardous Air Pollutants (NESHAP) pursuant to 40 CFR Part 61 or 40 CFR Part 63."

Pursuant to Rule 3003(j), a proposed permit incorporating this permit revision will be submitted to EPA for a 45-day review and 30-day public comment period.

FACILITY CLOSURE

Eventually the RBEP project would close, and all sources of air emissions would cease. Impacts associated with those emissions would also cease. The only other expected emissions would be construction/demolition emissions from any dismantling activities. A facility closure plan is required by Condition of Certification **COM-15** in the **COMPLIANCE CONDITIONS** section of this PSA to be submitted to the Energy Commission compliance project manager prior to conducting such activities to demonstrate compliance with all local, state and federal rules and regulations during both closure and demolition.

CONCLUSIONS

Staff concludes the following:

- Construction impacts would contribute to violations of the ozone, PM10, and PM2.5 ambient air quality standards. Staff recommends Conditions of Certification **AQ-SC1** to **AQ-SC6** to mitigate the project's construction-phase impacts. Due to the long construction period (60 months) and the complexity of construction activities, compliance with these conditions would be critical to reduce construction impacts.
- Commissioning of the project would not cause violations to any ambient air quality standards. Staff recommends Condition of Certification **AQ-SC 9** to limit the number of gas turbines that can be commissioned at the same time.
- Operation of the project would comply with applicable SCAQMD rules and regulations, including New Source Review, Best Available Control Technology (BACT) requirements, and requirements to offset emission increases; staff recommends the inclusion of the District's PDOC conditions as Conditions of Certification **AQ-1** through **AQ-43** for the RBEP.
- Staff proposes Conditions of Certification **AQ-SC7** to ensure that the license is amended as necessary to incorporate future changes to the air quality permits and **AQ-SC8** to ensure ongoing compliance during routine operation through quarterly reports.
- Implementation of the conditions of certification would reduce potential adverse impacts to insignificant levels and ensure that the project's emissions are mitigated to less than significant.

- The projects' emissions would comply with all applicable laws, ordinances, regulations, and standards related to air quality as described in pertinent portions of this analysis.

PROPOSED CONDITIONS OF CERTIFICATION

Air Quality Table 29 maps out the relationship between Energy Commission Condition numbering and district condition numbering and proposed modifications to each condition. This PSA is being published ahead of the District's responses to comments on the PDOC. Conditions of Certification are subject to change in the Final Staff Assessment.

Air Quality Table 29
Mapping of Energy Commission and District Condition Numbering

Energy Commission	District	Energy Commission	District
Staff Conditions		AQ-18	E193.3
AQ-SC1	(none)	AQ-19	E193.4
AQ-SC2	(none)	AQ-20	E193.5
AQ-SC3	(none)	AQ-21	E193.6
AQ-SC4	(none)	AQ-22	E193.7
AQ-SC5	(none)	AQ-23	E193.8
AQ-SC6	(none)	AQ-24	I197.1
AQ-SC7	(none)	AQ-25	I197.2
AQ-SC8	(none)	AQ-26	I197.3
AQ-SC9	(none)	AQ-27	I197.4
Facility Wide		AQ-28	I197.5
AQ-1	F9.1	AQ-29	I197.6
AQ-2	F52.1	AQ-30	K40.2
AQ-3	F52.2	AQ-31	K67.6
Gas Turbine		SCR/CO Catalyst	
AQ-4	A63.1	AQ-32	A195.8
AQ-5	A99.1	AQ-33	D12.8
AQ-6	A99.2	AQ-34	D12.9
AQ-7	A195.5	AQ-35	D12.10
AQ-8	A195.6	AQ-36	D29.3
AQ-9	A195.7	AQ-37	E179.3
AQ-10	A327.1	AQ-38	E179.4
AQ-11	B61.4	AQ-39	E193.3
AQ-12	C1.5	Ammonia Tank	
AQ-13	C1.6	AQ-40	C157.1
AQ-14	D29.1	AQ-41	E144.1
AQ-15	D29.2	AQ-42	E193.3
AQ-16	D82.1	Oil Water Separator	
AQ-17	D82.2	AQ-43	E193.3

PROPOSED CONDITIONS OF CERTIFICATION

Staff proposes the following conditions of certification (identified as the **AQ-SCx** series of conditions) to provide CEQA mitigation for this project.

AQ-SC1 Air Quality Construction Mitigation Manager (AQCMM): The project owner shall designate and retain an on-site AQCMM who shall be responsible for directing and documenting compliance with conditions **AQ-SC3, AQ-SC4** and **AQ-SC5** for the entire duration of project site construction. The on-site AQCMM may delegate responsibilities to one or more AQCMM delegates. The AQCMM and AQCMM delegates shall have full access to all areas of construction on the project site, and shall have the authority to stop any or all construction activities as warranted by applicable construction mitigation conditions. The AQCMM and AQCMM delegates may have other responsibilities in addition to those described in this condition. The AQCMM shall not be terminated without written consent of the compliance project manager (CPM).

Verification: At least 60 days prior to the start of ground disturbance, the project owner shall submit to the CPM for approval the name, resume, qualifications, and contact information for the on-site AQCMM and all AQCMM delegates. The AQCMM and all delegates must be approved by the CPM before the start of ground disturbance.

AQ-SC2 Air Quality Construction Mitigation Plan (AQCMP): The project owner shall provide, for approval, an AQCMP that details the steps to be taken and the reporting requirements necessary to ensure compliance with Conditions of Certification **AQ-SC3**, **AQ-SC4** and **AQ-SC5**.

Verification: At least 60 days prior to the start of any ground disturbance, the project owner shall submit the AQCMP to the CPM for approval. The CPM will notify the project owner of any necessary modifications to the plan within 30 days from the date of receipt. The AQCMP must be approved by the CPM before the start of ground disturbance.

AQ-SC3 Construction Fugitive Dust Control: The AQCMM shall submit documentation to the CPM in each monthly compliance report (MCR) that demonstrates compliance with the Air Quality Construction Mitigation Plan (AQCMP) mitigation measures for purposes of minimizing fugitive dust emission creation from construction activities and preventing all fugitive dust plumes from leaving the project's boundary. The following fugitive dust mitigation measures shall be included in the AQCMP required by **AQ-SC2**, and any deviation from the AQCMP mitigation measures shall require prior CPM notification and approval.

a. The main access roads through the facility to the power block areas will be either paved or stabilized using soil binders, or equivalent methods, to provide a stabilized surface that is similar for the purposes of dust control to paving, that may or may not include a crushed rock (gravel or similar material with fines removed) top layer, prior to initiating construction in the main power block area, and delivery areas for operations materials (chemical, replacement parts, etc.) will be paved prior to taking initial deliveries.

b. All unpaved construction roads and unpaved operation site roads, as they are being constructed, shall be stabilized with a non-toxic soil stabilizer or soil weighting agent that can be determined to be both as efficient or more efficient for fugitive dust control as ARB approved soil stabilizers, and shall not increase any other environmental impacts, including loss of vegetation, to areas beyond where the soil stabilizers are being applied for dust control. All other disturbed areas in the project construction site shall be watered as frequently as necessary during grading; and after active construction activities shall be stabilized with a non-toxic soil stabilizer or soil weighting agent, or alternative approved soil stabilizing methods, in order to comply with the dust mitigation objectives of Condition of Certification **AQ-SC4**. The frequency of watering can be reduced or eliminated during periods of precipitation.

c. No vehicle shall exceed ten miles per hour on unpaved areas within the construction site, with the exception that vehicles may travel up to 25 miles per hour on stabilized unpaved roads as long as such speeds do not create visible dust emissions.

d. The construction site entrances shall be posted with visible speed limit signs.

e. All construction equipment vehicle tires shall be inspected and washed as necessary to be free of dirt prior to entering paved roadways.

f. Gravel ramps of at least 20 feet in length must be provided at the tire washing/cleaning station.

g. All unpaved exits from the construction site shall be graveled or treated to prevent track-out to public roadways.

h. All construction vehicles shall enter the construction site through the treated entrance roadways unless an alternative route has been submitted to and approved by the CPM.

i. Construction areas adjacent to any paved roadway below the grade of the surrounding construction area, or otherwise directly impacted by sediment from site drainage, shall be provided with sandbags or other equivalently effective measures to prevent run-off to roadways, or other similar run-off control measures as specified in the Storm Water Pollution Prevention Plan (SWPPP), only when such SWPPP measures are necessary so that the condition does not conflict with the requirements of the SWPPP.

j. All paved roads within the construction site shall be swept daily or as needed (less during periods of precipitation) on days when construction activity occurs to prevent the accumulation of dirt and debris.

k. At least the first 500 feet of any paved public roadway exiting the construction site or exiting other unpaved roads en route from the construction site or construction staging areas shall be swept as needed (less during periods of precipitation) on days when construction activity occurs or on any other day when dirt or run-off resulting from the construction site activities is visible on the public paved roadways.

l. All soil storage piles and disturbed areas that remain inactive for longer than ten days shall be covered or treated with appropriate dust suppressant compounds.

m. All vehicles that are used to transport solid bulk material on public roadways and that have the potential to cause visible emissions shall be provided with a cover, or the materials shall be sufficiently wetted and loaded onto the trucks in a manner to provide at least two feet of freeboard.

n. Wind erosion control techniques (such as windbreaks, water, chemical dust suppressants, and/or vegetation) shall be used on all construction areas that may be disturbed. Any windbreaks installed to comply with this condition shall remain in place until the soil is stabilized or permanently covered with vegetation.

<u>Verification:</u> The AQCMM shall provide the CPM a Monthly Compliance Report to include the following to demonstrate control of fugitive dust emissions:

A. A summary of all actions taken to maintain compliance with this condition;

B. Copies of any air quality-related complaints filed with the air district or facility representatives in relation to project construction; and

C. Any other documentation deemed necessary by the CPM or AQCMM to verify compliance with this condition. Such information may be provided via electronic format or disk at the project owner's discretion.

AQ-SC4 <u>Dust Plume Response Requirement</u>: The AQCMM or an AQCMM delegate shall monitor all construction activities for visible dust plumes. Observations of visible dust plumes that have the potential to be transported off the project site and within 400 feet upwind of any regularly occupied structures not owned by the project owner indicates that existing mitigation measures are not resulting in effective mitigation. The AQCMP shall include a section detailing how the additional mitigation measures will be accomplished within the time limits specified. The AQCMM or delegate shall implement the following procedures for additional mitigation measures in the event that such visible dust plumes are observed:

Step 1: The AQCMM or delegate shall direct more intensive application of the existing mitigation methods within 15 minutes of making such a determination.

Step 2: The AQCMM or delegate shall direct implementation of additional methods of dust suppression if Step 1 specified above fails to result in adequate mitigation within 30 minutes of the original determination.

Step 3: The AQCMM or delegate shall direct a temporary shutdown of the activity causing the emissions if Step 2 specified above fails to result in effective mitigation within one hour of the original determination. The activity shall not restart until the AQCMM or delegate is satisfied that appropriate additional mitigation or other site conditions have changed so that visual dust plumes will not result upon restarting the shutdown activity. The owner/ operator may appeal to the CPM any directive from the AQCMM or delegate to shut down an activity, provided that the shutdown shall go into effect within one hour of the original determination, unless overruled by the CPM before that time.

<u>Verification:</u> The AQCMM shall provide the CPM a Monthly Compliance Report to include:

A. A summary of all actions taken to maintain compliance with this condition;

B. Copies of any air quality-related complaints filed with the district or facility representatives in relation to project construction; and

C. Any other documentation deemed necessary by the CPM and AQCMM to verify compliance with this condition. Such information may be provided via electronic format or disk at the project owner's discretion.

AQ-SC5 Diesel-Fueled Engine Control: The AQCMM shall submit to the CPM, in the Monthly Compliance Report, a table that demonstrates compliance with the AQCMP mitigation measures for purposes of controlling diesel construction-related combustion emissions. Any deviation from the AQCMP mitigation measures requires prior CPM notification and approval.

All off-road diesel construction equipment used in the construction of this facility shall be powered by the cleanest engines available that also comply with the California Air Resources Board's (ARB's) regulation for In-Use Off-Road Diesel Fleets and shall be included in the Air Quality Construction Mitigation Plan (AQCMP) required by **AQ-SC2**. The AQCMP measures shall include the following, with the lowest-emitting engine chosen in each case, as available:

a. All off-road vehicles with compression ignition engines shall comply with the California Air Resources Board's (ARB's)Regulation for In-Use Off-Road Diesel Fleets (California Code of Regulation Title 13, Article 4.8, Chapter 9, §2449 et. seq.).

b. To meet the highest level of emissions reduction available for the engine family of the equipment, each piece of diesel-powered equipment shall be powered by a Tier 4 engine (without add-on controls) or Tier 4i engine (without ad-on controls), or a Tier 3 engine with a post-combustion retrofit device verified by the ARB or the US EPA. For PM, the retrofit device shall be a particulate filter if verified, or a flow-through filter, or at least an oxidation catalyst. For NOx, the device shall meet the latest Mark level verified to be available.

c. For diesel powered equipment where the requirements of Part “b” cannot be met, the equipment shall be equipped with a Tier 3 engine without retrofit control devices or with a Tier 2 or lower Tier engine using retrofit controls verified by ARB or US EPA as the best available control device to reduce exhaust emissions of PM and nitrogen oxides (NOx) unless certified by engine manufacturers or the on-site AQCMM that the use of such devices is not practical for specific engine types. For purposes of this condition, the use of such devices can be considered “not practical” for the following, as well as other, reasons:

   1. There is no available retrofit control device that has been verified by either the California Air Resources Board or U.S. Environmental Protection Agency to control the engine in question and the highest level of available control using retrofit or Tier 1 engines is being used for the engine in question; or

   2. The use of the retrofit device would unduly restrict the vision of the operator such that the vehicle would be unsafe to operate because the device would impair the operator’s vision to the front, sides, or rear of the vehicle, or

   3. The construction equipment is intended to be on site for ten work days or less.

d. The CPM may grant relief from a requirement in Part “b” or “c” if the AQCMM can demonstrate a good faith effort to comply with the requirement and that compliance is not practical.

e. The use of a retrofit control device may be terminated immediately provided that the CPM is informed within ten working days of the termination and a replacement for the equipment item in question meeting the level of control required occurs within ten work days of termination of the use (if the equipment would be needed to continue working at this site for more than 15 work days after the use of the retrofit control device is terminated) if one of the following conditions exists:

   1. The use of the retrofit control device is excessively reducing the normal availability of the construction equipment due to increased down time for maintenance, and/or reduced power output due to an excessive increase in exhaust back pressure.

   2. The retrofit control device is causing or is reasonably expected to cause engine damage.

   3. The retrofit control device is causing or is reasonably expected to cause a substantial risk to workers or the public.

4. Any other seriously detrimental cause which has the approval of the CPM prior to implementation of the termination.

f. All equipment with engines meeting the requirements above shall be properly maintained and the engines tuned to the engine manufacturer's specifications. Each engine shall be in its original configuration and the equipment or engine must be replaced if it exceeds the manufacturer's approved oil consumption rate.

g. Construction equipment will employ electric motors when feasible.

h. If the requirements detailed above cannot be met, the AQCMM shall certify that a good faith effort was made to meet these requirements and this determination must be approved by the CPM.

i. All off-road diesel-fueled engines used in the construction of the facility shall have clearly visible tags issued by the on-site AQCMM showing that the engine meets the conditions set forth herein.

Verification: The AQCMM shall include in the MCR the following to demonstrate control of diesel construction-related emissions:

A. A summary of all actions taken to control diesel construction related emissions;

B. A list of all heavy equipment used on site during that month, showing the tier level of each engine and the basis for alternative compliance with this condition for each engine not meeting Part "b" or Part "c" requirements. The list shall include the owner of the equipment and a letter from each owner indicating that the equipment has been properly maintained; and

C. Any other documentation deemed necessary by the CPM and AQCMM to verify compliance with this condition. Such information may be provided via electronic format or disk at the project owner's discretion.

AQ-SC6 The project owner shall provide a Construction Particulate Matter Mitigation Plan (CPMMP) that details the steps to be taken and the reporting requirements necessary to provide the equivalent of at least 13.41 lbs/day PM10 and 4.18 lbs/day PM2.5 emission reductions during the construction phase of the project. Construction emission reduction measures can include: localized street sweepers or programs; local ban of leaf blowing or blowers; sodding of local parks or playfields; fireplace or woodstove replacements; offsets or emission reduction credits; or other measures that can provide local emission reductions coincident with construction emissions.

Verification: At least 90 days prior to the start of any ground disturbance, the project owner shall submit the CPMMP, including any approval needed by local jurisdiction, to the CPM for approval. The CPM will notify the project owner of any necessary modifications to the plan within 30 days from the date of receipt. The CPMMP must be approved by the CPM before the start of ground disturbance. During construction the project owner shall provide the records of the CPMMP in the Monthly Compliance Report.

AQ-SC7 The project owner shall provide the CPM copies of all district issued Permit-to-Construct (PTC) and Permit-to-Operate (PTO) documents for the facility. The project owner shall submit an amendment request to the CPM for review and approval any modification proposed by the project owner to any project air permit. The project owner shall submit to the CPM any modification to any permit proposed by the district or U.S. EPA, and any revised permit issued by the district or U.S. EPA, for the project.

Verification: The project owner shall submit any PTC, PTO, and proposed air permit modifications to the CPM within five working days of its submittal either by: 1) the project owner to an agency, or 2) receipt of proposed modifications from an agency. The project owner shall submit all modified air permits to the CPM within 15 days of receipt.

AQ-SC8 The project owner shall submit to the CPM Quarterly Operation Reports, following the end of each calendar quarter, that include operational and emissions information as necessary to demonstrate compliance with the conditions of certification herein. The Quarterly Operation Report shall specifically note or highlight incidences of noncompliance.

Verification: The project owner shall submit the Quarterly Operation Reports to the CPM and APCO no later than 30 days following the end of each calendar quarter.

AQ-SC9 The facility shall be operated such that simultaneous commissioning of two or more combustion turbines without abatement of nitrogen oxide or carbon monoxide emissions by its SCR system and oxidation catalyst system will not occur. Operation of one combustion turbine during commissioning without abatement shall be limited to times when the second and/or third combustion turbines are either non-operational or are in compliance with emission limits for routine operation.

Verification: The project owner shall submit a monthly compliance report to the CPM during the commissioning period demonstrating compliance with this condition.

DISTRICT PRELIMAINRY DETERMINATION OF COMPLIANCE CONDITIONS (SCAQMD 2014A)

The following SCAQMD conditions (**AQ-1** to **AQ-43**) apply to each unit of equipment, and the proposed RBEP facility as a whole.

Facility Wide

AQ-1 Except for open abrasive blasting operations, the operator shall not discharge into the atmosphere from any single source of emissions whatsoever any air contaminant for a period or periods aggregating more than three minutes in any one hour which is:

(a) As dark or darker in shade as that designated No. 1 on the Ringelmann Chart, as published by the United States Bureau of Mines; or

(b) Of such opacity as to obscure an observer's view to a degree equal to or greater than does smoke described in subparagraph (a) of this condition. [Rule 401, 3-2-1984; Rule 401, 11-9-2001]

Verification: The project owner shall make the site available for inspection of records by representatives of the District, Air Resources Board (ARB), and the Energy Commission.

AQ-2 The facility is subject to the applicable requirements of the following rules or regulations(s):

The facility shall submit a detailed retirement plan for the permanent shutdown of Boilers No. 6 (Device D23), No. 7 (Device D6), and No. 8 (Device D8) describing in detail the steps and schedule that will be taken to render Boilers Nos. 6, 7, and 8 permanently inoperable. The retirement plan shall be submitted to SCAQMD within 60 days after Permits to Construct for Gas Turbines No. 03-A (Device D88), 03-B (Device D98), and 03-C (Device D107) are issued.

The retirement plan must be approved in writing by SCAQMD. AES shall not commence any construction of the Redondo Beach Energy Project including Gas Turbines Nos. 03-A, 03-B, 03-C, Steam Turbine No. 03-ST1, and SCR/CO catalysts for Gas Turbine Nos. 03-A, 03-B, 03-C, before the retirement plan is approved in writing by SCAQMD. If SCAQMD notifies AES that the plan is not approvable, AES shall submit a revised plan addressing SCAQMD's concerns within 30 days.

Within 30 calendar days of actual shutdown but no later than December 31, 2018, AES shall provide SCAQMD with a notarized statement that Boilers No. 6, 7, and 8 are permanently shut down and that any re-start or operation of the boilers shall require new Permits to Construct and be subject to all requirements of nonattainment new source review and the prevention of significant deterioration program.

AES shall notify SCAQMD 30 days prior to the implementation of the approved retirement plan for permanent shutdown of Boilers No. 6, 7, and 8, or advise SCAQMD as soon as practicable should AES undertake permanent shutdown prior to December 31, 2018.

AES shall cease operation of Boilers No. 6 (Device D23), No. 7 (Device D6), and No. 8 (D8) within 90 calendar days of the first fire of Gas Turbines No. 03-A (Device D88), No. 03-B (Device D98), or No. 03-C (Device D107).

[Rule 1304(a)—Modeling and Offset Exemption, 6-14-1996; Rule 1313(d), 12-7-1995]

Verification: The project owner shall submit the retirement plan and any modifications to the plan to the CPM within five working days of its submittal either by: 1) the project owner to district, or 2) receipt of proposed modifications from district. The project owner shall make site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

AQ-3 The facility is subject to the applicable requirements of the following rules or regulations(s):

For all circuit breakers at the facility utilizing SF6, including the circuit breakers serving Gas Turbines No. 03-A, 03-B, and 03-C, Steam Turbine Generator No. 03-ST1, and the electrical connection line, the operator shall install, operate, and maintain enclosed-pressure SF6 circuit breakers with a maximum annual leakage rate of 0.5 percent by weight. The circuit breakers shall be equipped with a 10 percent by weight leak detection system.

The leak detection system shall be calibrated in accordance with manufacturer's specifications. The manufacturer's specifications and records of all calibrations shall be maintained on site.

The total CO2e emissions from all circuit breakers shall not exceed 17.8 tons per calendar year.

[Rule 1714, 12-10-2012]

Verification: The project owner shall make site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

Gas Turbines

AQ-4 The operator shall limit emissions from this equipment as follows:

CONTAMINANT	EMISSIONS LIMIT
VOC	14121 LBS IN ANY CALENDAR MONTH
PM10	4278 LBS IN ANY CALENDAR MONTH
SOx	1583 LBS IN ANY CALENDAR MONTH

For the purposes of this condition, the above emission limits shall be based on the emissions from a single turbine.

The turbine shall not commence with normal operation until the commissioning process has been completed. Normal operation commences when the turbine is able to supply electrical energy to the power grid as required under contract with the relevant entities. The SCAQMD shall be notified in writing once the commissioning process for each turbine is completed.

Normal operation may commence in the same calendar month as the completion of the commissioning process provided the turbine is in compliance with the above emission limits.

The operator shall calculate the monthly emissions for VOC, PM10, and SOx using the equation below.

Monthly Emissions, lb/month = (Monthly fuel usage in mmscf/month) * (Emission factors indicated below)

For commissioning, the emission factors shall be as follows: VOC, 22.29 lb/mmcf; PM10, 4.63 lb/mmcf; and SOx, 1.68 lb/mmcf.

For normal operation, the emission factors shall be as follows: VOC, 6.45 lb/mmcf; PM10, 3.73 lb/mmcf; and SOx, 1.38 lb/mmcf.

For a month during which both commissioning and normal operation take place, the monthly emissions shall be the sum of the commissioning emissions and the normal operation emissions.

Each turbine shall not be operated more than 6,835 hours (including 470 hours with duct firing) in any calendar year, including startups and shutdowns, but not commissioning.

The operator shall maintain records in a manner approved by the District to demonstrate compliance with this condition and the records shall be made available to District personnel upon request.

[Rule 1303(a)(1)-BACT, 5-10-1996; Rule 1303(a)(1)-BACT, 12-6-2002; Rule 1304.1, 9-6-2013; Rule 1703-PSD Analysis, 10-7-1988]

Verification: The project owner shall provide emissions summary data in compliance with this condition as part of the Quarterly Operation Reports (**AQ-SC7**). The project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

AQ-5 The 13.08 lbs/mmscf NOx emission limit(s) shall only apply during the turbine commissioning period to report RECLAIM emissions.

[Rule 2012, 5-6-2005]

Verification: The project owner shall demonstrate compliance with this condition as part of the Quarterly Operation Reports (**AQ-SC7**).

AQ-6 The 8.88 lbs/mmscf NOx emission limit(s) shall only apply during the interim period after commissioning to report RECLAIM emissions.

[Rule 2012, 5-6-2005]

Verification: The project owner shall demonstrate compliance with this condition as part of the Quarterly Operation Reports (**AQ-SC7**).

AQ-7 The 2.0 PPMV NOx emission limit(s) is averaged over one hour, dry basis at 15 percent oxygen. This limit shall not apply to turbine commissioning, cold startups, warm startups, hot startups, and shutdown periods.

[Rule 1703 – PSD Analysis, 10-7-1988; Rule 2005, 6-3-2011]

Verification: The project owner shall submit CEMS records demonstrating compliance with this condition as part of the Quarterly Operation Reports (**AQ-SC7**).

AQ-8 The 2.0 PPMV CO emission limit(s) is averaged over one hour, dry basis at 15 percent oxygen. This limit shall not apply to turbine commissioning, cold startups, warm startups, hot startups, and shutdown periods.

[Rule 1703 – PSD Analysis, 10-7-1988]

<u>Verification</u>: The project owner shall submit CEMS records demonstrating compliance with this condition as part of the Quarterly Operation Reports (**AQ-SC7**).

AQ-9 The 2.0 PPMV VOC emission limit is averaged over one hour, dry basis at 15 percent oxygen. This limit shall not apply to turbine commissioning, cold startups, warm startups, hot startups, and shutdown periods.

[Rule 1303(a)(1)-BACT; 5-10-1996; Rule 1303(a)(1)-BACT, 12-6-2002]

<u>Verification</u>: The project owner shall submit CEMS records demonstrating compliance with this condition as part of the Quarterly Operation Reports (**AQ-SC7**).

AQ-10 For the purpose of determining compliance with District Rule 475, combustion contaminant emissions may exceed the concentration limit or the mass emission limit listed, but not both limits at the same time.

[Rule 475, 10-8-1976; Rule 475, 8-7-1978]

<u>Verification</u>: The project owner shall demonstrate compliance with this condition as part of the Quarterly Operation Reports (**AQ-SC7**). The project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

AQ-11 The operator shall not use natural gas containing the following specified compounds:

Compound	Range	Grain per 100 scf
H2S	Greater than	0.25

This concentration limit is an annual average based on monthly samples of natural gas composition or gas supplier documentation. Gaseous fuel samples shall be tested using District Method 307-91 for total sulfur calculated as H2S.

[Rule 1304.1, 9-6-2013]

<u>Verification</u>: The project owner shall submit fuel usage records and calculations required to demonstrate compliance with this condition as part of the Quarterly Operational Reports (**AQ-SC7**).

AQ-12 The operator shall limit the number of start-ups to no more than 90 in any one calendar month.

The number of cold startups shall not exceed five in any calendar month, the number of warm startups shall not exceed 25 in any calendar month, and the number of hot starts shall not exceed 60 in any calendar month, with no more than three startups in any one day.

The number of cold startups shall not exceed 24 in any calendar year, the number of warm startups shall not exceed 150 in any calendar year, and the number of hot startups shall not exceed 450 in any calendar year.

For the purposes of this condition, a cold startup is defined as a startup which occurs after the steam turbine has been shut down for more than 49 hours. A cold startup shall not exceed 90 minutes. The NOx emissions from a cold startup shall not exceed 28.7 lbs. The CO emissions from a cold startup shall not exceed 115.9 lbs. The VOC emissions from a cold startup shall not exceed 27.9 lbs.

For the purposes of this condition, a warm startup is defined as a startup which occurs after the steam turbine has been shut down between nine and 49 hours, inclusive. A warm startup shall not exceed 32.5 minutes. The NOx emissions from a warm startup shall not exceed 16.6 lbs. The CO emissions from a warm startup shall not exceed 46.0 lbs. The VOC emissions from a warm startup shall not exceed 21.0 lbs.

For the purposes of this condition, a hot startup is defined as a startup which occurs after the steam turbine has been shut down for less than nine hours. A hot startup shall not exceed 32.5 minutes. The NOx emissions from a hot startup shall not exceed 16.6 lbs. The CO emissions from a hot startup shall not exceed 33.6 lbs. The VOC emissions from a hot startup shall not exceed 20.4 lbs.

The beginning of startup occurs at initial fire in the combustor and the end of startup occurs when the BACT levels are achieved. If during startup the process is aborted the process will count as one startup.

The operator shall maintain records in a manner approved by the District, to demonstrate compliance with this condition.

[Rule 1303(a)(1)-BACT, 5-10-1996; Rule 1303(a)(1)-BACT, 12-6-2002; Rule 1703(a)(2)-PSD-BACT, 10-7-1988; Rule 2012, 5-6-2005]

Verification: The project owner shall provide a table demonstrating compliance with this condition as part of the Quarterly Operation Reports (**AQ-SC7**). The project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

AQ-13 The operator shall limit the number of shutdowns to less than 90 in any one calendar month.

The number of shutdowns shall not exceed 624 in any calendar year.

Each shutdown shall not exceed ten minutes. The NOx emissions from a shutdown event shall not exceed 9.0 lbs. The CO emissions from a shutdown event shall not exceed 45.3 lbs. The VOC emissions from a shutdown event shall not exceed 31.0 lbs.

The operator shall maintain records in a manner approved by the District, to demonstrate compliance with this condition.

[Rule 1303(a)(1)-BACT, 5-10-1996; Rule1303(a)(1)-BACT, 12-6-2002; Rule 1703(a)(2)-PSD-BACT, 10-7-1988; Rule 2012, 5-6-2005]

Verification: The project owner shall provide a table demonstrating compliance with this condition as part of the Quarterly Operation Reports (**AQ-SC7**). The project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

AQ-14 The operator shall conduct source test(s) for the pollutant(s) identified below.

Pollutant(s) to be Tested	Required Test Method(s)	Averaging Time	Test Location
NOx emissions	District Method 100.1	1 hour	Outlet of SCR serving this equipment
CO emissions	District Method 100.1	1hour	Outlet of SCR serving this equipment
SOx emissions	Approved District Method	District-approved averaging time	Fuel Sample
VOC emissions	Approved District Method	1 hour	Outlet of SCR serving this equipment
PM10 emissions	Approved District Method	District-approved averaging time	Outlet of SCR serving this equipment
PM2.5 emissions	EPA Method 201A and 202	4 hours	Outlet of SCR serving this equipment
NH3 emissions	District Method 207.1 and 5.3 EPA Method 17	1 hour	Outlet of SCR serving this equipment

The test shall be conducted after District approval of the source test protocol, but no later than 180 days after initial start-up. The District shall be notified of the date and time of the test at least ten days prior to the test.

The test shall be conducted to determine the oxygen levels in the exhaust. In addition, the tests shall measure the fuel flow rate (CFH), the flue gas flow rate, and the combined gas turbine and steam turbine generating output in MW gross and MW net.

The test shall be conducted in accordance with a District approved source test protocol. The protocol shall be submitted to the SCAQMD engineer no later than 90 days before the proposed test date and shall be approved by the District before the test commences. The test protocol shall include the proposed operating conditions of the turbine during the tests, the identity of the testing lab, a statement from the testing lab certifying that it meets the criteria of Rule 304, and a description of all sampling and analytical procedures.

For gas turbines only the VOC test shall use the following method: a) Stack gas samples are extracted into Summa canisters, maintaining a final canister pressure between 400-500 mm Hg absolute, b) Pressurization of Summa canisters is done with zero gas analyzed/certified to having less than 0.05 ppmv total hydrocarbons as carbon, and c) Analysis of Summa canisters is per EPA Method TO-12 (with pre-concentration) and the canisters temperature when extracting samples for analysis is not to be below 70 deg F.

The use of this alternative VOC test method is solely for the determination of compliance with the VOC BACT level of 2.0 ppmv calculated as carbon for natural gas fired turbines. The test results must be reported with two significant digits.

The sampling time for the PM2.5 tests shall be four hours or longer as necessary to obtain a measureable amount of sample.

The test shall be conducted when this equipment is operating at loads of 70 and 100 percent of maximum load without duct burner firing, and 100 percent of maximum load with duct burner firing.

[Rule 1303(a)(1)-BACT, 5-10-1996; Rule 1303(a)(1)-BACT, 12-6-2002; Rule 1703(a)(2)-PSD-BACT, 10-7-1988; Rule 2005, 6-3-2011]

Verification: The project owner shall submit the proposed protocol for the initial source tests no later than 45 days prior to the proposed source test date to both the District and CPM for approval. The project owner shall submit source test results no later than 60 days following the source test date to both the District and CPM. The project owner shall notify the District and CPM no later than ten days prior to the proposed initial source test date and time.

AQ-15 The operator shall conduct source test(s) for the pollutant(s) identified below.

Pollutant(s) to be Tested	Required Test Method(s)	Averaging Time	Test Location
SOx emissions	Approved District Method	District-approved averaging time	Fuel sample
VOC emissions	Approved District Method	One hour	Outlet of SCR serving this equipment
PM10 emissions	Approved District Method	District-approved averaging time	Outlet of SCR serving this equipment

The test(s) shall be conducted at least once every three years.

The test shall be conducted and the results submitted to the District within 60 days after the test date. The SCAQMD shall be notified of the date and time of the test at least ten days prior to the test.

The test shall be conducted when this equipment is operating at 100 percent of maximum load without duct burner firing, and 100 percent of maximum load with duct burner firing.

For gas turbines only the VOC test shall use the following method: a) Stack gas samples are extracted into Summa canisters, maintaining a final canister pressure between 400-500 mm Hg absolute, b) Pressurization of Summa canisters is done with zero gas analyzed/certified to having less than 0.05 ppmv total hydrocarbons as carbon, and c) Analysis of Summa canisters is per EPA Method TO-12 (with pre-concentration) and the canisters temperature when extracting samples for analysis is not to be below 70 deg F.

The use of this alternative VOC test method is solely for the determination of compliance with the VOC BACT level of 2.0 ppmv calculated as carbon for natural gas fired turbines. The test results must be reported with two significant digits.

The test shall be conducted to demonstrate compliance with the Rule 1303 concentration and/or monthly emissions limit.

[Rule 1303(a)(1)-BACT, 5-10-1996; Rule 1303(a)(1)-BACT, 12-6-2002, Rule 1703(a)(2)-PSD-BACT, 10-7-1988]

Verification: The project owner shall submit the proposed protocol for the initial source tests no later than 45 days prior to the proposed source test date to both the District and CPM for approval. The project owner shall submit source test results no later than 60 days following the source test date to both the District and CPM. The project owner shall notify the District and CPM no later than ten days prior to the proposed initial source test date and time.

AQ-16 The operator shall install and maintain a CEMS to measure the following parameters:

CO concentration in ppmv

Concentrations shall be corrected to 15 percent oxygen on a dry basis.

The CEMS shall be installed and operated to measure CO concentrations over a 15 minute averaging time period.

The CEMS shall be installed and operating no later than 90 days after initial start-up of the turbine, and in accordance with an approved SCAQMD Rule 218 CEMS plan application. The operator shall not install the CEMS prior to receiving initial approval from SCAQMD.

The CEMS will convert the actual CO concentrations to mass emission rates (lbs/hr) and record the hourly emission rates on a continuous basis.

CO Emission Rate, lbs/hr = K*Cco*Fd[20.9/(20.9% - %O_2 d)][(Qg * HHV)/10E+06], where:

1. K = 7.267 *10E-08 (lb/scf)/ppm
2. Cco = Average of four consecutive 15 min. average CO concentrations, ppm

3. Fd = 8710 dscf/MMBTU natural gas
4. $\%O_2$ d = Hourly average % by volume O_2 dry, corresponding to Cco
5. Qg = Fuel gas usage during the hour, scf/hr
6. HHV = Gross high heating value of fuel gas, BTU/scf

[Rule 1703 – PSD Analysis, 10-7-1988]

Verification: The project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

AQ-17 The operator shall install and maintain a CEMS to measure the following parameters:

NOx concentration in ppmv

Concentrations shall be corrected to 15 percent oxygen on a dry basis.

The CEMS shall be installed and operating no later than 90 days after initial start-up of the turbine, and in accordance with an approved SCAQMD REG XX CEMS plan application. The operator shall not install the CEMS prior to receiving initial approval from SCAQMD.

Rule 2012 provisional RATA testing shall be completed and submitted to the SCAQMD within 90 days of the conclusion of the turbine commissioning period. During the interim period between the initial start-up and the provisional certification date of the CEMS, the operator shall comply with the monitoring requirements of Rule 2012(h)(2) and 2012(h)(3).

[Rule 1703 – PSD Analysis, 10-7-1988; Rule 2005, 6-3-2011; Rule 2012, 5-6-2005]

Verification: The project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

AQ-18 The operator shall upon completion of construction, operate and maintain this equipment according to the following requirements:

In accordance with all air quality mitigation measures stipulated in the final California Energy Commission decision for the 12-AFC-03 project.

[CA PRC CEQA, 11-23-1970]

Verification: The project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

AQ-19 The operator shall operate and maintain this equipment according to the following requirements:

The commissioning period shall not exceed 491 hours of operation for each turbine from the date of initial turbine start-up. Three turbines may be commissioned at the same time.

The operator shall vent this equipment to the CO oxidation catalyst and SCR control system whenever the turbine is in operation after initial commissioning.

The operator shall provide the SCAQMD with written notification of the initial startup date. Written records of commissioning, startups, and shutdowns shall be maintained and made available upon request from SCAQMD.

[Rule 1303(a)(1)-BACT, 5-10-1996; Rule 1303(a)(1)-BACT, 12-6-2002; Rule 1703(a)(2)-PSD-BACT, 10-7-1988; Rule 2005, 6-3-2011]

<u>Verification</u>: The project owner shall submit CEMS records to demonstrate compliance with this condition as part of the Quarterly Operation Reports (**AQ-SC7**).

AQ-20 The operator shall operate and maintain this equipment according to the following requirements:

Each turbine may start up as a simple cycle gas turbine. For the purposes of this condition, the beginning of a turbine startup occurs at initial fire in the combustor and the end of a turbine startup occurs when the turbine has reached 70 percent or higher load. A turbine startup shall not exceed ten minutes.

A turbine startup is the initial step of a combined cycle startup (cold startup, warm startup, hot startup) as defined in **AQ-12**.

A turbine shall operate as a combined cycle gas turbine except during turbine startup not to exceed ten minutes.

[Rule 1304(a)—Modeling and Offset, 6-14-1996]

<u>Verification</u>: The project owner shall demonstrate compliance with this condition as part of the Quarterly Operation Reports (**AQ-SC7**).

AQ-21 The operator shall upon completion of the construction, operate and maintain this equipment according to the following requirements:

The operator shall record the total net power generated in a calendar month in megawatt-hours.

The operator shall calculate and record greenhouse gas emissions for each calendar month using the following formula:

GHG = 61.37 * FF

Where GHG is the greenhouse gas emissions in tons of CO_2 and FF is the monthly fuel usage in millions standard cubic feet.

The operator shall calculate and record the GHG emissions in pounds per net megawatt-hours based on a 12-month rolling average. The GHG emissions from this equipment shall not exceed 572,378 tons per turbine per year on a 12-month rolling average basis. The calendar annual average GHG emissions shall not exceed 1,063.3 lbs per net megawatt-hours (1,148.4 lbs per net megawatt-hours inclusive of equipment degradation).

The operator shall maintain records in a manner approved by the SCAQMD to demonstrate compliance with this condition. The records shall be made available to SCAQMD upon request.

[Rule 1714, 12-10-2012]

Verification: The project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

AQ-22 The operator shall upon completion of the construction, operate and maintain this equipment according to the following requirements:

The operator shall record the total gross power generated in a calendar month in megawatt-hours.

The operator shall calculate and record greenhouse gas emissions of each calendar month using the following formula:

GHG = 61.37 * FF

Where GHG is the greenhouse gas emissions in tons of CO_2 and FF is the monthly fuel usage in millions standard cubic feet.

The operator shall calculate and record the GHG emissions in pounds per gross megawatt-hours on a 12-month rolling average. The calendar annual average GHG emissions shall not exceed 1000 lbs per gross megawatt-hours, or the applicable limit that is published in the final EPA regulation, if RBEP meets the applicability criteria for the final EPA regulation.

The operator shall maintain records in a manner approved by the SCAQMD to demonstrate compliance with this condition. The records shall be made available to SCAQMD upon request.

[40 CFR 63 Subpart KKKK, 4-20-2006]

Verification: The project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

AQ-23 The Permit to Construct shall become invalid if construction is not commenced within 18 months after the issuance date, if construction is discontinued for a period of 18 months or more, or if construction is not completed within a reasonable time. The EPA Administrator may extend the 18-month period upon a satisfactory showing that an extension is justified.

[40 CFR 52.21 – PSD, 6-19-1978]

Verification: The project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

AQ-24 Gas Turbine No. 03-A shall not be operated unless the facility holds 66,641 pounds of NOx RTCs in its allocation account to offset the annual emissions increase for the first year of operation. RTCs held to satisfy this condition may be transferred only after one year from the initial start of operation. If the hold amount is partially satisfied by holding RTCs that expire midway through the hold period, those RTCs may be transferred upon their respective expiration dates. This hold amount is in addition to any other amount of RTCs required to be held under other condition(s) stated in this permit.

[Rule 2005, 6-3-2011]

Verification: The project owner shall submit to the CPM copies of all RECLAIM reports filed with the District as part of Quarterly Operation Reports (**AQ-SC7**).

AQ-25 Duct Burner No. 03-A shall not be operated unless the facility holds 22,645 pounds of NOx RTCs in its allocation account to offset the annual emissions increase for the first year of operation. RTCs held to satisfy this condition may be transferred only after one year from the initial start of operation. If the hold amount is partially satisfied by holding RTCs that expire midway through the hold period, those RTCs may be transferred upon their respective expiration dates. This hold amount is in addition to any other amount of RTCs required to be held under other condition(s) stated in this permit.

[Rule 2005, 6-3-2011]

Verification: The project owner shall submit to the CPM copies of all RECLAIM reports filed with the District as part of Quarterly Operation Reports (**AQ-SC7**).

AQ-26 Gas Turbine No. 03-B shall not be operated unless the facility holds 66,641 pounds of NOx RTCs in its allocation account to offset the annual emissions increase for the first year of operation. RTCs held to satisfy this condition may be transferred only after one year from the initial start of operation. If the hold amount is partially satisfied by holding RTCs that expire midway through the hold period, those RTCs may be transferred upon their respective expiration dates. This hold amount is in addition to any other amount of RTCs required to be held under other condition(s) stated in this permit.

[Rule 2005, 6-3-2011]

Verification: The project owner shall submit to the CPM copies of all RECLAIM reports filed with the District as part of Quarterly Operation Reports (**AQ-SC7**).

AQ-27 Duct Burner No. 03-B shall not be operated unless the facility holds 22,645 pounds of NOx RTCs in its allocation account to offset the annual emissions increase for the first year of operation. RTCs held to satisfy this condition may be transferred only after one year from the initial start of operation. If the hold amount is partially satisfied by holding RTCs that expire midway through the hold period, those RTCs may be transferred upon their respective expiration dates. This hold amount is in addition to any other amount of RTCs required to be held under other condition(s) stated in this permit.

[Rule 2005, 6-3-2011]

Verification: The project owner shall submit to the CPM copies of all RECLAIM reports filed with the District as part of Quarterly Operation Reports (**AQ-SC7**).

AQ-28 Gas Turbine No.03-C shall not be operated unless the facility holds 66,641 pounds of NOx RTCs in its allocation account to offset the annual emissions increase for the first year of operation. RTCs held to satisfy this condition may be transferred only after one year from the initial start of operation. If the hold amount is partially satisfied by holding RTCs that expire midway through the hold period, those RTCs may be transferred upon their respective expiration dates. This hold amount is in addition to any other amount of RTCs required to be held under other condition(s) stated in this permit.

[Rule 2005, 6-3-2011]

Verification: The project owner shall submit to the CPM copies of all RECLAIM reports filed with the District as part of Quarterly Operation Reports (**AQ-SC7**).

AQ-29 Duct Burner No. 03-C shall not be operated unless the facility holds 22,645 pounds of NOx RTCs in its allocation account to offset the annual emissions increase for the first year of operation. RTCs held to satisfy this condition may be transferred only after one year from the initial start of operation. If the hold amount is partially satisfied by holding RTCs that expire midway through the hold period, those RTCs may be transferred upon their respective expiration dates. This hold amount is in addition to any other amount of RTCs required to be held under other condition(s) stated in this permit.

[Rule 2005, 6-3-2011]

Verification: The project owner shall submit to the CPM copies of all RECLAIM reports filed with the District as part of Quarterly Operation Reports (**AQ-SC7**).

AQ-30 The operator shall provide to the District a source test report in accordance with the following specifications:

Source test results shall be submitted to the District no later than 90 days after the source tests required by conditions **AQ-14**, **AQ-15**, and **AQ-36** are conducted.

Emission data shall be expressed in terms of concentration (ppmv), corrected to 15 percent oxygen (dry basis), mass rate (lbs/hr), and lbs/MM cubic feet. In addition, solid PM emissions, if required to be tested, shall also be reported in terms of grains per DSCF.

All exhaust flow rates shall be expressed in terms of dry standard cubic feet per minute (DSCFM) and dry actual cubic feet per minute (DACFM).

All moisture concentration shall be expressed in terms of percent corrected to 15 percent oxygen.

Source test results shall also include the oxygen levels in the exhaust, the fuel flow rate (CFH), the flue gas temperature, and the generator power output (MW) under which the test was conducted.

[Rule 1303, 5-10-1996; Rule 1303, 12-6-2002; Rule 1703-PSD Analysis, 10-7-1988; Rule 2005, 6-3-2011]

Verification: The project owner shall submit the proposed protocol for the initial source tests no later than 45 days prior to the proposed source test date to both the District and CPM for approval. The project owner shall submit source test results no later than 60 days following the source test date to both the District and CPM. The project owner shall notify the District and CPM no later than ten days prior to the proposed initial source test date and time.

AQ-31 The operator shall keep records, in a manner approved by the District, for the following parameter(s) or item(s):

Natural gas fuel use during the commissioning period.

[Rule 2012, 5-6-2005]

Verification: The project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

SCR/CO CATALYSTS

AQ-32 The 5.0 PPMV NH3 emission limit is averaged over one hour, dry basis at 15 percent oxygen.

The operator shall calculate and continuously record the NH3 slip concentration using the following equation:

NH_3 (ppmvd) = [a-b*(c*1.2)/1,000,000]*1,000,000/b, where:

a = NH3 injection rate (lb/hr)/17(lb/lb-mol)

b = dry exhaust gas flow rate (scf/hr)/385.3 scf/lb-mol)

c = change in measured NOx across the SCR (ppmvd at 15 percent O2)

The operator shall install and maintain a NOx analyzer to measure the SCR inlet NOx ppmv accurate to within plus or minus 5 percent calibrated at least once every 12 months. The operator shall use the method described above or another alternative method approved by the Executive Officer.

The ammonia slip calculation procedure shall be in effect no later than 90 days after initial startup of the turbine.

The ammonia slip calculation procedures described above shall not be used for compliance determination or emission information without corroborative data using an approved reference method for the determination of ammonia.

[Rule 1303(a)(1)-BACT, 5-10-1996; Rule 1303(a)(1)-BACT, 12-6-2002]

Verification: The project owner shall include exceedances of the hourly ammonia slip limit as part of the Quarterly Operation Reports (**AQ-SC7**). Exceedances of the ammonia limit shall be reported as prescribed herein. Chronic exceedances of the ammonia slip limit shall be identified by the project owner and confirmed by the CPM within 60 days of the fourth quarter Quarterly Operation Report (**AQ-SC7**) being submitted to the CPM. If a chronic exceedance is identified and confirmed, the project owner shall work in conjunction with the CPM to develop a reasonable compliance plan to investigate and redress the chronic exceedance of the ammonia slip limit within 60 days of the above confirmation. The project owner shall include all calibration results performed as part of Quarterly Operation Reports (**AQ-SC7**).

AQ-33 The operator shall install and maintain a(n) flow meter to accurately indicate the flow rate of the total hourly throughput of injected ammonia (NH3).

The operator shall also install and maintain a device to continuously record the parameter being measured.

The measuring device or gauge shall be accurate to within plus or minus 5 percent. It shall be calibrated once every 12 months.

The operator shall maintain the ammonia injection rate between 11.8 and 33 gallons per hour.

[Rule 1303(a)(1)-BACT, 5-10-1996; Rule 1303(a)(1)-BACT, 12-6-2002; Rule 1703(a)(2)-PSD-BACT, 10-7-1988; Rule 2005, 6-3-2011]

Verification: The project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

AQ-34 The operator shall install and maintain a(n) temperature gauge to accurately indicate the temperature in the exhaust at the inlet to the SCR reactor.

The operator shall also install and maintain a device to continuously record the parameter being measured.

The measuring device or gauge shall be accurate to within plus or minus 5 percent. It shall be calibrated once every 12 months.

The exhaust temperature at the inlet of the SCR/CO catalyst shall be maintained between 400 degrees F and 700 degrees F, except during startups and shutdowns.

[Rule 1303(a)(1)-BACT, 5-10-1996; Rule 1303(a)(1)-BACT, 12-6-2002; Rule 1703(a)(2)-PSD-BACT, 10-7-1988; Rule 2005, 6-3-2011]

Verification: The project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

AQ-35 The operator shall install and maintain a(n) pressure gauge to accurately indicate the differential pressure across the SCR catalyst bed in inches water column.

The operator shall also install and maintain a device to continuously record the parameter being measured.

The measuring device or gauge shall be accurate to within plus or minus 5 percent. It shall be calibrated once every 12 months.

The pressure differential shall be between 1.5 and 3.5 inches water column.

[Rule 1303(a)(1)-BACT, 5-10-1996; Rule 1303(a)(1)-BACT, 12-6-2002; Rule 1703(a)(2)-PSD-BACT, 10-7-1988; Rule 2005, 6-3-2011]

Verification: The project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

AQ-36 The operator shall conduct source test(s) for the pollutant(s) identified below.

Pollutant(s) to be Tested	Required Test Method(s)	Averaging Time	Test Location
NH3	District Method 207.1 and 5.3 or EPA Method 17	One hour	Outlet of the SCR serving this equipment

The test shall be conducted and the results submitted to the District within 60 days after the test date. The SCAQMD shall be notified of the date and time of the test at least ten days prior to the test.

The test shall be conducted at least quarterly during the first twelve months of operation and at least annually thereafter. The NOx concentration, as determined by the certified CEMS, shall be simultaneously recorded during the ammonia slip test. If the CEMS is inoperable or not yet certified, a test shall be conducted to determine the NOx emissions using District Method 100.1 measured over a 60 minute averaging time period.

The test shall be conducted to demonstrate compliance with the Rule 1303 concentration limit.

[Rule 1303(a)(1)-BACT, 5-10-1996; Rule 1303(a)(1)-BACT, 12-6-2002]

Verification: The project owner shall submit the proposed protocol for the source tests no later than 45 days prior to the proposed source test date to both the District and CPM for approval. The project owner shall notify the District and CPM no later than ten days prior to the proposed source test date and time. The project owner shall submit source test results no later than 60 days following the source test date to both the District and CPM.

AQ-37 For the purpose of the following condition number(s) continuously record shall be defined as recording at least once every hour and shall be calculated based upon the average of the continuous monitoring for that hour.

Condition **AQ-33**

Condition **AQ-34**

[Rule 1303(a)(1)-BACT, 5-10-1996; Rule 1303(a)(1)-BACT, 12-6-2002; Rule 1703(a)(2) – PSD BACT, 10-7-1988; Rule 2005, 6-3-2011]

Verification: The project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

AQ-38 For the purpose of the following condition number(s) continuously record shall be defined as recording at least once every month and shall be calculated based upon the average of the continuous monitoring for that month.

Condition **AQ-35**

[Rule 1303(a)(1)-BACT, 5-10-1996; Rule 1303(a)(1)-BACT, 12-6-2002; Rule 1703(a)(2) – PSD BACT, 10-7-1988; Rule 2005, 6-3-2011]

Verification: The project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

AQ-39 The operator shall upon completion of construction, operate and maintain this equipment according to the following specifications:

In accordance with all air quality mitigation measures stipulated in the final California Energy Commission decision for the 12-AFC-03 project.

[CA PRC CEQA, 11-23-1970]

Verification: The project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

AMMONIA TANK

AQ-40 The operator shall install and maintain a pressure relief valve set at 50 psig.

[Rule 1303(a)(1)-BACT, 5-10-1996; Rule 1303(a)(1)-BACT, 12-6-2002]

Verification: The project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

AQ-41 The operator shall vent this equipment, during filling, only to the vessel from which it is being filled.

[Rule 1303(a)(1)-BACT, 5-10-1996; Rule 1303(a)(1)-BACT, 12-6-2002]

Verification: The project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

AQ-42 The operator shall upon completion of construction, operate and maintain this equipment according to the following specifications:

In accordance with all air quality mitigation measures stipulated in the final California Energy Commission decision for the 12-AFC-03 project.

[CA PRC CEQA, 11-23-1970]

Verification: The project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

OIL WATER SEPARATOR

AQ-43 The operator shall upon completion of construction, operate and maintain this equipment according to the following specifications:

In accordance with all air quality mitigation measures stipulated in the final California Energy Commission decision for the 12-AFC-03 project.

[CA PRC CEQA, 11-23-1970]

Verification: The project owner shall make the site available for inspection of records by representatives of the District, ARB, and the Energy Commission.

ACRONYMS

AAQS	Ambient Air Quality Standard
AFC	Application for Certification
APCO	Executive Officer/Air Pollution Control Officer
ARB	Air Resource Board
BTU	British Thermal Unit
BACT	Best Available Control Technology
CAAQS	California Ambient Air Quality Standard
CARB	California Air Resources Board
CEC	California Energy Commission
CEM	Continuous Emission Monitor
CEQA	California Environmental Quality Act
CO	Carbon Monoxide
CO_2	Carbon Dioxide
CTG	Combustion Turbine Generator
EPA	Environmental Protection Agency
ERC	Emission Reduction Credit
FDOC	Final Determination of Compliance
GHG	Greenhouse Gases
MW	Megawatt
NH_3	Ammonia
N_2	Nitrogen
NO	Nitric Oxide
NO_2	Nitrogen Dioxide
NOx	Nitrogen Oxides
NSR	New Source Review

O_2	Oxygen
LAER	Lowest Achievable Emissions Rate
MMBtu	Million British Thermal Units
NAAQS	National Ambient Air Quality Standard
PDOC	Preliminary Determination of Compliance
PM10	Particulate Matter less than 10 Microns in Diameter
PM2.5	Particulate Matter less than 2.5 Microns in Diameter
POC	Precursor Organic Compounds
ppmvd	Parts Per Million by Volume, Dry
PSD	Prevention of Significant Deterioration
RATA	Relative Accuracy Test Audit
RECLAIM	Regional Clean Air Incentives Market
SCAQMD	South Coast Air Quality Management District
SCR	Selective Catalytic Reduction
SO_2	Sulfur Dioxide
SOx	Sulfur Oxides
U.S. EPA	United States Environmental Protection Agency
VOC	Volatile Organic Compounds

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AIR QUALITY APPENDIX AIR-1
GREENHOUSE GAS EMISSIONS

Joseph Hughes and David Vidaver

SUMMARY

The Redondo Beach Energy Project (RBEP) is a proposed addition to the state's electricity system. It would be an efficient, new, dispatchable natural gas-fired combined cycle power plant that would provide fast-start capabilities but would produce greenhouse gas (GHG) emissions while generating electricity for California consumers. Its addition to the system would displace other less efficient, higher GHG-emitting generation and facilitate the integration of renewable resources. Because the project would improve the efficiency of existing system resources, the addition of RBEP would contribute to a reduction of the California GHG emissions and GHG emission rate average. The relative efficiency of the RBEP project and the system build-out of renewable resources in California would result in a net cumulative reduction of GHG emissions from new and existing fossil sources of electricity. Electricity is produced by operation of an inter-connected system of generation sources. Operation of one power plant, like the RBEP, affects all other power plants in the interconnected system.

While the RBEP would burn natural gas for fuel and thus would produce GHG emissions that contribute cumulatively to climate change, it would have a beneficial impact on system operation and facilitate a reduction in GHG emissions in several ways:

- When dispatched,[2] the RBEP would displace less efficient (and thus higher GHG-emitting) generation. Because the project's GHG emissions per megawatt-hour (MWh) would be lower than those power plants that the project would displace, the addition of the RBEP would contribute to a reduction of California and overall Western Electricity Coordinating Council system GHG[3] emissions and GHG emission rate average.
- The RBEP would provide fast start and dispatch flexibility capabilities necessary to integrate the large amounts of variable renewable generation (also known as "variable" or "intermittent" energy resources) expected to meet the state's renewable portfolio standard (RPS) and GHG emission reduction targets.
- The RBEP would replace capacity and generation mostly provided by aging, high GHG emitting power plants, some of which are likely to retire in order to comply with the State Water Resource Control Board's (SWRCB) policy on the use of once-through cooling (OTC).

[2] The entity responsible for balancing a region's electrical load and generation will "dispatch" or call on the operation of generation facilities. The "dispatch order" is generally dictated by the facility's electricity production cost, efficiency, location or contractual obligations.
[3] Fuel-use closely correlates to the efficiency of and carbon dioxide (CO_2) emissions from natural gas-fired power plants. And since CO_2 emissions from fuel combustion dominate greenhouse gas (GHG) emissions from power plants, the terms CO_2 and GHG are used interchangeably in this section.

- The RBEP would replace less efficient generation in the South Coast local reliability area required to meet local reliability needs, reducing the GHG emissions associated with providing local reliability services and facilitating the retirement of aging, high GHG-emitting resources in the area.
- The RBEP would facilitate to some degree the replacement of high GHG emitting (e.g., out-of-state coal) electricity generation that must be phased out to meet the state's new Emissions Performance Standard implemented by SB 1368.

CONCLUSIONS

The project would lead to a net reduction in GHG emissions across the electricity system that provides energy and capacity to California. Thus, staff believes that the project would result in a cumulative overall reduction in GHG emissions from the state's power plants, would not worsen current conditions, and would thus not result in impacts that are cumulatively significant. In addition, it would provide flexible, dispatchable and fast-ramping power in relatively small increments of capacity, which is necessary for a reliable high-renewables, low-GHG system.

Staff notes that mandatory reporting of GHG emissions per federal government and Air Resources Board greenhouse gas regulations would occur, and these reports would enable these agencies to gather the information needed to regulate the RBEP project in trading markets, such as those required by regulations implementing the California Global Warming Solutions Act of 2006 (AB 32).

Staff does not believe that the GHG emission increases from construction activities would be significant for several reasons. First, construction emissions would be temporary and intermittent, and not continue during the life of the project. Additionally, the control measures or best practices that staff recommends such as limiting idling times and requiring, as appropriate, equipment that meet the latest emissions standards, would further minimize greenhouse gas emissions. Staff believes that the use of newer equipment would increase efficiency and reduce GHG emissions and be compatible with low-carbon fuel (e.g., bio-diesel and ethanol) mandates that will likely be part of the California Air Resources Board (ARB) regulations to reduce GHG from construction vehicles and equipment. For all these reasons, staff concludes that the emission of greenhouse gases during construction would be sufficiently reduced and would, therefore, not be significant.

As a base load power plant, the RBEP is subject to the Greenhouse Gases Emission Performance Standard (Title 20, California Code of Regulations, section 2900 et seq.). The project would meet the standard with a rating of 0.482 metric tonnes of carbon dioxide (CO_2) per megawatt-hour.

The RBEP would be consistent with all three main conditions in the precedent decision regarding GHG emissions established by the Avenal Energy Project's Final Energy Commission Decision (not increase the overall system heat rate for natural gas plants, not interfere with generation from existing or new renewable facilities, and ensure a reduction of systemwide GHG emissions).

INTRODUCTION

GHG emissions are not criteria pollutants; they are discussed in the context of cumulative impacts. In December 2009, the U.S. Environmental Protection Agency (EPA) declared that greenhouse gases (GHGs) threaten the public health and welfare of the American people (the so-called “endangerment finding”), and this became effective on January 14, 2010.

Federal rules that became effective December 29, 2009 (40 CFR 98) require federal reporting of GHGs. As federal rulemaking evolves, staff at this time focuses on analyzing the ability of the project to comply with existing federal- and state-level policies and programs for GHGs. The state has demonstrated a clear willingness to address global climate change though research, adaptation[4], and GHG inventory reductions. In that context, staff evaluates the GHG emissions from the proposed project, presents information on GHG emissions related to electricity generation, and describes the applicable GHG standards and requirements.

Generation of electricity using any fossil fuel, including natural gas, can produce greenhouse gases along with the criteria air pollutants that have been traditionally regulated under the federal and state Clean Air Acts. For fossil fuel-fired power plants, the GHG emissions include primarily CO_2, with much smaller amounts of nitrous oxide (N_2O, not NO or NO_2, which are commonly known as NOx or oxides of nitrogen), and methane (CH_4 – often from unburned natural gas). Also included are sulfur hexafluoride (SF_6) from high voltage equipment and hydrofluorocarbons (HFCs) and perfluorocarbons (PFCs) from refrigeration/chiller equipment. GHG emissions from the electricity sector are dominated by CO_2 emissions from the carbon-based fuels; other sources of GHG emissions are small and also are more likely to be easily controlled or reused or recycled, but are nevertheless documented here as some of the compounds have very high relative global warming potentials.

Global warming potential is a relative measure, compared to carbon dioxide, of a compound’s residence time in the atmosphere and ability to warm the planet. Mass emissions of GHGs are converted into carbon dioxide equivalent (CO2E) for ease of comparison.

LAWS, ORDINANCES, REGULATIONS AND STANDARDS

The following federal, state, and local laws and policies in **Greenhouse Gas Table 1** pertain to the control and mitigation of greenhouse gas emissions. Staff’s analysis examines the project’s compliance with these requirements.

[4] While working to understand and reverse global climate change, it is prudent to also adapt to potential changes in the state’s climate (for example, changing rainfall patterns).

Greenhouse Gas Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable LORS	Description
Federal	
40 Code of Federal Regulations (CFR) Parts 51, 52, 70 and 71	This rule “tailors” GHG emissions to PSD and Title V permitting applicability criteria. As of June 23, 2014 the US Supreme Court has invalidated this requirement.
40 Code of Federal Regulations (CFR) Parts 51 and 52	A new stationary source that emits more than 100,000 TPY of greenhouse gases (GHGs) is also considered to be a major stationary source subject to Prevention of Significant Determination (PSD) requirements. As of June 23, 2014 the US Supreme Court has invalidated this requirement. However, PSD applies to GHGs if the source is otherwise subject to PSD (for another regulated NSR pollutant). The proposed facility modifications are subject to the PSD analysis for other NSR pollutants and are, therefore subject to GHG PSD analysis.
40 Code of Federal Regulations (CFR) Part 98	This rule requires mandatory reporting of GHG emissions for facilities that emit more than 25,000 metric tons of CO_2 equivalent emissions per year. This requirement is triggered by this facility.
State	
California Global Warming Solutions Act of 2006, AB 32 (Stats. 2006; Chapter 488; Health and Safety Code sections 38500 et seq.)	This act requires the California Air Resource Board (ARB) to enact standards to reduce GHG emission to 1990 levels by 2020. Electricity production facilities are included. A cap-and-trade program became active in January 2012, with enforcement beginning in January 2013. Cap-and-trade is expected to achieve approximately 20 percent of the GHG reductions expected under AB 32 by 2020.
California Code of Regulations, Title 17, Subchapter 10, Article 2, sections 95100 et. seq.	These ARB regulations implement mandatory GHG emissions reporting as part of the California Global Warming Solutions Act of 2006 (Stats. 2006; Chapter 488; Health and Safety Code sections 38500 et seq.)
Title 20, California Code of Regulations, Section 2900 et seq.; CPUC Decision D0701039 in proceeding R0604009	The regulations prohibit utilities from entering into long-term contracts with any base load facility that does not meet a greenhouse gas emission standard of 0.5 metric tonnes carbon dioxide per megawatt-hour (0.5 $MTCO_2$/MWh) or 1,100 pounds carbon dioxide per megawatt-hour (1,100 lbs CO_2/MWh).
Local	
Rule 1714 – Prevention of Significant Deterioration for Greenhouse Gases, Gas Turbines	This rule establishes preconstruction review requirements for greenhouse gases (GHG). This rule is consistent with federal PSD rule as defined in 40 CFR Part 52.21. This rule requires the owner or operator of a new major source or a major modification to obtain a PSD permit prior to commencing construction. As of June 23, 2014, only PSD review is required if the PSD requirements are triggered for criteria pollutants.

AIR QUALITY GHG ANALYSIS

California is actively pursuing policies to reduce GHG emissions that include adding low-GHG emitting renewable electricity generation resources to the system. The GHGs evaluated in this analysis include carbon dioxide (CO2), nitrous oxide (N2O), methane (CH4), sulfur hexafluoride (SF6), hydrofluorocarbons (HFC), and perflurocarbons (PFC). CO2 emissions are far and away the most common of these emissions; as a result, even though the other GHGs may have a greater impact on climate change on a per-unit of mass basis due to their greater global warming potential as described more fully below, GHG emissions are often “normalized” in terms of metric tons of CO2-equivalent

(MTCO2E) for simplicity. Global warming potential (GWP) is a relative measure, compared to carbon dioxide, of a compound's ability to warm the planet, taking into account each compound's expected residence time in the atmosphere. By convention, carbon dioxide is assigned a global warming potential of one. In comparison, for example methane has a GWP of 25, which means that it has a global warming effect 25 times greater than carbon dioxide on an equal-mass basis. The carbon dioxide equivalent (CO2E) for a source is obtained by multiplying each GHG by its GWP and then adding the results together to obtain a single, combined emission rate representing all GHGs in terms of CO2E.

GHG emissions are not included in the class of pollutants traditionally called "criteria pollutants." Since the impact of the GHG emissions from a power plant's operation has global rather than local effects, those impacts should be assessed not only by analysis of the plant's emissions, but also in the context of the operation of the entire electricity system of which the plant is an integrated part. Furthermore, the impact of the GHG emissions from a power plant's operation should be analyzed in the context of applicable GHG laws and policies, especially Assembly Bill (AB) 32, California's Global Warming Solutions Act of 2006.

GLOBAL CLIMATE CHANGE AND CALIFORNIA

Worldwide, with the exception of 1998, over the past 132-year record, the nine warmest years all have occurred since 2000, with the two hottest years on record being 2010 and 2005 (NASA 2013). According to "The Future Is Now: An Update on Climate Change Science Impacts and Response Options for California," an Energy Commission document, the American West is heating up faster than other regions of the United States (CEC 2009c). The California Climate Change Center (CCCC) reports that, by the end of this century, average global surface temperatures could rise by 4.7°F to 10.5°F due to increased GHG emissions.

The accumulation of GHGs in the atmosphere regulates the earth's temperature. Without these natural GHGs, the earth's surface would be approximately 61°F (34°C) cooler (CalEPA 2006); however, emissions from fossil fuel combustion for activities such as electricity production and vehicular transportation have elevated the concentration of GHGs in the atmosphere above natural levels. ARB estimated that the mobile source sector accounted for approximately 38 percent of the GHG emissions generated in California in 2009, while the electricity generating sector accounted for approximately 23 percent of the 2009 California GHG emissions inventory, with just more than half of that from in-state generation sources (ARB 2011).

The Fourth U.S. Climate Action Report concluded, in assessing current trends, that CO_2 emissions increased by 20 percent from 1990 to 2004, while methane and nitrous oxide emissions decreased by 10 percent and 2 percent, respectively. The Intergovernmental Panel on Climate Change (IPCC) constructed several emission trajectories of GHGs needed to stabilize global temperatures and climate change impacts. It concluded that stabilization of GHGs at 450 ppm carbon dioxide equivalent concentration is required to keep the global mean warming increase below 3.8°F (2.1°C) from year 2000 base line levels (IPCC 2007a).

GHGs differ from criteria pollutants in that GHG emissions from a specific project do not cause direct adverse localized human health effects. Rather, the direct environmental effect of GHG emissions is the cumulative effect of an overall increase in global temperatures, which in turn has numerous indirect effects on the environment and humans. The impacts of climate change include potential physical, economic and social effects. These effects could include inundation of settled areas near the coast from rises in sea level associated with melting of land-based glacial ice sheets, exposure to more frequent and powerful climate events, and changes in suitability of certain areas for agriculture, reduction in Arctic sea ice, thawing permafrost, later freezing and earlier break-up of ice on rivers and lakes, a lengthened growing season, shifts in plant and animal ranges, earlier flowering of trees, and a substantial reduction in winter snowpack (IPCC 2007b). For example, current estimates include a 70 to 90 percent reduction in snow pack in the Sierra Nevada mountain range. Current data suggests that in the next 25 years, in every season of the year, California could experience unprecedented heat, longer and more extreme heat waves, greater intensity and frequency of heat waves, and longer dry periods. More specifically, the CCCC predicted that California could witness the following events (CCCC 2006):

- Temperature rises between 3 and 10.5 ºF
- Six to 20 inches or greater rise in sea level
- Two to four times as many heat-wave days in major urban centers
- Two to six times as many heat-related deaths in major urban centers
- One to 1.5 times more critically dry years
- Losses to mountaintop snowpack and water supply (e.g., according to the CCCC, Sierra Nevada snowpack could be reduced by as much as 70 to 90 percent by 2100 [CEC 2009c])
- 25 to 85 percent increase in days conducive to ozone formation
- 3 to 20 percent increase in electricity demand
- 10 to 55 percent increase in the risk of wildfires

There is general scientific consensus that climate change is occurring and that human activity contributes in some measure (perhaps substantially) to that change. Man-made emissions of GHGs, if not sufficiently curtailed, are likely to contribute further to continued increases in global temperatures. Indeed, the California Legislature found that "[g]lobal warming poses a serious threat to the economic well-being, public health, natural resources, and the environment of California" (Cal. Health & Safety Code, .§. 38500, division 25.5, part 1).

The state has demonstrated a clear willingness to address global climate change (GCC) through research, adaptation, and GHG emission reductions. In that context, staff evaluates the GHG emissions from the proposed project, presents information on GHG emissions related to electricity generation (see Electricity System GHG Impacts below), and describes the applicable GHG policies and programs.

In April 2007, the U.S. Supreme Court held that GHG emissions are pollutants within the meaning of the Clean Air Act (CAA). In reaching its decision, the Court also acknowledged that climate change results, in part, from anthropogenic causes (*Massachusetts et al. v. Environmental Protection Agency*, 549 U.S. 497, 2007). The Supreme Court's ruling paved the way for the regulation of GHG emissions by U.S. Environmental Protection Agency (U.S. EPA) under the CAA.

In response to this Supreme Court decision, on December 7, 2009 the U.S. EPA Administrator signed two distinct findings regarding GHGs under Section 202(a) of the CAA:

- Endangerment Finding:[5] That the current and projected concentrations of the GHGs in the atmosphere threaten the public health and welfare of current and future generations; and
- Cause or Contribute Finding: That the combined emissions of GHGs from new motor vehicles and new motor vehicle engines contribute to the GHG pollution which threatens public health and welfare.

As federal rulemaking evolves, staff at this time focuses on analyzing the ability of the project to comply with existing federal- and state-level policies and programs for GHGs. As of June 23, 2014, the US Supreme Court has validated that GHG emissions should continue to be regulated, but only for those facilities that are already regulated under Prevention of Significant Deterioration (PSD) for NSR pollutants.

In 1998, the Energy Commission identified a range of strategies to prepare for an uncertain climate future, including a need to account for the environmental impacts associated with energy production, planning, and procurement (CEC 1998, p. 5). In 2003, the Energy Commission recommended that the state require reporting of GHGs or global climate change[6] emissions as a condition of state licensing of new electric generating facilities (CEC 2003, IEPR p. 42). In 2006, California enacted the California Global Warming Solutions Act of 2006 (AB 32). It requires the ARB to adopt standards that will reduce 2020 statewide GHG emissions to 1990 levels.

AB 32 includes a number of specific requirements:

ARB shall prepare and approve a scoping plan for achieving the maximum technologically feasible and cost-effective reductions in greenhouse gas emissions from sources or categories of sources of greenhouse gases by 2020 (Health and Safety Code (HSC) §38561). The scoping plan, approved by the ARB on December 12, 2008, provides the outline for actions to reduce greenhouse gases in California. The approved scoping plan indicates how these emission reductions will be achieved from significant greenhouse gas sources via regulations, market mechanisms and other actions. The scoping plan must be updated every five years to track progress

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[5] The Supreme Court is expected to once again review the endangerment finding in early 2014, according to an article published online October 15, 2013 by E & E Publishing.

[6] Global climate change is the result of greenhouse gases, or air emissions with global warming potentials, affecting the global energy balance and thereby the global climate of the planet. The terms greenhouse gases (GHGs) and global climate change (GCC) gases are used interchangeably.

towards the 2020 emission goals and propose new measures as appropriate. ARB approved the First Update to the Climate Change Scoping Plan on May 22, 2014.

The adopted Scoping Plan anticipates that four-fifths of the planned reductions will come from cost-effective programs and regulations, with the remainder provided by economy-wide cap-and-trade. Measures which affect the electricity sector directly include a 33 percent Renewable Portfolio Standard, alternative transportation fuels such as vehicle and ship electrification, building energy efficiency, and combined heat and power. Most of these measures have been implemented, such as Senate Bill X1 2 (Simitian, Chapter 1, Statutes of 2011-12) which established a firm goal requiring all retail providers to have 33 percent of California's electricity supplies by renewable sources by 2020.

The Scoping Plan Update (Update) builds upon the initial Scoping Plan with new strategies and recommendations. The Update identifies opportunities to leverage existing and new funds to further drive GHG emission reductions through strategic planning and targeted low-carbon investments. The Update defines ARB's climate change priorities for the next five years and sets the groundwork to reach California's long-term climate goals. The Update highlights California's progress toward meeting the near-term 2020 GHG emission reduction goals defined in the initial Scoping Plan. These efforts put California on course to achieve the near-term 2020 goal, and have created a framework for ongoing climate action that can be built upon to maintain and continue economic sector-specific reductions beyond 2020, as required by AB 32.

Identify the statewide level of greenhouse gas emissions in 1990 to serve as the emissions limit to be achieved by 2020 (HSC §38550). In December 2007, the ARB approved the 2020 emission limit of 427 million metric tons of carbon dioxide equivalent (MMTCO2E) of greenhouse gases. In 2013, ARB used EPA's updated information to re-calculate that level to 431 million metric tons.

Adopt a regulation requiring the mandatory reporting of greenhouse gas emissions (HSC §38530). In December 2007, the ARB adopted a regulation requiring the largest electric power generation and industrial sources to report and verify their greenhouse gas emissions. The reporting regulation serves as a solid foundation to determine greenhouse gas emissions and track future changes in emission levels. Facilities which emit more than 25,000 metric tons per year are covered. That includes most emitting power plants of five megawatts or larger. Reported emissions from individual facilities may be found on the Mandatory Reporting website, http://www.arb.ca.gov/cc/reporting/ghg-rep/reported-data/ghg-reports.htm.

Adopt a regulation that establishes a system of market-based declining annual aggregate emission limits for sources or categories of sources that emit greenhouse gas emissions, applicable from January 1, 2012, to December 31, 2020 (HSC §38562(c)). In 2011, the ARB adopted the cap-and-trade original regulation. The cap-and-trade program covers major sources of GHG emissions in the state such as refineries, power plants, industrial facilities, and transportation fuels. The cap-and-trade program includes an enforceable emissions cap that will decline over time. The state will distribute allowances, which are tradable permits, equal to the emissions allowed under the cap. Sources under the cap will need to surrender allowances and offsets equal to their emissions at the end of each compliance period.

Individual in-state generating facilities and the first deliverers of imported electricity are the point of regulation. They are responsible for measuring their GHG emissions using ARB and U.S. EPA regulations, and purchasing either carbon allowances or offsets to meet their emissions obligation. Third party verification is required. If facilities find that it is not economic to operate and to purchase sufficient compliance instruments to cover its GHG obligations, facilities must lower their annual energy output. Further information on cap-and-trade may be found at http://www.arb.ca.gov/cc/capandtrade/capandtrade.htm.

The first mandatory compliance period[7] with cap-and-trade requirements commenced on January 1, 2012, although enforcement was delayed until January 2013.

Convene an Environmental Justice Advisory Committee (EJAC) to advise the Board in developing the Scoping Plan and any other pertinent matter in implementing AB 32 (HSC §38591). The EJAC met between 2007 and 2010, providing comments on the proposed early action measures and the development of the scoping plan, public health issues, and issues for impacted communities and cap-and-trade. To advise the ARB on the 2013 Scoping Plan Update, ARB reconvened a new EJAC on March 21, 2013. The committee met three times in 2013 and will continue in 2014 to provide advice to the ARB.

It is likely that GHG reductions mandated by ARB will be non-uniform or disproportional across emitting sectors, in that most reductions will be based on cost-effectiveness (i.e., the greatest GHG reduction for the least cost). For example, ARB proposes a 40 percent reduction in statewide GHG emissions from the electricity sector even though that sector currently only produces about 25 percent of the state's GHG emissions.

SB 1368,[8] enacted in 2006, and regulations adopted by the Energy Commission and the California Public Utilities Commission (CPUC), pursuant to that bill, prohibits California utilities from entering into long-term commitments with any base load facilities that exceed the Emission Performance Standard (EPS) of 0.5 metric tonnes CO_2 per megawatt-hour[9] (1,100 pounds CO_2/MWh). Specifically, the SB 1368 EPS applies to new California utility-owned power plants, new investments in existing power plants, and new or renewed contracts with terms of five years or more, including contracts with power plants located outside of California, where the power plants are "designed or intended" to operate as base load generation.[10] If a project, instate or out of state, plans

[7] A compliance period is the time frame during which the compliance obligation is calculated. The years 2013 and 2014 are known as the first compliance period and the years 2015 to 2017 are known as the second compliance period. The third compliance period is from 2018 to 2020. At the end of each compliance period, each facility will be required to turn in compliance instruments, including allowances and a limited number of ARB offset credits equivalent to their total GHG emissions throughout the compliance period. (http://www.arb.ca.gov/cc/capandtrade/guidance/chapter1.pdf)

[8] Public Utilities Code § 8340 et seq.

[9] The Emission Performance Standard only applies to carbon dioxide and does not include emissions of other greenhouse gases converted to carbon dioxide equivalent.

[10] See Rule at http://www.cpuc.ca.gov/PUBLISHED/FINAL_DECISION/64072.htm

to sell electricity or capacity to California utilities, those utilities will have to demonstrate that the project meets the EPS. *Base load* units are defined as units that are expected to operate at a capacity factor higher than 60 percent. Compliance with the EPS is determined by dividing the annual average carbon dioxide emissions by the annual average net electricity production in MWh. This determination is based on capacity factors, heat rates, and corresponding emissions rates that reflect the *expected* operations of the power plant and not on full load heat rates [Chapter 11, Article 1 §2903(a)].

RBEP would be required to participate in California's GHG cap-and-trade program. This cap-and-trade program is part of a broad effort by the State of California to reduce GHG emissions as required by AB 32, which is being implemented by ARB. As currently implemented, market participants such as RBEP are required to report their GHG emissions and to obtain GHG emissions allowances (and offsets) for those reported emissions by purchasing allowances from the capped market and offsets from outside the AB 32 program. As new participants enter the market and as the market cap is ratcheted down over time, GHG emission allowance and offset prices will increase encouraging innovation by market participants to reduce their GHG emissions. Thus, RBEP, as a GHG cap-and-trade participant, would be consistent with California's landmark AB 32 Program, which is a statewide program coordinated with a region wide Western Climate Initiative (WCI) program to reduce California's GHG emissions to 1990 levels by 2020.

On January 8, 2014, in the Federal Register the US EPA proposed the New Source Performance Standard (NSPS) for GHG emissions for new electric power plants (Federal Register, Volume 79, No. 5); the requirement is effective on the date of publication unless it is significantly revised. This new requirement would limit large natural gas-fired stationary combustion turbines to no more than 1,000 lbs CO_2 per MWh and small natural gas-fired stationary combustion turbines to no more than 1,100 lbs CO_2 per MWh. Large natural gas-fired stationary combustion turbines are those with heat input ratings greater than 850 MMBtu/h (approximately 100 MWe) and small natural gas-fired stationary combustion turbines are those with heat input ratings less than 850 MMBtu/h. According to U.S. EPA, the proposed NSPS limits apply to an electric generating unit if it supplies more than one-third of its potential electric output and more than 219,000 MWh net electric output to the grid per year.

AES has indicated that the RBEP would be operated in compliance with the NSPS, as applicable, by increasing the amount of time RBEP is operated at more efficient heat rates and reducing the number of starts and shutdowns, as necessary. To demonstrate compliance with the proposed emission standard AES provided heat rates for an annual operating schedule for the thermal efficiency calculations of 6,370 hours normal operations, five cold starts, 295 combined hot and warm starts, and 300 shutdowns. This schedule includes fewer startups and shutdowns than the permitted annual operating schedule for each turbine of 6,370 hours normal operations, 24 cold starts, 600 combined hot and warm starts, and 624 shutdowns. Thus, the NSPS may somewhat limit RBEP's operating flexibility. The permitted annual operating schedule represents the maximum operating schedule, and allows the facility the flexibility to operate as necessary to meet the proposed emission standard. The District's PDOC contains the hours for each configuration (1-on-1, 2-on-1, and 3-on-1), and the net plant power electrical output, and net plant heat rates (LHV and HHV) for each of the five load scenarios for each configuration, resulting in 974.3 lb CO_2 /MWh-HHV$_{gross}$, which demonstrates that RBEP can meet the 1000 lb CO_2/MWh$_{gross}$ standard.

ELECTRICITY PROJECTED GREENHOUSE GAS EMISSIONS

While electricity use can be as simple as turning on a switch to operate a light or fan, the system to deliver the adequate and reliable electricity supply is complex and variable. But it operates as an integrated whole to reliably and effectively meet demand, such that the dispatch of a new source of generation unavoidably curtails or displaces one or more less efficient or less competitive existing sources. Within the system, generation resources provide electricity, or energy, generating capacity, and ancillary services to stabilize the system and facilitate electricity delivery, or movement, over the grid. *Capacity* is the instantaneous output of a resource in megawatts. *Energy* is the capacity output over a unit of time, for example an hour or year, generally reported as megawatt-hours or gigawatt-hours (GWh). Ancillary services[11] include regulation, spinning reserve, non-spinning reserve, voltage support, and black start capability. Individual generation resources can be built and operated to provide only one specific service. Alternatively, a resource may be able to provide one or all of these services, depending on its design and constantly changing system needs and operations.

GHG EMISSIONS FROM THE PROPOSED FACILITY

Project Construction

Construction of industrial facilities such as power plants requires coordination of numerous equipment and personnel. The concentrated on-site activities result in temporary, unavoidable increases in vehicle and equipment emissions that include greenhouse gases. Construction of the RBEP project would involve 60 months of activity (not including start-up or commissioning). The project owner provided annual GHG emissions estimate for the construction phase. The GHG emissions estimate is presented below in **Greenhouse Gas Table 2**. The term CO2E represents the total GHG emissions after weighting by the appropriate global warming potential.

Greenhouse Gas Table 2
RBEP, Estimated Maximum Annual Construction Greenhouse Gas Emissions

	CO_2	CH_4	N_2O	CO2E
Construction Total (Metric Tons)	3,366	0.154	0.0615	3,388

Source: RBEP 2013r, Revised Appendix 5.1A

[11] See CEC 2009b, page 95.

Project Operations

The RBEP is a proposed natural-gas fired, combined-cycle, air-cooled, 546.4-megawatt (MW) electrical generating facility that would replace the existing Redondo Beach Generating Station. The proposed RBEP would consist of a three-on-one combined-cycle power block, with three Mitsubishi Power Systems Americas (MPSA) 501DA combustion turbine generators (CTG) and associated equipment in each block. The primary sources of GHG would be the natural gas-fired combustion turbines. The employee and delivery traffic GHG emissions from off-site activities are negligible in comparison with the gas turbine GHG emissions.

Greenhouse Gas Table 3 shows estimated annual CO_2 emissions from permitted operations, and as limited by **AQ-21**. Electricity generation GHG emissions are generally dominated by CO_2 emissions from the carbon-based fuels; other sources of GHG are typically small and also are more likely to be easily controlled or reused/recycled, but are nevertheless included here as some of the compounds have very high relative global warming potentials.

Greenhouse Gas Table 3
RBEP, Estimated Potential Greenhouse Gas (GHG) Emissions

Emissions Source	Operational GHG Emissions[a]
Carbon Dioxide (CO_2)	1,557,773.2
Methane (CH_4)	29.4
Nitrous Oxide (N_2O)	3.0
Sulfur Hexafluoride (SF_6) Leakage	0.00071
Total Project GHG Emissions (MTCO2E/yr)	**1,557,805**

Sources: RBEP 2013r, Revised Appendix 5.1A, Table 5.1B.7 and SCAQMD 2014a.
Notes: a. One metric tonne (MT) equals 1.1 short tons or 2,204.6 pounds or 1,000 kilograms.

As a base load power plant, the RBEP is subject to SB1368 Emission Performance Standard of 60 percent capacity factor. Therefore, the project must comply with the SB1368 Greenhouse Gas Emission Performance Standard of 0.500 $MTCO_2/MWh$. The applicant provided data on the expected heat rates for different gas turbine load scenarios and different configurations. For each configuration (1x1, 2x1, and 3x1), the applicant provided heat rates for five different power outputs ranging from about 60 percent load up to 100 percent load. The applicant also provided the expected number of hours the plant would operate under each scenario, and heat rates for start ups and shutdowns. The estimated annual GHG performance is 1,063.3 lb CO_2/MWh_{net}, or 0.482 MTCO2/MWh, which could meet the standard (SCAQMD 2014a). However, under the new federal NSPS, the operation of the facility would have to be restricted somewhat as described above. The federal NSPS is equivalent to 0.454 $MTCO_2$ per MWh. Therefore the project would exceed the NSPS limit unless the applicant changes the operation profile to include more operations at higher loads. Conditions of Certification **AQ-21** and **AQ-22** require the facility to comply with Greenhouse Gas Emission Performance Standard and the federal NSPS, respectively.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Staff assesses the cumulative effects of GHG emissions caused by both construction and operation. As the name implies, construction impacts result from the emissions occurring during the construction of the project. The operation impacts result from the emissions of the proposed project during operation. Staff is continuing to monitor development of AB 32 Scoping Plan implementation efforts and general trends and developments affecting GHG regulation in the construction and electricity sectors.

CONSTRUCTION IMPACTS

It is staff's position that the small GHG emission increases from construction activities would not be significant for several reasons. First, the intermittent emissions during the construction phase are not ongoing during the life of the project. Additionally, control measures that staff recommends to address criteria pollutant emissions, such as limiting idling times and requiring, as appropriate, equipment that meets the latest criteria pollutant emissions standards, would further minimize greenhouse gas emissions to the extent feasible. The use of newer equipment will increase efficiency and reduce GHG emissions and be compatible with low-carbon fuel (e.g., bio-diesel and ethanol) mandates that will likely be part of future ARB regulations to reduce GHG from construction vehicles and equipment.

Direct/Indirect Operation Impacts and Mitigation

Operational impacts of the proposed project are described in detail in a later section titled "Project Impacts on Electricity System" since the evaluation of these effects must be done by considering the project's role(s) in the integrated electricity system. In summary, these effects include reducing the operation and greenhouse gas emissions from the older, existing power plants; potentially displacing local electricity generation; the penetration of renewable resources; and accelerating generation retirements and replacements, including facilities currently using once-through cooling.

CUMUMATIVE IMPACTS

Cumulative impacts are defined as "two or more individual effects which, when considered together, are considerable or . . . compound or increase other environmental impacts" (CEQA Guidelines § 15355). "A cumulative impact consists of an impact that is created as a result of a combination of the project evaluated in the EIR together with other projects causing related impacts" (CEQA Guidelines § 15130[a][1]). Such impacts may be relatively minor and incremental, yet still be significant because of the existing environmental background, particularly when one considers other closely related past, present, and reasonably foreseeable future projects.

This entire assessment is a cumulative impact assessment. The project alone would not be sufficient to change global climate, but would emit greenhouse gases and therefore has been analyzed as a potential cumulative impact in the context of existing GHG regulatory requirements and GHG energy policies.

COMPLIANCE WITH LORS

RBEP is required to participate in California's GHG cap-and-trade program, which became active in January 2012, with enforcement beginning in January 2013. This cap-and-trade program is part of a broad effort by the State of California to reduce GHG emissions as required by AB 32, which is being implemented by ARB. As currently implemented, market participants such as RBEP are required to report their GHG emissions and to obtain GHG emissions allowances (and offsets) for those reported emissions by purchasing allowances from the capped market and offsets from outside the AB 32 program. RBEP, as a GHG cap-and-trade participant, would be consistent with California's landmark AB 32 Program, which is a statewide program coordinated with a region wide WCI program to reduce California's GHG emissions to 1990 levels by 2020. ARB staff continues to develop and implement regulations to refine key elements of the GHG reduction measures to improve their linkage with other GHG reduction programs. The project may have to provide additional reports and GHG reductions, depending on the future regulations expected from ARB. Similarly, the proposed facility modifications would be subject to federal mandatory reporting of GHG emissions.

Reporting of GHG emissions would enable the project to demonstrate consistency with the policies described above and the regulations that ARB adopts and to provide the information to demonstrate compliance with any future AB 32 requirements that could be enacted in the next few years.

The RBEP as proposed would comply with California's Emissions Performance Standard of 1,100 lbs of carbon dioxide per MWh, but may have to restrict operations somewhat to comply with the new federal NSPS of 1,000 lbs carbon dioxide per MWh.

District Regulation XVII establishes preconstruction review requirements for GHGs and the facility is evaluated for these requirements in the PDOC beginning on page 132. RBEP would be a major PSD source for criteria pollutants and is, therefore subject to GHG PSD requirements. The district performed a PSD BACT analysis for GHGs and concluded thermal efficiency is the only technically and economically feasible alternative for CO_2/GHG emissions control for the facility. The current design proposed for the facility meets the BACT requirement for GHG emission reductions.

CALIFORNIA ELECTRICITY AND GREENHOUSE GASES – DAVID VIDAVER

California's commitments to dramatically reduce greenhouse gas (GHG) emissions over the next four decades include moving to a high-renewable/low GHG electricity system.

However, natural gas-fired power plants--and the GHG emissions associated with their output--will still be integral to the reliable operation of the electricity system at the outset of this period. In the long-run, zero- and low carbon resources, including demand-side and storage resources, may provide a majority, if not all of the balancing services needed to integrate variable[12] renewable resources. However, the technologies that are

[12] Variable and intermittent are often used interchangeably, but variable more accurately reflects the integration issues of renewable into the California grid. Winds can slow across a wind farm or cloud cover

needed to do so are not expected to be available in sufficient quantities by the early- to mid-2020s to obviate the need for dispatchable, flexible natural gas-fired electricity generation. Furthermore, the 2017–2020 retirements of natural gas-fired generation resources in the Los Angeles and San Diego regions that use once-through cooling (OTC) technologies and the closure of the San Onofre Nuclear Generating Station (SONGS) will require the development of natural gas-fired generation as part of the set of resources that will maintain local reliability.

The amount of new natural gas-fired capacity needed to provide reliable service to the customers of the state's investor-owned utilities, direct access providers and community choice aggregators over a ten-year planning horizon is determined in the California Public Utilities Commission's (CPUC's) Long-term Procurement Planning (LTPP) proceeding. The resulting portfolio of demand- and supply-side resources satisfies the state's loading order, which mandates development of cost-effective preferred resources (zero- and low-GHG emitting resources, such as energy efficiency, demand response, and renewable generation) in support of the state's climate change policies before authorizing the development/financing of conventional fossil resources.[13]

THE ROLE OF NATURAL GAS-FIRED GENERATION IN A LOW-GHG ENVIRONMENT

The need for natural gas-fired generation to reliably operate the electricity system is well established. On October 8, 2008, the Energy Commission adopted an Order Instituting Informational Proceeding (08-GHG OII-1) to solicit comments on how to assess the greenhouse gas impacts of proposed new power plants in accordance with the California Environmental Quality Act (CEQA).[14] A report prepared as a response to the GHG OII (CEC 2009a) defines the roles that natural gas-fired power plants fulfill in an evolving high-renewables, low-GHG system (CEC 2009b, pp 93 and 94). Such new facilities serve to:

1. Provide variable generation and grid operations support;

2. Meet extreme load and system emergency requirements;

3. Meet local capacity requirements; and,

4. Provide general energy support.

can shade portions of a solar field, temporarily reducing unit or facility output, but not shut down the unit or facility.

[13] The loading order is set forth in California's Energy Action Plans. Energy Action Plan I was adopted by the state's energy agencies in April/May 2003 and Energy Action Plan II in September 2005, An update to these plans was issued in February 2008.

[14] This need for gas-fired generation to reliably operate the system was reaffirmed in the CPUC decision authorizing Southern California Edison to procure new gas-fired generation in the Los Angeles Basin. D.13-02-015, See Decision Authorizing Long-Term Procurement for Local Capacity Requirements, February 13, 2013, p. 2.

Variable Generation and Grid Operations Support

California's renewable portfolio standard (RPS) requires that the state's energy service providers meet 33 percent of retail sales with renewable energy by 2020; meeting GHG emission reduction targets for 2050 will likely require a far higher percentage. Much of this energy will come from variable wind and solar resources to be developed in California, or on an "as generated" basis from neighboring states.

The California Independent System Operator (CA ISO) has identified an increased need for regulation services, "load-following" generation, and multi-hour ramping as a result of the increase in these variable ("intermittent energy") renewable resources, whose output changes over the course of the day, often in a sudden and unpredictable fashion. Dispatchable capacity must provide "regulation," small changes in output over a five-minute period at CA ISO direction, requiring that the generator be equipped with automated generation control (AGC). "Load following" requires larger changes in output by the generation portfolio over a five-minute to one-hour period. Multi-hour ramping needs require that units be dispatched, at CA ISO direction if necessary, over time periods of one to nine hours and wider ranges of output in aggregate, requiring dispatchable generation that can start and ramp up and down quickly and be capable of operating at relatively low load levels if the amount of dispatchable capacity and associated energy needed from these resources is to be minimized.

Natural gas-fired power plants are currently the only type of new facility that can provide these "ancillary" services in the quantities needed now and in the near future. While dispatchable hydroelectric plants can also provide them, the potential for adding hydroelectric resources to the system is limited. Nuclear, coal and geothermal facilities are generally more economic if operated at or near their design point (ie, base loaded)[15] and therefore, are not the preferred technologies for providing ancillary services. While demand-side resources and storage may ultimately provide significant quantities of these ancillary services, only pumped hydro storage facilities are currently capable of doing so on a large scale.[16]

Historically, a large share of California's load-following and ramping needs have been provided by the natural gas-fired steam turbines built on the Pacific Coast and in the San Francisco Bay Delta during the 1960s and 1970s. While these units were modified to operate successfully as load followers, they are not as efficient or economic as newer technologies. Several of these have retired as a result of the State Water Resource Control Board's (SWRCB's) policy on the use of OTC technologies; others are expected to retire by 2020. This represents a loss of capacity capable of operating at a very wide range of output and thus providing large quantities of ancillary services.

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[15] Issues can arise from: thermal fatigue due to cycling; difficulties starting and stopping solid or geothermal fuel supplies; significant inefficiencies at low loads or standby points used to avoid full shutdowns; and, significant capital outlays that make it necessary to operate the units as much as possible.

[16] In D.13-02-015, the CPUC provides the assumptions regarding demand response and storage that were used in estimating the residual need for gas-fired generation capacity to meet the estimated 2021 local capacity requirement (LCR) for the Los Angeles Basin local capacity area (LCA).

Local Capacity Requirements

The CA ISO has identified numerous local capacity areas (LCA) and sub-areas in which threshold amounts of capacity are required to ensure reliability. Transmission constraints prevent the import of sufficient energy into these areas under high load conditions to ensure reliable service without requiring specified amounts of local capacity be generating or available to the CA ISO for immediate dispatch.

Reliable service requires that the CA ISO be able to maintain service under one-in-ten-year load conditions given the sequential failure of two major components (a large power plant and a major transmission line, for example); this requirement is imposed by the North American Electric Reliability Council (NERC). The amount of capacity needed in each of these areas (the local capacity requirement, or "LCR") is determined annually by the CA ISO; the LCR study process culminates in an annual *Local Capacity Technical Analysis*. The need for natural-gas fired capacity in LCAs stems in part from their predominantly urban nature and coastal location (i.e., fewer transmission lines into the coastal region as none are available from the west or ocean-side of the basin). The LCRs of the Greater Bay Area, Los Angeles Basin, San Diego and Big Creek-Ventura local reliability areas (LRAs) are too large to be met solely with non-natural gas fired generation; the renewable development scenarios compiled by the CPUC for use in the 2014 LTPP proceeding and the CA ISO's 2014-2015 Transmission Planning Process indicate that only a share of the new capacity needed in the large LCAs can be expected to come from new renewable resources. This share is not sufficient to eliminate the need for new natural gas-fired generation in the Los Angeles Basin LCA, as evidenced by the procurement authorization issued in that proceeding.

Extreme Load and System Emergency Requirements

Sufficient capacity must exist to meet demand under very high load conditions or when generator outages reduce capacity surpluses to levels low enough to threaten reliability. Historically, generation capacity and demand response programs equal to 115 percent to 117 percent of forecasted annual peak demand have been deemed sufficient to meet reliability requirements.

General Energy Support

The loading order indicates the resources that the state intends to rely on to meet energy needs while reducing GHG emissions. While energy efficiency, demand response programs, renewable generation, and combined heat and power are preferred resources that are to be developed before natural gas-fired generation, they are not sufficient to meet the state's future energy demand and maintain the electric system's reliability. In addition, a significant share of the state's still-operating generation fleet is expected to shut down to comply with the SWRCB's OTC policy. Energy from natural gas-fired generation will increasingly be needed during a prolonged nuclear plant outage (for refueling for example) or during dry years, in which hydroelectric production is reduced.

QUANTIFYING THE NEED FOR NATURAL GAS-FIRED GENERATION

Prior to the deregulation of the California electricity system during the 1990's, the Energy Commission's power plant siting process considered the need for power plant development. SB 110 (Chapter 581, Statutes of 1999) eliminated the requirement that projects licensed by the Energy Commission be in conformance with an integrated assessment of need that was conducted by the Energy Commission until that time.

The need for new generation capacity to ensure reliable service in the investor-owned utility (IOU) service territories is now determined in the CPUC's biennial LTPP proceeding.[17] This proceeding is the forum in which the state's major IOUs are authorized to finance the development of new "least-cost, best-fit" generation (on behalf of either IOU customers or all ratepayers not served by publicly-owned utilities) needed to reliably meet electricity demand. This need, specified in terms of: (a) the MW of capacity needed; (b) the desired or required operating characteristics of the resource(s) to be financed; and (c) the location of proposed additions if required for local reliability, is a function of planning assumptions that reflect the state's commitment to dramatically reduce GHG emissions from the electricity sector. The MWs of capacity needed are driven by:

- Peak demand growth due to economic and demographic factors;
- Reductions in peak demand due to committed and uncommitted energy efficiency and demand response programs;
- Reserve margins (dependable capacity in excess of peak demand) needed to ensure system reliability, normally assumed to be 15 to 17 percent of peak demand, but also including any additional dispatchable capacity needed to ensure reliability given variation of renewable resources (e.g., wind or solar generation);
- Capacity to be provided by fossil-fired resources being developed by California-based investor-owned utilities pursuant to authorization by the CPUC in previous LTPP proceedings;
- Capacity to be provided by new renewable resources built/contracted with to meet the state's RPS; and,
- Capacity to be lost due to retirement, e.g., capacity expected to cease operation as a result of the SWRCB policy regarding the use of OTC.

The planning assumptions adopted for use in the LTPP proceeding, and thus determinant of the amount of new capacity authorized, consider both the state's "loading order" for resource development, as well as the expected development of specific types of preferred resources, including energy efficiency, demand response, and renewable generation. In other words, in authorizing the procurement/financing of dispatchable, natural gas-fired capacity by an IOU, the CPUC assumes that cost-effective amounts of preferred resources will have been procured.[18]

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[17] The need for new generation capacity to ensure reliable service by publicly-owned utilities (POU) is determined by the governing authorities of the individual utilities.

[18] Both the amount of natural gas-fired capacity conditionally authorized by the CPUC and the amount that will ultimately approved are dependent upon the amount of preferred resources that are assumed by

The authorization for Southern California Edison to procure natural gas-fired generation to meet local reliability needs in the Los Angeles Basin was granted in D.13-02-015 (February 13, 2013) in the CPUC's 2012 LTPP proceeding (R.12-03-014). The decision requires that Southern California Edison procure at least 1,000 MW and not more than 1,200 MW of new conventional natural gas-fired resources in order to replace in-basin capacity utilizing OTC expected to retire by the end of 2020. The decision did not consider any need for additional capacity as a result of the retirement of San Onofre.

The CPUC does not require Energy Commission certification for a generation project to participate in a utility request for offers (RFOs), nor does the Energy Commission require a power purchase agreement (PPA) for a project to be considered for certification. Requiring the sequencing of these processes would not only lengthen the time needed to bring projects on line and thus threaten system reliability, it would reduce the number of projects that could compete in utility RFOs. This could lead to non-competitive solicitations, unnecessarily raising ratepayer costs.

Energy Commission certification of fossil generation without a long-term PPA does not result in the development of more fossil generation than that needed to reliably operate the system. It is not expected that developers of new capacity, such as the developer of the proposed RBEP facility, would bring a project to completion without a long-term PPA with a utility that would guarantee recovery of the investment of several hundred million dollars. Only one so-called "merchant plant" has been developed since the energy crisis (2000 – 2001) without a PPA, and the conditions that led to that merchant plant are specific to that one facility. This merchant plant, in turn, provides capacity and ancillary services that obviates the need for energy and capacity from other, new gas-fired generation and contributes to reduction in GHG emissions. However, if the RBEP were to be built and come on line without CPUC approval of a PPA, they would still: (a) displace energy from higher GHG-emission facilities, and (b) not "crowd out" renewable generation and demand-side programs (i.e., requirements/targets for the procurement of preferred resources would be unaffected).

ENERGY DISPLACEMENT AND CHANGES IN GHG EMISSIONS

Any assessment of the impact of a new power plant on system-wide GHG emissions must begin with the understanding that electricity generation and demand must be in balance at all times; the energy provided by any new generation resource simultaneously displaces exactly the same amount of energy from an existing resource or resources.[19] The GHG emissions produced by the RBEP are thus not incremental, but are partially or totally offset by reductions in GHG emissions from those generation resources that are displaced, depending on the relative GHG emission rates.

the CPUC to be developed and a showing by the IOU that all cost-effective preferred resources available have been procured. See D.13-02-015, pp. 78 - 80

[19] Over time, the development of demand-side and storage technologies that can cost-effectively substitute for generation as providers of regulation, load-following, and multi-hour ramping services may obviate the need for gas-fired generation, but this is not expected to occur soon enough to eliminate the need for gas-fired generation to replace retiring OTC units and San Onofre.

At renewable penetration levels of less than 33 percent, new natural gas-fired generation such as the RBEP displaces less efficient natural gas-fired generation[20] in a very straightforward fashion. It is reasonable to assume that the RBEP would be dispatched (called upon to generate electricity) whenever they are a cheaper source of energy than an alternative - i.e., that they will displace a more expensive resource, if not the most expensive resource that would otherwise be called upon to operate. The costs of dispatching a power plant are largely the costs of fuel, plus variable operations and maintenance (O&M) costs, with the former representing the lion's share of such costs (90 percent or more). It follows that the RBEP would be dispatched when they burn less fuel per MWh than the resource(s) they displace, i.e., when they produce fewer GHG emissions. There are exceptions in theory, but not in practice.[21]

Holding the portfolio of generation resources constant, energy from new natural gas-fired plants displaces energy from existing natural gas-fired plants. In the longer-term, the development and operation of the RBEP would reduce the use of less efficient generation resources, and ultimately, to their retirement. By reducing revenue streams accruing to other resources (for the provision of both energy and capacity-related services, whether through markets or under a bilateral contract), the RBEP would render these other facilities less profitable and riskier to operate. This follows from the fixed demand for energy and ancillary services; the developers of the RBEP cannot stimulate demand for energy and other products they provide, but merely provide a share of the energy that is needed to meet demand and the capacity needed to reliably operate the system. In doing so, the RBEP both discourages the use of, and allows for the retirement of, less-efficient generation.

The long-run impact of the natural gas fired fleet turnover as described here can be seen from historical changes in resources that are providing electricity in California as presented below in **Greenhouse Gas Figure 1** (data includes combined cycles and boilers only). In 2001, approximately 74,000 GWh (62.5 percent of natural gas-fired generation) in California was from pre-1980 natural gas fired steam turbines, combusting an average of 11,268 Btu per kWh (not shown in the figure). By 2010, this share had fallen to approximately 6,000 GWh (5.4 percent); 64.1 percent of natural-gas fired generation was from new combined cycles with an average heat rate of 7,201 Btu per kWh (CEC 2011, also not shown in the figure).[22] The net change over this period was a 22 percent reduction in GHG emissions (also not shown in the figure) despite a 3.5 percent increase in generation. The post-2000 development of new combined cycle

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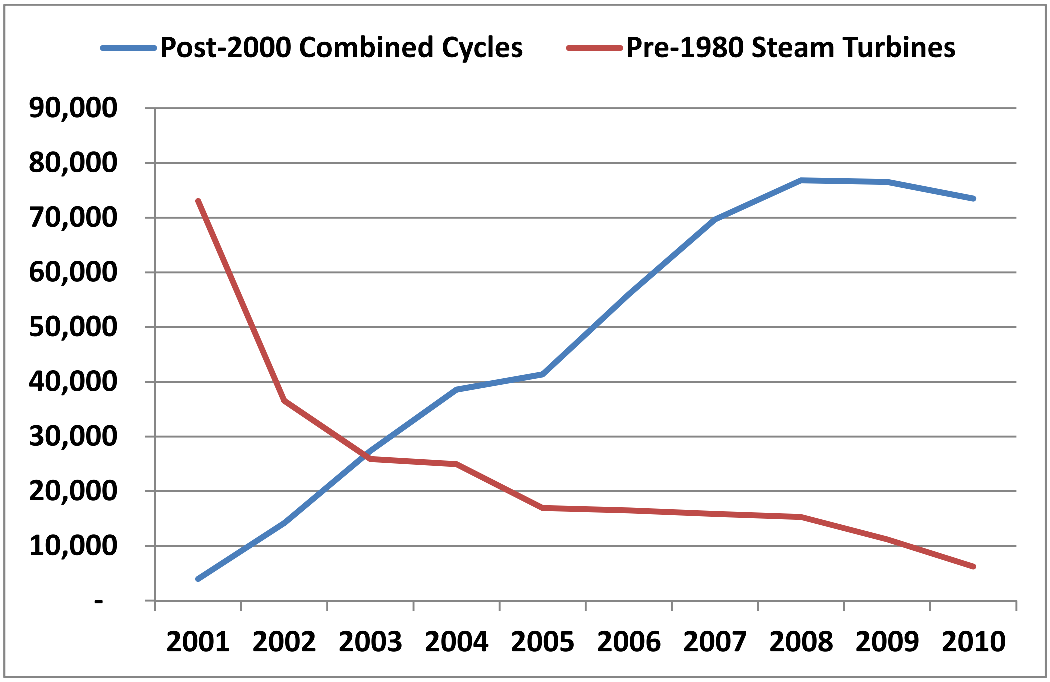
[20] At very low gas prices relative to coal prices, i.e., when electricity from natural gas is cheaper than that from coal, new gas-fired generation will displace coal-fired generation. In markets such as California, where GHG emissions allowance costs are a component of the market price, coal-fired generation is displaced even sooner due to its higher carbon content.

[21] If a plant's variable O&M costs are so low as to offset the costs associated with its greater fuel combustion, a less efficient (higher GHG emission) plant may be dispatched first. There is no indication that the RBEP's' variable O&M costs are unusually low and that they would be dispatched before a more efficient facility. If a natural gas-fired plant's per-mmBtu fuel costs are very low, it may be less efficient (higher GHG emission) but still be dispatched first. Natural gas costs in California, however, are higher than elsewhere in the WECC and thus this scenario is unlikely to occur.

[22] The remaining 30 percent of natural-gas-fired generation is largely cogeneration; slightly more than 1 percent is from peaking units. For a detailed discussion of the evolution of natural gas-fired generation in California since 2000, see *Thermal Efficiency of Gas-Fired Generation in California: 2012 Update* (CEC-200-2013-002; May 2013)

generation has allowed for the retirement of aging natural gas-fired steam turbines along the California Coast and in the San Francisco Bay Delta. Those that remain in operation have seen a dramatic reduction in their capacity factors[23] and are used primarily as a source of dispatchable capacity.

Greenhouse Gas Figure 1
Annual California Output (GWh), Selected Natural Gas-Fired Generation Technologies, 2001 – 2010



Source: Generator Quarterly Fuel and Report Filings with the Energy Commission

The dispatch of the RBEP would generally not result in the displacement of energy from renewable resources or large hydroelectric generation. Most renewable resources have must-take contracts with utilities, which must purchase all the energy produced by these renewable generators. Rare exceptions occur due to transmission congestion or seasonal surpluses. Even in those instances where this is not the case (e.g., where renewable generation is participating in a spot market for energy) the variable costs associated with renewable generation are far lower than those associated with the RBEP (e.g., fuel costs for wind, solar, other renewable generation technologies, and large hydroelectric facilities are zero or minimal); these resources can bid into spot markets for energy at prices far below the RBEP and other natural gas-fired generators. Nor would the RBEP displace energy from operating (zero-GHG emission) nuclear generation facilities, as these resources have far lower variable operating costs as well.

[23] A unit's capacity factor is its output expressed as a share of potential output, the amount it would generate if it were operated continuously at 100 percent of their maximum capacity for every hour of the year.

The relationship between a natural gas-fired plant's heat rate and its dispatch in the real world is in fact more complicated than that described above. While natural gas-fired plants differ in their thermal efficiency – the amount of fuel combusted, and thus GHG emissions per unit of electricity generated – very efficient natural gas plants are not necessarily dispatched before less efficient ones. While this would seem to contradict the assertion that output from a new plant will always displace a higher emitting one, a less efficient (e.g., at full output) plant may actually combust less fuel during a duty cycle than a plant with a lower heat rate, and thus produce fewer GHG emissions. Consider a 30-MW peaking plant with a heat rate of 10,000 Btu/kWh when operated at full output whose electrical outputs can be moved from off to on, generating approximately 15 to 30 MW in a matter of minutes. Use of this plant to meet contingency needs (e.g., demand on a hot afternoon) may result in less incremental fuel combustion than a 100 MW plant with a lower heat rate at full output if the latter requires several hours and combusts large amounts of fuel to start up, must be kept on overnight or for several hours in order to be available the next day and/or cannot operate at 30 MW (without a marked degradation in efficiency, and thus increases in GHG emissions).

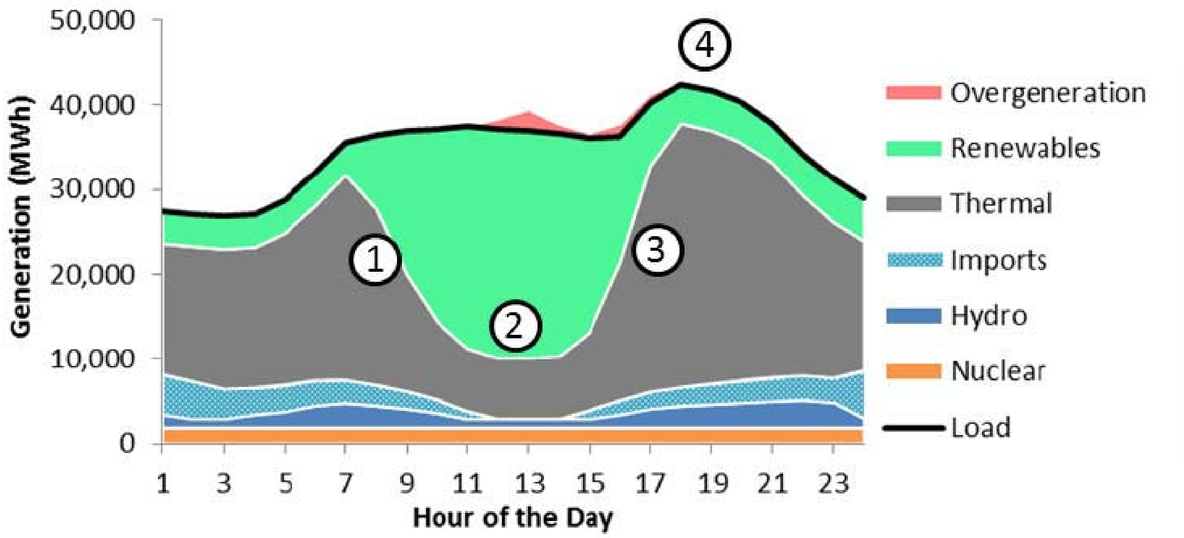
At levels of renewable energy penetration in excess of 33 percent, flexible combined cycles such as the RBEP contribute to GHG emission reductions by increasing the amount of renewable energy that can be integrated into the electricity system. Given the solar-intensive generation portfolio being developed in California, increasing renewable penetration without curtailing renewable output more often will require an increasing ability to export surplus generation, store energy over a multi-hour period, and/or reduce gas-fired generation needed to reliably operate the system.[24] While the RBEP is less thermally efficient than some of the natural gas-fired combined cycles built in California during the past decade, RBEP turbines are capable of operating at lower levels of output, and doing so without a marked decrease in efficiency. As a result, they can allow for more renewable generation than a conventional combined cycle, with the concomitant reduction in GHG emissions serving to offset the impact of their lower efficiency.

Flexible natural gas-fired generation capable of operating in the manner described above also serves to reduce GHG emissions by allowing for the integration of greater amounts of variable renewable energy into the electricity system. **Greenhouse Gas Figure 2** below depicts the estimated operating profile of the generating resources of the high-solar electricity system that California will increasingly have over the next three to 15 years and beyond. While the state's Renewable Portfolio Standard is 33 percent of retail sales for 2020, the value for 2030 may be much higher. Much of the additional renewable energy will come from solar resources even if there is limited development of utility-scale solar generation, as the residential and commercial sectors take advantage of falling distributed solar costs and new residential construction post-2020 is required to be zero-net energy, i.e., include solar panels.

[24] For a detailed discussion of the operational needs for a high-solar portfolio, see Energy and Environmental Economics, *Investigating a Higher Renewables Standard in California*, January 2014, available at http://www.ethree.com/public_projects/renewables_portfolio_standard.php.

The large “belly” (2 in the chart) represents solar generation on a typical non-summer day; this gets larger over time as more solar is added to the system. The gray area represents necessary thermal generation, which is increasing natural gas over time as California portfolios are divested of coal pursuant to the state’s Emissions Performance Standard. Note that imports are reduced to zero at mid-day, and hydro generation is limited to run-of-river (from hydro-generation facilities that do not have water storage, and from water that must be allowed to flow due to recreational needs, flood control, habitat preservation, etc.). A share of mid-day generation must also be thermal/natural gas as: a threshold amount of thermal capacity needs to be idling (or at least readily available, not unlike a hybrid car) at mid-day at minimum output to protect against sudden component failures (major power plants and transmission lines); and, a large amount of gas-fired generation will be needed four to eight hours later and thus must be on line and generating at minimum output at mid-day.

Greenhouse Gas Figure 2
California Generation Typical for a Non-Summer Day (“Duck” Chart)



The combined cycles built during 2001 – 2010, as presently configured, cannot start up quickly and, when operating, generally must be at 50 percent load or higher to remain in compliance with air permits. This can present problems during the morning and through mid-day (1 and 2 on the chart) as solar generation comes on line, requiring rapid turndown or shut-off of thermal resources. If the combined cycles on line and generating cannot turn down fast enough or to low enough levels, this could result in overgeneration, as shown in the figure.

Assuming the combined cycles are compatible with the rapid shifts in thermal generation during the morning shoulder, then they must be on at 50 percent load or higher (i.e., engaged and driving slowly, more so than just idling) at mid-day to ramp up as needed in the early evening to cover increasing demand (4 on the chart) and diminishing solar generation (3 on the chart). The flexible combined cycles becoming commercially available can ramp down to 20 - 30 percent load and, more importantly, are designed to shut off up to twice a day and start up again quickly. The resulting mid-day thermal wedge is much smaller (only 20 - 30 percent of the thermal capacity needed for reliability, as opposed to as much as 50 percent of the thermal energy needed at the evening peak). This allows for greater variable energy to be absorbed by the system, reducing the potential need for solar curtailment, and thus the costs/risks associated with its development.

THE ROLE OF THE RBEP IN LOCAL GENERATION DISPLACEMENT

As new generation capacity in the California ISO-defined Los Angeles Basin local capacity area (LCA) and its Western Los Angele sub-area (LCA), the proposed RBEP would provide local reliability services. The CA ISO has determined in their *2014 Local Capacity Technical Analysis* that the Los Angeles Basin and its Western sub-area need 10,430 MW and 4,175 MW of local capacity, respectively.[25] The RBEP facility would contribute up to 546.4 MW of local capacity to these areas; in D.13-02-015[26] the CPUC has established the need for local capacity in excess of this amount to replace retiring OTC capacity in the Los Angeles Basin LCA.

As stated above, local reliability requires generation by resources located within an LCA; the LCR reflects the amount of capacity that must be generating, synchronous to the grid or available within a few minutes under one-in-ten load conditions.[27] At lower levels of demand, a share of local capacity must be generating, synchronous to the grid or available on a moment’s notice as long as reliability cannot be maintained solely with imported energy in the event of major component failures.

The number of hours per year that the RBEP would be required to operate in support of local reliability needs and the amount of energy that would be generated as a result are not known; CA ISO operating procedures which result in the dispatch of specific generating units for local reliability purposes are confidential. When called upon to generate for such purposes, however, it is reasonable to expect that the RBEP would be the least-cost and thus lowest-emitting natural gas-fired resources able to do so, given the duty cycle that was necessary to provide local reliability. It would thus displace a less-efficient resource, reducing GHG emissions resulting from relying on the latter. Should it be dispatched for local reliability needs ahead of units that were thermally more efficient, it would likely be because, able to operate at lower levels of output, it would allow for the integration of a greater amount of renewable energy.

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[25] California ISO, *2014 Local Capacity Technical Analysis: Final Report and Study Results*, April 30, 2013, pp 75, 79.

[26] It is expected that the Energy Commission will receive AFCs from applicants expecting to provide additional local capacity well in excess of that authorized by D. 13-02-015 as well as additional conventional natural gas-fired capacity to replace the San Onofre Nuclear Generating Station authorized by D. 14-03-004 on March 14, 2014 in the same 2012 LTPP proceeding (R. 12.03.014). Approving AFCs for projects whose capacity in aggregate is in excess of that authorized by the CPUC facilitates competitive solicitations for new capacity and does not present a significant risk of the development of capacity in excess of the amount authorized.

[27] One-in-ten load conditions refer to a level of demand that is expected to be observed on only one day in ten years

AVENAL PRECEDENT DECISION

The Energy Commission established a precedent decision in the Final Commission Decision for the Avenal Energy Project (CEC 2009b), finding as a conclusion of law that any new natural gas-fired power plant certified by the Energy Commission "must:

- not increase the overall system heat rate for natural gas plants;
- not interfere with generation from existing renewables or with the integration of new renewable generation; and
- take into account the two preceding factors, reduce system-wide GHG emissions"[28]

The average heat rate for the Western Electricity Coordinating Council (WECC) is presented in **Greenhouse Gas Table 4**.

Greenhouse Gas Table 4
Weighted Average Heat Rate for Operating Natural Gas-Fired Plants[1] in the WECC 2010-2012

Year	Average Heat Rate (mmBtu/kWh)
2010	7,784
2011	7,995
2012	7,918

[1] Excludes cogeneration facilities
Source: Ventyx, Velocity Suite (compiled from EPA hourly Continuous Emission Monitoring Survey data

Despite having a heat rate in excess of the WECC average, the operation of the RBEP should result in a reduction in the system heat rate for natural gas plants in the WECC due to its displacing energy from less-efficient natural gas-fired generation as discussed above. In those instances where RBEP is higher emitting on a per-MWh basis than the resources it displaces, but does so because it can operate at lower output levels and thus allow for more renewable integration and generation, the result might be a higher system heat rate, but total gas-fired generation (energy) and GHG emissions will fall.

As noted above, the addition of the RBEP would not interfere with generation from existing renewable facilities nor with the integration of new renewable generation. The flexible nature of the RBEP would in fact serve to facilitate the integration of additional variable renewable resources.

The RBEP would reduce system-wide GHG emissions as discussed above; their development is consistent the goals and policies of AB 32 and thus are consistent with the Avenal precedent decision.

[28] Final Commission Decision, Avenal Energy Application for Certification (08-AFC-1) December 2009, p. 114.

PROPOSED CONDITIONS OF CERTIFICATION – JOSEPH HUGHES

No Conditions of Certification related to greenhouse gas emissions are proposed. The facility owner would participate in California's GHG cap-and-trade program. The facility owner is required to report GHG emissions and to obtain GHG emissions allowances (and offsets) for those reported emissions by purchasing allowances from the capped market and offsets from outside the AB 32 program. Similarly, the proposed facility modifications would be subject to federal mandatory reporting of GHG emissions. The facility owner may have to provide additional reports and GHG reductions, depending on the future regulations formulated by the U.S. EPA or the ARB.

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ACRONYMS

AB	Assembly Bill
ARB	California Air Resources Board
CAA	Clean Air Act
CalEPA	California Environmental Protection Agency
CA ISO	California Independent System Operator
CCCC	California Climate Change Center
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CH4	Methane
CO2	Carbon Dioxide
CO2E	Carbon Dioxide Equivalent
CPUC	California Public Utilities Commission
EIR	Environmental Impact Report
EPS	Emission Performance Standard
GCC	Global Climate Change
GHG	Greenhouse Gas
GWh	Gigawatt-hour
GWP	Global Warming Potential
HFC	Hydrofluorocarbons
IEPR	Integrated Energy Policy Report
IPCC	Intergovernmental Panel on Climate Change
KW	Kilowatt
LRAs	Local Reliability Areas
MT	Metric tonnes
MW	Megawatt

MWe	Megawatt electrical
MWh	Megawatt-hour
N2O	Nitrous Oxide
NO	Nitric Oxide
NO2	Nitrogen Dioxide
NOx	Oxides of Nitrogen or Nitrogen Oxides
OII	Order Initiating an Informational
OTC	Once-Through Cooling
PFC	Perfluorocarbons
PSD	Prevention of Significant Deterioration
RBEP	Redondo Beach Energy Project
RPS	Renewables Portfolio Standard
SB	Senate Bill
SF6	Sulfur hexafluoride
SWRCB	State Water Resource Control Board
U.S. EPA	United States Environmental Protection Agency

ALTERNATIVES

Negar Vahidi and Scott Debauche[1]

INTRODUCTION

This section evaluates a reasonable range of potential alternatives to the Redondo Beach Energy Project (RBEP or project). As the California Environmental Quality Act (CEQA) lead agency for the RBEP, the California Energy Commission (Energy Commission or staff) is required to identify and evaluate a range of reasonable alternatives to the project that 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 guiding principles for selection of alternatives analyzed are consistent with CEQA Guidelines (Cal. Code Regs., tit. 14, §15000 et seq.). These guidelines are described in detail below in the subsection "CEQA Requirements."

Staff has reviewed the alternatives analysis provided by the project applicant within the RBEP Application for Certification (AFC, Section 6.0) (RBEP 2012a). The applicant's analysis of project alternatives did not identify any feasible alternatives to the RBEP. In addition, staff issued several data requests (Set 1B, DRs 48-51) to the applicant regarding alternatives. The information provided in the AFC and the applicant's partial responses to the data requests (RBEP 2014d) served as a starting point for the alternatives analysis in this Preliminary Staff Assessment (PSA). Additionally, alternatives analyzed within this section include those recommended through agency and public comment, as well as those developed by staff.

Alternatives that have been evaluated are either eliminated from further consideration or evaluated against the RBEP to determine if they meet the basic objectives of the RBEP and would reduce or avoid any adverse environmental impacts of the RBEP. As discussed below, only the No-Project Alternative was determined to warrant detailed analysis and comparison to the RBEP at this time. Alternatives eliminated from detailed analysis are also discussed in this section, including the reasons for their elimination.

SUMMARY OF CONCLUSIONS

Based on the analysis provided below in the subsection "Alternatives Eliminated From Detailed Consideration," the only alternative evaluated in detail is the No-Project Alternative. Under the No-Project Alternative, the existing Redondo Beach Generating Station (RBGS) would not employ a means to comply with the State Water Resources Control Board's once-through-cooling (OTC) policy to reduce the impacts of using seawater. Therefore, on December 31, 2020, the RBGS would cease all operations. The No-Project Alternative consists only of RBGS shutdown and the site remaining un-operational in its existing state at that time. **Alternatives Table 3** provides a summary comparison of the RBEP environmental impacts and those of the No-Project Alternative. Based upon staff's analysis, the No-Project Alternative's impacts would be similar to,

[1] Preparation of this alternatives section includes technical analysis and additional input completed by other Energy Commission staff. **Alternatives Appendix 1** of this staff assessment contains a list of staff contributors.

less than, and in some instances greater than, those of the RBEP. The reductions in impacts stem from the elimination of RBEP construction and cessation of RBGS operations. However, staff analysis found the No-Project Alternative would increase the following impacts when compared to the RBEP: land use conflict with applicable land use policies; visual resources impacts that substantially degrade the existing visual character or quality of the site and its surroundings; and potential waste management impacts on human health and the environment related to past or present soil or water contamination. Furthermore, the No-Project Alternative does not meet RBEP objectives of providing efficient, reliable and flexible generation. While the No-Project Alternative would avoid construction impacts of the RBEP, staff acknowledges that at some point beyond the known extent of the No-Project Alternative, similar construction-related impacts would likely occur from demolition and/or construction of future facilities.

CEQA REQUIREMENTS

As the CEQA lead agency for the RBEP, the Energy Commission is required to consider and discuss alternatives to the RBEP. The guiding principles for the selection of alternatives for analysis are provided by the CEQA Guidelines (Cal. Code Regs., tit. 14, §15000 et seq.). According to section 15126.6 of the CEQA Guidelines, the alternatives analysis must:

- Describe 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;
- Consider alternatives that would avoid or substantially lessen any significant environmental impacts of the project; and
- Evaluate the comparative merits of the alternatives.

The lead agency is responsible for selecting a reasonable range of project alternatives for examination and must publicly disclose its reasoning for selecting those alternatives (Cal. Code Regs., tit. 14, §15126.6, subd.(a)). CEQA does not require an agency to “consider every conceivable alternative to a project.” Rather, CEQA requires consideration of a “reasonable range of potentially feasible alternatives.” The reasonable range of alternatives must be selected and discussed in a manner that fosters meaningful public participation and informed decision making (Cal. Code Regs., tit. 14, §15126.6, subd. (f)). The range of alternatives presented in this analysis is limited to those that will inform a reasoned choice by the Energy Commission. Under the “rule of reason,” an agency need not consider an alternative whose effect cannot be reasonably ascertained and whose implementation is remote and speculative (Cal. Code Regs., tit. 14, §15126.6, subd. (f)(3)).

The CEQA lead agency is also required to:

1. Evaluate a “no project” alternative,
2. Identify alternatives that were initially considered but then rejected from further evaluation, and

3. Identify an environmentally superior alternative among the other alternatives if the environmentally superior alternative is the “no project” alternative (Cal. Code Regs., tit. 14, §15126.6)

Alternatives may be eliminated from detailed consideration by the lead agency if they fail to meet most of the basic project objectives, are infeasible, or could not avoid any significant environmental effects (Cal. Code Regs., tit. 14, §15126.6, subd. (c)).

PROJECT OBJECTIVES

The process for selecting alternatives to evaluate begins with the establishment of project objectives. The CEQA Guidelines define the requirement for a statement of objectives (Cal. Code Regs., tit. 14, §15124, subd.(b)):

> “A clearly written statement of objectives will help the lead agency develop a reasonable range of alternatives to evaluate in the EIR and will aid the decision makers in preparing findings or a statement of overriding considerations, if necessary. The statement of objectives should include the underlying purpose of the project.”

The California Independent System Operator (CAISO) identified the importance for new power generation facilities in their Western Los Angeles Basin (LA Basin) Local Reliability Area (LRA) to replace the ocean water once-through-cooling (OTC) plants. Generation facilities that use ocean water for OTC are expected to retire as a result of the State Water Resources Control Board (SWRCB) Water Quality Control Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling (referred to as the OTC Policy). The South Coast Air Quality Management District’s (SCAQMD) Rule 1304(a)(2) allows for the replacement of older, less efficient, electric utility steam boilers with specific new generation technologies on a megawatt-to-megawatt basis.

The objectives for the RBEP are identified below.

- Provide the most efficient, reliable, and predictable generating capacity available by using combined-cycle, natural gas-fired combustion turbine technology to replace the OTC generation, support the local capacity requirements of southern California's Western LA Basin LRA and be consistent with SCAQMD Rule 1304(a)(2).
- Develop a 496 MW (net) project that provides efficient operational flexibility with rapid-start and steep ramping capability to allow for the efficient integration of renewable energy sources into the California electrical grid.
- Serve southern California energy demand with efficient and competitively priced electrical generation.
- Develop on a brownfield site of sufficient size and reuse existing offsite electrical, water, wastewater, natural gas infrastructure and land to minimize terrestrial resource impacts.
- Site the project to serve the Western LA Basin LRA load center without constructing new transmission facilities.
- Assist in developing increased local generation projects, thus reducing dependence on imported power and associated transmission infrastructure.

- Ensure potential environmental impacts can be avoided, eliminated, or mitigated to less-than-significant.

ENERGY COMMISSION STAFF'S ALTERNATIVES SCREENING PROCESS

The CEQA Guidelines describe selection of a reasonable range of alternatives and the requirement to include those that could feasibly accomplish most of the basic project objectives while avoiding or substantially lessening one or more of the significant effects (Cal. Code Regs., tit. 14, § 15126.6, subd. (c)). The CEQA Guidelines address the requirement for the alternatives analysis to briefly describe the rationale for selecting alternatives to be discussed. The analysis should identify any alternatives that were considered by the lead agency but were rejected as infeasible and briefly explain the reasons underlying the lead agency's determination.

The CEQA Guidelines list factors that may be considered when addressing feasibility of alternatives: site suitability; economic viability; availability of infrastructure; general plan consistency; other plans or regulatory limitations; jurisdictional boundaries; and whether the proponent can reasonably acquire, control or otherwise have access to, the alternative site (or the site is already owned by the proponent). No one of these factors establishes a fixed limit on the scope of reasonable alternatives (Cal. Code Regs., tit. 14, § 15126.6, subd. (f)(1)).

Pursuant to CEQA, the purpose of staff's alternatives analysis is to identify the potential significant impacts of the RBEP and to focus on alternatives that are capable of avoiding or substantially reducing those impacts while still meeting most of the basic project objectives.

Staff used the methodology summarized below to prepare the analysis of alternatives.

- Describe the objectives of the project and compare those against potentially feasible alternatives to the project.
- Identify any potential significant environmental impacts of the project.
- Identify and evaluate feasible alternatives that meet most of the basic project objectives, to determine whether such alternatives would avoid or substantially lessen project impacts identified as significantly adverse, and determine whether such alternatives would result in impacts that are the same, less than, or greater than those of the project.
- Evaluate the comparative merits of the alternatives.

PUBLIC AND AGENCY PARTICIPATION

Staff, in determining the scope and content of this analysis, has considered verbal and written agency, general public, and intervener comments received to date regarding alternatives to the RBEP. Preparation of the RBEP alternatives analysis included staff's participation in the following:

- Energy Commission public workshop held in Redondo Beach, CA (February 10, 2014) – TN 201615
- Energy Commission public workshop held in Redondo Beach, CA (December 5, 2013) – TN 201264.
- Energy Commission Environmental Public Site Visit, Environmental Scoping Meeting and Informational Hearing held in Redondo Beach, CA (October 1, 2013) – TN 200423.

The following summarizes the general themes of public and agency written comments that pertain to the CEQA alternatives analysis of the RBEP.

- A summary of the California Coastal Conservancy's Study of Alternative Generation was attached to multiple individual comments. The attachment stated that local reliability requirements specified by the CAISO for the LA Basin LRA do not require generation to be located at the existing RBGS. Thus, alternatives for generation in other locations should be considered.
- The power plant can be sited in other less densely populated, non-residential locations.
- Focus should be on development of renewable sources of power.
- It would be more efficient and cost effective to increase the capacity at other AES facilities such as the Huntington Beach and Alamitos Generating Stations rather than building a new plant in Redondo Beach.
- Reasonable alternatives exist and include the use of AES' other properties to develop power generation.

ALTERNATIVES ELIMINATED FROM DETAILED CONSIDERATION

CEQA Guidelines section 15126.6(c) describes selection of a reasonable range of alternatives and the requirement to include those that could feasibly accomplish most of the basic project objectives while avoiding or substantially lessening one or more of the significant effects of the project. The analysis should identify any alternatives that were considered by the lead agency, but were rejected as infeasible. CEQA requires a brief explanation of the reasons underlying the lead agency's determination to eliminate alternatives from detailed analysis.

The following alternatives were considered but eliminated from detailed consideration. Alternatives that were not carried forward for full analysis include Alternative Sites, Alternative Site Configuration, and Technology Alternatives. The following provides staff's reasons for eliminating these alternatives from detailed analysis.

ALTERNATIVE SITES

Review of Off-site Alternatives

Staff conducted a desktop site search of the Environmental Protection Agency's (EPA) brownfield sites within the CAISO Western LA Basin LRA to identify sites with disturbed lands. **Alternatives Figure 1** illustrates the CAISO Western LA Basin LRA. Staff established a two-step system to help screen and streamline sites suitable for development of a power plant.

- Step 1: Apply Tier 1 Site Screening Factors
  - Location – The site must be located within the CAISO Western LA Basin LRA to address local energy capacity requirements.
  - Site Control - The site should be void of any site encumbrances (physical or administrative obstructions to long-term use of property), and should be available for sale or long-term lease.
  - Site Suitability – The site should be of adequate size (minimum 50 acres consistent with the RBEP site, which includes 16.8 acres of construction laydown and parking, 10.5 acres of new aboveground equipment, a 2.2-acre switchyard, and 20 acres encompassing the footprint of the existing RBGS aboveground equipment and infrastructure. Because the RBEP site is 50 acres, seeking alternative sites of equal or greater acreage is assumed to ensure the applicant could feasibly develop a similar size project accounting for any necessary new infrastructure (substations, switchyards, utility interconnections, administrative/control buildings, etc.), construction laydown/parking, and sufficient buffer areas for safety and adjacent land uses.
- Step 2: Apply Tier 2 Site Screening Factors
  - Brownfield Site - In urban planning, a brownfield site (or simply a brownfield) is land previously used for industrial purposes or some commercial uses, and usually refers to disturbed lands.
  - Zoning – The site must currently be zoned for industrial use.
  - Electric Transmission Proximity – The site must be proximate to existing high voltage transmission line(s) with available capacity for a power plant to tie-in (referred to as a gen-tie).
  - Utility Infrastructure Proximity - The site should be within a reasonable distance of natural gas and water supply networks, as well as immediately accessible by roads capable of transporting large equipment and supplies.
  - Land Use Proximity – The site must be a location with no adjacent sensitive receptors (i.e., residences, day care centers, nursing homes, schools, and public recreation areas) to avoid exposure of these receptors to significant noise, public health, and/or visual impacts.

Staff worked with the Energy Commission Cartography unit to develop a map of brownfields sites (EPA GIS dataset) within the Western LA Basin LRA. The two main factors of the Tier 1 criteria that eliminated sites were land availability and the size of the site. Subsequent to map development, staff obtained keyhole markup language (KML) files for Google Earth, which identified brownfield sites within a one-mile radius of high voltage transmission lines within the Western LA Basin LRA. A total of 473 brownfield sites were surveyed using Google Earth, and recorded through this process.

A matrix was created to fully document the site research by listing the location and suitability of the sites. It is attached in **Alternatives Appendix 2 (**Tier 1 Site Screening Results). Tier 1 site screening eliminated the majority of the brownfield sites from consideration due to the presence of existing development on many of the sites. These sites, under the “Land Availability” column, are marked with the notation “No - existing development.” Once it was determined that a site was developed, the site was eliminated and no further research was conducted. The sites that appeared vacant on Google Earth were measured to ensure that a minimum of 50 acres was vacant. The majority of sites reviewed contained less than 50 acres, and as such were eliminated from further consideration. Vacant sites that measured at approximately 50 acres or more were noted for further investigation. This research resulted in the identification of seven vacant potential sites that met the Tier 1 requirements.

The sites that met the criteria for land availability and size were carried forward for application of the Tier 2 Site Screening Factors are shown in Table 1.

Alternatives Table 1
Tier 2 Site Screening Results

Location	Site Suitable	Site Control	Zoning	Land Use Proximity	T/Line Proximity	Reason for Elimination
West Los Angeles Possible sites at PCH (Lincoln Blvd.) and Culver Blvd. (LAC 2000, 2014)	>130 acres	Vacant site: Unknown ownership	**General Plan (GP):** Medium Residential **Zoning:** R3 (Multiple Dwelling Zone); C2 (Regional Mixed Commercial) Playa Vista Area C Specific Plan Freeway Adjacent Advisory Notice for Sensitive Uses C	Multi-family residential units; wetlands; Culver Marina Little League Park; Ballona Creek Bike Path	Within 1,000 feet	• Incompatible zoning; • Surrounded by residential development and recreation uses
Pico Rivera 8467 E. Loch Lomond Dr. (Pico Rivera 1993)	100+ acres	Rio Hondo Coastal Basin Spreading Grounds: owned by Los Angeles County, Department of Public Works, Flood Control District	**GP:** P-F **Zoning:** (P-F) (Public Facility)	Single-family homes (east); Rio Hondo, Rio Hondo bike path (west); local parks	LADWP 287 kV T/Line located along the length of the east side of the site	**Carried forward for further consideration (see discussion below)**
Seal Beach 1776 Adolfo Lopez Dr. at 1st Street (Seal Beach 2003)	60 acres	Vacant site: Unknown ownership	**GP:** Open Space (Planning Area 2- Hellman Ranch Specific Plan for possible restored wetlands) **Zoning:** OS-Natural	Single-family residence to the south; Gum Grove Park	Approx. 3,000 feet	• Specific Plan states land is deed restricted for wetlands restoration and open space • Distance from T/Line • Residences and a park border south side of site
Monterey Park 2550 Greenwood Ave. (Monterey Park, 2007a, 2007b)	100+ acres	Mostly vacant site with roadway network: Unknown ownership	**GP:** Open space **Zoning:** Office Professional w/ Planned Development Overlay	Commercial development to the north; residences to the south	Within 1,000 feet	• Incompatible zoning • Residences border south side of site

Location	Site Suitable	Site Control	Zoning	Land Use Proximity	T/Line Proximity	Reason for Elimination
West Los Angeles Bluff Creek Dr. and Dawn Creek (LAC, 2001, 2014)	50+ acres	Vacant site: Unknown ownership	**GP:** High Medium Residential **Zoning:** R4 (Multiple Dwelling Zone) and C2 (Regional Mixed Commercial) Playa Vista Area D Specific Plan	Loyola Marymount University to the south; residential development; two elementary schools within 1,000 feet	Within 1,000 feet	• Incompatible zoning • Residential sensitive receptors border north, west, and south sides of site
El Segundo Rosecrans Ave. and Sepulveda Blvd. (PCH) (El Segundo 2012a, 2012b)	~50 acres	Vacant site: Unknown ownership	**GP:** Medium Residential **Zoning:** Downtown Commercial on west side; Heavy and Light Industrial on northeast side	Surrounded by industrial and commercial uses; residential and recreation uses south within 1,000 feet south of the site	Within 1,000 feet; SCE Substation across the street (west side of Sepulveda)	**Carried forward for further consideration (see discussion below)**
Carson Del Amo and Main St. (20400 Main St.) (Carson 2011, 2014)	~50 acres	Appeared vacant on Google Earth: Unknown ownership	**GP:** Mixed-Use Residential **Zoning:** Carson Marketplace Specific Plan, now known as The Boulevards at South Bay Project	Single-family residence to the south	Within 1,000 feet	Construction is underway for The Boulevards at South Bay Project

Five of the seven sites were eliminated from further analysis due to existing specific plan zoning designations. The zoning designations indicated that the parcels are earmarked for commercial or residential development and the presence of sensitive land uses in the immediate vicinity including residential development, recreation areas, and schools. The remaining two sites are located in the cities of El Segundo and Pico Rivera. Staff conducted reconnaissance of both sites on June 12, 2014.

El Segundo Site Screening Analysis

As shown in Table 1, the El Segundo site was identified as a potentially viable alternative site through the research effort based on the Tier 2 Site Screening Criteria. The proximity to existing industrial development would likely result in fewer potential impacts to sensitive receptors. As shown on Google Earth, the site appeared to be vacant, approximately 50 acres in size, and located across the street from an existing SCE substation on the northwest corner of Rosecrans Avenue and Sepulveda Boulevard. According to the city of El Segundo's general plan and zoning ordinance, the land use designation is Heavy Industrial and the zoning designations are Downtown

Commercial on the west side and Heavy and Light Industrial on northeast side (El Segundo, 2012a, 2012b). These designations indicate that development of the RBEP could be compatible with the city's long-range planning vision, as well as the zoning regulations. The surrounding land uses consist of industrial development, and there are no sensitive receptors in the immediate vicinity.

Based on this initial research, staff visited the site on June 12, 2014. During site reconnaissance, staff focused on documenting on-site and surrounding land uses (particularly sensitive receptors), accessibility to the site, availability of infrastructure (i.e., transmission lines, and any markers for gas, water, and wastewater pipelines), and existing traffic and noise levels in the area.

Goggle Earth did not indicate any on-site activity. Upon approaching the El Segundo site on Rosecrans Avenue from the east, staff observed construction of a substantial commercial development on the northeast corner of Rosecrans Avenue and Sepulveda Boulevard. Construction fencing surrounded the site with a banner that read "Coming Soon: The Point SB." The banner also provided the following website address: www.thepointsb.com. This website advertises the site as a shopping, dining and entertainment destination. Further research of The Point provided additional information. This development is intended to complement adjacent Plaza El Segundo. The site plan on the website indicates the building footprint would be 119,613 square foot, which would include 5,912 square feet of outdoor space and 689 parking stalls onsite. It is intended to have a mix of more than 25 retail and restaurant occupants (The Point, 2014).

This site was eliminated from further consideration and will not be carried forward for analysis based on the factors listed below.

- The site is currently under construction and is being developed with a commercial project.
- The site is almost exactly 50 acres and is irregularly shaped, so the narrow part of the site at the northeast corner may not adequately support components of the RBEP.
- Recreation and residential uses are within 1,000 feet south and southwest of the site, respectively, which are sensitive land uses.

Pico Rivera Site Screening Analysis

As shown in Table 1, the Pico Rivera site was identified as a potentially viable alternative site through the research effort based on the Tier 1 Site Screening Criteria. Google Earth imagery and measurement tools indicated the site is over 100 acres in size, within the CAISO Western LA Basin LRA, and appeared to be in use as a groundwater basin. It was apparent from aerial imagery that the development to the north and southeast of the site are industrial land uses, which indicated that the RBEP could be a compatible land use. For these reasons, the site was retained for application of the Tier 2 Site Screening Criteria.

Staff verified that the site is currently in use as spreading grounds for the Los Angeles County Department of Public Works (LADPW) through additional internet research.

According to the city of Pico Rivera's general plan and zoning ordinance, the land use designation is Public Facility and the Zoning designation is Public Facility, which allows for public utility facilities and structures (Pico Rivera, 1993). The RBEP is a private electrical generating facility, which is not stated as a permitted use by the city's zoning regulations. However, at the preliminary stage of the alternative site analysis, staff determined that it would be possible for the RBEP to be considered a compatible land use since it is similar to a public utility facility and proceeded with further consideration of this site to determine its suitability.

Onsite development includes an existing Los Angeles Department of Water and Power (LADWP) 287-kV transmission line located along the eastern side of the site. Due to the undeveloped space, the existing land use and zoning designations that would likely be compatible with an energy generating system, and the proximity to an existing transmission line, staff considered this a potentially viable site and proceeded to visit the site on June 12, 2014 for further investigation.

The site visit began on the north side of the site along Loch Lomond Drive. Staff observed substantial industrial development north of the site. The majority of the surrounding businesses consist of industrial cold storage facilities, semi-trailer truck repair shops, and a recycling center. There are two access points to the site from Loch Lomond Drive. However, neither gate allows public access. There are numerous signs indicating the site is spreading grounds under the jurisdiction of the LADPW. There are numerous "No Trespassing" signs on the perimeter gates. Staff observed several cyclists riding through the site and learned of official public access points for recreation users. Staff then entered the site from the recreation entrance on Paramount Avenue and Mines Avenue. This vantage point enabled staff to observe the majority of the basin. It is divided by an on-site access road network elevated above the basin floor. Authorized recreation uses appeared to include cycling, jogging, picnicking, and dog walking. Non-authorized uses seemed to include camping or squatting. The area east of the site is characterized by a densely populated single-family residential neighborhood.

Staff entered the western portion of the site on Bluff Road and Mines Avenue and observed ranchettes and stables adjacent to the recreational pedestrian access gate. This portion of the site is divided from the eastern portion by the Rio Hondo river channel and consists of narrow spreading grounds areas. Staff then accessed the site at Bluff Road and Sycamore Street south of Washington Boulevard. This southern portion of the site is separated from the rest of the site by Washington Boulevard to the north and the Rio Hondo river channel to the east. It is adjacent to a neighborhood of single-family residences. Staff observed industrial land uses operating to the east of the site. Throughout the site visit, staff took numerous photos documenting the on-site and surrounding land uses.

As noted above, this site is currently being used as a water conservation facility adjacent to the Rio Hondo river channel to permit water to percolate into groundwater basins for later pumping. This site is owned and operated by the LADPW Water Resources Division. After the site visit, staff contacted the Water Resources Division to ascertain the status of the site ownership, and whether the site was available for sale or lease. County staff indicated that the site is currently owned by the LADPW, and is not available for lease or sale for any other use (TN 202468).

This site was eliminated from further consideration and will not be carried forward for analysis based on the factors listed below.

- The site supports authorized recreation use, which is a sensitive use.
- LADPW has site control and the site is not available for development.
- Surrounding land uses include single- and multiple-family residences, which are sensitive uses.

Exxon-Mobil Torrance Refinery Site Screening Analysis

The Exxon-Mobile Torrance Refinery, located at 3700 W 190th St in Torrance, sits approximately three miles east of the RBEP. The public and interveners brought up this location as a potentially viable site for a power plant (TN 201641). Due to its highly industrialized nature, and proximity to a number of high-voltage transmission lines, staff proceeded with further investigation of this site.

The refinery site was evaluated as a potentially viable alternative site utilizing the Tier 1 Site Screening Criteria. Google Earth imagery and measurement tools estimated the site at over 950 acres in size, and within the CAISO Western LA Basin LRA. Furthermore, aerial imagery indicated exiting industrial land use operations to the south, east and west of the site. These conditions indicate potential site suitability for development of a power plant. Therefore, the site was retained for application of the Tier 2 Site Screening Criteria.

Staff verified that the site operates as a petroleum refinery wholly owned and run by ExxonMobil through internet research. Additionally, the city of Torrance general plan designates the site Heavy Industrial. Heavy Industrial uses are characterized by manufacturing industries. Heavy Industrial uses are typically segregated from other uses to mitigate safety hazards and minimize noise, pollution, odors, vibrations, and other effects on non-industrial properties. The zoning is Heavy Manufacturing (M-2).

The RBEP, a private electrical generating facility, does not appear on the list of permitted uses by the city’s M-2 zoning regulations. However, staff determined RBEP might be considered a compatible land use given that it shares characteristics with an electrical transformer substation, which is a permitted use in the city’s M-2 zoning regulations. As a result, staff proceeded with further consideration of this site.

Using Goggle Earth, staff identified two non-contiguous areas that appeared undeveloped on site. Yet each area measures less than 50 acres. Also, a search of sensitive receptor locations within a ½ mile of the site, identified schools, parks, daycare centers, a nursing home, a hospital and single-family houses. The schools identified include Magruder Middle School, Playhouse Preschool Kindergarten, Edison Elementary School, North High School, Crenshaw Children’s Center, and Ambassador High School. The parks consist of Columbia Park and Delthorne Park. The daycare centers include Beyond Basics, Friendship Children Center, and Playhouse Preschool Kindergarten. The nursing home includes Summerwind Manor. The hospital includes Providence Little Company of Mary Medical Center Torrance. Additionally, there are single-family houses to the north, northeast, northwest, south and southwest of the site.

Staff reached out to ExxonMobil Torrance Refinery to inquire about site control (Wirsing, 2014). Specifically, staff wanted to know if a minimum 50-acre area on-site would be available for sale or lease. Refinery staff response indicated that it is not in ExxonMobil's interest to answer and that ExxonMobil has no vested interest in the RBEP. Unless the project impacted ExxonMobil interests no one is likely to answer questions regarding site control.

As noted above, ExxonMobil is currently using this site as a petroleum refinery. The site is owned and operated by ExxonMobil. This site was eliminated from further consideration and will not be carried forward for analysis based on the factors listed below.

- The site does not have 50 acres of contiguous undeveloped land so it would not adequately support all components of the RBEP.
- ExxonMobil has site control and the site is not available for development.
- Surrounding land uses include single- family residences, parks, a hospital, schools and a nursing home, which are sensitive uses.

Review of the Existing RBGS site

Relationship of the RBEP to the Project Site

The Warren-Alquist Act addresses aspects of an applicant's site selection criteria for thermal power plants and the use of an existing industrial site for such use when the project has a strong relationship to the existing industrial site. When this is the case, it is "reasonable not to analyze alternative sites for the project" (Pub. Resources Code, § 25540.6, subd. (b)).

The discussion below addresses the project's strong relationship to the project site, both from a regulatory and practical standpoint, and provides a framework for staff's selection of project alternatives, and dismissal of off-site alternatives for further analysis.

Use of the Existing RBGS Site for Electrical Power Generation

The long-term historical use of the project site for electrical power generation is applicable to the discussion of the project's strong relationship to the site. This analysis recognizes the fact that the RBEP would be constructed and operated at the existing RBGS site. A power plant was first built on the RBGS site in 1906–1907, and was operated for several years by the Pacific Light and Power Company (RBEP, 2012a). In 1917, the company and the power plant were purchased by SCE who later built Units 1 through 4, which came on line in 1948 and 1949. Then, Units 5 and 6 were added, coming on line in 1956. Units 7 and 8 came on line in 1968. AES Southland Development, LLC, (AES) acquired the RBGS from SCE in 1998. RBGS Units 5 through 8 have the total electrical generation capacity of 1,310 megawatts (MW). Units 1 through 4 are retired. The existing plant has various ancillary facilities, which will remain in use to support RBEP, including the existing SoCalGas natural gas pipeline interconnection, the existing permitted ocean outfall, California Water Service Company potable water connection, and connection to the city of Redondo Beach sanitary sewer system.

Expansion of Existing Coastal Power Plants

The California Coastal Act of 1976 (Coastal Act) protects coastal resources from the major impacts of power plant siting. In 1978, the California Coastal Commission (Coastal Commission) adopted a report that satisfied a requirement of the Coastal Act to designate specific locations in the coastal zone where the location of an electric generating facility would prevent the achievement of the objectives of the Coastal Act (Pub. Resources Code § 30413(b)). The 1978 report was revised in 1984 and re-adopted in 1985 (Coastal Commission 1985). In accordance with the Coastal Act, the report designates sensitive resource areas along the California coast as unsuitable for power plant construction and provides "that specific locations that are presently used for such facilities and reasonable expansion thereof shall not be so designated." This policy encourages expansion of existing power plant sites if new plants are necessary, thereby protecting undeveloped coastal areas (Coastal Commission 1985).

In a related effort, the Energy Commission prepared a 1980 study that examined opportunities for the reasonable expansion of existing power plants in the state's Coastal Zone and reviewed the effects of the designated resource areas on expansion opportunities (Energy Commission 1980). The 1980 study defines "reasonable" in this context to mean the provision or maintenance of land area adequate to satisfy a specific site's share of the state's need for increased electrical power generating capacity over the Energy Commission's planning intervals of 12 and 20 years (Energy Commission 1980). The study also gives practical consideration to coastal power plant expansion and siting opportunities. The ancillary support facilities already exist at the power plant sites, and the industrial-type land use has been established, which are important points to consider from a practical standpoint (Energy Commission 1980).

The expansion areas should be inside or adjacent to the existing site boundaries, or within a distance that would permit the cost effective use of the existing power plant support facilities, where necessary or advisable. The 1980 study acknowledged that other conventional siting factors (e.g., local land use plans) could affect expansion opportunities. The Energy Commission study is not intended to be used to endorse specific sites or types and sizes of power plants for expansion.

The 1980 study describes expansion opportunities for various combinations of plant types and sizes at 19 of the 25 evaluated sites. The Redondo Beach power plant is characterized as having "expansion opportunities" while avoiding sensitive habitat and designated resource areas (Energy Commission 1980). The RBEP would be located inside the existing RBGS site, and no off-site expansion of power plant facilities would be required.

City of Redondo Beach General Plan/Zoning

The City of Redondo Beach General Plan designates the existing RBGS as Public or Institutional (P) in the Land Use Element (Redondo Beach 2008). The (P) General Plan land use designation allows for "…public utility and infrastructure (transmission corridors, etc.)." The RBGS site is zoned for Generating Plant (P-GP) (Redondo Beach 2011). The Coastal Commission certified the city's Coastal Plan in 2010. Redondo Beach Harbor Zoning, Measure G, passed in November 2010, allows for continuation of the AES power plant. In addition, park zoning was permitted at the site, but was not defined or required (Redondo Beach 2010).

The General Plan recognizes the existing use of the RBGS site. The General Plan focuses on directing any development surrounding the site to implement mitigation measures for noise, vibration, and aesthetics from impacts attributable to the existing RBGS site. The General Plan is internally consistent in its descriptions of the existing energy facility and the goals, policies, and objectives pertaining to its use for that purpose.

Potential for the RBEP to Contribute to Local Grid Capacity Requirements

CAISO regularly evaluates grid reliability issues in its balancing authority area for the state. The RBEP would be located in the Western LA Basin LRA, which requires a minimum amount of electrical generation to maintain grid reliability; the specific number of needed megawatts is reported in annual CAISO transmission plan studies. The shutdown of the San Onofre Nuclear Generating Station (SONGS) in 2013 and the SWRCB policy restricting the use of coastal waters for the once-through cooling of power plants could significantly reduce the amount of generation available in the LA Basin LRA. The most recent CAISO Transmission Plan evaluates the potential impacts of the SONGS shutdown and the SWRCB once-through cooling policy on grid reliability in California.

Approximately 30 percent of California's in-state generating capacity (gas and nuclear power) uses coastal and estuarine water for the once-through cooling (OTC) systems of power plants. On May 4, 2010, the SWRCB adopted a statewide policy (OTC Policy) on the use of coastal and estuarine waters for power plant cooling. The OTC Policy minimizes the use of coastal or estuarine water for OTC by power plants. AES power plants in the LA Basin affected by this policy include the existing Alamitos Generating Station (2,000 MW), the Huntington Beach Generating Station (450 MW), and the Redondo Beach Generating Station (1,310 MW). To comply with the OTC Policy, these generators must be retrofitted, repowered, or retired.

CAISO develops and publishes its annual Transmission Plan, which includes a comprehensive evaluation of the CAISO transmission grid identifying the upgrades required to successfully meet California's energy policy goals, maintain grid reliability requirements, and provide economic benefits to consumers. The most recent plan adopted by the CAISO Board of Governors, the 2012–2013 Transmission Plan, evaluates issues relating to power generators' compliance with the SWRCB ruling on OTC (CAISO 2013a), and includes an initial study of the long-term impacts of the SONGS shutdown.

The RBEP is located within the Western LA Basin LRA. Absent SONGS (which provided 2,246 MW from Units 2 and 3 at full capacity), the CAISO projects a need for approximately 10,000 MW of generating capacity in the LA Basin (CAISO 2013a, page 128). A total of 11,789 MW of generation exists or is under construction in the LA Basin LRA (CAISO 2013b, page 98). If the AES OTC plants are not retrofitted or repowered and are retired to comply with the OTC Policy, approximately 8,000 MW of capacity would be available in the LA Basin LRA, which is insufficient capacity to meet the CAISO local area requirements. Use of the existing RBGS site to help meet known local electrical capacity requirements makes practical sense given the site's history of power generation, the existing site infrastructure, and the uncertainty of identifying other potentially feasible sites to replace the RBGS in a highly developed and densely populated region.

Alternative Site Summary

Staff's analysis eliminated offsite alternatives from detailed consideration for the following reasons:

- Staff did not identify a feasible alternative site within the Western LA Basin LRA that could meet project objectives and result in similar or less environmental impacts than the RBEP; and
- The RBEP has a strong relationship to the current RGBS site.

ALTERNATIVE SITE CONFIGURATION

In late 2013, staff requested information from the applicant in data requests (Set 1B, 48-51) regarding the feasibility of reconfiguring the RBEP and to provide information on any site constraints, including existing site restrictions, and necessary RBEP infrastructure and components. In their response, the applicant stated that the primary constraints at the site are related to the existing RBGS facilities that need to stay operational until the RBEP is completed (RBEP 2014d). For example, the existing SCE 230 kV and 66 kV switchyards must remain in service for the existing RBGS and for the switch over to the RBEP upon commercial operations.

In addition, during the February 10, 2014, public workshop, public comments requested the alternatives analysis include alternative site configurations. As noted by these comments, the focus of this alternative was to lessen or avoid potential noise impacts. Based on staff's analysis provided in the **NOISE** section, the RBEP's operational noise impacts are not determined to be significant, with implementation of noise conditions of certification. Based on input from engineering staff, reconfiguring the power block in the center or center-western portion of the site may help to slightly reduce the noise impacts at the residential receptors across the street on Herondo Street. However, as currently configured, the power block would be partially blocked by a three-story commercial/office building located on N. Catalina Ave. This building would provide this partial blockage from project noise for some of the residential receptors east on N. Catalina. If the project is moved to the center or center-western portion of the site, this effect would also move; it may provide blockage for other residential receptors across N. Catalina, but it would take away the benefit for the others.

If any alternative site configuration was determined to be potentially feasible, it would likely meet most of the basic project objectives. However, no alternative site configuration is likely to avoid or substantially lessen project impacts identified as significant. Therefore, alternatives staff has eliminated alternative site configurations from further consideration.

TECHNOLOGY ALTERNATIVES

Technology alternatives to the RBEP were developed and considered by staff to lessen or avoid project impacts. These alternatives are primarily focused on reducing air quality impacts of the RBEP, and discussed below. The following discussion utilizes nomenclature and terminology specific to air quality. For a full description of these terms and issues, please refer to the **AIR QUALITY** section of this PSA.

Generation Technology Alternatives

The generation technology alternatives evaluated by staff for the RBEP focus on technologies that can utilize natural gas, which can take advantage of the existing natural gas pipeline system and also meet the electrical capacity replacement requirements specified by SCAQMD's Rule 1304. Eligible technologies include combined-cycle technology, other advanced gas turbine(s), or a renewable energy resource.

RBEP's objectives include the generation of base load electricity and load-following all hours of the day to serve energy requirements from the CAISO (RBEP 2012a, AFC §§ 1.2, 2.1, 6.1).

Alternative generating technologies for RBEP are considered in the AFC (RBEP 2012a, AFC §§ 1.1, 6.7). For purposes of this analysis, solar technology, other fossil fuels, nuclear, biomass, hydroelectric, wind, and geothermal technologies are all considered. Due to regulatory prohibitions, nuclear technology was rejected. Biomass, hydroelectric, geothermal, wind, and solar technologies were ruled out due to the limitations on the availability of these energy resources in the project area and/or their unavailability all hours of the day. Given the project objectives, location, and the commercial availability of the above technologies, engineering staff supports the applicant's selection of a natural gas-burning technology as reasonable.

Simple-Cycle Combustion Turbine

A simple-cycle combustion turbine has a quick startup and rapid ramping capabilities appropriate for a peaking facility. To generate similar electric output to RBEP, or 511 MW gross, five simple cycle General Electric LMS100 units, each rated at 99.4 MW gross would be needed. Each turbine can have an exhaust stack 13.5 feet in diameter and 90 feet tall. Auxiliary equipment may include a spray mist fogging system for cooling the inlet combustion air; a turbine intercooler; five single-cell cooling towers, each with circulating water pumps. The size of each cooling tower can be 40 feet high, 42 feet wide and 42 feet long. Within the power block footprint for RBEP and utilizing the space set aside for the RBEP's power block and associated equipment (including the air-cooled condenser), not including the designated parking spaces, administration building, the existing switchyard, and access roads, engineering staff determined there would not be enough space to locate the five units and their associated equipment. Therefore, this alternative was found infeasible and eliminated from further consideration.

RECYCLED WATER ALTERNATIVE

The use of recycled water (instead of potable water) as part of the RBEP has been considered within the **SOIL AND WATER RESOURCES** section of this PSA.

RETROFIT ALTERNATIVES

Staff considered the potential retrofit of the existing Redondo Beach Generating Station (RBGS) to reduce impacts from the use of ocean water for cooling and to comply with the State Water Resources Control Board's (SWRCB) once-through-cooling (OTC) policy. This analysis focuses on retrofits that would ensure OTC policy compliance and long-term operation of the existing RBGS. As discussed below, under the No-Project Alternative, should the applicant not find a means of compliance with the OTC policy by December 31, 2020, any scenario beyond shutdown of the RBGS would be highly speculative. Therefore, the Retrofit Alternative scenarios are not considered part of the No Project Alternative as they are assumed to occur prior to the OTC compliance date of December 31, 2020 to continue long-term operation of the RBGS.

Staff acknowledges that OTC policy compliance allows for a 90 percent improvement of ocean water impingement and entrainment. However, the idea of operating the RBGS less (without any plant retrofits) to somehow achieve a 90 percent improvement in impingement and entrainment is infeasible for long-term compliance of the OTC policy and would be a business decision by the operator. Furthermore, staff acknowledges the OTC policy includes a mechanism to extend the OTC compliance date. However, such an extension would need to come directly from an authorizing agency for purposes of maintaining grid reliability. Any such extension is not considered a long-term solution to OTC policy compliance.

Therefore, staff considered the feasibility of two permanent retrofit scenarios at the RBGS that would allow long-term operation of the facility at its current designed generation (1,310 MW) capacity. In accordance with CEQA, these retrofit scenarios were also evaluated to determine if they could reduce or avoid any of the environmental impacts associated with the RBEP. Through coordination with the applicant and engineering staff, two Retrofit Alternative scenarios have been developed and evaluated:

1. Retrofit RBGS to become an air-cooled facility; or

2. Retrofit RBGS to use another cooling water source (other than ocean water). Under this retrofit scenario, the RBGS would continue operation as a wet-cooled facility.

These two retrofit scenarios are analyzed below.

Air Cooled Condenser Retrofit Scenario

This retrofit would require reconfiguring the existing plant to be an air-cooled facility by installing air cooled condenser (ACC) infrastructure similar to that of the RBEP, but at a scale available for use by all existing RBGS power units. Therefore, an ACC would have to be large enough to meet the cooling demand of all existing RBGS (1,310 MW) steam generator units, to continue use of full existing RBGS output. Engineering staff independently reviewed the RBGS site configuration and concluded there is not enough land available to site ACC infrastructure large enough to serve existing plant capacity needs. An air-cooled retrofit of the existing RBGS would require existing power blocks and other infrastructure to be removed, resulting in the plant capacity being scaled down, to allow space for necessary ACC infrastructure. To only retrofit the newer RBGS Units 7 and 8 (thus removing existing operational RBGS Units 5 and 6) to allow room for an ACC would be a business decision by the applicant. While staff acknowledges that output of such a retrofit would be similar to the RBEP, such a smaller retrofit is outside the scenarios described by the applicant within the AFC. Therefore, staff has evaluated a retrofit of the existing RBGS as currently operationally available to the applicant.

Due to the age of the existing RBGS power generating units (built between 1954 and 1967, with Units 5 and 6 online in 1956 and Units 7 and 8 online in 1968), retrofitting the remaining RBGS boilers for air-cooling would not be as energy efficient as the RBEP system (air cooled combined cycle), which would include new and modern power block units. Because of decreased efficiency, such a retrofit would increase air emissions when compared to the RBEP. Also, an old plant such as the existing RBGS would not meet the operating flexibility offered by the rapid response design incorporated into the RBEP.

This retrofit scenario is found infeasible due to the following:

- Site restrictions not allowing an ACC unit big enough to support the existing plant,
- Inability in meeting RBEP objectives concerning operating flexibility, and
- Increased operational emissions when compared to the RBEP.

Therefore, the Retrofit Alternative air-cooled scenario is eliminated from further consideration by staff.

Wet Cooling Retrofit Scenarios

The following evaluates retrofitting the existing RBGS to utilize either potable or recycled water for cooling (instead of ocean water) in an evaporative cooling tower. These retrofit scenarios would leave the RBGS as a wet-cooled facility at existing plant capacity.

Potable Water Retrofit. Wet cooling, using potable water, is discouraged by SWRCB and Energy Commission policies related to water consumption of a facility. Because 100 percent of the power generated from the existing RBGS is from steam and the existing full available output of the RBGS is more than twice the generation of the RBEP (1,310 MW versus 496 MW), the cooling requirements of the existing RBGS are significant when compared to the RBEP. To only retrofit the newer RBGS Units 7 and 8 to utilize a different cooling water source would be a business decision by the applicant. While staff acknowledges that output of such a retrofit would be similar to the RBEP, such a smaller retrofit is outside the scenarios described by the applicant within the AFC. Therefore, staff has evaluated a retrofit of the existing RBGS as currently operationally available to the applicant.

While the RBEP, as proposed, would utilize potable water for industrial processes (e.g., evaporative cooling blowdown makeup), the amount of potable water used by the RBEP (an air-cooled, combined-cycle facility) is nominal compared to that necessary for a wet cooled retrofit of the existing RBGS. Therefore, a wet cooled retrofit of the RBGS utilizing potable water would:

- Require use of potable water at quantities found inconsistent with SWRCB and Energy Commission policies related to water consumption; and
- Significantly increase water supply impacts when compared to the RBEP.

Additionally, a wet cooling retrofit system may have a visible plume (depending on if such a retrofit utilized plume abated cooling tower infrastructure). While the existing RBGS generates visible plumes during steam blow-off, the RBEP (being an air-cooled facility) would not generate any visible plumes. Therefore, when compared to the RBEP, a potential increase in visual impacts may occur from such a retrofit.

A replacement closed-loop cooling system, using wet-cooling technology was also rejected as a feasible option at the RBGS because this option would:

- Result in a significant increase to impacts on local water supplies,
- Result in a larger industrial site than the RBEP (RBEP 2012a),
- Increase visual impacts when compared to the RBEP, and
- May not be feasible on the limited land available at the RBGS site (RBEP 2012a).

Based on the supporting analysis above, staff eliminated any Retrofit Alternative wet cooled scenarios utilizing potable water from further consideration.

Recycled Water Retrofit. Retrofitting the existing RBGS to utilize Title 22 Reclaimed water was evaluated by both the applicant and staff. As discussed above, this analysis first acknowledges the significant water needs for cooling the existing RBGS (1,300 MW wet cooled facility). Six reclaimed water providers proximate to the RBGS were evaluated as potential sources for recycled water to serve such a retrofit scenario. Of those sources, recycled water produced by the West Basin Municipal Water District (WBMWD) and distributed by California Water Service Co. (Cal-Water) was found to have sufficient capacity to provide long-term recycled water to the RBGS (RBEP 2014d, Response 50).

The following analyzes the feasibility and ability of this retrofit scenario to reduce potential impacts associated with the RBEP.

- **City of Los Angeles Hyperion Treatment Plant (HTP)**: The HTP treats up to 450 million gallons per day (gpd) of wastewater and discharges about 91 percent of the treated effluent into the ocean. As noted in the **SOIL AND WATER RESOURCES** section, a pipeline providing tertiary effluent from the HTP to the WBMWD is located proximate to the RBGS site. However, while **SOIL AND WATER RESOURCES** staff found this WBMWD tertiary water pipeline has sufficient capacity to serve the RBEP (496 MW net dry cooled facility), it is unlikely and unknown if the pipeline has capacity to serve the full available RBGS output for this retrofit scenario (1,310 MW wet cooled facility). This retrofit would require significantly more recycled water than the RBEP. Therefore, in order to deliver HTP effluent water to the RBGS, an approximately 5.4-mile pipeline would likely be needed. While this effluent is disinfected tertiary treated water, this scenario may also require construction of a treatment facility or expansion treatment facility at the RBGS site to further treat the wastewater before use by the existing RBGS power blocks.

Any required treatment and storage facilities would require being of sufficient size to provide long-term water usage to the existing 1,310 MW wet-cooled facility. Due to site constraints at the existing RBGS, engineering staff found significant site constraints for any new facilities within the existing RBGS site. Siting such facilities within the HTP (or another off-site location) are assumed infeasible because the use of such locations extends beyond site control of the RBEP applicant.

Even if a suitable site(s) for any needed treatment and storage facilities were located, this retrofit alternative would not reduce any environmental impacts of the RBEP, which is a dry cooled facility and not found to have water supply impacts. Due to the age of the existing RBGS power generating units, retrofitting the remaining RBGS boilers for use of recycled water would not be as efficient as the RBEP system (air cooled combined cycle), which would include new and modern power block units. Because of decreased efficiency, such a retrofit would increase air emissions when compared to the RBEP. Also, an old plant such as the existing RBGS would not meet the operating flexibility offered by the rapid response design incorporated into the RBEP.

A wet cooling retrofit using recycled water was rejected as a feasible option at the RBGS for the following reasons:

- May be infeasible due to site restrictions for needed cooling tower and any necessary water treatment plant and storage facilities within the existing RBGS;
- It would be unable to meet RBEP objectives concerning operating flexibility;
- May result in visible plumes (depending upon if a plume abatement cooling tower was installed), which could result in an increase in visual impacts when compared to the RBEP; and
- It would increase operational emissions when compared to the RBEP.

Therefore, staff eliminated the Retrofit Alternative wet-cooled scenario utilizing recycled water from further consideration.

INCREASED OUTPUT AT OTHER AES PLANTS

Members of the public and interveners (TN 201641) brought up the question of whether, or not, increasing power generation capacity at two other power plant locations in the Western LA Basin LRA, and owned by AES, could facilitate the shutdown of the existing RBGS, and replace the power generation that would otherwise be provided by the RBEP. The Energy Commission is presently reviewing applications for AES's Huntington Beach Energy Project (HBEP) and Alamitos Energy Center (AEC). Either application would have to be amended to increase generating capacity. Any such amendments would require new analysis and studies that could result in delays in the certification process.

The transmission system that serves the Western LA Basin LRA was designed, built, and subsequently expanded around existing power plant locations as the area became further urbanized and more densely populated. The proposed AES power plant projects (i.e., HBEP, AEC, and RBEP) within the Western LA Basin LRA have been designed to fit within the existing electrical system and serve the current and future needs of the dense urban development which now constrains further expansion, replacement or relocation of the existing electrical transmission and distribution system. Increasing generating capacity at any one generation point within the electric system would require a System Impact Study (SIS) to evaluate stability of the transmission system. In order to support electric system reliability and stability, power generation, which has been removed from the grid, needs to be located at nearby locations within the system and the locations would need to be evaluated through an SIS process. The SIS process consists of power flow, stability and short circuit evaluations. Therefore, in order to determine if another power plant location could handle an additional 500 MW of power generation (i.e., approximately the MW generation by RBEP), the applicant would need to request SCE to perform a new SIS. Staff cannot determine the feasibility of whether, or not, additional generation at other power plants can be interconnected into the grid without a new SIS.

The current proposal for RBEP requires no offsite transmission system upgrades (TN 201469). If AES were to increase the capacity of the generating units, it would require in-depth study of transmission interconnection requirements and deliverability, including downstream impacts on transmission lines and substations. Based on engineering staff's review of information in the RBEP record, the SCAQMD FDOC (TN 202774) explains that although the total megawatts (MW) that would be installed at the RBEP would total 1091 MW (gross) for blocks 1 and 2, the RBEP site has a transmission constraint of 939 MW (net) and a permit condition of 972 MW (gross). RBEP's one transmission path is constrained and transmission upgrades would be required to increase generation at this site.

The AES proposal for AEC plans on retiring approximately 2,000 MW from the existing Alamitos Generating Station and installing approximately 2,000 MW of new generation. Similar to the RBEP, the proposal for AEC requires no offsite transmission system upgrades and no in-depth study of transmission system interconnection requirements and deliverability (including downstream impacts on substations), because the total capacity at this location would be substantially unchanged (CH2MHill, 2014). Such studies (including an SIS) normally take eight to 12 months to complete. As with RBEP, transmission upgrades likely would be required to increase generation at this site.

It should be noted that pursuant to CEQA, an alternative must avoid or reduce the significant impacts of a project. Transmission line upgrades typically may require acquisition of additional easement rights (or franchise rights), use of different and/or larger transmission line structures, upgrades to substation components to accommodate the line upgrades and associated interconnection, etc. These activities would have physical environmental impacts on adjacent land uses. In addition, moving RBEP power generation from the site to another location may not reduce its impacts, but would simply move them to another site. For these reasons, staff eliminated further consideration of siting the RBEP at other AES-owned locations.

ALTERNATIVES EVALUATED IN FULL DETAIL

Based on the analysis provided above in the subsection “Alternatives Eliminated from Detailed Consideration,” the only alternative carried forward for detailed analysis and comparison against the RBEP is the No-Project Alternative. A description of the No-Project Alternative is provided. Following this overview, a detailed analysis is provided comparing the environmental impacts of the No-Project Alternative to the impacts of the RBEP. Where applicable, the analysis is focused on the No-Project Alternative’s ability to avoid or lessen any significant RBEP impacts.

Alternatives Table 2 provides the comparison of RBEP impacts to those of the No Project Alternative in summary form. Pursuant to CEQA, when developing alternatives and evaluating them, all significant project impacts were considered and evaluated for each alternative’s ability to lessen or avoid any RBEP-related impacts.

NO PROJECT ALTERNATIVE

The CEQA Guidelines state that “the purpose of describing and analyzing a “no project” alternative is to allow decision makers to compare the impacts of approving the project with the impacts of not approving the project” (Cal. Code Regs., tit. 14, § 15126.6, subd. (i)). Toward that end, the “no project” analysis considers “existing conditions” and “what would be reasonably expected to occur in the foreseeable future if the project were not approved…” (§ 15126.6(e)(2)).

If the RBEP were not approved, the applicant has indicated the existing RBGS would remain in operation in its current configuration until 2020 (RBEP 2013t, p.13). Staff acknowledges that, absent approval of the RBEP, an extension of the 2020 deadline for discontinuance of OTC could be obtained, or, the RBGS could be ordered to run beyond that date by state or federal officials to ensure electric reliability (RBEP 2013t, p.13). However, at this time it is unknown if the conditions necessary for continued operation of the RBGS beyond 2020 would occur. Furthermore, those would not assure long-term compliance with SWRCB’s OTC policy.

Under the No-Project Alternative, the existing RBGS would not employ a means to comply with the SWRCB’s OTC policy directed at reducing impacts from the use of seawater. Therefore, on December 31, 2020, the RBGS would cease all operations. The No-Project Alternative consists only of RBGS shutdown and the site remaining un-operational in its existing state at that time. Any activities beyond facility shutdown are speculative and extend beyond the scope of a No-Project Alternatives analysis, as defined by Title 14, California Code of Regulations, section 15126.6(e).

There are no current plans for decommissioning of the Redondo Beach Generating Station, for public use of the site, for sale to a third party, or for alternative development of the site (RBEP 2013t, p.13). Even if the power plant were to be removed from service sometime after 2020, there is no legal requirement that the structures be removed and the site remediated for public use (RBEP 2013t, p.13). Therefore, any inclusion of these possible activities after facility shutdown on December 31, 2020 would not represent a “No-Project” alternative that is reasonably expected occur as defined by CEQA Section 15126.6(e).

Because circumstances after the OTC compliance date are unknown, it is assumed shutdown of the existing RBGS would include on-site activities ensuring site safety and security. Security of the facilities would be maintained on a 24-hour basis and shutdown would likely include the draining of all chemicals from storage tanks and other equipment and the safe shutdown of all equipment.

Alternatives Table 2 provides a comparison of the No-Project Alternative against the project objectives of the RBEP. Based upon staff's analysis, the No-Project Alternative would not meet the project objectives. However, CEQA Section 15126 requires a thorough evaluation of the No-Project Alternative.

Alternatives Table 2
Summary Comparison of No-Project Alternative to RBEP Objectives

RBEP Objective	No-Project Alternative
Provide the most efficient, reliable, and predictable generating capacity available by using combined-cycle, natural-gas-fired combustion turbine technology to replace the OTC generation, support the local capacity requirements of southern California's western Los Angeles Basin Local reliability Area and be consistent with SCAQMD Rule 1304(a)(2).	No. Under the No-Project Alternative, the existing RBGS would be shutdown on December 31, 2020 to comply with SWRCB's OTC Policy. The No-Project Alternative would not support long-term local capacity needs or requirements of the Los Angeles Basin local reliability area.
Develop a 496 MW project that provides efficient operational flexibility with rapid-start and steep ramping capability to allow for the efficient integration of renewable energy source into the California electrical grid.	No. Under the No-Project Alternative, the existing RBGS would be shutdown on December 31, 2020 to comply with SWRCB's OTC Policy.
Serve southern California energy demand with efficient and competitively prices electrical generation.	No. Under the No-Project Alternative, the existing RBGS would be shutdown on December 31, 2020 to comply with SWRCB's OTC Policy. The No-Project Alternative would not support long-term local capacity needs or requirements of the Los Angeles Basin local reliability area.
Develop on a brownfield site of sufficient size and reuse existing offsite electrical, water, wastewater, natural gas infrastructure and land to minimize terrestrial resource impacts.	No. Under the No-Project Alternative, the existing RBGS would be shutdown on December 31, 2020 to comply with SWRCB's OTC Policy.
Site the project to serve the western Los Angeles Basin load center without constructing new transmission facilities.	No. Under the No-Project Alternative, the existing RBGS would be shutdown on December 31, 2020 to comply with SWRCB's OTC Policy. The No-Project Alternative would not support long-term local capacity needs or requirements of the Los Angeles Basin local reliability area.
Assist in developing increased local generation projects, thus reducing dependence on imported power and associated transmission infrastructure.	No. Under the No-Project Alternative, the existing RBGS would be shutdown on December 31, 2020 to comply with SWRCB's OTC Policy. The No-Project Alternative would not support long-term local capacity needs or requirements of the Los Angeles Basin local reliability area.
Ensure potential environmental impacts can be avoided, eliminate, or mitigated to less-than-significant.	Yes. Staff has not identified any significant impacts associated with RBGS shutdown on December 31, 2020 to comply with SWRCB's OTC Policy.

Alternatives Table 3 provides a summary comparison of the RBEP environmental impacts and those of the No-Project Alternative. Based upon staff's analysis, the No-Project Alternative impacts are similar to or less than those of the RBEP.

Alternatives Table 3
Comparison of RBEP Project and No-Project Alternative

Issue Area	RBEP[1]	No-Project Alternative[2]
Air Quality		
Construction Emissions	SM	Less than RBEP
Operational Emissions	SM	Less than RBEP
Biological Resources		
Construction and Demolition		
Coastal Commission Jurisdictional Wetlands	SM	Less Than RBEP
Common Wildlife	SM	Less Than RBEP
Special-Status Plant Species	LS	Less than RBEP
Special-Status Wildlife	LS	Less than RBEP
Noise	SM	Less than RBEP
Lighting	LS	Less than RBEP
Stormwater Discharge	SM	Less than RBEP
Operation Impacts and Mitigation		
Noise	LS	Less than RBEP
Stormwater Discharge	SM	Less than RBEP
Collision and Electrocution	LS	Less than RBEP
Air Emissions – Nitrogen Deposition	LS	Less than RBEP
Cultural Resources		
Damage to Surficial Archaeological Resources	—	Similar to RBEP
Damage to Buried Archaeological Resources	PSM	Less than RBEP
Damage to Identified Archaeological and Ethnographic Resource	—	Similar to RBEP
Damage to RBGS and SEA Lab	SM	Less than RBEP
Geology and Paleontology		
Risk of strong seismic shaking	PSM	Similar to RBEP
Risk of liquefaction resulting from strong seismic shaking.	PSM	Similar to RBEP
Risk of potential excessive settlement due to dynamic compaction resulting from strong seismic shaking.	PSM	Similar to RBEP
Risk of potential excessive settlement due to heavy structural loads bearing on compressible soils	PSM	Similar to RBEP
Risk of surface fault rupture	LS	Similar to RBEP
Hazardous Materials Management		
Risk of fire or explosion impact off-site resulting from natural gas usage during operations	PSM	Less than RBEP
Risk of hazardous material spill impact en route (off-site) resulting from hazardous materials transportation to site	PSM	Less than RBEP
Risk of hazardous material spill / migration impact off-site resulting from hazardous materials storage and use on-site shaking	PSM	Less than RBEP
Risk of significant drawdown of emergency response services causing impact off-site	LS	Similar to RBEP

Issue Area	RBEP[1]	No-Project Alternative[2]
Land Use		
Conflict with applicable land use policies	—	Greater than RBEP
Noise and Vibration		
Potential noise impacts at noise-sensitive receptors	SM	Less than RBEP
Public Health		
Construction-related diesel particulate matter (DPM) emissions	LS	Less than RBEP
Operation-related toxic air contaminants (TACs) emissions	LS	Less than RBEP
Socioeconomics		
Induce substantial population growth in an area, either directly or indirectly	LS	Similar to RBEP
Displace substantial numbers of people and/or existing housing, necessitating the construction of replacement housing elsewhere	—	Similar to RBEP
Adversely impact acceptable levels of service for police protection, schools, and parks and recreation	LS	Similar to RBEP
Soil and Water Resources		
Soil erosion by wind and water during project construction	LS	Less than RBEP
Soil erosion by wind and water during project operations	LS	Similar to RBEP
Water quality impacts from contaminated storm water runoff	PSM	Similar to RBEP
Water quality impacts from storm damage	LS	Less than RBEP
Water quality impacts from power plant operations	PSM	Less than RBEP
Water quality impacts from sanitary waste	PSM	Less than RBEP
Potential impacts from on-site and off-site flooding	—	Similar to RBEP
Potential to impede or redirect 100-year flood flows, as shown on Federal Emergency Management Agency maps	—	Similar to RBEP
Potential impacts on potable water supplies	B	Less than RBEP
Potential impacts on local wells	B	Similar to RBEP
Potential impacts on groundwater basin balance	B	Similar to RBEP
Traffic & Transportation		
Potential impacts from increased construction workforce traffic which is substantial in relation to the existing traffic load and capacity of the street system	SM	Less than RBEP
Potential impacts from thermal plumes in an area where flight paths could occur below 1,000 feet from the ground	SM	Less than RBEP

Issue Area	RBEP[1]	No-Project Alternative[2]
Transmission Line Safety and Nuisance		
Impacts from generated fields	LS	Less than RBEP
Non-field impacts from operations	LS	Less than RBEP
Visual Resources		
Substantial adverse effect on a scenic vista	—	Similar to RBEP
Substantially damage scenic resources, including but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway	—	Similar to RBEP
Substantially degrade the existing visual character or quality of the site and its surroundings	KOPs 1-4, 6, and 7 = LS KOPs 5, 8, and 9 = PSM	Greater than RBEP
Create a new source of substantial light or glare that would adversely affect daytime or nighttime views in the area	KOPs 1-4 = LS KOPs 5-9 = PSM	Similar to RBEP
Waste Management		
Potential for material/waste generated during the construction and operation would not be managed in an environmentally safe manner, i.e. recycling or disposal	PSM	Similar to RBEP
Potential for disposal or diversion of project materials to cause impacts on existing waste disposal or diversion facilities	PSM	Less than RBEP
Potential for impacts on human health and the environment related to past or present soil or water contamination	PSM	Greater than RBEP
Worker Safety & Fire Protection		
Risk of fire or explosion impact off-site resulting from natural gas usage during construction	PSM	Less than RBEP
Risk of significant drawdown of emergency response services causing impact off-site	LS	Less than RBEP

Notes:
[1] The following correspond to impact determinations of the RBEP, as provided within each environmental analysis section of this PSA:
— = no impact
UNK = significance of impact is unknown
B = beneficial impact
LS = less than significant impact, no mitigation required
SM or PSM = significant or potentially significant impact that can be mitigated to less than significant
SU or PSU = significant and unavoidable or potentially significant and unavoidable impact that cannot be mitigated to less than significant
[2] This summary corresponds to the analysis provided within subsection “Alternatives Evaluated in Detail.”

The following discussion provides a detailed issue area analysis of the No-Project Alternative.

Air Quality

Under the No-Project Alternative there would be no emissions associated with existing facility operations after 2020. Therefore, the impacts would be less than those associated with the RBEP.

Biological Resources

Under the No-Project Alternative, no construction activities would occur in the basins that were once occupied by fuel tanks, thus avoiding the loss of Coastal Commission-jurisdictional wetlands that would happen with the RBEP. Under the No-Project Alternative there would be no RBGS operation after 2020 and no demolition activities are expected. Therefore, the impacts of the No-Project Alternative on biological resources would be less than RBEP.

Cultural Resources

As described in the AFC (RBEP 2012a) and this section of the PSA, the No-Project Alternative would not involve the demolition or other physical alteration of the RGBS. As such, the applicant would not conduct excavations or other ground disturbance at the site, nor alter the RBGS or SEA Lab. The No-Project Alternative, therefore, would not result in impacts to cultural resources. The No-Project Alternative would result in similar or lesser impacts on cultural resources than the RBEP. No mitigation measures would be required concerning cultural resources for the No-Project Alternative.

Geology and Paleontology

The No-Project Alternative would involve doing nothing with the existing plant. There are no geologic, paleontologic or mineralogic resources that would be impacted. This existing facility would remain as is, such that geologic hazards are not a concern, similar to RBEP. Thus, impacts from the No-Project Alternative would be similar to the RBEP.

Hazardous Materials Management

Continued compliance with laws, ordinances, regulations and standards (LORS) related to worker safety/fire protection under the No-Project Alternative would result in no significant impacts related to hazardous materials management. As described, all hazardous materials would continue to be properly managed after shutdown. There would be no significant impact on the public resulting under the No-Project Alternative.

Land Use

The existing RBGS facility is considered a nonconforming use by the city of Redondo Beach. However, the RBGS was established prior to the city’s adoption of the Generating Plant (P-GP) zoning regulations; a conditional use permit has not been required or approved by the city. The city of Redondo Beach Zoning Ordinance states that a nonconforming use which has been suspended or discontinued for a continuous period of at least two years shall automatically expire and may not be renewed, nor replaced, by any other use not permitted within the zone (Redondo Beach 2014).

The No-Project Alternative would continue the ongoing conflict of the RBGS with the following goals, policies, and objectives of the city of Redondo Beach General Plan Land Use Element (Redondo Beach 1992) and the Harbor/Civic Center Specific Plan (Redondo Beach 2008), whereas staff found that the RBEP would be consistent with these and other policies as described in the Land Use section of this staff assessment:

Land Use Element

- Goal 1D seeks to provide for the development of public infrastructure to support existing and future residents, businesses, recreation, and other uses.

- Policy 1.8.2 seeks to allow utility corridors, easements, and facilities (sewer, water, energy, storm drainage, telecommunications, and other) to provide for existing and future land use development in areas classified as Public (P) on the Land Use Plan map.

Harbor/Civic Center Specific Plan

- Goals and Objectives 5.6.1 seeks to undertake and pursue (as appropriate and environmentally viable) planning and feasibility studies leading to the ultimate future recycling of the Southern California Edison Company (SCE) site into a more attractive, modern, and compatible alternative land use.

Under the No-Project Alternative, the existing RBGS facility would remain rather than being replaced with the RBEP. Therefore, it is staff's position that the No-Project Alternative would have greater potential impacts of conflicting with applicable land use policies over the RBEP.

Noise and Vibration

Under the No-Project Alternative there would be no operational noise associated with existing facility operations after 2020. Therefore, operational noise impacts would be less than those associated with the RBEP.

Public Health

Under this No-Project Alternative, no construction activity would be needed. Also, the No-Project Alternative consists only of RBGS shutdown and the site remaining un-operational in its existing state at that time, and no demolition activities are expected. Therefore, construction-related diesel particulate matter (DPM) emissions and public health impacts of the No-Project Alternative would be less than the DPM and public health impacts of the RBEP.

Since the No-Project Alternative consists only of RBGS shutdown and the site remaining un-operational in its existing state at that time, no toxic air contaminants would be emitted. Therefore, staff concluded that the toxic air emissions and public health impacts from the No-Project Alternative would be less than the RBEP. No significant impacts would occur, and no conditions of certification would be required for the No-Project Alternative.

Socioeconomics

The No-Project Alternative consists of RBGS shutdown and the site remaining un-operational. Under the No-Project Alternative there would be no construction activity; therefore, construction workers for the project would not be needed. As a result, the No-Project Alternative would not induce substantial population growth or induce substantial increases in demand for schools, parks or law enforcement services. In the **SOCIOECONOMICS** section of the PSA, staff defined “induce substantial population growth” as workers moving into the project area because of project construction and operation. Additionally, the No-Project Alternative would not displace substantial numbers of people and/or existing housing, necessitating the construction of replacement housing elsewhere.

Soil and Water Resources

The No Project Alternative would involve doing nothing with the existing plant. There are no soils or water resources that would be impacted because there would be no construction and the plant would not operate. There would also be no water quality impacts because no more operation and sanitary wastewater would be generated.

Similar to RBEP, there would be no impact to local groundwater wells since there would be no groundwater pumping for project operation or construction activity that would affect groundwater. There would be no impacts from on and offsite flooding since the plant is not located in a flood zone and has a stormwater system in place to handle on and offsite water flow. The No-Project Alternative has no impacts to the soil and water resources.

The proposed project and the use of recycled water for project operation as recommended by staff would result in the savings of 305 acre feet per year (AFY) for potable water. In addition, use of recycled water for project construction would result in the savings of 100 AF of potable water over the five-year construction period.

Traffic and Transportation

Implementation of the No-Project Alternative would decrease impacts related to the operation of intersections as well as impacts related to aviation safety. New traffic on local roadways associated with RBEP construction or operation would not occur. As a result, the No-Project Alternative would eliminate potential increased delays for vehicles from degradation of existing peak hour levels-of-service at intersections. Similarly, there would be no creation of high-velocity thermal plumes from RBGS operation, thereby eliminating the potential for causing aircraft flying directly overhead to experience turbulence from RBEP exhaust plumes.

Transmission Line Safety and Nuisance

Staff has analyzed the potential for field and non-field impacts from the physical presence of the existing SCE 230-kV line and the interactive effects of the generated electric and magnetic fields. These impacts were discussed in staff’s Transmission Line Safety and Nuisance analysis in terms of aviation safety, interference with radio-frequency communication, audible noise, fire hazards, hazardous shocks, nuisance shocks, and electric and magnetic field (EMF) exposure. Staff’s four recommended conditions of certification in the **TRANSMISSION LINE SAFETY AND NUISANCE** section of this PSA would ensure that these impacts would be mitigated to less-than-significant levels. At 496 net megawatts (MW) and 511 gross MW, RBEP's generating capacity would be much less than the 1,356 net MW for the units of the existing RBGS, meaning that there would be a net reduction in power and current flowing in the transmission lines exiting the power plant site. Since the project lines would be operated at 230-kV whether with RBEP or the existing RBGS units, the resulting electric fields and related impacts would remain the same. Only the magnetic fields would be reduced with RBEP operation, since it is the only field component that directly depends on current levels.

Under the No-Project Alternative there would be no RBGS operation after 2020. Therefore, because no electricity generation would occur, there would be no impact to the existing transmission system interconnections to the RBGS.

Visual Resources

The No-Project Alternative consists of the RBGS shutting down and the site remaining un-operational in its existing state. This would result in continued unmitigated adverse impacts on the existing visual character and quality of the project site and its surroundings.

The No-Project Alternative would result in greater significant and unavoidable impacts that cannot be mitigated to visual resources at any of the Nine Key Observation Points (KOPs) analyzed in the "Visual Change for the KOPs" subsection of this Preliminary Staff Assessment.

There would be no visual impacts with the No-Project Alternative related to the demolition of the RBGS and construction of the RBEP. However, the overall greater visual impacts produced by an un-operational RBGS remaining in place indefinitely would not be mitigated.

Under the No-Project Alternative, operational lighting would cease but lighting for public safety and security purposes would continue.

Waste Management

Under the No-Project Alternative the applicant would avoid the generation of 37,436 tons of solid waste resulting from demolition of Units 1 through 8 (including approximately 2,106 tons of hazardous waste), 171 tons of solid waste from construction (including approximately seven tons of hazardous waste), and approximately 57 tons a year from operations (including approximately 18 tons of hazardous waste). No mitigation would be required for waste disposal under the No-Project Alternative.

However, staff notes that as presented in the Waste Management section of the PSA, several areas on the Redondo Beach Generating Station site require investigation and remediation. The remediation of the project site may not be completed under the No-Project option; therefore all existing contamination will remain in place at the site and may pose a risk to the environment.

Worker Safety & Fire Protection

Worker safety & fire protection is regulated through LORS, at the federal, state, and local levels. Industrial workers at the facility operate equipment and handle hazardous materials daily and may face hazards that can result in accidents and serious injury. Protection measures are employed to eliminate or reduce these hazards or to minimize the risk through special training, protective equipment, and procedural controls.

Compliance with LORS related to worker safety/fire protection to ensure RBGS safety and security after shutdown would minimize any impacts. However, because the plant would not be operational, it would have less operational-related risk for worker safety and fire protection when compared to the RBEP. Thus, the No-Project Alternative would avoid or lessen any significant impacts compared to the RBEP.

CONCLUSION

Comparison of Project Alternatives to the Project

As shown in **Alternatives Table 2**, when comparing impacts of the RBEP against the No-Project Alternative, there would be a reduction of impacts in certain resource areas (such as air quality, biological resources, cultural resources, noise and vibration, public health, soil and water resources, water supply, traffic and transportation, transmission line safety and nuisance, and worker safety and fire protection). These reductions stem from the elimination of RBEP construction and cessation of RBGS operations. Also shown in **Alternatives Table 2**, the No-Project Alternative would result in an increase of impacts in certain resource areas (such as land use and visual resources).

When reviewing the impact summary comparisons provided in **Alternatives Table 2** for all issue areas, the No-Project Alternative would lessen potential impacts of the RBEP. While reducing impacts in these resource areas, No-Project-Alternative would not meet any of the project objectives, including the objectives of providing efficient, reliable and flexible generation.

Environmentally Superior Alternative

At this time, there is no environmentally superior alternative to the RBEP. Overall, the No-Project Alternative may have less environmental impacts than the RBEP. However, these reduced impacts are attributed to the absence of RBEP short-term construction-related effects and the cessation of current RBGS operations. The No-Project Alternative would not meet any of the RBEP project objectives. While the No-Project Alternative would avoid construction impacts of the RBEP, staff acknowledges that at some point beyond the known extent of the No-Project Alternative, similar construction-related impacts would likely occur at the RBGS site from demolition and/or construction of future facilities.

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Alternatives Appendix 1
Staff Contributors to the RBEP Alternatives Analysis

Energy Commission staff contributions to the RBEP alternatives analysis include the following:

Issue Area	Energy Commission Staff Contributor
Air Quality	Joseph Hughes
Biological Resources	Andrea Martine
Cultural Resources	Gabriel Roark/Melissa Mourkas
Hazardous Materials Management	Geoff Lesh
Geology and Paleontology	Casey Weaver
Land Use	Steven Kerr
Noise and Vibration	Edward Brady and Shahab Khoshmashrab
Public Health	Gerry Bemis
Socioeconomics	Lisa Worrall
Soil and Water Resources	Karim Abulaban
Traffic and Transportation	John Hope
Transmission Line Safety and Nuisance	Obed Odoemelam
Visual Resources	Jeff Juarez
Waste Management	Ellie Townsend-Hough
Worker Safety & Fire Protection	Ellie Townsend-Hough
Engineering Staff/Technology Alternatives	Matthew Layton, Gerry Bemis, Shahab Khoshmashrab, and Joseph Hughes

Alternatives Appendix 2
Tier 1 Site Screening: Brownfield Sites Within the CAISO Western Los Angeles Basin Local Reliability Area

City	Location	Site Control	Notes[2]
Newport Beach	MacArthur Blvd.	Unknown	~17 acres; 3 brownfields (bf)[3]
	Jamboree Rd. and Bayview Way	No - existing facilities	3 bf sites
Santa Ana	MacArthur Blvd. and Bonita Cyn Dr.	No - existing development	
	Main St. and Flora St.	No - existing development	
	St Andrews Pl.	No - existing development	
	Lyon St. and St. Andrews Pl.	No - existing development	2 bf sites
	Ritchey St.	No - existing development	2 bf sites
	Edinger Ave.	No - existing development	
	Dan Gurney Dr.	No - existing development	
	Auto Mall Dr.	No - existing development	4 bf sites
	Normandy Pl.	No - existing development	
	Washing Blvd. and Santa Ana Blvd.	Unknown	~5 acres; 2 bf sites
Costa Mesa	MacArthur Blvd, Ciba Geigy Corp	No - existing development	4 bf sites
	Hyland Ave	No - existing development	
	MacArthur Blvd. and Harbor Blvd.	No - existing development	2 bf sites
Irvine	Theory and California Ave.	No - existing facility	
	Campus Dr. and Health Sciences Rd.	Vacant, (wetlands/body of water)	~300 acres; not near T/L corridor
	MacArthur Blvd. and Main St.	No - existing development	
	Barranca Pkwy. and Red Hill Ave.	Mostly vacant; wetland/body of water	>50 acres ; Total acreage of 4 bf sites; not near T/L corridor
Huntington Beach	AES Huntington Beach Generating Station	No - existing facilities	2 bf sites
	Edison HB	No - existing facilities	2 bf sites
	Ascon Landfill	No - existing facilities	~27 acres; 2 bf sites
	Huntington Beach Marine Terminal, Newland St.	No - existing facilities	~21 acres
	Ellis Substation	No - existing facilities	
	Brookhurst St.	No - existing facilities	2 bf sites
	Albacore Dr.	No - existing development (residential)	
	Bushard St.	No - existing development	
	Magnolia Ave.	No - existing development	2 bf sites

[2] The KML file used to identify Tier 1 sites shows numerous brownfield sites in close proximity to each other. In areas where there is dense existing development with no vacant land, the "Notes" column indicates how many brownfield sites appeared within a one- to three-block radius.

[3] bf = brownfield as identified on Google Earth mapped imagery

City	Location	Site Control	Notes[2]
	Huntington Beach Water Department, Garfield Ave.	No - existing development	
	Gothard St.	No - existing development (residential)	
	Ellis Ave. and Goldenwest St.	No – lake	
	HB Central Park	No – recreation area	
	Enterprise Lane	No - existing development	
	Gothard St.	No - existing development	
	HB Medical Center	No - existing development	
	Edinger Ave., Lewis Cleaners	No - existing development	
	Beach Blvd., Bella Terra Carwash	No - existing development	
	Center Ave., Mica Pacific Imaging and Costco	No - existing development	2 bf sites
	McFadden and Gothard	Unknown	6 acres
Fountain Valley	Warner Ave. and Newland St.	No - existing development	2 bf sites
	Warner Ave., Lehmans Medical Corp	No - existing development	
	Warner Ave., HB Water Dept.	No - existing development	
Westminster	Newland St. and Heil Ave.	No - existing development	
	Venus Dr.	No - existing development	
	Moran St.	No - existing development	3 bf sites
	Westminster Buick, Beach Blvd.	No - existing development	
	Edison Facility	No - existing development	
	Goldenwest Circle	No - existing development	5 bf sites
	Bolsa and Goldenwest Circle	No - existing development	4 bf sites
	HB Service Center	No - existing development	
	SOWELL AVE. & GOLDEN WEST ST.	No - existing development	
	Hazard Ave. and Hoover St.	No - existing development	3 bf sites
	Orange County Environmental Health, Olive St.	No - existing development	
	Suzi Lane	No - existing development	
	Westminster Blvd.	No - existing development	4 bf sites
	Trask Ave.	No - existing development	3 bf sites
	Garden Grove Blvd.	No - existing development	3 bf sites
Garden Grove/Stanton	Garden Grove Blvd.	No - existing development	
	Western Blvd.	No - existing development	15 bf sites between Lampson Ave and Garden Grove Blvd
	Western Blvd.	No - existing development	5 bf sites between Chapman Ave and Anaconda Ave
	Chapman Ave.	No - existing development	2 bf sites

City	Location	Site Control	Notes[2]
	Western Ave.	No - existing development	9 bf sites (7 in the city of Stanton)
	Orangewood Ave.	No - existing development	3 bf sites (1 in the city of Stanton)
	Lincoln Way and Western Ave.	No - existing development	5 bf sites (1 in the city of Stanton)
Orange	Rutledge Ave. and Western Ave.	No - existing development	2 bf sites
	Industrial Way	No - existing development	3 bf sites
	Katella Ave. and Western Ave.	No - existing development	
	Greenbrier Ct.	No - existing development	
	Park Acc	No - existing development	
	Katella Ave.	No - existing development	16 bf sites between Beach Blvd and Dale St
	Electric Ave.	No - existing development	7 bf sites
	Monroe Ave.	No - existing development	7 bf sites
	Standustrial St.	No - existing development	8 bf sites
	Barre Substation	Yes	5 acres
	Cerritos Ave.	No - existing development	3 bf sites
Anaheim	Magnolia	No - existing development	
	Brookhurst St.	No - existing development	2 bf sites
	Euclid St.	No - existing development	2 bf sites
	Walnut St.	No - existing development	2 bf sites
	Near Katella Ave. and Harbor	No - existing development	7 bf sites
	Near intersection of Anaheim and I5	No - existing development	10 bf sites
	Cerritos Ave. and Lewis St.	No – existing development	8 bf sites
	State College Blvd.	No - existing development	2 bf sites
	Auto Center Dr.	No - existing development	
	Broadway and Atchinson	No - existing development	
	91 Fwy and Tustin Ave.	Partially vacant	~50 acres; 2 bf sites – non-contiguous, oddly-shaped parcels
	La Palma Ave.	No – existing development	2 bf sites
	Miraloma Ave.	No – existing development	
	Orangefair Lane	No – existing development	2 bf sites
	Orangethorpe	No – existing development	2 bf sites
	La Palma Ave. and Anaheim Blvd.	No - existing development	
	Knollwood Circle	No - existing development	6 bf sites
	Knollwood Circle	Vacant	~20 acres; 4 bf sites
	Knollwood Circle	No - park	
	Lincoln Ave. and Syracuse St.	No - existing development	
Buena Park	Camellia	No - existing development	
	Beach Blvd.	No - existing development	2 bf sites
	Artesia and Dale Pl.	No - existing development	
	River Way and Cascade Way	No - existing development	
La Mirada	Snell St.	No - existing development	
	Trojan Way	No - existing development	3 bf sites
Fullerton	Rosslynn Ave.	No – existing development	3 bf sites

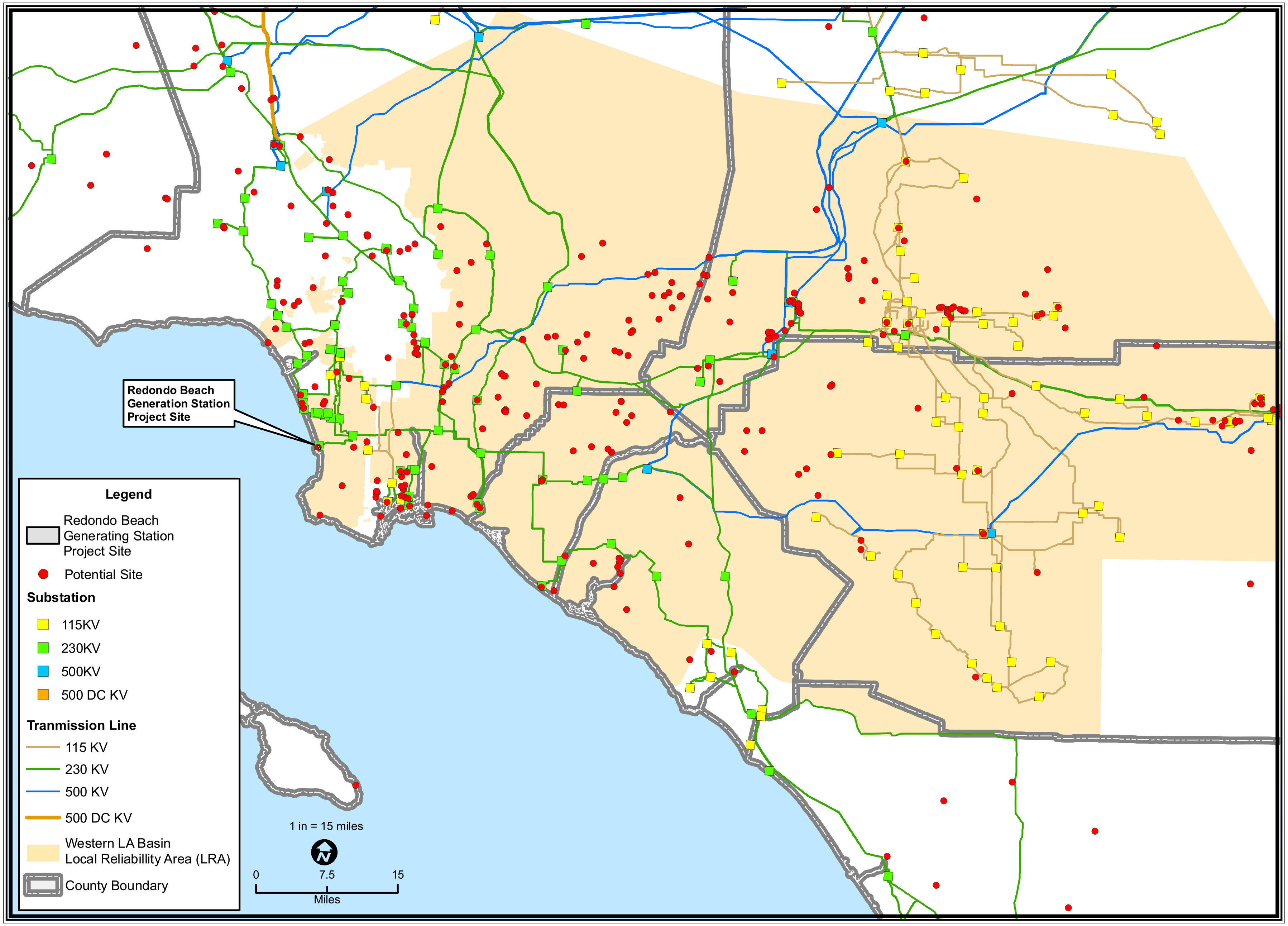
City	Location	Site Control	Notes[2]
	Western Ave.	No – existing development	3 bf sites (2 sites one block east of Western)
	Valley View St.	No – existing development	
	Burning Tree Rd.	No – existing development	
	Palm St. and Lambert	No - existing development	
Cerritos	Bloomfield Ave.	No – existing development	
	Alida Ave.	No – existing development	
	Harvest Ave.	No – existing development	
	Del Amo Blvd. and Studebaker Ave.	No – existing development	2 bf sites
	State St.	No – existing development	
	Piuma Ave. and Midway Ave.	No – existing development	9 bf sites
	South St. and Studebaker Rd.	No – existing development	6 bf sites
	Studebaker Rd. between South St. and Auto Center	No – existing development	10 bf sites
	Crusader Ave. and 183rd St.	No – existing development	
	Crusader Ave.	No – existing development	4 bf sites
	Artesia Blvd. and Dumont Ave.	No – existing development	
	Alondra Blvd. and Piuma Ave.	No – existing development	2 bf sites
	Artesia Blvd. and Jasmine Way	No - existing development	
Santa Fe Springs	Spring Ave.	No - existing development	2 bf sites
	Firestone Blvd. and Shoemaker Ave.	No - existing development	
Norwalk	Domart Ave.	No - existing development	
	Priscilla St.	No - existing development	
	Firestone Blvd. and 605 Fwy	No – existing development	6 bf sites
	Peaker Power Plant, Firestone Blvd.	No – existing development	
Downey	Imperial Hwy and Woodruff Ave.	No - existing development	2 bf sites
	Stewart & Gray Rd.	No - existing development	
	Pangborn Ave.	No - existing development	2 bf sites
	Washburn Rd.	No - existing development	2 bf sites
	Regent View Ave. and Downey Norwalk Rd.	No – existing development	3 bf sites
	Firestone Blvd. and SG River Mid Trail	No – existing development	
Bellflower	Clark Ave. and Rose St.	No – existing development	4 bf sites
	Lakewood Blvd. and Cedar St.	No – existing development	3 bf sites
	Lakewood Blvd. and Artesia St.	No – existing development	9 bf sites
	Downey and Artesia St.	No – existing development	3 bf sites
	Lakewood Blvd. and Walnut St.	No – existing development	6 bf sites
	Park St. and Lakewood Blvd.	No – existing development	4 bf sites

City	Location	Site Control	Notes[2]
	91 Fwy (Artesia Blvd and Downey)	No – existing development	
	Alondra Blvd. and Haylord St.	No - existing development	3 bf sites
	Rosecrans Ave. and McNab Ave.	No - existing development	2 bf sites
	Rosecrans Ave. and Lakewood Blvd.	No - existing development	
Lakewood	Del Amo Blvd. and Studebaker Ave.	No - existing development	2 bf sites
	Woodruff Ave. and South St.	No - existing development	6 bf sites
	Bellflower Blvd. and Ashworth	No - existing development	
Long Beach	Carson St. and Nector Ave.	No - existing development	
	Parkcrest St.	No - existing development	
	Willow St. and SG River Bike Trail	No - existing development	
	Katella and SG River Bike Trail	Vacant	20 acres
	7th and Studebaker	Vacant	5 acres; 4 bf sites
	Westminster and Studebaker	No - existing development	5 bf sites
	Downey Ave. between 69th and 70th	No - existing development	11 bf sites
	Paramount and 68th	No - existing development	10 bf sites
	Thompson and Stanley	No - existing development	
	Cherry Ave and 68th	No - existing development	4 bf sites
	Orange and 68th	No - existing development	
	70th and Orange	No - existing development	
Compton	South Atlantic/Myrtle	No - existing development	
Seal Beach/Fallbrook	Westminster St. and Devlin Rd.	No – US Department of Defense land	2 bf sites
	Adolfo Lopez Dr. and 1st St.	Vacant	100+ acres; 2 bf sites; Carried forward for Tier 2 evaluation
Los Alamitos	Sausalito and Los Alamitos	Vacant	2 acres
Cypress	Katella and Walker	No - existing development	
	Phylllis Dr and Valley View St.	No - existing development	2 bf sites
Paramount	Alondra Blvd. and Downey Ave.	No - existing development	2 bf sites
	Verdura (Downey Ave.)	No - existing development	
	Rancho Palermo Rd.	No - existing development	
	Somerset Blvd. and Downey Ave.	No - existing development	4 bf sites
	Indiana Ave.	No - existing development	
	3rd St. and Indiana (City of LA)	No - existing development	
	Downey Ave. and Contreras	No - existing development	3 bf sites

City	Location	Site Control	Notes[2]
	Rosecrans Ave. between Paramount Blvd. and Garfield Ave.	No - existing development	5 bf sites
Los Angeles	Lincoln Blvd. and Culver Blvd.	Vacant	130+ acres Carried forward for Tier 2 evaluation
	Bluff Creek Dr. and Dawn Creek	Vacant	50 + acres Carried forward for Tier 2 evaluation
Brea	Saturn St.	Vacant	~10 acres
	Kraemer and Imperial Hwy	No - existing development	
	Imperial Hwy and Gateway Center	No - existing development	
La Habra	Skyline Dr.	Vacant	Whittier Hills – not viable land
Walnut	Valley Blvd.	Vacant areas	
	Lemon Ave.	No - existing development	
	Grand Ave.	No - existing development	3 bf sites
	Fairway Dr.	No - existing development	
Pico Rivera	E. Loch Lomond Dr.	No – LA County Department of Public Works Flood Control District	100 + acres Carried forward for Tier 2 evaluation
Monterey Park	Greenwood Ave.	Vacant	100 + acres Carried forward for Tier 2 evaluation
Industry	Valley Blvd.	No - existing development	2 bf sites
	Fullerton and Rowland	No - existing development	
	Arenth Ave.	No - existing development	
	Railroad St.	No - existing development	
	Rowland St. and Canada Ct.	No - existing development	3 bf sites
	Gale Ave. and Azusa	No - existing development	6 bf sites
El Segundo	Rosecrans and Sepulveda Blvd.	Vacant	~ 50 acres Carried forward for Tier 2 evaluation
Carson	Del Amo and Main St.	Vacant	~50 acres Carried forward for Tier 2 evaluation

ALTERNATIVES - FIGURE 1

Redondo Beach Energy Project - CAISO Western Los Angeles Basin Local Reliability Area



CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: CEC Power Plant-Substation Database, CH2MHILL, CAISO

BIOLOGICAL RESOURCES

Andrea Martine

SUMMARY OF CONCLUSIONS

The proposed Redondo Beach Energy Project (RBEP) is a natural-gas-fired electrical generating facility that would replace, and be constructed on the site of the existing Redondo Beach Generating Station, an operating power plant in Redondo Beach, California. The proposed power plant site is an industrial brownfield site and vegetation is primarily weedy species and landscaping. The U.S. Army Corps of Engineers (USACOE) has determined that there are no waters of the U.S. that fall under its jurisdiction (DOA 2013a); however, there are wetlands on site that fall under the jurisdiction of the California Coastal Commission (Coastal Commission). Rare plants and special-status wildlife are not expected to occur onsite; however, nearby beaches and other natural areas support special-status species such as the Riverside fairy shrimp (*Streptocephalus wootoni*, federally listed endangered), San Diego fairy shrimp (*Branchinecta sandiegonensis*, federally listed endangered), El Segundo blue butterfly (*Euphilotes battoides allyni*, federally listed endangered), Palo Verdes blue butterfly (*Glaucopsyche lygdamus palosverdensensis*, federally listed endangered), western snowy plover (*Charadrius alexandrinus nivosus*; federally listed threatened), and coastal California gnatcatcher (*Polioptila californica californica*, federally listed threatened and state species of special concern).

Construction of the proposed RBEP would have a significant permanent impact on 5.93 acres of Coastal Commission jurisdictional wetlands on site (**Biological Resources Figure 1)**. This significant impact to the wetlands would be mitigated to less than significant by the implementation of staff's proposed Condition of Certification **BIO-9 (Restoration Program Funding)**, which requires providing funding to a restoration program (see staff's proposed **BIO-9** at the end of this analysis). Staff concludes that with implementation of the proposed conditions of certification, the project's direct, indirect, and cumulative impacts would be avoided, minimized, or mitigated to less than significant levels, and compliance with laws, ordinances, regulations, and standards would be achieved.

INTRODUCTION

This section of the Preliminary Staff Assessment (PSA) provides the California Energy Commission (Energy Commission) staff's analysis of potential impacts to biological resources from the construction, demolition, and operation of the proposed Redondo Beach Energy Project.

This analysis addresses potential impacts to special-status species, wetlands and other waters of the U.S., and areas of critical biological concern. Information contained in this document includes a detailed description of the existing biotic environment, an analysis of potential impacts to biological resources and, where necessary, specifies mitigation measures (conditions of certification) to reduce impacts to less than significant levels. Additionally, this analysis assesses compliance with applicable laws, ordinances, regulations, and standards.

This analysis is based, in part, on information provided in the RBEP Application for Certification (RBEP 2012a, pages 2-2 to 2-31, 5.2-1 to 5.2-48, Appendix 5.2 A-F, TN 66003), Data Response Set 1A (RBEP 2013b, pgs 18-21, TN 201167) (RBEP 2013c; Figure DR22-1, pgs 11-16, TN 201383), wetland delineation (RBEP 3013a; TN 69414), and staff's observations during a site visit (January 2014) of the proposed RBEP site, and discussions with California Coastal Commission, California Department of Fish and Wildlife, and U.S. Fish and Wildlife biologists.

Compliance with Laws, Ordinances, Regulations, and Standards (LORS)

The applicant must comply with the LORS listed in **Biological Resources Table 1** during project construction, demolition and operation.

Biological Resources Table 1
Laws, Ordinances, Regulations, and Standards

Applicable LORS	Description
Federal	
Endangered Species Act (Title 16, United States Code, section 1531 et seq., and Title 50, Code of Federal Regulations, part 17.1 et seq.)	Designates and provides for protection of threatened and endangered plant and animal species, and their critical habitat. Take of federally listed species as defined in the Act is prohibited without incidental take authorization, which may be obtained through Section 7 consultation (between federal agencies) or Section 10 Habitat Conservation Plan. The administering agencies are the United States Fish and Wildlife Service (USFWS) and National Marine Fisheries Service.
Clean Water Act (Title 33, United States Code, sections 1251 through 1376, and Code of Federal Regulations, part 30, section 330.5(a)(26))	Requires the permitting and monitoring of all discharges to surface water bodies. Section 404 requires a permit from the U.S. Army Corps of Engineers (USACE) for a discharge from dredged or fill materials into Waters of the U.S., including wetlands. Section 401 requires a permit from a regional water quality control board (RWQCB) for the discharge of pollutants.
Migratory Bird Treaty Act (Title 16, United States Code, sections 703 through 711)	Makes it unlawful to take or possess any migratory nongame bird (or any part of such migratory nongame bird including nests with viable eggs). The administering agency is the USFWS.
State	
California Endangered Species Act of 1984 (Fish and Game Code, sections 2050 through 2098)	Protects California's rare, threatened, and endangered species. The administering agency is California Department of Fish and Wildlife (CDFW).
California Code of Regulations (Title 14, sections 670.2 and 670.5)	Lists the plants and animals of California that are declared rare, threatened, or endangered. The administering agency is CDFW.
Fully Protected Species (Fish and Game Code sections 3511, 4700, 5050, and 5515)	Designates certain species as fully protected and prohibits the take of such species or their habitat unless for scientific purposes (see also Title 14, California Code of Regulations, section 670.7). The administering agency is CDFW.
Nest or Eggs (Fish and Game Code section 3503)	Protects California's birds by making it unlawful to take, possess, or needlessly destroy the nest or eggs of any bird. The administering agency is CDFW.

Applicable LORS	Description
Migratory Birds (Fish and Game Code section 3513)	Protects California's migratory birds by making it unlawful to take or possess any migratory nongame bird as designated in the Migratory Bird Treaty Act or any part of such migratory nongame birds. The administering agency is CDFW.
Lake and Streambed Alteration Agreement (Fish and Game Code sections 1600 et seq.)	Regulates activities that may divert, obstruct, or change the natural flow or the bed, channel, or bank of any river, stream, or lake in California designated by CDFW in which there is at any time an existing fish or wildlife resource or from which these resources derive benefit. Impacts to vegetation and wildlife resulting from disturbances to waterways are also reviewed and regulated during the permitting process. The administering agency is CDFW.
California Coastal Act (Public Resources Code, sections 30000 et seq.)	The California Coastal Act of 1976 establishes a comprehensive scheme to govern land use planning along the entire California coast. The Coastal Act sets forth general policies (§30200 et seq.) which govern the California Coastal Commission's review of permit applications and local plans. Specific to energy facilities, the Coastal Act requires that the Coastal Commission designate specific locations within the coastal zone where the establishment of a thermal power plant subject to the Warren-Alquist Act could prevent the achievement of the objectives of the Coastal Act (30413(b)). Section 30231 of California Coastal Act requires actions that minimize adverse impacts to biological productivity of coastal waters. Such actions may include: the control of run-off, minimization of discharge and entrainment, prevention of interference with surface water flow (and streams), prevention of groundwater depletion, use of wastewater reclamation, and maintenance of natural vegetation in buffer areas that protect riparian habitats. Section 30240 of the Coastal Act mandates protection of environmentally sensitive habitats from the degradation of habitat value. The administering agency is the California Coastal Commission.
California Food and Agriculture Code, section 403	The California Department of Food and Agriculture is the state agency designated to prevent the introduction and spread of injurious insect or animal pests, plant diseases, and noxious weeds.
Porter-Cologne Water Quality Control Act	Regulates discharges of waste and fill materials to waters of the state, including "isolated" waters and wetlands.
Local	
City of Redondo Beach General Plan	The Land Use Element of the General Plan recognizes the existing pattern of land use for the city and provides for their continuation into the future. There is very little undeveloped land remaining however future development will be in-filled and compatible with existing uses.

SETTING

PROJECT OVERVIEW

The proposed RBEP is a natural-gas-fired, combined-cycle, air-cooled, 511 gross megawatt (MW) electrical generating facility that would replace, and be constructed on the site of, the AES Redondo Beach Generating Station, an existing and operating power plant in Redondo Beach, California. The project would be constructed within the existing 50-acre Redondo Beach Generating Station site. RBEP construction would require approximately 17 acres of construction laydown and parking areas onsite, 10.5 acres for new aboveground equipment construction, 2.2-acre existing switchyard, and 20 acres which encompass the footprint of the existing Redondo Beach Generating Station aboveground equipment. Construction of the new RBEP and demolition of the existing units would occur over five years. For further details of the project see the section on **PROJECT DESCRIPTION**.

The RBEP would reuse existing natural gas, water, sewer, and high-voltage interconnections to the site. No offsite linear developments are proposed as part of the project. The new generating units would use air-cooled condensers and would eliminate the use of ocean water for cooling, which is currently used for the existing Redondo Beach Generating Station units.

REGIONAL SETTING

The regional setting of the proposed project encompasses the area within ten miles of the RBEP. The proposed RBEP site lies within the Los Angeles Plain subsection of the Southern California Coast Section (USDA 1997), which is characterized by flat floodplains and terraces and very gently sloped alluvial fans with small areas of marine terraces. Land use proximate to the proposed project area primarily includes urban development (both commercial and residential), and public beaches. The RBEP site is approximately 900 feet inland from the Pacific Ocean.

Regional Wetlands and Other Protected Areas

Several important ecological preserves, wetland preservation sites, and designated open spaces occur in the region (**Biological Resources Figure 2**). These areas represent some of the best remaining habitat in the region and provide important habitat for migratory birds along the Pacific Flyway as well as habitat for several special-status plants and animals.

Ballona Creek Wetlands

The Ballona Wetlands, which once occupied over 2,000 acres of coastal wetland in Los Angeles County, are located south of Marina del Rey and east of Playa del Rey, approximately eight miles north-northwest of the RBEP site (**Biological Resources Figure 2**). The protected wetlands include 600 acres of estuarine and brackish marshes, freshwater marsh and riparian habitats, seasonal wetlands, and coastal sage scrub in the Santa Monica Bay (Friends of Ballona Wetlands 2012). The refuge provides important habitat for numerous migratory birds. Special-status avian species that occur at the Ballona Wetlands include two endangered species: the least tern (*Sterna antillarum*; federally listed) and Belding's savanna sparrow (*Passerculus sandwichensis* *beldingi*; state listed). In addition, the least bittern (*Ixobrychus exilis*; State Species of Special Concern) is known to breed in the freshwater marsh (Friends of Ballona Wetlands 2012). Although this site is not currently occupied by the El Segundo blue butterfly, management by the conservation group Friends of Ballona Wetlands has produced an increase in coast buckwheat on the Ballona Wetlands Dune over the past decade (USFWS 2008, pg 10-11).

LAX Airport/El Segundo Dunes

The El Segundo Dunes preserve (**Biological Resources Figure 2**) is the largest remaining coastal dune area in Southern California, supporting 43 acres of original native dunes habitat located within the 203-acre El Segundo Blue Butterfly Habitat Restoration Area of the preserve. Vegetation communities within the preserve include southern foredune, southern dune scrub, and valley needlegrass grassland. Also known as the Airport Dunes, the restoration area is home to more than 1,000 species of plants and animals. An estimated 90,000 butterflies were present in the preserve in 2012. Habitat restoration at LAX continues and includes the removal of acacia, ice plant and other invasive plants. Crews also perform regular trash and debris removal, weeding, and other vegetation management activities. LAX has experienced an increase in butterfly numbers of about 65-130 times (depending on the year) since the start of restoration. Other special status species know to occur include coast horned lizard (*Phrynosoma coronatum blainvillii*). The LAX Airport/El Segundo Dunes is located approximately six miles north of the proposed RBEP site.

Chevron El Segundo Blue Butterfly Preserve

The Chevron El Segundo Blue Butterfly Preserve (**Biological Resources Figure 2**) is one of three locations of occupied habitat for the El Segundo blue butterfly. This 1.6-acre of remnant sand dune (Chevron Preserve) is owned by the Chevron Corporation at its refinery location in the city of El Segundo. The Chevron Preserve is the only currently known occupied site within the El Segundo Recovery unit. Although there is no formal management strategy for this site, Chevron is implementing management actions for the El Segundo blue butterfly (USFWS 2008, pg 12). Recent management activities include extensive planting of coast buckwheat. The Chevron El Segundo Blue Butterfly Preserve is located five miles north of the proposed RBEP site.

Dockweiler State Beach

Dockweiler State Beach (SB) is located at the western terminus of Imperial Highway in Playa del Rey (**Biological Resources Figure 2**). It is under the jurisdiction of California Department of Parks and Recreation and operated by the Los Angeles County Department of Beaches and Harbors. Dockweiler SB is comprised of nearly 288 acres of sandy beach and bluffs and more than two miles of ocean frontage along the shoreline of Santa Monica Bay. It contains a wide variety of land uses including public facilities, recreation amenities and natural resources including a 4.04 acre Least Tern Bird Sanctuary (1992). Dockweiler SB is composed of over 90 percent sandy fill material which has been imported since the 1930s. Little native vegetation is found at Dockweiler SB and only approximately 35 acres along the Vista Del Mar bluffs support plant and animal life. Vegetation is located on the bluffs and includes non-native iceplant and coastal sage scrub (1992). In 2013, the Los Angeles Conversation Corps was awarded a grant to restore native habitat at Dockweiler State Beach by removing iceplant, however this work has not yet been initiated. No rare or endangered plants have been identified at this site. Shorebirds as well as gulls, pelicans, loons, and terns are found inhabiting the beach. The federal and state listed California least tern and the formerly listed and state fully protected California brown pelican have been known to occur at Dockweiler SB. The 4.04 acre least tern nesting area provides foraging, nesting and roosting habitat for California least tern in a fenced sand dune area which is located approximately eight miles north of the RBEP site. Santa Monica Bay provides habitat for marine mammals such as California gray whale, California sea lion, and Pacific bottlenose dolphin as well as benthic species and fishes. Dockweiler State Beach is located over four miles north of the RBEP site.

Beach Bluff Restoration Project

The beach bluff restoration project study area encompasses portions of the former El Segundo dune ecosystem (**Biological Resources Figure 2**). The northern limit is Ballona Creek with County Beach in Torrance its most southern limit. Within this area restoration is concentrated on three sections: Playa del Rey segment, Manhattan Beach Segment, and Torrance and Redondo Beach segment (Longcore 2004, pg 3). The Torrance and Redondo Beach segment is one mile south of the RBEP. Local residents, environmental groups, and local, state and federal agencies comprise a steering committee to accomplish the vision of restoring the native dune and bluff scrub vegetation, and improving the physical infrastructure of the coastline. One of the goals of the restoration is to contribute to the recovery of the El Segundo blue butterfly. The butterfly has been found in the restored area by SEA Lab at Dockweiler State Beach and the bluffs of the cities of Torrance and Redondo Beach (Longcore 2014).

Madrona Marsh Preserve and Nature Center

The Madrona Marsh Preserve and Nature Center is approximately 3.1 miles southeast of the RBEP site (**Biological Resources Figure 2**). The preserve is approximately 49 acres and is owned and managed by the city of Torrance. This preserve is one of the last remaining vernal marshes in southern California (City of Torrance 2011). The lowland area is a ten-acre vernal marsh and alkaline margin, while the upland supports a back dune system and vernal pools. Currently, the preserve is trying to restore as much native vegetation to the upland areas as feasible; virtually all the vegetation of the wetland is composed of native species (Friends of Madrona Marsh Preserve 2012). Two federally listed invertebrate species occurring in the vernal pools at Madrona Marsh are Riverside fairy shrimp (*Streptocephalus wootoni*) and San Diego fairy shrimp (*Branchinecta sandiegonensis*) (Drake 2014; City of Torrance, 2009).

Malaga Cove

Malaga Cove is located just north of the Palos Verdes Peninsula and is a known occupied site of the federally endangered El Segundo blue butterfly in the Torrance Recovery Unit (**Biological Resources Figure 2**). The population of El Segundo blue butterfly in Malaga Cove is one of only three existing populations of this species and represents the southern end of its historical range. This El Segundo blue butterfly population was discovered on an eroded and iceplant dominated site in Malaga Cove in 1983. Private lands at the base of the bluffs supports seacliff buckwheat (*Eriogonum parviflorum*) the host plant of the butterfly. Malaga Cove is located approximately three miles south of the proposed RBEP site.

Palos Verdes Peninsula (PVP) Subarea Natural Community Conservation Plan (NCCP)

In 1996, the city of Rancho Palos Verdes entered into a Planning Agreement with CDFG and USFWS to develop a Natural Community Conservation Planning (NCCP) subarea plan (CDFG 2012). The northern boundary for the proposed Palos Verdes Peninsula (PVP) Subarea NCCP is located approximately 5.5 miles south of the project site according to NCCP reserve boundary parcels (RPV 2012), but an NCCP permit has not been issued so the final boundaries have not been finalized (CDFG 2012). Significant regional wetlands and protected areas in the PVP Subarea NCCP include Vista del Norte, Aqua Amarga, Vincente Bluffs, Alta Vincente, Abalone Cove, Ocean Trails, San Ramon, Forrestal, Portuguese Bend, Upper Filiorum, and Three Sisters (RBEP 2012; Figure 5.2-1).

Linden H. Chandler Preserve

The Linden H. Chandler Preserve is located in the city of Rolling Hills Estates. The preserve, which is owned by the city of Rolling Hills Estates and the Palos Verdes Peninsula Land Conservancy (PVPLC), is located approximately 5.8 miles southeast of the RBEP site (**Biological Resources Figure 2**). The site is only 28.5 acres, but it provides some natural habitat in Rolling Hills Estates consisting of grasslands, coastal sage scrub, and a riparian corridor. PVPLC has rigorously been restoring coastal sage scrub since development, agriculture, and invasive plant species have reduced this ecosystem by 75 to 90 percent. This area has been restored to provide habitat for Palos Verdes blue butterfly (federally endangered) and the coastal California gnatcatcher, which is federally listed as threatened (PVPLC 2013).

George F. Canyon Nature Preserve

The George F. Canyon Nature Preserve includes approximately 36 acres of riparian and coastal sage scrub habitats. It is located in the city of Rolling Hills Estates and is managed by PVPLC (PVPLC, 2013) (**Biological Resources Figure 2**). This nature preserve is approximately 6.6 miles southeast of the RBEP site. An intermittent stream attracts many wildlife species to the area, including several non-migratory bird species and migratory birds including orioles, yellow-rumped warbler (*Dendroica coronate*), western tanager (*Piranga ludoviciana*), phainopepla (*Phainopepla nitens*), and black-headed grosbeak (*Pheucticus melanocephalus*).

Defense Fuel Support Point (DFSP)

The DFSP is approximately 331 acres and is located in San Pedro in the city of Los Angeles, approximately seven miles southeast of the RBEP site (NAVFAC 2012) (**Biological Resources Figure 2**). This site belongs to the Unites States military and is not open to the public. The coastal sage scrub onsite provides habitat for the Palos Verdes blue butterfly. This species was rediscovered at this location after being presumed extinct. The PVPLC uses this location as a plant nursery, and native plants are grown from locally collected seeds, which are used for restoration projects (PVPLC 2013).

White Point Nature Preserve

The White Point Nature Preserve is located in San Pedro in the city of Los Angeles, approximately 9.8 miles southeast of the RBEP site (**Biological Resources Figure 2**). The preserve is approximately 102 acres of restored coastal sage scrub habitat that is managed by the PVPLC (PVPLC 2011). The coastal California gnatcatcher and western meadowlark (*Sturnella neglecta*) have been observed within the preserve (Moody and Dalkey 2007).

Critical Habitat

Critical habitat is a formal designation under the Endangered Species Act. In accordance with section 3(5)(A)(i) of the Act and the regulations at Title 50, Code of Federal Regulations, section 424.12, in determining which areas occupied by the species at the time of listing to designate as critical habitat, factors considered are those physical and biological features essential to the conservation of the species that may require special management considerations or protection. Critical habitat for the following federally listed species occurs in the regional vicinity of the proposed RBEP (**Biological Resources Figure 3**).

Palos Verdes Blue Butterfly

The final rule for USFWS-designated critical habitat for Palos Verdes blue butterfly (*Glaucopsyche lygdamus palosverdesensisis*) was published on July 2, 1980 (USFWS 1980, pg 44942), and includes pockets of land in the Palos Verdes Estates, Frank Hesse Park, and Rancho Palos Verdes located approximately seven miles south of the RBEP (RBEP 2012, Figure 5.2-3) (**Biological Resources Figure 3**). Habitat consists of cool, fog shrouded, seaward canyons and terraces of coastal sage scrub where the larval food plants locoweed (*Astragalus trichodpodus* var. *lonchus*) and common deerweed (*Lotus scoparius*) occur. The butterfly has been extirpated from all designated critical habitat (Porter 2014).

Western Snowy Plover

The final rule for USFWS-designated critical habitat for western snowy plover (*Charadrius alexandrinus nivosus*) was published on June 19, 2012 (USFWS 2012 pg 36860), and includes Hermosa State Beach, approximately 1,200 feet northwest; Dockweiler South, which is 4.8 miles northwest; and Dockweiler North, about 6.9 miles northwest of the RBEP site (USFWS 2012) (RBEP 2013, Figure 5.2-3) (**Biological Resources Figure 3**).The beach habitats for western snowy plover within the designated critical habitat are generally characterized by large, flat, and open spaces.

Coastal California gnatcatcher

The final revised rule for USFWS-designated critical habitat for the coastal California gnatcatcher (*Polioptila californica californica*) was published December 19, 2007 (USFWS 2007a, pg 72040), and includes high quality sage scrub habitat in Palos Verdes Peninsula located approximately 3.4 miles south of the proposed RBEP site (RBEP 201; Figure 5.2-3) and approximately 23 miles northeast of the RBEP site (**Biological Resources Figure 3**). Unit 8 Palos Verdes Peninsula Subregion, Los Angeles County is under private ownership and the majority is within the city of Rancho Palos Verdes' draft NCCP/MSHCP sub regional planning area. It was occupied at the time of listing, is currently occupied, and contains all of the features essential to the conservation of the coastal California gnatcatcher. In addition this unit provides connectivity and genetic interchange among core populations and contains large blocks of high-quality habitat (USFWS 2007, pg 72040).

Existing Vegetation and Wildlife

The applicant conducted a reconnaissance-level survey of biological resources within the proposed project area on September 29, 2011. The following description of existing biological resources presents the results of biological surveys of the proposed project as well as observations from staff's site visits.

Vegetation

The proposed RBEP site is industrial. The entire site is developed with no natural habitats present. Vegetation is limited to landscaping trees and shrubs such as Moreton Bay fig (*Ficus macrophylla*), pepper tree (*Schinus molle*), Mexican fan palm (*Washingtonia robusta*), junipers (*Juniperus* sp.) and a few scattered weedy plants as well as some wetland vegetation associated with the wetlands. Species in these areas consisted of a few cattails (*Typha* sp.) and sprangletop (*Leptochloa* sp.), an opportunistic weedy species often found in moist, disturbed areas. Redtop (*Agrostis gigantea*) and common sow thistle (*Sonchus oleraceus*) was seen in the former fuel tank areas 1 through 3 while other nonnative species onsite include cheeseweed (*Malva parviflora*), common groundsel (*Senecio vulgaris*), common sowthistle (*Sonchus oleraceus*), pink powderpuff (*Calliandra surinamensis*), and spotted spurge (*Chamaesyce maculate*).

Within one mile of the proposed RBEP site are the following vegetation communities and land cover types present.

- **Urban.** Urban development represents the largest land cover type in the survey area. It includes residential, commercial, light industrial, public schools, and other municipal facilities, around the project site.
- **Industrial and landfill.** This land cover type includes the project site and the SCE 230-kV switchyard. There are no landfills in the vicinity of the project area.
- **Parks and open space.** Parks within one mile of the project area include Redondo Beach State Park, Veterans Park, Vincent Park, Clark Field, and Hermosa Beach State Park.

Sensitive Habitat

Sensitive habitats within ten miles of the RBEP site include significant natural communities identified by CDFW's California Natural Diversity Database (CNDDB), including southern coastal salt marsh, southern coastal bluff, and southern dune scrub. Sensitive habitat types within ten miles of the RBEP site are shown on (**Biological Resources Figure 4**). Descriptions of these areas are provided below.

Southern Coastal Salt Marsh

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. 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 area 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 truxilensis*), California seablite (*Suaeda californica*), and marsh jaumea (*Jaumea carinosa*).

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. Southern coastal salt marsh habitat is found in the Ballona Wetlands, which is approximately 8.5 miles north-northwest of RBEP (**Biological Resources Figure 4**).

Southern Coastal Bluff Scrub

Southern coastal bluff scrub occurs at localized sites along the coast with woody and/or succulent plants that reach up to two meters in height (Holland, 1986). As with other natural habitats, the historical extent of this habitat type in southern California has been dramatically reduced. This sensitive habitat type occurs approximately three miles south of RBEP and stretches along the coastline of the Palos Verdes Peninsula (**Biological Resources Figure 4**).

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 one meter tall and often associated with a high percentage of cover. This habitat type is drier, warmer, and experiences less onshore wind when 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, lemonade berry, and jojoba (*Simmondsia chinensis*). This sensitive habitat type occurs 5.8 miles north-northwest of the proposed RBEP site (**Biological Resources Figure 4**).

<u>Common Wildlife</u>

Due to the developed nature of the site and frequency and intensity of disturbance from operation of the existing Redondo Beach Generating Station along with the lack of habitat, the proposed RBEP site does not provide habitat capable of supporting wildlife. Species observed within the proposed project site include American crow (*Crovus brachyrhynchos*), gull (*Larus* spp.), and rock pigeon (*Columba livia*). Other bird species seen during a January 2014 site visit include mallard (*Anas platyrhynchos*), snowy egret (*Egretta thyula*), and black phoebe (*Sayornis nigricans*).

JURISDICTIONAL WETLANDS

The Coastal Commission regulates wetlands within the coastal zone. Wetlands are defined by the Coastal Act Section 30121 as “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”. The Coastal Commission regulations (Cal. Code Regs., tit. 14, § 13577(b)) only requires a “one parameter definition” that only requires evidence of a single parameter to establish wetland conditions: “Wetland shall be defined as land where the water table is at, near, or above the land surface long enough to promote the formation of hydric sols or to support the growth of hydrophytes, and shall also include those types of wetlands where vegetation is lacking and soil is poorly developed or absent as a result of frequent and drastic fluctuations of surface water levels, wave actions, water flow, turbidity or high concentrations of salts or other substances in the substrate. Such wetlands can be recognized by the presence of surface water or saturated substrate at some time during each year and their location within or adjacent to, vegetated wetlands or deep-water habitats”.

The applicant conducted a wetland delineation in January 2013 (RBEP 2013) to determine whether the three constructed retention basins, one constructed pit, and five former fuel tank detention basins (RBEP 2013, Figure 2) are considered wetlands based on the Army Corp of Engineers definition. According to a determination made by the USACE (DOA 2013), these areas are not considered waters of the U.S. since they were incorporated into NPDES permit No. CA0001201 and were constructed in accordance with Section 402 of the Clean Water Act. However, some of the areas are considered jurisdictional wetlands under the Coastal Commission. Staff conducted a site visit with Coastal Commission staff and the applicant on January 22, 2014 to examine potential wetland areas and discuss obtaining additional data points in order to determine the extent of these wetlands.

The constructed pit and former tank basins 1 through 4 (**Biological Resources Figure 1**) were determined to be Coastal Commission wetlands based on the definition stated above. The following information is based on staff’s site visit in January and communications with Coastal Commission staff regarding the evaluation of the wetlands on site.

Constructed Pit

Although the constructed pit was dry during the site visit, the entire bottom area had evidence of hydrology including several primary indicators such as surface soil cracks, salt crust, and biotic crust. Therefore this whole area meets the definition of a Coastal Commission wetland.

Former Fuel Tank 1 Basin

The entire area of former fuel tank 1 had evidence of hydrology including several primary indicators such as surface soil cracks, salt crust, and aquatic invertebrates. Algae was growing in the water and there were several areas covered with wetland vegetation including creeping bentgrass (*Agrostis gigantea*) and variable flatsedge (*Cyperus difformis*). Mallards (*Anas fulvigula*) and a snowy egret (*Egretta thula*) were utilizing the area. Staff has confirmed the presence of all three wetland parameters at data point SP 03 and evidence of hydrology at data point SP 04. Based on this information this area is considered a Coastal Commission wetland.

Former Fuel Tank 2 Basin

Former fuel tank 2 was completely surrounded by water and mallards and a snowy egret were observed utilizing this area. Algae was present in the water and creeping bentgrass and variable flatsedge were growing in several large patches. Primary indicators of hydrology observed include surface soil cracks and salt crust. Wetland delineation data points SP 07 and 08 exhibited evidence of hydrology and hydric soils. The entire area is considered a wetland under the jurisdiction of Coastal Commission.

Former Fuel Tank 3 Basin

Former tank 3 had all the same indicators as former tank 2 including wetland delineation data points SP 09 and 10 indicating evidence of hydrology and hydric soils.

Former Fuel Tank 4 Basin

There was no standing water or vegetation in the area of former fuel tank 4, however there were indicators of primary hydrology throughout the area including water marks, salt crust, and surface soil cracks. Data point SP 12 showed no evidence of hydrology, hydrophytic vegetation, or hydric soils. While some areas may not meet the definition of a wetland, there is evidence that much of the area is a wetland. Further delineation of former tank 4 would be required to better determine the extent of wetlands based on the Coastal Commission's single parameter criteria.

Based on site visit and discussions with Coastal Commission staff, staff has determined the proposed RBEP contains 5.93 acres (**Biological Resources Table 2**) of Coastal Commission jurisdictional wetlands (**Biological Resources Figure 1**). Acre determinations were made using aerial photographs. If a delineation is provided by the applicant for this areas based on using a single wetland parameter, the acreage would be adjusted accordingly.

Biological Resources Table 2
Impacts and Mitigation for Coastal Commission Wetlands

Project Feature	Impact Acres
Constructed Pit	**0.08**
Former Fuel Tank 1	**1.35**
Former Fuel Tank 2	**1.42**
Former Fuel Tank 3	**1.59**
Former Fuel Tank 4	**1.49**
Total	**5.93**

SPECIAL-STATUS SPECIES

Special-status species are plant and wildlife species that have been afforded special recognition by federal, state, or local resource agencies or organizations. Listed and special-status species are of relatively limited distribution and typically require unique habitat conditions. Special-status species are defined as meeting one or more of the following criteria:

- Federally or state-listed, proposed, or candidate for listing, as rare, threatened or endangered under the Endangered Species Act or California Endangered Species Act;
- Protected under other state or federal regulations (e.g., Migratory Bird Treaty Act);
- Identified as a California Species of Special Concern by the CDFW;
- California Fully Protected Species;
- A plant species considered by the California Native Plant Society and CDFW to be "rare, threatened, or endangered in California" (California Rare Plant Rank [CRPR] 1A, 2A, 1B, and 2) as well as CRPR 3 and 4 species;
- A plant listed as rare under the California Native Plant Protection Act;
- Considered a locally significant species, that is, a species that is not rare from a statewide perspective but is rare or uncommon in a local context such as within a county or region or is so designated in local or regional plans, policies, or ordinances; or
- Any other species receiving consideration during environmental review under the California Environmental Quality Act (CEQA).

The project site is an industrial brownfield site with an operating power plant, and vegetation is limited to a few scattered weedy species and landscaping trees. Rare plants and most special-status wildlife are not expected to occur onsite.

Biological Resources Table 3 identifies occurrences of special-status species reported in the California Natural Diversity Database (CDFW 2013) and California Native Plant Society's (CNPS 2013) Inventory of Rare and Endangered Plants within a ten mile radius around the proposed RBEP. The majority of the species would not likely occur on site since there is no natural habitat.

Biological Resources Table 3
Special-status Species Known to Occur or Potentially Occurring In the RBEP Area and the Regional Vicinity

Common Name (*Scientific Name*)	Status Fed/State/RPR/ G-Rank/S-Rank	Potential for Occurrence in Project Impact Area
PLANTS		
Aphanisma (*Aphanisma blitoides*)	__/__/1B.2/ G3G4/S3	**Not Likely to Occur**. No suitable habitat occurs within the proposed project site. Species has been found in Redondo Beach State Park and in Palos Verdes Peninsula.
Ventura Marsh milk-vetch (*Astragalus pycnostachyus var. lanosissimus*)	FE/SE/1B.1/ G2T1/S1	**Not Likely to Occur.** No suitable habitat occurs within the proposed project site. Nearest CNDDB occurrence records are historic locations which are ten miles northwest of RBEP. All records are considered extirpated.
Coastal dunes milk-vetch (*Astragalus tener var. titi*)	FE/SE/1B.1/ G2T2/S1	**Not Likely to Occur.** No suitable habitat occurs within the proposed project site. CNDDB occurrence records are mapped in the general vicinity of Santa Monica and in the general vicinity of Hyde Park in Inglewood.
Coulter's saltbush (*Atriplex coulteri)*	__/__/ 1B.2/ G2/S2	**Not Likely to Occur.** No suitable habitat occurs within the proposed project site. Nearest CNDDB occurrence is historic record at the Newport Bay approximately miles from proposed project site.
South coast saltscale (*Atriplex pacifica*)	__/__/1B.2/ G3G4/S2	**Not Likely to Occur.** No suitable habitat occurs within the proposed project site. Historic record documented this species in vicinity of Redondo Beach.
Parish's brittlescale (*Atriplex parishii*)	__/__/1B.1/ G1G2/S1	**Not Likely to Occur.** No suitable habitat occurs within the proposed project site. This species was recorded approximately 1.5 miles south of RBEP.
Davidson's saltscale (*Atriplex serenana var. davidsonii*)	__/__/1B.2/ G5T2?/ S2?	**Not Likely to Occur.** No suitable habitat occurs within the proposed project site. CNDDB occurrence records are from near Los Angeles, Cienega, and San Pedro and are all historical and likely extirpated. The nearest occurrence record is approximately ten miles southeast of the project area.
Southern tarplant (*Centromadia parryi ssp. australis*)	__/__/1B.1/ G3T2/S2	**Not Likely to Occur.** No suitable habitat occurs within the propose project site. The nearest CNDDB records are two locations within five miles of RBEP.
Orcutt's yellow pincushion (Chaenactis glabriuscula var. orcuttiana)	__/__/1B.1/ G5T1/S1	**Not Likely to Occur.** No suitable habitat occurs within the proposed project site. Species was recorded approximately 3.2 miles north northwest of RBEP.
Coastal goosefoot (*Chenopodium littoreum*)	__/__/1B.2/ G2/S2	**Not Likely to Occur.** No suitable habitat occurs within the proposed project site. The nearest occurrence record is approximately eight miles northwest of the RBEP.

Common Name (*Scientific Name*)	Status Fed/State/RPR/ G-Rank/S-Rank	Potential for Occurrence in Project Impact Area
Salt marsh bird's-beak (*Chloropyron maritimum ssp. maritimum*)	FE/SE/1B.2/ G4?T1/S1	**Not Likely to Occur.** No suitable habitat occurs within the proposed project site. Most of the nearest occurrences are historic records and are noted in CNDDB as possibly extirpated. Nearest presumed extant, recent record is in Upper Newport Bay Ecological Reserve.
San Fernando Valley spineflower (*Chorizanthe parryi* var. *fernandina*)	FC/SE/1B.1/ G2T1/S1	**Not Likely to Occur.** No suitable habitat is present with the RBEP site. This species was recorded approximately 9.5 miles southeast of the project area.
Catalina crossosoma (*Crossosoma californicum*)	__/__/1B.2/ G2/S2	**Not Likely to Occur.** No suitable habitat occurs within the proposed project site. Species was recorded approximately six miles southeast of the project area in the Palos Verdes Peninsula.
Island green dudlyea (*Dudleya virens ssp. insularis*)	__/__/1B.2/ G2?T2/S2.2	**Not Likely to Occur.** No suitable habitat occurs within the proposed project site
Beach spectaclepod (*Dithyrea maritima*)	__/ST/1B.1/ G2/S2.1	**Not Likely to Occur.** No suitable habitat occurs within the proposed project site. This species is presumed extirpated from historical locations however habitat may remain at the LAX El Segundo Dunes Preserve.
Island green dudleya (*Dudleya virens* ssp. *insularis*)	__/__/1B.2/ G2?T2/S2.2	**Not Likely to Occur.** No suitable habitat occurs within the proposed project site. Endemic to the Palos Verdes Peninsula, San Clemente and the Catalina Islands.
Coulter's goldfields (*Lasthenia glabrata ssp. coulteri)*	__/__/1B.1/ G4T3/S2.1	**Not Likely to Occur.** No suitable habitat occurs within the proposed project site. Species was documented in El Segundo. Documented CNDDB occurrences within miles of the RBEP site are from Los Alamitos, Bryant Ranch, Seal Beach National Wildlife Refuge, Costa Mesa, and Bolsa Chica Salt Marsh. All are historic records, and most are listed by the CNDDB as possibly extirpated.
Santa Catalina Island desert thorn (*Lycium brevipes* var. *hassei*)	__/__/1B.1/ G1Q/S1	**Not Likely to Occur.** No suitable habitat occurs within the proposed project site. This species was recorded approximately 8.9 miles south southeast of RBEP.
Mud nama *(Nama stenocarpum*)	__/__/2B.2/ G4G5/S1S2	**Not Likely to Occur.** No suitable habitat occurs within the proposed project site. Nearest occurrences are a historic record from the Seal Beach National Wildlife Refuge miles from the RBEP site and a 1998 record from vernal pools in the Fairview Regional Park approximately miles from the RBEP site. The nearest occurrence record is approximately seven miles southeast of the RBEP.
Spreading navarretia (*Navarretia fossalis*)	FT/__/1B.1/ G1/S1	**Not Likely to Occur.** No suitable habitat occurs within the proposed project site. The nearest CNDDB occurrence record is a historic record from the Los Angeles area that is presumed extirpated.

Common Name (*Scientific Name*)	Status Fed/State/RPR/ G-Rank/S-Rank	Potential for Occurrence in Project Impact Area
Prostrate vernal pool navarretia (*Navarretia prostrata*)	__/__/1B.1/ G2/S2	**Not Likely to Occur.** No suitable habitat occurs within the proposed project site. Historic record documented this species within Manhattan Beach area and populations are likely extirpated.
Coast woolly-heads (*Nemacaulis denudata var. denudata*)	__/__/1B.2/ G3G4T3?/ S2.2	**Not Likely to Occur.** No suitable habitat occurs within the proposed project site. Nearby records are from 1951, 1955, 1986, 1993, 2003, 2004, and 2011 observations at Seal Beach, Newport Bay and Peninsula, Bolsa Chica, the Least Tern Preserve north of the mouth of the Santa Ana River, and the southern end of the Huntington State Beach.
California Orcutt grass (*Orcuttia californica)*	FE/SE/1B.1/ G1/S1	**Not Likely to Occur.** No suitable habitat occurs within the proposed project site. Species was documented approximately 4.4 miles northeast of the project area.
Lyon's pentachaeta (*Pentachaeta lyonii*)	FE/SE/1B.1/ G2/S2	**Not Likely to Occur.** No suitable habitat occurs within the proposed project site. The nearest record is approximately eight miles southeast of the project area.
Brand's star phacelia (*Phacelia stellaris*)	FC/__/1B.1/ G1/S1	**Not Likely to Occur.** No suitable habitat occurs within the proposed project site. Species was recorded at Redondo Beach State Park.
Ballona cinquefoil (*Potentilla multijuga*)	__/__/1A/ GX/SX	**Not Likely to Occur.** No suitable habitat occurs within the proposed project site. Species is presumed to be extinct.
Estuary seablite (*Suaeda esteroa*)	__/__/1B.2/ G3/S2	**Not Likely to Occur.** No suitable habitat occurs within the proposed project site. The nearest occurrence record is approximately ten miles southeast of the RBEP site.
San Bernardino aster (*Symphyotrichum defoliatum*)	__/__/1B.2/ G2/S2	**Not Likely to Occur.** No suitable habitat occurs within the proposed project site. Only reported occurrences are from historic collections most likely extirpated. Closest CNDDB occurrence record is near Newport Bay.
Fish		
Mojave tui chub (*Gila bicolor mohavensis*)	FE/SE/FP/ G4T1/S1	**Not Likely to Occur.** No suitable habitat occurs within the RBEP site. This species was formerly found in deep pools and slough-like areas of the Mojave River, but now only occurs in highly modified refuge sites in San Bernardino County.
Invertebrates		
Riverside fairy shrimp (*Streptocephalus woottoni*)	FE/__/__/G1/S1	**Not Likely to Occur.** No suitable habitat occurs within the proposed project site. Occurrence documented at the Madrona Marsh Preserve. 3.1 miles southeast miles from RBEP site.
San Diego fairy shrimp (*Branchinecta sandiegonensis*)	FE/__/__/G1/S1	**Not Likely to Occur.** No suitable habitat occurs within the proposed project site. Occurrence documented at the Madrona Marsh Preserve. 3.1 miles southeast from RBEP site.
Belkin's dune tabanid fly (*Brennania belkini*)	__/__/__/ G1G2/S1S2	**Not Likely to Occur.** No suitable habitat occurs within the proposed project site. Occurrence documented at Manhattan Beach State Park.

Common Name (*Scientific Name*)	Status Fed/State/RPR/ G-Rank/S-Rank	Potential for Occurrence in Project Impact Area
Busck's gall moth (*Carolella busckana*)	__/SC/__/ G1G3/SH	**Not Likely to Occur.** No suitable habitat occurs within the proposed project site. Species is extirpated or possibly extirpated, not enough information is available.
Western tidal-flat tiger beetle (*Cicindela gabbii*)	__/SA/__/ G4/S1	**Not Likely to Occur.** No suitable habitat occurs within the proposed project site. Area occurrences are historic and most are considered extirpated. Species inhabits estuaries and mudflats along the Southern California coast.
Sandy beach tiger beetle (*Cicindela hirticollis gravida*)	__/SA/__/ G5T2/S1	**Not Likely to Occur.** No suitable habitat occurs within the proposed project site. Area occurrences are historic and are presumed extirpated by development. The nearest CNDDB occurrence record is at Dockweiler State Beach five miles north of the RBEP site. Species inhabits areas adjacent to non-brackish water along the California coast.
Western beach tiger beetle (*Cicindela latesignata latesignata*)	__/SA/__/ G4T1T2/S1	**Not Likely to Occur.** No suitable habitat occurs within the proposed project site. Area occurrences are historic and are extirpated. Species inhabits mudflats and beaches in Southern California.
Senile tiger beetle (*Cicindela senilis frosti*)	__/SA/__/ G4T1/S1	**Not Likely to Occur.** No suitable habitat occurs within the proposed project site. The nearest CNDDB occurrence record is located at Manhattan Beach. Species inhabits marine shoreline, from central California coast south to salt marshes of San Diego.
Globose dune beetle (*Coelus globosus*)	__/SA/__/ G1/S1	**Not Likely to Occur.** No suitable habitat occurs within the proposed project site. Recorded in 2008 at Redondo Beach less than one mile southeast of the RBEP site. Species inhabits coastal sand dunes. The nearest CNDDB occurrence records are located at the Chevron El Segundo Blue Butterfly Preserve and at the LAX El Segundo Dunes Preserve.
Monarch butterfly (*Danaus plexippus*)	__/SA/__/ G5/S3	**Not Likely to Occur.** Records from the 1980s and 1990s Bolsa Chica Ecological Reserve, El Dorado Nature Center, Gum Grove Park, Redondo Beach Central Park, and Norma B. Gibbs Regional Park. Species has been documented approximately 1.8 miles southeast and approximately 4.9 miles north of the RBEP. Roosts in wind-protected tree groves along the California coast in winter.
Henne's eucosman moth (*Eucosma hennei*)	__/__/__/ G1/S1	**Not Likely to Occur.** No suitable habitat occurs within the proposed project site. The nearest CNDDB occurrence record is at the LAX El Segundo Dunes Preserve, six miles north.
El Segundo blue butterfly (*Euphilotes battoides allyni*)	FE/__/__/ G5T1/S1	**Not Likely to Occur.** No suitable habitat occurs within the RBEP site. Regionally this species is known to occur in the El Segundo sand dunes. Nearest recorded occurrence was approximately 5.8 miles northwest of RBEP. The El Segundo blue butterfly has been seen along the bluffs of Torrance and Redondo Beach (one mile south) in 2013.

Common Name (*Scientific Name*)	Status Fed/State/RPR/ G-Rank/S-Rank	Potential for Occurrence in Project Impact Area
Palos Verdes blue butterfly (*Glaucopsyche lygdamus palosverdesensis*)	FE/__/__/ G5T1/S1	**Not Likely to Occur.** No suitable habitat occurs within the RBEP site. This species has been documented within suitable habitat in the Palos Verdes hills approximately three miles south.
Lange's El Segundo Dune weevil (*Onychobaris langei*)	__/__/__/ G1/S1	**Not Likely to Occur.** No suitable habitat within the RBEP site and this species does not occur within the immediate vicinity of the project area. The nearest CNDDB occurrence record is at the LAX El Segundo Dunes Preserve.
Wandering (saltmarsh) skipper (*Panoquina errans*)	__/SA/__/ G4G5/S1	**Not Likely to Occur.** No suitable habitat occurs within the RBEP site. This species has been observed in and near the Ballona Wetlands. Inhabits coastal salt marshes in Southern California; requires moist saltgrass for larval development.
El Segundo flower-loving fly (*Rahaphoimidas terminatus terminatus*)	__/__/__/ G1T1/S1	**Not Likely to Occur.** This species was presumed to be extinct but has been recently discovered at Malaga Dunes approximately three miles south of RBEP site. No suitable habitat is present within the project area.
Dorothy's El Segundo Dune weevil (*Trigonoscuta dorothea dorothea*)	__/__ /__/ G1T1/S1	**Not Likely to Occur.** No suitable habitat occurs within the RBEP site. The nearest CNDDB occurrence records are located at the LAX El Segundo Dunes Preserve and at the Ballona Wetlands Ecological Reserve.
Mimic tryonia (=California brackishwater snail) (*Tryonia imitator*)	__/__/__/ G2G3/S2S3	**Not Likely to Occur.** No suitable habitat occurs within the RBEP site. The nearest CNDDB record occurs at Ballona Wetlands over eight miles north of the RBEP site.
Reptiles		
Silvery legless lizard (*Anniella pulchra pulchra*)	__/SSC/__/ G3G4T3T4Q/S3	**Not Likely to Occur.** There is no suitable habitat for this species within the project area. Species had been documented approximately 4.2 miles southeast of RBEP.
Western pond turtle (*Emys marmorata*)	__/SSC/__/ G3G4/S3	**Not Likely to Occur.** No aquatic habitat occurs at the RBEP site. All nearby records possibly extirpated.
Coast horned lizard (*Phrynosoma blainvillii*)	__/SSC/__/ G4G5/S3S4	**Not Likely to Occur.** No suitable habitat occurs within the RBEP site. The species inhabits open areas of sandy soil and low vegetation in valleys, foothills and semiarid mountains from sea level to 8,000 ft. Nearest CNDDB occurrences are all extirpated by development.
Birds		
Tricolored blackbird (*Agelaius tricolor*)	BCC/SSC/__/ G5T2T4/S2S3	**Not Likely to Occur.** No suitable habitat occurs within the RBEP site. Species occurs at Madrona Marsh (~3 miles southeast) and also occurs at Harbor Lake (~7 miles southeast).
Burrowing owl (*Athene cunicularia*)	BCC/SSC/__/ G4/S2	**Not Likely to Occur.** No suitable habitat occurs within the RBEP site. The species is known to occur at Ballona Wetlands Ecological Reserve eight miles from RBEP site.

Common Name (*Scientific Name*)	Status Fed/State/RPR/ G-Rank/S-Rank	Potential for Occurrence in Project Impact Area
Western snowy plover (*Charadrius alexandrinus nivosus*)	FT/SSC/__/ G4T3/S2	**Not Likely to Occur.** No suitable habitat occurs within the RBEP. This species has been reported at Dockweiler State Beach (SB) which annually supports a significant wintering flock. This species has not successfully bred at Dockweiler SB since the 1940s due to increased human activity. Requires sandy, gravelly, or friable soils for nesting.
Southwestern willow flycatcher (*Empidonax trailii extimus*)	FE/SE/__/G4T3/ S2	**Not Likely to Occur.** No suitable habitat occurs within the RBEP. The nearest CNDDB occurrence is over 12 miles from RBEP.
California black rail (*Laterallus jamaicensis coturniculus*)	BCC/ST,FP/ __/ G4T1/S1	**Not Likely to Occur.** No suitable habitat occurs within the RBEP site. The nearest CNDDB occurrence is over seven miles north.
Belding's savannah sparrow (*Passerculus sandwichensis beldingi*)	__/SE/__/ G5T3/S3	**Not Likely to Occur.** No suitable habitat occurs within the RBEP site. The nearest occurrence record for this species is over eight miles north in the Ballona Wetlands Ecological Reserve.
California brown pelican (*Pelecanus occidentalis Californicus*)	FD/SD, FP/__/ G4T3/S1S2	**Not Likely to Occur.** No suitable habitat occurs within the RBEP site. This species has recorded known roost near Marina Del Rey approximately 8.4 miles north and has been observed offshore.
Coastal California gnatcatcher (*Polioptila californica californica*)	FT/SSC/__/ G3T2/S2	**Not Likely to Occur.** No suitable habitat occurs within the RBEP site. The species is known from coastal sage scrub in the Palos Verdes Peninsula. The nearest CNDDB occurrence is approximately five miles south from the RBEP site.
Bank swallow (*Riparia riparia*)	__/ST/__/ G5/S2S3	**Not Likely to Occur.** No suitable habitat occurs within the RBEP site. Nesting populations are considered to have been extirpated in southern California.
California least tern (*Sternula antillarum browni*)	FE/SE/FP/ G4T2T3Q/S2S3	**Not Likely to Occur.** No suitable habitat occurs within the RBEP site. This species is known to breed in regional area at tidal salt/mud flats over eight miles from the RBEP site in the Ballona Wetlands Ecological Reserve. Historically nested in beach habitat but increased human disturbance has made these habitats unsuitable for breeding.
Mammals		
Western mastiff bat (*Eumops perotis californicus*)	__/SSC/__/ G5T4/S3?	**Not Likely to Occur.** No suitable habitat occurs within the RBEP site. This species is present only where there are significant rock features offering suitable roosting habitat or may roost in buildings with appropriately proportioned cracks.
Silver-haired bat (*Lasionycteris noctivagans*)	__/SA/__/ G5/S3S4/WBWG-M	**Not Likely to Occur.** No suitable habitat occurs within the RBEP site. The nearest CNDDB occurrence record is over 12 miles from the RBEP site. This species roosts in hollow trees, snags, buildings, rock crevices, caves, and under bark.

Common Name (*Scientific Name*)	Status Fed/State/RPR/ G-Rank/S-Rank	Potential for Occurrence in Project Impact Area
South coast marsh vole (*Microtus californicus stephensi*)	__/SSC/__/ G5T1T2/S1S2	**Not Likely to Occur.** No suitable habitat occurs within the RBEP site. The nearest CNDDB occurrence record is located in the Ballona Wetlands Ecological Reserve approximately eight miles north of RBEP. It occurs in tidal marshes in Los Angeles, Orange, and Southern Ventura counties.
San Diego desert woodrat (Neotoma lepida intermedia)	__/SSC/__/ G5T3/S3?	**Not Likely to Occur.** No suitable habitat occurs within the project area. Nearest occurrence was recorded approximately 8.4 miles southeast of the project area.
Pocketed free-tailed bat (Nyctinomops femorosaccus)	__/SSC/__/ G5/S2	**Not Likely to Occur.** No suitable habitat occurs within the project area. The nearest CNDDB occurrence is approximately five miles southeast of RBEP.
Big free-tailed bat (*Nyctinomops macrotis*)	__/SSC/__/ G5/S2	**Not Likely to Occur.** No suitable habitat occurs within the RBEP site. Occurs approximately 12 miles southeast. This species inhabits low-lying arid areas in Southern California and requires high cliffs or rocky outcrops for roosting.
Pacific pocket mouse (*Perognathus longimembris pacificus*)	FE/SSC/__/ G5T1/S1	**Not Likely to Occur.** No suitable habitat occurs within the RBEP site. Presumed extinct in the area. Suitable habitats for the contains fine-grain sandy substrates on the coastal strand, coastal dunes, river alluvium and coastal sage scrub.
Southern California saltmarsh shrew (*Sorex ornatus salicornicus*)	__/SSC/__/ G5T1? /S1	**Not Likely to Occur.** No suitable habitat occurs within the RBEP site. The nearest CNDDB occurrence record is presumed extirpated and located over eight miles from the RBEP site in the Ballona Wetlands Ecological Reserve. Occurs in coastal marshes and requires dense vegetation and woody debris for cover.
American badger (*Taxidea taxus*)	__/SSC/__/ G5/S4	**Not Likely to Occur.** No suitable habitat occurs within the RBEP site. One CNDDB record of an occurrence in Los Angeles. Inhabits most shrub, forest, and herbaceous habitats, primarily in drier open areas. Requires friable soil for burrow construction.

Sources: CDFW 2013a; CNPS 2013

Biological Resources Table 2 – Notes

STATUS CODES:

State
SE: State listed as endangered
SR: State listed as rare
ST: State listed as threatened
SFP: Fully protected
SSC: California Species of Special Concern. Species of concern to CDFW because of declining population levels, limited ranges, and/or continuing threats have made them vulnerable to extinction.
WL: Watch List: includes species formerly on California Species of Special Concern List (Remsen 1978) but which did not meet the criteria for the current list of special concern bird species (Shuford and Gardali 2008).
SA: Special Animal. Species is tracked in the CNDDB (due to rarity, limited distribution in California, declining throughout the range, etc.) but holds no other special status at the state or federal level.

Federal
FC: Federal species of concern
FE: Federally listed endangered: species in danger of extinction throughout a significant portion of its range
FT: Federally listed, threatened: species likely to become endangered within the foreseeable future
BCC: Fish and Wildlife Service: Birds of Conservation Concern: Identifies migratory and non-migratory bird species (beyond those already designated as federally threatened or endangered) that represent highest conservation priorities http://www.fws.gov/migratorybirds/NewReportsPublications/SpecialTopics/BCC2008/BCC2008.pdf
D: Delisted taxon that is considered recovered

California Native Plant Society (CNPS)
CRPR 1B: Rare, threatened, or endangered in California and elsewhere
CRPR 2: Rare, threatened, or endangered in California but more common elsewhere
CRPR 3 = Plants which need more information
CRPR 4 = Limited distribution – a watch list
0.1: Seriously threatened in California (high degree/immediacy of threat)
0.2: Fairly threatened in California (moderate degree/immediacy of threat)
0.3: Not very threatened in California (low degree/immediacy of threats or no current threats known)

Global Rank/State Rank
Global rank (G-rank) is a reflection of the overall condition of an element throughout its global range. Subspecies are denoted by a T-Rank; multiple rankings indicate a range of values
G1 = Less than 6 viable element occurrences (EOs) OR less than 1,000 individuals
G2 = 6-20 EOs OR 1,000-3,000 individuals
G3 = 21-100 EOs OR 3,000-10,000 individuals
G4 = Apparently secure; this rank is clearly lower than G3 but factors exist to cause some concern; i.e., there is some threat, or somewhat narrow habitat.
G5 = Population or stand demonstrably secure to ineradicable due to being commonly found in the world.
GX = Presumed extinct.

State rank (S-rank) is assigned much the same way as the global rank, except state ranks in California often also contain a threat designation attached to the S-rank. An H-rank indicates that all sites are historical
S1 = Less than 6 element occurrences (EOs) OR less than 1,000 individuals
S1.1 = very threatened
S1.2 = threatened
S1.3 = no current threats known
S2 = 6-20 EOs OR 1,000-3,000 individuals
S3 = 21-100 EOs or 3,000-10,000 individuals
S4 = Apparently secure in California; this rank is clearly lower than S3 but factors exist to cause some concern, i.e., there is some threat or somewhat narrow habitat. No threat rank.
S5 = Demonstrably secure or ineradicable in California. No threat rank.
SH = All California occurrences historical (i.e., no records in > 20 years).

Rank qualifiers
? = Inexact numeric rank
Q = Questionable taxonomy that may reduce conservation priority.

Infraspecific Taxon Conservation Status Ranks
T# = Infraspecific taxon; The status of subspecies or varieties.

Potential Occurrence:

High – Suitable habitat is present within or near the proposed site: occurrence records exist for species in proximity to the site; species expected to occur on or near site

Moderate – Low quality habitat is present within or near the proposed site; species was not identified during reconnaissance surveys of the site; species may occur on or near site

Low – Marginal habitat is present on or adjacent to site; no recent records within ten miles of the site

Not Likely to Occur – No recent records within ten miles, no suitable habitat occurs on or near site

Special-Status Plant Species

The RBEP site is entirely developed with no natural habitats present. The vegetation observed during the September 2011 reconnaissance survey and staff's site visit was limited to landscaping trees and shrubs and a few scattered weedy plants along with some wetland vegetation. Due to the developed nature of the project site, the potential for special-status plants to occur at the RBEP site is low, therefore rare plant surveys were not conducted.

Special-Status Wildlife

The applicant conducted general reconnaissance survey of the project site in September 2011. No protocol or focused surveys were performed because there are no habitats to support any special-status wildlife species within the proposed project or nearby surrounding the site. There is habitat in the vicinity (six-mile radius) that supports listed species. These species are discussed further below.

Invertebrates

Riverside Fairy Shrimp

The Riverside fairy shrimp (*Streptocephalus woottoni*) is a small freshwater crustacean occurring in vernal pools that is federally listed as endangered. Its distribution in California includes Ventura, Los Angeles, Riverside, Orange and San Diego counties. Threats include urban sprawl, agribusiness, off-road vehicles, livestock grazing, wetland draining, invasive non-native plants, fire and fire-suppression activities. This freshwater crustacean occurs in vernal pools present at the Madrona Marsh Preserve and Nature Center (eight miles away)(**Biological Resources Figure 2**) (Drake 2014). No suitable habitat is present at the proposed RBEP site and the species does not occur at the project site.

San Diego Fairy Shrimp

The San Diego fairy shrimp (*Branchinecta sandiegonensis*) is another small freshwater crustacean occurring in vernal pools that is federally listed as endangered. Most of the San Diego fairy shrimp are located in San Diego County from Marine Corps Base Camp Pendleton, inland to Ramona, and south through Del Mar Mesa, Kearney Mesa, Proctor Valley, and Otay Mesa, and into northwestern Baja California, Mexico. This species is threatened by habitat destruction from agricultural and urban development, alternation of wetland hydrology by draining, off-road vehicle activity, cattle grazing, and replacement by other fairy shrimp species. This freshwater crustacean occur in vernal pools present at the Madrona Marsh Preserve and Nature Center (eight miles away) (Drake 2014) (**Biological Resources Figure 2**). No suitable habitat is present at the proposed RBEP site and the species does not occur at the project site.

El Segundo Blue Butterfly

The El Segundo blue butterfly (*Euphilotes battoides allyni*) is a federally listed endangered species. This small butterfly is less than one inch across. The wings of the males are a brilliant blue color with an orange border on the rear of the upper hindwings. The females have dull brown colored wings with an orange border on the upper distal surface of the hindwings. The El Segundo blue's entire life cycle is associated with seacliff buckwheat (*Eriogonum parvifolium*) from which the larvae feed on the inflorescence (flower heads). Current distribution includes the Torrance recovery unit, specifically on beach bluffs between Malaga Cove and Redondo Beach (USFWS 2008) (**Biological Resources Figure 2**). The El Segundo blue butterfly has recently been discovered at newly occupied sites within its known range including at the restored dunes at Dockweiler State Beach and the bluffs of Torrance and Redondo Beach in 2013 (Longcore 2014). In addition, long-term survey data from the LAX Dunes shows population numbers of El Segundo blue butterfly appear to have fluctuated greatly over time and generally trend up or down based on rainfall. Threats to the species include loss of habitat due to urban and industrial development as well as invasions of non-native exotic species (USFWS 1998). Proposed rule for USFWS designated critical habitat for El Segundo blue butterfly was published February 8, 1977 (USFWS 1977) and includes Los Angeles Airport dunes and Chevron butterfly preserve but was never finalized while critical habitat has not been established for this species, the USFWS Recovery Plan recommended the protection of four Recovery Units (RU) that include adequate habitat and area to prevent the extinction of the butterfly. The El Segundo blue butterfly is extant at seven sites within three locations: two sites at the Airport Dunes location; the Chevron Preserve, and four sites near or north of Malaga Cove. These seven sites are included in the four RUs: Ballona Recovery Unit, Airport Dunes Recovery Unit, El Segundo Recovery Unit, and the Torrance Recovery Unit.). No suitable habitat is present at the proposed RBEP site and the species is not expected to occur at the project site.

Palos Verdes Blue Butterfly

The Palos Verdes blue butterfly (*Glaucopsyche lygdamus palosverdesensis*) is federally listed as endangered. The larvae feed on two plants: deerweed (*Lotus scoparius*) and coast locoweed (*Astragalus trichopodus lonchus*) which grow in disturbed open patches within coastal sage scrub. Distribution of the butterfly includes Defense Fuel Support Point and adjacent housing area, Linden H. Chandler Preserve, Friendship Park and Trump (reintroduced but likely failed), a patch above a golf course in Palos Verdes Estates (occupied in 2001 but not surveyed since), and the preserve system in city of Rancho Palos Verdes (future releases) (Porter 2014) (**Biological Resources Figure 2**). Threats to the species includes loss of habitat, overgrowth of non-native plants, and recreational development (USFWS 1980).The final rule for USFWS designated critical habitat for Palos Verdes blue butterfly was published July 2, 1980 (USFWS 1980), however this species has been extirpated from the designated critical habitat. No suitable habitat is present at the proposed RBEP site and the species is not expected to occur at the project site.

Birds

The project region supports a wide range of both resident and migratory bird species. The area is located within the Pacific Flyway, a very broad corridor stretching along the Pacific Coast from Mexico north to Alaska and into Siberia, Russia. Birds utilizing the area surrounding the project site and the regional vicinity include resident breeding birds, migratory birds that breed in the region but winter elsewhere, birds that forage and rest in the area during migration between breeding and wintering grounds, and species that winter in the project region. Nesting habitat on site is limited to landscaped areas which are primarily trees which also provide foraging opportunities for birds. Native birds, regardless of any additional conservation status at the local, state, or federal level, are afforded protection by the federal Migratory Bird Treaty Act (MBTA) and California Fish and Game Code.

Western Snowy Plover

The western snowy plover (*Charadrius alexandrinus nivosus*) is a federally listed threatened species and a California Species of Concern. This small shorebird is about six inches long, it has a thin dark bill and is pale brown to gray above with a white or buff colored underside with darker patches on its shoulders and head. It typically forages for small invertebrates in wet or dry beach sand, in salt marshes, and within low foredune vegetation. The Pacific coast breeding population of the western snowy plover currently extends along coastal beaches from the southern portion of Washington State to southern Baja California, Mexico. This population breeds primarily above the high-tide line on coastal beaches, sand spits, dune-backed beaches, sparsely vegetated dunes, beaches at creek and river mouths, and salt pans at lagoons and estuaries. Less common nesting habitats include bluff-backed beaches, dredged material disposal sites, salt pond levees, dry salt ponds, and river bars. The snowy plover winters mainly in coastal areas from southern Washington to Central America. In winter, snowy plovers are found on many of the beaches used for nesting as well as on beaches where they do not nest, in man-made salt ponds, and on estuarine sand and mud flats. The breeding season for the western snowy plover normally extends from March 1 through September 15, however the first nest at Bolsa Chica in 2009 occurred on February 23 and courting behavior has been observed as early as late January (Knapp and Peterson 2009, pg 1).

Poor reproductive success resulting from human disturbance, predation, and inclement weather, combined with permanent or long-term loss of nesting habitat to urban development has led to the decline in active nesting colonies as well as an overall decline in the breeding and wintering population of the western snowy plover along the Pacific coast of the United States. In southern California, extensive recreational beach use by humans has precluded the western snowy plover from breeding in several historically used beach strand areas (USFWS 2007b, pg 14).

The final rule for USFWS revised designated critical habitat for western snowy plover was published on June 19, 2012 (USFWS 2012), and includes CA 45B Dockweiler North, CA 45C Dockweiler South, and CA 45D Hermosa State Beach. These subunits were occupied at the time of listing and are currently occupied. In conjunction with subunit CA 45C Dockweiler South, and subunit CA 45D Hermosa Beach these subunits annually supports a significant wintering flock and high quality breeding habitat (USFWS 2012, pg 36670-36671).

The western snowy plover occurs at the Dockweiler State Beach, approximately four miles from the proposed project site. The species was not observed at the project site during the 2011 reconnaissance survey or during the site visit in 2014. Additionally, no suitable habitat for the species occurs within the proposed RBEP site.

Coastal California Gnatcatcher

The coastal California gnatcatcher (*Polioptila californica californica*) is a federally threatened species and a California Species of Concern. It is a small, non-migratory songbird (passerine) that occurs in San Diego, Orange, Riverside, San Bernardino, Los Angeles, and Ventura counties, California south to approximately El Rosario, Mexico. Coastal California gnatcatchers occur in or near coastal scrub vegetation communities. The breeding season generally extends from late February through July (sometimes later), with the peak of nest initiations (start-ups) occurring from mid-March through mid-May. Threats to the species include urban and agricultural development, fires, and non-native plants. Fires and introduction of non-native plants contribute to habitat type conversion.

The Coastal California gnatcatcher occurs at the Palo Verdes Peninsula, approximately five miles from the proposed project site. The species was not observed at the project site during the 2011 reconnaissance survey or during the site visit in 2014. Additionally, no suitable habitat for the species occurs within the proposed RBEP site.

IMPACT ASSESSMENT

METHOD AND THRESHOLDS FOR DETERMINING SIGNIFICANCE

A significant impact is defined under CEQA as “a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project” (Cal. Code Regs., tit. 14, [hereinafter CEQA Guidelines] § 15382). In this analysis, the following impacts to biological resources are considered significant if the project would result in:

- a substantial adverse effect to wildlife species that are federally-listed or state-listed or proposed to be listed; a substantial adverse effect to wildlife species of special concern to CDFW, candidates for state listing, or animals fully protected in California;
- a substantial adverse effect to plant species considered by CDFW, USFWS, or CNPS to be rare, threatened, or endangered in California or with strict habitat requirements and narrow distributions; a substantial impact to a sensitive natural community (i.e., a community that is especially diverse; regionally uncommon; or of special concern to local, state, and federal agencies);

- substantial adverse effects on habitats that serve as breeding, foraging, nesting, or migrating grounds and are limited in availability or that serve as core habitats for regional plant and wildlife populations;
- interfere substantially with the movement of any native resident or migratory fish or wildlife species or with established native resident or migratory wildlife corridors, or impede the use of native wildlife nursery sites;
- substantial adverse effect on important riparian habitats or wetlands and any other “Waters of the U.S.” or state jurisdictional waters; or
- conflict with the provisions of an adopted Habitat Conservation Plan, Natural Community Conservation Plan, or other approved local, regional, or state habitat conservation plan.

Direct and Indirect Impacts and Mitigation

The CEQA Guidelines define direct impacts as those impacts that result from the project and occur at the same time and place. Indirect impacts are caused by the project, but can occur later in time or farther removed in distance and are still reasonably foreseeable and related to the operation of the project. Direct or indirect impacts on biological resources could be permanent or temporary in nature. All impacts that result in the irreversible removal of biological resources are considered permanent. Any impact considered to have reversible effects on biological resources can be viewed as temporary.

This section evaluates the potential direct, indirect, permanent, and temporary impacts to biological resources from proposed RBEP construction and associated demolition activities, operation, maintenance, and decommissioning, and provides mitigation, as necessary, to reduce impacts to less than significant levels.

General Biological Resources Conditions of Certification

In order to avoid or minimize potentially adverse impacts to biological resources (i.e. nesting birds), staff recommends that a Designated Biologist and/or Biological Monitor(s) be employed to ensure impact avoidance and minimization measures to potential nesting avian species. The selection criteria and minimum qualifications of the Designated Biologist and Biological Monitor(s) are described in staff’s proposed Conditions of Certification **BIO-1 (Designated Biologist Selection)** and **BIO-3 (Biological Monitor Selection).** The duties and authority of the Designated Biologist and Biological Monitor are described in staff’s proposed Condition of Certification **BIO-4 (Designated Biologist and Biological Monitor Authority)**. The Designated Biologist and/or Biological Monitor would be responsible, in part, for developing and implementing the Worker Environmental Awareness Program (WEAP) [see Condition of Certification **BIO-5 (Worker Environmental Awareness Program)**], which is a mechanism for training the on-site project construction and maintenance personnel as well as project site visitors on the how to protect sensitive biological resources and the consequences of non-compliance.

CONSTRUCTION AND DEMOLITION IMPACTS AND MITIGATION

Construction and Demolition Impacts to Coastal Commission Jurisdictional Wetlands

Biological Resources Table 2 summarizes the direct impacts to Coastal Commission jurisdictional wetlands (wetlands) as a result of project construction. The wetland delineation (RBEP 2013a) conducted by the applicant did not accurately map the wetlands on site. Staff's calculations of the acres of wetlands impacted by the project were based on information gathered during the site visit, discussions with Coastal Commission staff, and aerial photographs. Staff has determined that the construction of the proposed RBEP would result in direct impacts to 5.93 acres of wetlands under the jurisdiction of Coastal Commission (**Biological Resources Table 4**) that occur within the proposed RBEP site (**Biological Resources Figure 1**).

The wetlands occur in basins created by an existing NPDES permit (DOA 2013) for the Redondo Beach Generating Station. The fuel tanks were removed but ground water is seeping through the bottom of the wetland allowing brackish water, composed of both secondary treated water and salt water from the ocean, to pond and wetland vegetation to grow. These areas exhibit hydric soils, hydrophytic vegetation, and wetland hydrology characteristic of wetlands. Mallards, snowy egrets, and snails were observed in these wetlands.

Biological Resources Table 4
Impacts and Mitigation for Coastal Commission Wetlands

Project Feature	Impact Acres	Mitigation @ 3:1 (Acres)
Constructed Pit	**0.08**	**0.24**
Former Fuel Tank 1	**1.35**	**4.05**
Former Fuel Tank 2	**1.42**	**4.26**
Former Fuel Tank 3	**1.59**	**4.77**
Former Fuel Tank 4	**1.49**	**4.47**
Total	**5.93**	**17.79**

The significant direct impacts of the proposed RBEP to 5.93 acres of wetlands would be mitigated at a ratio of 3:1 required by the Coastal Commission for all impacts to wetlands under its jurisdiction. Staff's proposed Condition of Certification **BIO-9 (Wetland Mitigation)** requires 17.79 acres of mitigation for these impacts. The total may change based on the final determination of the acres impacted at the Former Fuel Tank 4 or if the Coastal Commission requires a higher ratio. Staff's proposed mitigation would be achieved through funding a new or existing wetland restoration program(s) in the affected area or as close to the site of impact as possible. Impacts to the wetlands would be mitigated through restoration of salt marsh or estuary habitats occurring along the coast (Engle 2013) such as Huntington Beach wetlands system (includes Magnolia Marsh and Talbert Marsh), Bolsa Chica wetlands, and Long Beach (lagoon and wetland restoration). Another restoration project that could possibly be used is Los Cerritos, which is yet to be established. Funds would be provided annually for the life of the project.

Construction and Demolition Impacts to Common Wildlife

The proposed project area provides marginally suitable nesting habitat for a variety of common bird species. Birds could nest in the ornamental plants within and around the proposed RBEP site. Additionally, some bird species adapted to disturbed environments could nest in equipment or other available substrate in the areas within the RBEP site. Many adult birds would flush from equipment during project construction. However, birds nesting in ornamental trees, other landscaping, or equipment and facilities would be vulnerable to impacts during project construction. Nests, nestlings and eggs of native birds are protected by the Migratory Bird Treaty Act (MBTA) and Fish and Game Code Section 3503 and 3513. If initial demolition and site grading or vegetation removal in landscaped areas were to occur during nesting season, then it could destroy bird nest, including eggs or nesting birds.

Staff recommends conduction of a preconstruction active nest survey within and around the perimeter of the RBEP site, and monitoring active nests during demolition and construction activities if it is determined that active nests would be disturbed by RBEP activities. Staff's proposed Condition of Certification **BIO-8 (Pre-Construction Nest Surveys and Impact Avoidance and Minimization Measures for Breeding Birds)**, provides detail on survey timing and recommendations to avoid disturbance to active nests and ensure compliance with the MBTA. With implementation of Condition of Certification **BIO-8**, impacts to nesting birds would be less than significant.

Construction and Demolition Impacts to Special-Status Plant Species

Special-status plants recorded within one to five miles of the proposed RBEP site include Brand's star phacelia (CRPR 1B.1), Aphanisma (CRPR 1B.2), Parish's brittlescale (CRPR 1B.1), Orcutt's yellow pincushion (CRPR 1B.1), California Orcutt grass (FE/SE/CRPR 1B.1), and southern tarplant (CRPR 1B.1). However, the existing conditions at the proposed RBEP and surround area do not support these special-status plants as none have been observed at the site. The proposed RBEP site is within an existing operating power generating plant, and is an entirely developed site with no natural habitat. Therefore, impacts to special-status plants from construction would not occur and no mitigation is warranted.

Construction and Demolition Impacts to Special-Status Wildlife

Wildlife habitat in the project area has been significantly developed and fragmented by urban development. The RBEP site is located in developed areas; therefore, there would be no direct impacts resulting from disruption of wildlife movement, or habitat loss or fragmentation. The potential for the monarch butterfly to roost in landscaping trees along the perimeter of the project site is low and none have been previously recorded. El Segundo Blue Butterfly has not been observed at the proposed RBEP site and the host plant occurs approximately one mile from the proposed site, therefore it is not expected to occur at the site. Impacts to monarch butterflies and El Segundo Blue Butterfly are less than significant and mitigation is not required.

General Construction and Demolition Impacts

Noise

Noise from demolition and construction activities could discourage birds from foraging and nesting near the proposed RBEP. Many bird species rely on vocalization during the breeding season to attract a mate within their territory and noise from demolition and construction could adversely affect nesting behavior and other activities.

Studies have shown that noise levels over 60 dBA can affect the behavior of certain birds species and could interfere with acoustic communication (Dooling and Popper 2007). Noise may affect birds in several ways, including reducing reproductive success; raising the level of stress hormones; interfering with sleep; cause permanent injury to the auditory system; and interfering with acoustic communication by making important sounds, such as an approaching predator (Halfwerk et al 2011; Dooling 2006; Knight and Swaddle 2011). Many birds species rely on vocalizations during the breeding season to attract a mate within their territory. Francis et al. (2009) showed that noise alone reduced nesting species richness and led to a different composition of avian communities. Although some birds are able to shift their vocalizations to reduce the masking effects of noise, when shifts did not occur or were insignificant, masking could impair signaling and listening capabilities necessary for successful communication and survival (Barber et al. 2010).

Average ambient noise levels measured by the applicant were 63 A-weighted decibels (dBA) at the Best Western Hotel south of the site and 64 dBA at the apartments at King Harbor across the street (west) of the proposed RBEP site. The apartments are closest to Hermosa Beach, which is Critical Habitat for a wintering flock of western snowy plovers. This demonstrates that ambient noise levels are already above 60 dBA.

Construction and demolition noise level at 375 feet from the noise sources is estimated to be 71 dBA. Hermosa Beach is approximately 1,300 feet from the center of the existing facility, which means the noise would be attenuated to approximately 61 dBA and below the ambient level of 64 dBA at the apartments on King Harbor. The apartments are approximately 350 feet south of Hermosa Beach and therefore noise levels would be slightly lower still. It is expected that western snowy plovers present in this area would have acclimated to the existing ambient noise levels. In addition Hermosa Beach only contains a wintering flock of western snowy plovers. However, during construction high pressure steam blows, if un-silenced, can typically produce noise levels as high as 129 dBA at a distance of 50 feet; see the **NOISE AND VIBRATION** section of this PSA for a complete analysis of steam blows. Use of a quieter steam blow process, referred to as “low-pressure steam blow” results in noise levels that reach about 86 dBA at 50 feet. Steam blows for RBEP would be performed in compliance with the existing Condition of Certification **NOISE-7** which requires low-pressure steam blows. This noise source would not be audible above ambient near western snowy plover critical habitat as it is 1,300 feet from the center of the noise source and the noise would be 61 dBA, however steam blows would be intermittent and temporary. Demolition and construction noise would occur over a five year period. With implementation of noise impacts to western snowy plovers is less than significant.

Lighting

Construction and demolition activities would typically occur Monday thru Friday between 7:00 a.m. and 6:00 p.m. and Saturday between 9:00 a.m. and 5:00 p.m. Construction activities would result in a long-term temporary increase in lighting. Lights can disorient migratory birds flying at night or attract wildlife such as insects and insect-eaters in some cases. Since the project is located within an industrial area with existing lighting and surrounded by development in which there is already night lighting from existing surrounding developmental uses and there is no habitat for wildlife, the additional light from the proposed RBEP would not adversely affect any local wildlife.

In addition, lighting would be directed toward the center of the site and shielded. If night construction were required, the applicant proposes to use task-specific lighting to the extent practicable, shield and direct lighting onsite, and use switched lighting where possible (RBEP 2012a, p. 2-38 section 2.2.2.9). Staff has incorporated these measures into proposed Condition of Certification **VIS-2 (Site Lighting – Project Demolition, Construction, and Commissioning)**. Please refer to the **VISUAL RESOURCES** section of this PSA for the full text of this condition.

Stormwater Discharge

Stormwater would be collected onsite through existing drains and then discharged to the Pacific Ocean through the current permitted outfall for the existing Redondo Beach Generating Station. To ensure compliance with the State Water Resources Control Board Order No. 2009-0009-DWG, NPDES No. CAS000002 and the city of Redondo Beach stormwater discharge requirements, the project would be required to comply with Condition of Certification **SOIL&WATER-1,** which requires preparation of a construction Storm Water Pollution Prevention Plan (SWPPP) for the RBEP site and laydown areas. The SWPP would specify best management practices (BMPs) that would prevent all construction pollutants, including erosion products, from contacting stormwater, eliminate or reduce non-stormwater discharges to waters of the Pacific Ocean, and would require inspection and monitoring of BMPs. With implementation of these measures, project impacts to biological resources from stormwater discharge would be less than significant.

Operation Impacts and Mitigation

Noise

The proposed RBEP would be located on an industrial site and near developed areas and California State Highway 1. Wildlife species near the proposed RBEP site are accustomed to elevated ambient (existing) noise levels as a result of the vehicular traffic caused by trucks and existing uses around the site. However, it is also located adjacent to Critical Habitat for western snowy plover at Hermosa Beach.

Excessive noise masks auditory cues from other birds, including potential mates and approaching predators. Chronic exposure to excessive noise has been demonstrated to negatively affect foraging behavior, reproductive success, population density, and community structure (Habib et al. 2007; Bayne et al 2008; Barber et al 2010).

Noise levels during operations are expected to be below 45 dBA at Hermosa Beach (RBEP 2014) which is well below 60 dBA. In addition, Condition of Certification **NOISE-4** restricts noise levels during operations to not exceed an average of 55 dBA during the day and 51 dBA during the night and therefore operational noise would not impact any wildlife.

The existing Redondo Beach Generating Station and existing facilities adjacent to the proposed RBEP site provide an elevated ambient level of lighting to which local wildlife, including nocturnal species, have acclimated. However, excessively bright lighting at night could disturb the nesting, foraging, or mating activities of wildlife, primarily birds, and make them more visible to predators. Also night lighting could be disorienting to migratory birds and, if placed on tall structures, may increase the likelihood of collision, as discussed below. To minimize backscatter of light to the sky and ensure that lighting does not obtrude beyond the project site, staff recommends Condition of Certification **VIS-3** (refer to the **VISUAL RESOURCES** section of this PSA for the full text of this condition). **VIS-3** also would require that all lighting be of minimum necessary brightness consistent with worker safety, and wherever feasible and safe be kept off when not in use. In addition, staff has proposed Condition of Certification **BIO-7 (General Impact Avoidance and Minimization Measures)** which requires that Federal Aviation Administration (FAA) visibility lighting would be only strobe, strobe-like or blinking incandescent lights, preferably with all lights illuminating simultaneously. This type of lighting is less attractive to night-migrating birds and would minimize collisions with project features. With implementation of Condition of Certification **VIS-3 (Lighting Management Plan – Project Operation)** and **BIO-7 (General Impact and Avoidance and Minimization Measures)**, impacts from operational lighting would be less than significant.

Stormwater Discharge

Stormwater (oil free stormwater from the process areas and from pavement areas) would be collected onsite in a new retention basin before discharged to the Pacific Ocean through the existing outfall currently used by the Redondo Beach Generating Station. The residual oil containing sludge would be collected via vacuum truck and disposed of as hazardous waste (see the **WASTE MANAGEMENT** section of this PSA for more details). Staff's proposed Condition of Certification **SOIL&WATER-4** would require the applicant to obtain a National Pollutant Discharge Elimination System permit for industrial waste and stormwater discharge to the Pacific Ocean through the existing Redondo Beach Generating Station outfall. In addition, staff's Condition of Certification **BIO-7 (Impact Avoidance and Minimization Measures)** would require BMPs from the project SWPPP to be implemented during all phases of the proposed project to control stormwater. With implementation of these measures, potential project impacts from stormwater discharge during operation would be less than significant.

Collision and Electrocution

The adjacent beaches and marine area provide habitat for resident and migratory birds because of foraging opportunities and proximity to the Pacific Ocean. This concentration of birds creates the potential for direct impacts through collision or electrocution with proposed RBEP facilities and appurtenant structures including exhaust stacks. No new transmission lines and transmission support structures are proposed for the RBEP.

Birds can collide with transmission lines, exhaust stacks, and other structures associated with the proposed project, causing injury or mortality. Bird collisions with power lines and structures generally occur when a power line or other structure transects a daily flight path used by a concentration of birds and these birds are traveling at reduced altitudes and encounter tall structures in their path (Brown 1993). Collision rates generally increase in low light conditions, during inclement weather, during strong winds, and during panic flushes when birds are startled by a disturbance or are fleeing danger. Collisions are more probable near wetlands, within valleys that are bisected by power lines, and within narrow passes where power lines run perpendicular to flight paths (APLIC 2012).

Although collision may occur, it is not likely that bird mortality due to collision with RBEP facilities would significantly reduce the population numbers of any bird species or that the reduction in numbers within any population would impair its function within the local ecosystem. The proposed RBEP exhaust stacks would be much shorter than 350 feet (the height above which is considered dangerous to migrating birds). The reduction in height of the exhaust stacks would result in a lower risk of bird collision with this project feature compared with existing conditions. See the **VISUAL RESOURCES** section for a complete discussion of the heights of project features.

The proposed RBEP would connect to the regional electrical grid using the existing SCE 230-kV switchyard located within the Redondo Beach Generating Station site and adjacent to the proposed project. No new offsite transmission lines are proposed. Therefore no new direct or indirect impacts to birds from collision with transmission structures and lines are expected to occur from the RBEP.

Air Emissions – Nitrogen Deposition

Nitrogen deposition is the input of nitrogen oxide (NO_x) and ammonia (NH_3) derived pollutants, primarily nitric acid (HNO_3), from the atmosphere to the biosphere. Nitrogen deposition sources are primarily vehicle and industrial emissions, including power plants. Appended to the end of this section is **BIOLOGICAL RESOURCES - APPENDIX 1**, which Air Quality staff has provided to give a better understanding of the nitrogen deposition analysis and modeling used for the proposed RBEP. Based on the information provided in this document, Biological Resources staff performed a qualitative analysis of nitrogen deposition impacts to biological resources. Staff evaluated the direct nitrogen plume impacts of the power plant within a six-mile radius and Air Quality staff have determined that by the time the plume has traveled this distance, in-plume concentrations become indistinguishable from background concentrations.

Air Quality staff modeled total nitrogen deposition for the proposed RBEP using the AERMOD model. The information provided in **BIOLOGICAL RESOURCES - APPENDIX 1** discusses limitations of the method used to analyze potential nitrogen deposition impacts for the proposed project, including the conservative assumptions used to model nitrogen deposition, insufficient time for the emitted nitrogen to convert to atmospherically derived nitrogen, and determination that a less than significant amount of the ammonium sulfate particles would actually deposit on the ground within the six-mile radius. Other confounding factors that confirm that AERMOD overestimates the modeled nitrogen deposition include the use of baseline emissions inventory data from

2002 despite evidence of substantial reduction in the regional emissions that have occurred since 2002 as a result of the U.S. EPA and California programs enforced by the State Implementation Plan (SIP) and regional air district Air Quality Management Plans.

Mechanisms by which nitrogen deposition can lead to impacts on sensitive species include direct toxicity, changes in species composition among native plants, and enhancement of invasive species (Fenn et al. 2003; Weiss 2006). The increased dominance and growth of invasive annual grasses is especially prevalent in low-biomass vegetation communities that are naturally nitrogen-limited, such vegetation communities that occur in the project vicinity include dunes, coastal sage scrub, and vernal pools (Weiss 2006a).

Nitrogen deposition, primarily from industrial and vehicle emissions, artificially fertilizes the soil and creates better conditions for non-native species to persist and to ultimately displace the native species, resulting in type conversion (conversion of one habitat type to another). Excessive nitrogen deposition is strongly correlated with the growth of non-native vegetation (Huenneke et al. 1990; Inouye and Tilman 1995; Weiss 1999; Bowman and Steltzer 1998; Brooks 2003) and field studies have found that nitrogen fertilization in sites with elevated nitrogen deposition will enhance grass invasion (Rillig et al 1998; Brooks 2003). Several recent studies have attempted to quantify the critical load or rate at which nitrogen deposition begins to result in adverse effects to nitrogen-sensitive ecosystems. Studies in the United Kingdom suggest that the critical load ranges from ten to 20 kilograms of nitrogen per hectare per year (kg/ha/yr) for mobile and fixed sand dune ecosystems (Jones et al. 2004; Plassmann et al. 2009).

In response to staff's Data Request #20 (RBEP 2013b), the applicant estimated the baseline nitrogen deposition rate to be 2 kg/ha/yr for selected sensitive habitats. Based on nitrogen deposition rates presented in the California Energy Commission's publication: *Impacts of Nitrogen Deposition on California Ecosystem and Biodiversity* (Weiss, 2006), the background nitrogen deposition rates in the South Coast Air Basin range from 1 or 2 kg/ha/yr along the coastline to 21 kg/ha/yr in the Central Los Angeles Basin. The applicant estimates that the existing baseline nitrogen deposition rates near the project site are less than or equal to 2 kg/ha/yr because the RBEP site and neighboring biological resource areas are within 5 kilometers of the coastline.

Staff performed its own independent assessment of the data's accuracy, including modeling nitrogen deposition (using AERMOD) to verify the applicant's results. AERMOD is a conservative model that overestimates impacts by making several conservative assumptions (see **BIOLOGICAL RESOURCES - APPENDIX 1**). It does so by assuming 100 percent conversion of NOx and NH_3 into atmospherically derived nitrogen (ADN) at the stack, using HNO_3 which has the most affinity to soils and vegetation, using maximum settling velocities, basing emissions on the maximum potential that would be emitted, and estimating ammonia emissions to average 2.5 ppm instead of the reality of less than 1 ppm.

There are several listed species (Riverside fairy shrimp, San Diego fairy shrimp, El Segundo blue butterfly, Palo Verde blue butterfly, and coastal California gnatcatcher) and their habitats (vernal pools, coastal dunes, and coastal sage scrub) within the six mile-radius of the proposed RBEP and staff has considered impacts of nitrogen deposition on these sensitive habitat and designated critical habitat areas. The nitrogen deposition plume extends in an easterly direction and encompasses several different levels of nitrogen deposition as illustrated in **Biological Resources Figure 5**. The RBEP nitrogen deposition levels also vary across listed species habitat areas and range from 0.03 kg/ha/yr to 3 kg/ha/yr at the source. However, as discussed in **BIOLOGICAL RESOURCES - APPENDIX 1**, it is unlikely that there would be sufficient time within the six-mile radius for the emitted nitrogen (NOx and NH_3) to convert to ADN and deposit to the ground.

Based on the California Energy Commission's publication: *Assessment of Nitrogen Deposition Modeling and Habitat Assessment* (Tonneson et. al. 2007), the 2002 baseline nitrogen deposition rates in protected areas in the region varied from 1.56 to 23 kg/ha/yr. However, a more recent review of the nitrogen emission inventory for the South Coast Air Basin by Air Quality staff has determined that emissions from both mobile and stationary sources have decreased more than 50 percent from 2002 to 2014 for oxides of nitrogen and ammonia combined and these trends are continuing downward (see **BIOLOGICAL RESOURCES – APPENDIX 1**). Therefore, the use of the 2002 emission baseline data for determining potential nitrogen deposition impacts would overestimate the baseline deposition rate by a factor of two.

Although the proposed RBEP would emit nitrogen oxides and ammonia, implementation of the Regional Clean Air Incentives Market (RECLAIM) by the South Coast Air Quality Management District requires RBEP and other similar projects to purchase RECLAIM Trading Credits (RTCs) to offset their annual NOx emissions increase at a 1:1 ratio. As a result, any new stationary source like RBEP would not result in a net increase in NOx emissions basin wide. Therefore baseline nitrogen from NOx would not change with operation of the RBEP. Based on the above limitations and conservative assumptions used with the AERMOD model, the insufficient time for emitted nitrogen to convert to ADN and deposit within the six-mile radius from the proposed RBEP, the low probability of ammonium sulfate deposition in the six-mile radius, the continuing downward trend of baseline deposition of NOx and NH_3 , and the purchase of RTCs, the project's nitrogen deposition impacts to listed species would be less than significant.

CUMULATIVE EFFECTS

Cumulative impacts are those that result from the incremental impacts of a proposed action considered with other past, present, and reasonably foreseeable future actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over time. A project may result in a significant adverse cumulative impact if its effects are cumulatively considerable.

The proposed RBEP site would impact Coastal Commission wetlands, however there are no listed species associated with these wetlands and Condition of Certification **BIO-9 (Restoration Program Funding)** would mitigate for significant impacts to wetlands onsite. In addition there are no projects within the region that would contribute to cumulative impacts to wetlands. With implementation of Condition of Certification **BIO-9**, the proposed RBEP would not contribute to cumulative impacts to wetlands and therefore it would not contribute considerably to cumulative impacts to biological resources.

FACILITY CLOSURE

When the RBEP is closed in the future, whether planned or unexpected, it must be done so that closure activities protect the environment and public health and safety. A closure plan would be prepared by the project owner prior to any planned closure. To address unanticipated facility closure, an "on-site contingency plan" would be developed by the project owner and approved by the Energy Commission compliance project manager (CPM). Facility closure requirements are discussed in more detail in the **COMPLIANCE CONDITIONS AND COMPLIANCE MONITORING PLAN** section of the PSA. Facility closure mitigation measures would also be included in the Biological Resources Mitigation Implementation and Monitoring Plan (BRMIMP) prepared by the project owner and described in staff's proposed Condition of Certification **BIO-6 (Biological Resources Mitigation Implementation and Monitoring Plan).**

Upon decommissioning and permanent facility closure, reclamation would be necessary to prevent adverse effects such as contamination from hazardous substances, erosion, dust, invasion and spread of weeds, and hazards to wildlife from abandoned project infrastructure. Staff concludes that these potential effects of facility closure and decommissioning would be a significant impact absent mitigation. Decommissioning activities are likely to cause similar indirect impacts to adjacent sensitive biological resources as described above for the construction and demolition phases of the proposed project.

To ensure that public health and safety and the environment are protected during decommissioning, the applicant has committed to developing a decommissioning plan that would be submitted to the Energy Commission for approval prior to decommissioning (RBEP 2012). If possible, unused chemicals would be sold back to the suppliers or other purchasers or users. All equipment containing chemicals would be drained and shut down to ensure public health and safety and to protect the environment. All nonhazardous wastes would be collected and disposed of in appropriate landfills or waste collection facilities. All hazardous wastes would be disposed of according to all applicable LORS.

As described above, decommissioning and site closure would likely result in similar types of impacts to biological resources as construction and demolition. It is anticipated that Conditions of Certification similar to **BIO-1** through **BIO-8** would minimize or avoid these impacts to biological resources, and impacts to biological resources would be less than significant.

COMPLIANCE WITH LORS

The proposed project must comply with LORS that address state and federally listed species, as well as other sensitive biological resources. Applicable LORS are described in **Biological Resources Table 1** of the PSA.

Biological Resources Table 5
Summary of Impacts to Biological Resources from the RBEP

Impact	Condition of Certification	Significance Determination
CONSTRUCTION AND DEMOLITION IMPACTS		
Coastal Commission jurisdictional wetlands: removal of wetlands	• **BIO-9** requires payment to an existing restoration program for salt marsh or estuary habitat	Less than significant with implementation of condition of certification
Common wildlife: disturbance from noise and lighting, or stormwater discharge	• **BIO-7** avoid wildlife pitfalls • **BIO-8** requires pre-construction nest surveys and impact avoidance	Less than significant with implementation of condition of certification
Stormwater discharge: degradation of marine habitat	• **SOIL&WATER-1** requires a construction SWPPP to prevent all construction pollutants from contacting storm water and eliminate or reduce non-storm water discharges	Less than significant with implementation of condition of certification
OPERATIONAL IMPACTS		
Lighting: disturbance resulting in altered behavior or increased predation	• **VIS-3** requires all lighting to be of minimum necessary brightness and to be kept off when not in use • **BIO-7** requires that FAA visibility lighting would employ only strobed, strobe-like or blinking incandescent lights, preferably with all lights illuminated simultaneously	Less than significant with implementation of condition of certification
Stormwater discharge: degradation of marine habitat	• **SOIL&WATER-4** requires compliance with NPDES permit requirements for discharge	Less than significant with implementation of condition of certification
Air emissions – nitrogen deposition: degradation of habitat by enhancing invasive weeds	None	Less than significant

With implementation of staff's proposed conditions of certification, the proposed RBEP would comply with LORS pertaining to biological resources. Implementation of Conditions of Certification **BIO-8** and **BIO-9** would avoid impacts to nesting birds to be in compliance with the Migratory Bird Treaty Act.

NOTEWORTHY PUBLIC BENEFITS

The RBEP would not use ocean water for cooling, as is currently in use for the Redondo Beach Generating Station. Therefore, the RBEP would eliminate the potential for entrainment of aquatic species. The existing RBGS discharges approximately 889 million gallons per day (996,000 acre feet per year) to the Pacific Ocean through once-through cooling. Removal of the once through cooling would end the discharge of 996,000 AFY. The reduction in outfall discharge into the Pacific Ocean and the elimination of impingement and entrainment of marine organisms is a noteworthy environmental public benefit.

CONCLUSIONS

The project site is an industrial brownfield site with an operating power plant, and vegetation is limited to landscaping, some wetland plants, and weedy species. Rare plants and special-status wildlife are not expected to occur onsite; however, the site contains wetlands under the jurisdiction of the Coastal Commission. Construction and operation of the proposed would result in the direct loss of these wetlands.

With implementation of staff's proposed conditions of certification, compliance with LORS would be achieved and direct, indirect, and cumulative impacts would be avoided, minimized, or mitigated to less than significant levels.

PROPOSED CONDITIONS OF CERTIFICATION

Staff proposes the following Biological Resources conditions of certification:

DESIGNATED BIOLOGIST SELECTION

BIO-1 The project owner shall assign at least one Designated Biologist to the project. The project owner shall submit the resume of the proposed Designated Biologist, with at least three references and contact information, to the Energy Commission Compliance Project Manager (CPM) for approval in consultation with CDFW and USFWS.

The Designated Biologist must meet the following minimum qualifications:

1. Bachelor's degree in biological sciences, zoology, botany, ecology, or a closely related field;

2. Three years of experience in field biology or current certification of a nationally recognized biological society, such as The Ecological Society of America or The Wildlife Society; and

3. At least one year of field experience with biological resources found in or near the project area.

In lieu of the above requirements, the resume shall demonstrate to the satisfaction of the CPM, in consultation with CDFW and USFWS, that the proposed Designated Biologist or alternate has the appropriate training and background to effectively implement the conditions of certification.

Verification: The project owner shall submit the specified information to the CPM, CDFW, and USFWS at least 75 days prior to the start of site mobilization or construction-related ground disturbance activities. No pre-construction site mobilization or construction related activities shall commence until a CPM approved Designated Biologist is available to be on site.

If a Designated Biologist is replaced, the specified information of the proposed replacement must be submitted to the CPM at least ten working days prior to the termination or release of the preceding Designated Biologist. In an emergency, the project owner shall immediately notify the CPM to discuss the qualifications and approval of a short-term replacement while a permanent Designated Biologist is proposed to the CPM for consideration.

DESIGNATED BIOLOGIST DUTIES

BIO-2 The project owner shall ensure that the Designated Biologist performs the following during any site (or related facilities) mobilization, ground disturbance, grading, construction, operation, and closure activities. The Designated Biologist may be assisted by the approved Biological Monitor(s) but remains the contact for the project owner and CPM. The Designated Biologist Duties shall include the following:

1. Advise the project owner's Construction and Operation Managers, supervising construction and operations engineer on the implementation of the biological resources conditions of certification;

2. Consult on the preparation of the Biological Resources Mitigation Implementation and Monitoring Plan (BRMIMP) to be submitted by the project owner;

3. Be available to supervise, conduct and coordinate mitigation, monitoring, and other biological resources compliance efforts, particularly in areas requiring avoidance or containing sensitive biological resources, such as special status species or their habitat;

4. Clearly mark sensitive biological resource areas and inspect these areas at appropriate intervals for compliance with regulatory terms and conditions;

5. Inspect active construction areas where animals may have become trapped prior to construction commencing each day. At the end of the day, inspect for the installation of structures that prevent entrapment or allow escape during periods of construction inactivity. Periodically inspect areas with high vehicle activity (e.g., parking lots) for animals in harm’s way;

6. Notify the project owner and the CPM of any non-compliance with any biological resources condition of certification;

7. Respond directly to inquiries of the CPM regarding biological resource issues;

8. Maintain written records of the tasks specified above and those included in the BRMIMP. Summaries of these records shall be submitted in the monthly compliance reports and the annual compliance reports;

9. Train the Biological Monitors as appropriate, and ensure their familiarity with the BRMIMP, Worker Environmental Awareness Program (WEAP) training, and all permits; and

10. Maintain the ability to be in regular, direct communication with representatives of CDFW, USFWS, and CPM, including notifying these agencies of dead or injured listed species and reporting special status species observations to the California Natural Diversity Database.

Verification: The Designated Biologist shall submit in the monthly compliance report to the CPM copies of all written reports and summaries that document construction activities that have the potential to affect biological resources. If actions may affect biological resources during operation the Biological Monitor(s), under the supervision of the Designated Biologist, shall be available for monitoring and reporting. During project operation, the Designated Biologist(s) shall submit record summaries in the annual compliance report unless their duties cease, as approved by the CPM.

BIOLOGICAL MONITOR SELECTION

BIO-3 The project owner's CPM-approved Designated Biologist shall submit the resume, at least three references, and contact information of the proposed Biological Monitors to the CPM for approval. The resume shall demonstrate, to the satisfaction of the CPM, the appropriate education and experience to accomplish the assigned biological resource tasks. The Biological Monitor(s) training by the Designated Biologist shall include familiarity with the conditions of certification, BRMIMP, WEAP, and sensitive biological resources present at or near the project site.

Verification: The project owner shall submit the specified information to the CPM for approval at least 30 days prior to the start of any project-related site disturbance activities. The Designated Biologist shall submit a written statement to CPM confirming that individual Biological Monitor(s) have been trained including the date when training was completed. If additional biological monitors are needed during construction, the specified information shall be submitted to the CPM for approval at least ten days prior to their first day of monitoring activities.

DESIGNATED BIOLOGIST AND BIOLOGICAL MONITOR AUTHORITY

BIO-4 The project owner's construction/operation manager shall act on the advice of the Designated Biologist and Biological Monitor(s) to ensure conformance with the biological resources conditions of certification.

If required by the Designated Biologist and Biological Monitor(s) the project owner's construction/operation manager shall halt all site mobilization, ground disturbance, demolition, grading, construction, and operation activities in areas specified by the Designated Biologist. The Designated Biologist or the Biological Monitor shall:

1. Require a halt to all activities in any area when determined that there would be an unauthorized adverse impact to biological resources if the activities continued;

2. Inform the project owner and the construction/operation manager when to resume activities; and

3. Notify the CPM if there is a halt of any activities and advise the CPM of any corrective actions that have been taken or would be instituted as a result of the work stoppage.

If the Designated Biologist is unavailable for direct consultation, the Biological Monitor shall act on behalf of the Designated Biologist.

Verification: The project owner shall ensure that the Designated Biologist or Biological Monitor notifies the CPM immediately (and no later than the morning following the incident, or Monday morning in the case of a weekend) of any non-compliance or a halt of any site mobilization, ground disturbance, grading, construction, and operation activities. The project owner shall notify the CPM of the circumstances and actions being taken to resolve the problem.

Whenever corrective action is taken by the project owner, a determination of success or failure would be made by the CPM within five working days after receipt of notice that corrective action is completed, or the project owner would be notified by the CPM that coordination with other agencies would require additional time before a determination can be made.

WORKER ENVIRONMENTAL AWARENESS PROGRAM (WEAP)

BIO-5 The project owner shall develop and implement an RBEP-specific Worker Environmental Awareness Program (WEAP) and shall secure approval for the WEAP from the CPM. The WEAP shall be administered to all onsite personnel including surveyors, construction engineers, employees, contractors, contractor's employees, supervisors, inspectors, subcontractors, and delivery personnel. The WEAP shall be implemented during site mobilization, ground disturbance, demolition, grading, construction, operation, and closure. The WEAP shall:

1. Be developed by or in consultation with the Designated Biologist and consist of an on-site or training center presentation in which supporting electronic media and written material, is made available to all participants;

2. Discuss the locations and types of sensitive biological resources on the project site and adjacent areas, explain the reasons for protecting these resources, and the function of flagging in designating sensitive resources and authorized work areas;

3. Discuss federal and state laws afforded to protect the sensitive species and explain penalties for violation of applicable laws, ordinances, regulations, and standards (e.g., federal, and state endangered species acts);

4. Include a discussion of fire prevention measures to be implemented by workers during project activities; request workers to dispose of cigarettes and cigars appropriately and not leave them on the ground or buried;

5. Present the meaning of various temporary and permanent habitat protection measures;

6. Identify whom to contact if there are further comments and questions about the material discussed in the program; and

7. Include a training acknowledgment form to be signed by each worker indicating that they received the WEAP training and shall abide by the guidelines.

The specific WEAP shall be administered by a competent individual(s) acceptable to the Designated Biologist, and documented in the monthly compliance report.

Verification: At least 45 days prior to the start of any project-related site disturbance activities, the project owner shall provide to the CPM a copy of the draft WEAP and all supporting written materials and electronic media prepared or reviewed by the Designated Biologist and a resume of the person(s) administering the program. The CPM shall approve the WEAP materials prior to their use.

The project owner shall provide in the monthly compliance report the number of persons who have completed the training in the prior month and a running total of all persons who have completed the training to date. At least ten days prior to site and related facilities mobilization, the project owner shall submit two copies of the CPM-approved final WEAP.

Training acknowledgement forms signed during construction shall be kept on file by the project owner for at least six months after the start of commercial operation.

Throughout the life of the project, the worker education program shall be repeated annually for permanent employees, and shall be routinely administered within one week of arrival to any new construction personnel, foremen, contractors, subcontractors, and other personnel potentially working within the project area. Upon completion of the orientation, employees shall sign a form stating that they attend the program and understand all protection measures. These forms shall be maintained by the project owner and shall be made available to the CPM upon request.

During project operation, signed statements for operational personnel shall be kept on file for six months following the termination of an individual's employment.

BIOLOGICAL RESOURCES MITIGATION IMPLEMENTATION AND MONITORING PLAN (BRMIMP)

BIO-6 The project owner shall develop a BRMIMP and submit two copies of the proposed BRMIMP to the CPM (for review and approval) and to CDFW and USFWS (for review and comment), if applicable, and shall implement the measures identified in the approved BRMIMP. The BRMIMP shall be prepared in consultation with the Designated Biologist and shall include the following:

1. All biological resource conditions of certification identified in the Commission Decision as necessary to avoid or mitigate impacts;

2. All biological resource mitigation, monitoring, and compliance measures required in other state agency terms and conditions, such as those provided in the National Pollution Discharge Elimination System (NPDES) Construction Activities Stormwater General Permit;

3. All sensitive biological resources to be impacted, avoided, or mitigated by project construction, operation, and closure;

4. All required mitigation measures for each sensitive biological resource;

5. A detailed description of measures that shall be taken to avoid or mitigate disturbances from construction and demolition activities;

6. All locations on a map, at an approved scale, of sensitive biological resource areas subject to disturbance and areas requiring temporary protection and avoidance during construction;

7. Aerial photographs, at an approved scale, of all areas to be disturbed during project construction activities; include one set prior to any site or related facilities mobilization disturbance and one set subsequent to completion of project construction.

8. Duration for each type of monitoring and a description of monitoring methodologies and frequency;

9. Performance standards to be used to help decide if/when proposed mitigation and conditions are or are not successful;

10. All performance standards and remedial measures to be implemented if performance standards are not met;

11. A discussion of biological resources-related facility closure measures including a description of funding mechanism(s);

12. A process for proposing plan modifications to the CPM and appropriate agencies for review and approval; and

13. A requirement to submit any sightings of any special-status species that are observed on or in proximity to the project site, or during project surveys, to the California Natural Diversity Database (CNDDB) per CDFW requirements.

Verification: The project owner shall provide the BRMIMP to the CPM, CDFW, and USFWS at least 45 days prior to start of any project-related ground disturbing activities.

If there are any permits that have not yet been received when the BRMIMP is first submitted, these permits shall be submitted to the CPM, the CDFG, and USFWS within five days of their receipt, and the BRMIMP shall be revised or supplemented to reflect the permit condition within ten days of their receipt by the project owner. Ten days prior to site (and related facilities) mobilization, the revised BRMIMP shall be resubmitted to the CPM.

The project owner shall notify the CPM no less than five working days before implementing any modifications to the approved BRMIMP to obtain CPM approval.

Any changes to the approved BRMIMP must also be approved by the CPM in consultation with CDFG, the USFWS, and appropriate agencies to ensure no conflicts exist.

Implementation of BRMIMP measures shall be reported in the monthly compliance reports by the designated biologist (i.e., survey results, construction activities that were monitored, species observed). Within 30 days after completion of project construction, the project owner shall provide to the CPM, for review and approval, a written construction closure report identifying which items of the BRMIMP have been completed; a summary of all modifications to mitigation measures made during the project's site mobilization, ground disturbance, grading, and construction phases; and which mitigation and monitoring items are still outstanding.

GENERAL IMPACT AVOIDANCE AND MINIMIZATION MEASURES

BIO-7 The project owner shall implement the following measures during site mobilization, construction, operation, and closure to manage their project site and related facilities in a manner to avoid or minimize impacts to biological resources:

1. At the end of each work day, the Designated Biologist or Biological Monitor shall ensure that all potential wildlife pitfalls (trenches, bores, and other excavations) outside the permanently fenced area have been backfilled. If backfilling is not feasible, all trenches, bores, and other excavations shall be sloped at a 3:1 ratio at the ends to provide wildlife escape ramps, or covered completely to prevent wildlife access. Should wildlife become trapped, the Designated Biologist or Biological Monitor shall remove and relocate the individual to a safe location. Any wildlife encountered during the course of construction shall be allowed to leave the construction area unharmed.

2. Soil bonding and weighting agents used on unpaved surfaces shall be non-toxic to wildlife and plants.

3. Facility lighting shall be designed, installed, and maintained to prevent side casting of light towards the project boundaries. Lighting shall be shielded, directional, and at the lowest intensity required for safety. Lighting shall be directed away from biologically sensitive areas (e.g. Hermosa Beach). FAA visibility lighting shall employ only strobed, strobe-like or blinking incandescent lights, preferably with all lights illuminating simultaneously. Minimum intensity, maximum “off-phased” duel strobes are preferred, and no steady burning lights (e.g., L-810s) shall be used.

4. Water applied to dirt roads and construction areas (trenches or spoil piles) for dust abatement shall use the minimal amount needed to meet safety and air quality standards in an effort to prevent the formation of puddles. During construction, a Designated Biologist or Biological Monitor shall patrol these areas to ensure water does not puddle and attract crows and other wildlife to the site, and shall take appropriate action to reduce water application rates where necessary.

5. Report all inadvertent deaths of special-status species to the appropriate project representative, including road kill. Species name, physical characteristics of the animal (sex, age class, length, weight), and other pertinent information shall be noted and reported in the monthly compliance reports. For special-status species, the Biological Monitor shall contact CDFW and USFWS within one working day of receipt of the carcass for guidance on disposal or storage of the carcass. Injured animals shall be reported to CDFW and/or USFWS and the CPM, and the project owner shall follow instructions that are provided by CDFW or USFWS. During construction, injured or dead animals detected by personnel in the project area shall be reported immediately to a Biological Monitor or Designated Biologist, who shall remove the carcass or injured animal promptly. During operations, the Project Environmental Compliance Monitor shall be notified.

6. All vehicles and equipment shall be maintained in proper working condition to minimize the potential for fugitive emissions of motor oil, antifreeze, hydraulic fluid, grease, or other hazardous materials. The Designated Biologist shall be informed of any hazardous spills immediately as directed in the project Hazardous Materials Plan. Hazardous spills shall be immediately cleaned up and the contaminated soil would be properly disposed of at a licensed facility. Servicing of construction equipment shall take place only at a designated area. Service/maintenance vehicles shall carry a bucket and pads to absorb leaks or spills.

7. During construction all trash and food-related waste shall be placed in self-closing containers and removed weekly or more frequently from the site. Workers shall not feed wildlife, or bring pets to the project site.

8. Except for law enforcement personnel, no workers or visitors to the site shall bring firearms or weapons.

9. Standard best management practices (BMPs) from the project Stormwater Pollution Prevention Plan shall be implemented during all phases of the project (construction, demolition, operation, and decommissioning) where stormwater run-off from the site could to enter adjacent marshes or channels. Sediment and other flow-restricting materials shall be moved to a location where they shall not be washed back into the jurisdictional waters. All disturbed soils within the project site shall be stabilized to reduce erosion potential, both during and following construction.

10. The project owner shall implement the following measures during construction and operation to prevent the spread and propagation of nonnative, invasive weeds:

    a. Limit the size of any vegetation and/or ground disturbance to the absolute minimum and limit ingress and egress to defined routes;

    b. Use only weed-free straw, hay bales, and seed for erosion control and sediment barrier installations. Invasive non-native species shall not be used in landscaping plans and erosion control. Monitor and rapidly implement control measures to ensure early detection and eradication of weed invasions.

11. During construction and operation, the project owner shall conduct pesticide management in accordance with standard BMPs. The BMPs shall include non-point source pollution control measures. The project owner shall use a licensed herbicide applicator and obtain recommendations for herbicide use from a licensed Pest Control Advisor. Herbicide applications must follow EPA label instructions. Minimize use of rodenticides and herbicides in the project area and prohibit the use of chemicals and pesticides known to cause harm to non-target plants and wildlife. The project owner shall only use pesticides for which a "no effect" determination has been issued by the EPA's Endangered Species Protection Program for any species likely to occur within the project area or adjacent wetlands. If rodent control must be conducted, zinc phosphide or an equivalent product shall be used.

Verification: All mitigation measures and their implementation methods shall be included in the BRMIMP and implemented. Implementation of the measures would be reported in the monthly compliance reports by the Designated Biologist. Within 30 days after completion of project construction, the project owner shall provide to the CPM, for review and approval, a written construction termination report identifying how measures have been completed.

PRE-CONSTRUCTION NEST SURVEYS AND IMPACT AVOIDANCE AND MINIMIZATION MEASURES FOR BREEDING BIRDS

BIO-8 Pre-construction nest surveys shall be conducted if site mobilization, grading, demolition, and construction activities would occur from February 1 through August 31. The Designated Biologist or Biological Monitor shall perform surveys in accordance with the following guidelines:

1. Surveys shall cover all potential nesting habitat within the project site and areas surrounding the project site that are next to construction and demolition activities.

2. At least two pre-construction surveys shall be conducted, separated by a minimum ten-day interval. Pre-construction surveys shall be conducted no more than 14 days prior to initiation of construction activity. One survey needs to be conducted within the three-day period preceding initiation of construction activity. Additional follow-up surveys may be required if periods of construction inactivity exceed two weeks in any given area, an interval during which birds may establish a nesting territory and initiate egg laying and incubation.

3. If active nests are detected during the survey, a no-disturbance buffer zone (protected area surrounding the nest) shall be established around each nest. The size of each buffer zone shall be determined by the Designated Biologist in consultation with the CPM (in coordination with CDFW and USFWS). Nest locations shall be mapped using GPS technology and included in the monthly compliance reports.

4. The Designated Biologists or Biological Monitor shall monitor all nests with buffers at least once per week, to determine whether birds are being disturbed. If signs of disturbance or distress are observed, the Designated Biologist or Biological Monitor shall immediately implement adaptive measures to reduce disturbance. These measures could include, but are not limited to, increasing buffer size, halting disruptive construction activities in the vicinity of the nest until fledging is confirmed, or placement of visual screens or sound dampening structures between the nest and construction activity.

5. The Designated Biologist shall monitor the nest until he or she determines that nestlings have fledged and dispersed or the nest is no longer active. Activities that might, in the opinion of the Designated Biologist, disturb nesting activities (e.g., excessive noise above ambient levels or 60 dBA in areas where pre-construction noise levels were below 60 dBA shall be prohibited within the buffer zone, as determined by the Designated Biologist in consultation with the CPM, until additional noise minimization measures are implemented.

Verification: Prior to the start of any site mobilization or construction, the project owner shall provide the CPM a letter-report describing the findings of the preconstruction nest surveys, including the time, date, and duration of the survey; identity and qualifications of the surveyor(s); and a list of species observed. If active nests are detected during the survey, the report shall include a map or aerial photo identifying the location of the nest and shall depict the boundaries of the no disturbance buffer zone around the nest, and a monitoring plan shall be submitted to the CPM for review and approval. Additional copies shall be provided to the CDFW and USFWS for review and comment. Approval of the plan is required before construction may commence. All impact avoidance and minimization measures related to nesting birds shall be included in the BRMIMP and implemented. Implementation of the measures shall be reported in the monthly compliance reports by the Designated Biologist.

RESTORATION PROGRAM FUNDING

BIO-9 Prior to the start of project operation the project owner shall provide funding to support an existing or soon to be established salt marsh or estuary habitat restoration project to fully mitigate for impacts to Coastal Commission wetlands. Permanent impacts shall be mitigated at a 3:1 ratio. Mitigation shall occur as close to the site of impact as possible. Mitigation shall be in kind and consist of at least 17.79 acres of salt marsh or estuary habitat restoration.

Mitigation shall occur at an established wetland restoration program such as Huntington Beach Wetlands Restoration Project (includes Magnolia Marsh, Talbert Marsh, and Brookhurst Marsh), Bolsa Chica, Long Beach, and/or the soon to be established Los Cerritos Wetlands or any other wetland restoration program approved by the CPM in consultation with the Coastal Commission.

Verification: At least 90 days prior to the start of project operations, the project owner shall submit the restoration program(s) the project owner wishes to participate in for approval by the CPM (in consultation with the Coastal Commission). At least 60 days prior to the start of project operation the project owner shall submit a Restoration Management Plan or similar plan (used by the land manager) that discusses the details of the wetland restoration program to the CPM. No less than 30 days prior to the start of project operation, the project owner shall provide a written verification to the CPM that the endowment has been paid in full to the land manager approved by the CPM (in coordination with the Coastal Commission in accordance with this condition of certification. The project owner shall provide evidence that it has specified that its annual payment from the endowment to the third party(ies) approved by the CPM can be used only to assist in coastal wetland restoration to mitigate the project's effects for the loss of Coastal Commission wetlands. Thereafter, within 30 days after each anniversary date of the commencement of project operation, the project owner shall obtain an annual report from the land manager administering the restoration program(s), as approved by the CPM. The annual reports will document how each annual payment from the endowment required hereunder was used and applied to assist in wetland habitat restoration/enhancement at approved locations. The project owner shall provide copies of such reports to the CPM within 30 days of receipt. This verification shall be provided annually for the operating life of the project.

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BIOLOGICAL RESOURCES-APPENDIX-1
NITROGEN DEPOSITION ANALYSIS

Brewster Birdsall, P.E., Wenjun Qian, Ph.D., P.E., and Joseph Hughes

INTRODUCTION

The following provides a technical description of the preliminary nitrogen deposition analysis for operation of the proposed Redondo Beach Energy Project (RBEP).

PROJECT DESCRIPTION

The proposed RBEP would be a natural gas-fired, combined-cycle, air-cooled, electrical generating facility with a net generating capacity of 496 megawatts (MW). The RBEP would replace the existing Units 1 through 8 and auxiliary boiler number 17 at the existing Redondo Beach Generating Station, which would be demolished. The proposed RBEP would consist of a three-on-one combined-cycle power block, with three combustion turbine generators (CTG) and one single-cylinder condensing steam turbine generator (STG). Each CTG would have a heat recovery steam generator (HRSG) with a natural gas-fired duct burner for supplemental firing along with an emission reduction system consisting of a selective catalytic reduction (SCR) unit and an oxidation catalyst.

NITROGEN DEPOSITION

Nitrogen deposition is the term used to describe the input of reactive nitrogen species from the atmosphere to the biosphere. The pollutants that contribute to nitrogen deposition derive mainly from oxides of nitrogen (NOx) and ammonia (NH_3) emissions. NOx emissions (a term used for nitric oxide [NO] and nitrogen dioxide [NO_2]), which are the result of combustion processes, are much more widely distributed than NH_3. Reduced forms of nitrogen including NH_3 are emitted from agriculture and intensive animal operations (e.g., dairies), from pollution control systems at stationary sources like power plants, and from vehicles with the introduction of catalytic converters. The proposed CTGs and duct burners would be new stationary sources of NOx, and the proposed SCR units would emit NH_3 in the form of ammonia slip.

In the atmosphere NOx is chemically transformed to a range of secondary pollutants, including nitric acid (HNO_3), nitrates (NO_3), and organic compounds, such as peroxyacetyle nitrate (PAN), which is an unstable secondary pollutant present in smog. Atmospheric NH_3 is readily absorbed by surfaces such as water and soil, and it can be rapidly transformed to ammonium (NH_4^+) by reaction with acidic compounds, which leads to particulate matter in the form of ammonium nitrate (NH_4NO_3). Both the primary and secondary nitrogen-based pollutants may be removed by wet deposition (scavenging of gases and aerosols by precipitation) and by dry deposition (direct turbulent deposition of gases and aerosols) on the earth's surface.

NITROGEN DEPOSITION MODELS

Staff used the American Meteorological Society/Environmental Protection Agency Regulatory Model known as AERMOD (version 12345) to evaluate the potential nitrogen deposition impacts of this power plant project. AERMOD is a steady-state Gaussian plume model that incorporates air dispersion based on planetary boundary layer turbulence structure and scaling concepts, including treatment of both surface and elevated sources, and is applicable for use in both simple and complex terrain.

AERMOD includes logic for calculating the total (wet and dry) deposition rates for the modeled pollutant, in this case nitrogen. The model calculates the deposition rate at each receptor and each hour under consideration, while taking into account the wet and dry depletion (removal) of the pollutant. The annual rate is based on five years of results from hourly meteorological data (wind speed, wind direction, temperature, humidity, precipitation rate, and other parameters). Although the depletion of the pollutant is considered, AERMOD does not account for the chemical transformation of the nitrogen species through oxidation or other reactions which are time, moisture, and sunlight dependent. Therefore, it is a conservative model that overestimates deposition impacts. But, it is also approved for regulatory purposes for near-field impacts analyses (used by the Energy Commission and the air district), is most familiar to users and regulatory agencies, and is generally used to estimate nitrogen deposition. Staff also used several assumptions with regard to nitrogen formation and deposition, which tend to further overestimate impacts. These assumptions include:

- 100 percent conversion of oxides of nitrogen (NOx) and ammonia (NH_3) into atmospherically derived nitrogen (ADN) within the exhaust stacks rather than allowing the conversion of NOx and NH_3 to occur over distance and time within the plume and atmosphere, which would be beyond the scope of AERMOD;
- Depositional rates and parameters based upon nitric acid (HNO_3), which, of all the depositional species, has the most affinity for soils and vegetation and the tendency to adhere to what it is deposited on;
- Maximum settling velocities derived from the parameters for gaseous HNO_3 to produce maximum, or conservatively estimated, deposition rates;
- Emissions rates of NOx based upon the proposed facility’s maximum annual potential to emit, rather than averaged likely emissions based on previous equipment performance and actual operations; and
- Ammonia emissions based on the proposed RBEP achieving an annual average exhaust concentration of 2.5 ppm, while the permitted level would be 5 ppm over one hour. This assumption recognizes that ammonia emissions normally occur at concentrations of less than 1 ppm over the life of the catalyst. Plant operators have economic incentives to avoid wasting ammonia and to minimize excess ammonia in the exhaust. Excess ammonia can lead to premature fouling of the catalyst. As a result, plant operators normally carefully calibrate ammonia injection to avoid exceedances of NOx permit limits and to keep valuable catalysts clean and active, which limits the amount of unreacted ammonia in the exhaust.

Appendix Bio-1 Table Ndep-1 shows the emission rates of NOx and NH_3 from the proposed RBEP as modeled for nitrogen deposition impacts.

Appendix Bio-1 Table Ndep-1
RBEP, Modeled Nitrogen Species Emissions (tons per year [tpy])

Source	NOx	NH_3	Depositional Nitrogen from NOx	Depositional Nitrogen from NH_3	Depositional Nitrogen
Facility Total (3 x CTGs, Duct Burners, SCR)	121.5	48.0	37.0	39.5	76.5

Note: Nitrogen (molecular weight 14) based on ratio of molecular weight of NOx as NO_2 (46) and molecular weight of NH_3 (17).
Source: (RBEP 2012a, Response to Data Request 21, 12/6/2013).

Assuming 100 percent of the NOx and NH_3 conversion to ADN within the exhaust stacks ignores the fact that it requires sunlight, moisture, and time for the nitrogen compounds to convert to ADN. Since staff analyzes habitat areas within a six mile radius of the project, the airborne pollutants would not have sufficient time to fully convert to ADN. Therefore, this approach overestimates the amount of the project's nitrogen emissions that would actually deposit on these areas. The project's NOx and NH_3 emissions would contribute to regional nitrogen deposition, but this would occur at levels less than those predicted by AERMOD because distance and time are necessary for nitrogen formation and deposition.

For wind speeds of five miles per hour (2.2 meters per second), the project's pollutants would take under two hours to reach the furthest habitat of interest. However, in urban atmospheres, the oxidation rate of NOx to HNO_3 is approximately 20 percent per hour, with a range of 10 to 30 percent per hour (ARB 1986). Nighttime NOx oxidation rates are generally much lower than typical daytime rates. HNO_3 is readily taken up by soil, vegetation, and water surfaces. HNO_3 also reacts with gaseous NH_3 to form ammonium nitrate (NH_4NO_3), but the reaction is reversible and dependent on temperature, relative humidity, and concentrations of other pollutants. The ambient concentration of nitrate is limited by the availability of NH_3 which is preferentially scavenged by sulfate (Scire et al 2000).

On the other hand, because NH_3 is readily taken up by damp soils and vegetation and by water bodies, a notable portion of the emitted NH_3 can be deposited to vegetation depending on the type of land cover and on meteorological conditions (Hatfield and Follett 2008). NH_3 is also readily taken up by aerosol particles of sulfuric acid (H_2SO_4) to form ammonium sulfate ($(NH_4)_2SO_4$ [Metcalfe et al 1999]). Since most $(NH_4)_2SO_4$ particles deposit to ground by rain, and the average rainfall for Redondo Beach is about 12 inches per year, only a very small fraction of the $(NH_4)_2SO_4$ particles would actually deposit on the habitat areas within the six mile radius of the project, with the majority falling between December and March. Instead, the $(NH_4)_2SO_4$ particles would be more likely to travel beyond the six-mile study area before they deposit on the earth's surface.

The Energy Commission's 2007 report *Assessment of Nitrogen Deposition: Modeling and Habitat Assessment* (Tonnesen et al 2007) reviewed two other air dispersion models, which can represent chemical speciation and formation of aerosols: CALPUFF and the Community Multiscale Air Quality (CMAQ) model for nitrogen deposition modeling. The CMAQ version used in the report sometimes produced relatively large numerical errors, thus the 2007 report concluded that CMAQ cannot be used reliably for single point source sensitivity simulations.

CALPUFF is a non-steady-state Lagrangian Gaussian puff dispersion model that simulates the effects of time- and space-varying meteorological conditions on pollution transport, transformation, and removal by modeling parcels of air as they move along their trajectories. Different from AERMOD, CALPUFF uses simplified chemistry to attempt to represent nitrogen partitioning with relatively low computational cost compared to CMAQ. The Energy Commission's 2007 report concluded that the CALPUFF model can be used to simulate nitrogen deposition, and its results were generally similar in magnitude to the CMAQ-simulated nitrogen deposition. However, CALPUFF is more appropriate for long-range transport (i.e., greater than 50 kilometers – at less than 50 km, and for complex terrain, it requires regulatory approval for its use by the relevant reviewing agency). In addition, CALPUFF allows users to define certain parameters in its meteorological processor, which makes it difficult to be standardized for regulatory review purposes at the current stage.

Both AERMOD and CALPUFF have strengths and weaknesses in modeling nitrogen deposition as mentioned above. Based on staff's modeling experience, the relatively standardized application of AERMOD, with the simplifying assumptions mentioned above, will produce conservative results for nitrogen deposition impacts.

NITROGEN DEPOSITION IMPACTS

The applicant modeled the total nitrogen deposition impacts from the proposed sources (CTGs) with duct burners (RBEP 2013r). To confirm the results, Air Quality staff did its own analysis using AERMOD to evaluate and compare the nitrogen deposition impacts from the proposed RBEP. Staff's analysis differs by considering a full receptor grid, while the applicant modeled deposition impacts only at certain locations of sensitive habitat. Where the two analyses overlap, staff found the same resulting nitrogen deposition impacts from the proposed RBEP as found by the applicant.

Staff emphasizes that its modeling provides an overestimation of nitrogen deposition of the project. However, the model itself and the approach are the best tools we currently have to provide a consistent, albeit extremely conservative result.

The **BIOLOGICAL RESOURCES** section of this document uses a qualitative approach to analyzing nitrogen deposition impacts to determine the significance of the impact to biological resources. The baseline nitrogen deposition rates are based on emission inventory for calendar year 2002 (see more details below). Staff believes that additional conservatisms are introduced by using the 2002 baseline nitrogen deposition rates as discussed below.

CALIFORNIA AND SOUTH COAST AIR BASIN BASELINE NITROGEN DEPOSITION

The baseline nitrogen deposition rates used in staff's analysis are from the Energy Commission's 2007 report (Tonnesen et al 2007), which provided the total nitrogen deposition on a rather coarse 4-km (2.5-mile) grid (4 km x 4 km, or 16 km^2) throughout California. The report used emission inventory data that were previously developed through the Western Regional Air Partnership (WRAP) to simulate annual air quality and visibility for calendar year 2002. The source categories included for the calendar year 2002 include: area sources, point sources, mobile sources, non-road mobile sources, road dust, off shore sources, Mexico emissions inventory, and biogenic emissions for volatile organic compounds.

However, substantial reductions in regional emissions have occurred since 2002 as a result of the U.S. EPA's and California's programs, implemented through the State Implementation Plan (SIP) and the regional air districts' Air Quality Management Plan (AQMP). More details on the AQMP appear in the **AIR QUALITY** section. **Appendix BIO-1 Figures Ndep-1a** and **Ndep-1b** show that both the actual and forecasted nitrogen emissions calculated from the NOx and NH_3 emissions (red solid lines) for all sources in South Coast Air Basin decrease from year 2000 to year 2035. The nitrogen portion of the NOx and NH_3 emissions are based on the mass fraction of nitrogen in NOx and NH_3. It should be noted that nitrogen constitutes about 82 percent of NH_3 by weight while it only constitutes about 30 percent of NOx by weight.

The emissions from stationary sources, including electric generation facilities, are also presented (green dashed lines) in the figures for comparison. NOx emissions from the stationary sources only account for 8 to 22 percent of those from all sources and also show a steady decrease over the years. The majority of the NOx emissions come from mobile sources. The NH_3 emissions from the stationary sources mainly waste disposal and fuel combustion, show an increase, to account for 22 to 47 percent of the total emissions from all sources. The majority of the NH_3 emissions come from non-stationary sources, meaning the combination of area wide sources such as livestock operations, fertilizer applications, and mobile sources.

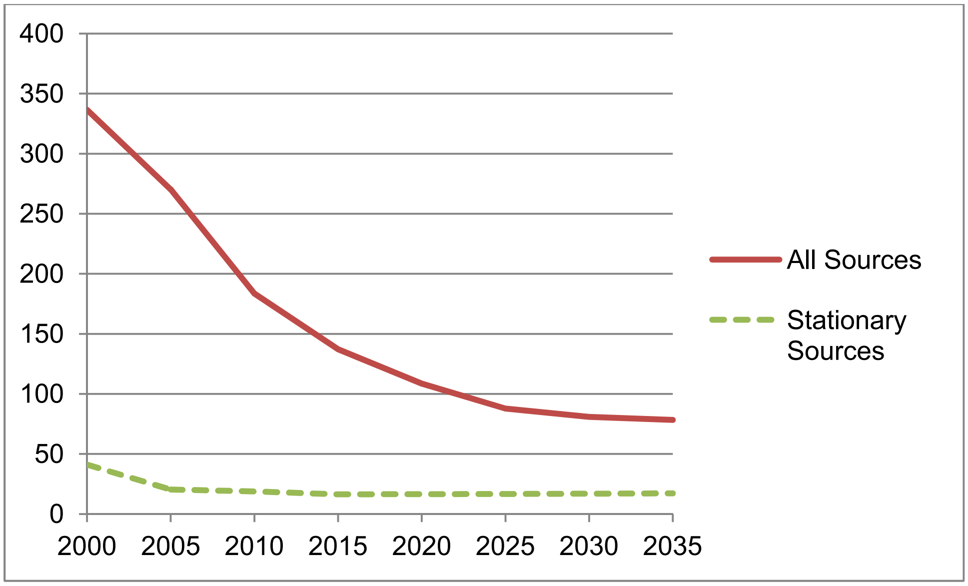
Appendix BIO-1 Figure Ndep-2 shows measured annual averaged nitrates (NO_3) and sulfates (SO_4) concentrations of dry particles at the San Gabriel monitoring station (located in South Coast Air Basin) from the Interagency Monitoring of Protected Visual Environments (IMPROVE) network. This is representative of depositional particles in the ambient air at the station. The nitrates concentrations have decreased more than 50 percent from 2002 to 2012. The general trend of the sulfate concentrations is also decreasing. The sulfates concentrations have decreased about 30 percent from 2002 to 2012. This indicates that the reductions in regional emissions shown in **Appendix BIO-1 Figures Ndep-1a** and **Ndep-1b** are effective in reducing the background nitrates and sulfates in the South Coast Air Basin.

Considering the decreasing nitrogen emission inventory trend (an overall reduction of over 50 percent from 2002 to 2014, shown in **Appendix BIO-1 Figures Ndep-1a** and **1b** from the two trends for all sources combined), the relatively small contribution from the stationary sources, and the decreasing nitrates and sulfates concentration measurements, the use of 2002 emissions inventory in the baseline nitrogen deposition rates (as discussed in **BIOLOGICAL RESOURCES**) probably overestimates baseline deposition by a factor of two.

Staff assumes that total nitrogen loading is directly proportional to NOx and ammonia inventories. Since deposition pathways are complex and dependent on components such as time, humidity, sunlight exposure, and uniform mixing of needed reactants, deposition rates at any location may be reduced due to the constrained availability of reactants by more than the percentage change to nitrogen inventories.

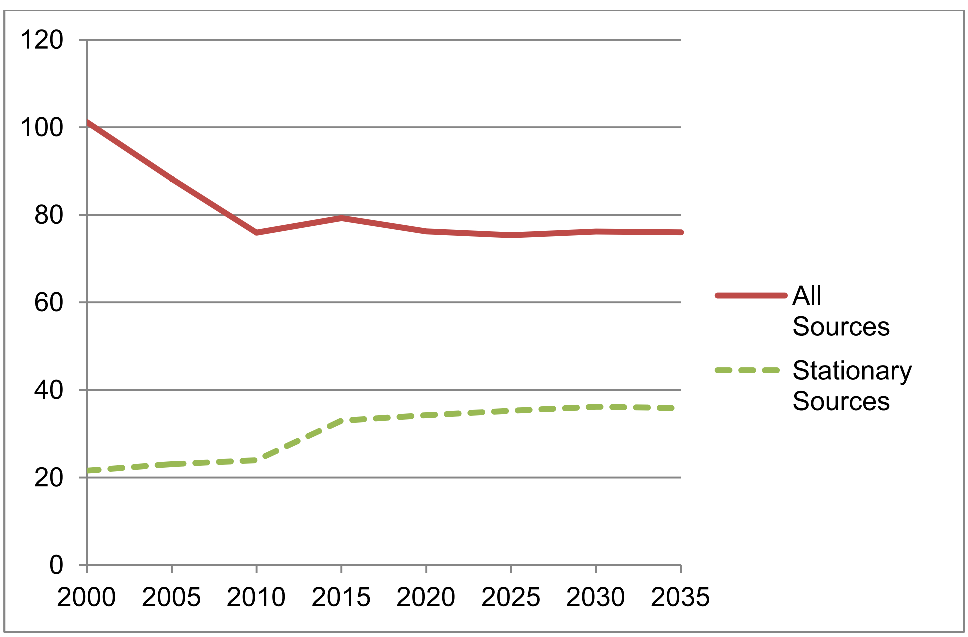
In addition, the South Coast Air Quality Management District (SCAQMD) implemented the Regional Clean Air Incentives Market or RECLAIM on January 1, 1994. Facilities subject to this program, including the existing RBGS and proposed RBEP, are required to hold RECLAIM Trading Credits (RTCs) to offset total facility NOx emissions at a 1-to-1 offset ratio. The regional supply of RTCs is limited by the SCAQMD to that the region achieves no net increase in emissions from new or modified stationary sources. As a result, any new stationary source like the proposed RBEP would not result in a net increase in NOx emissions basin wide (see details in the **AIR QUALITY** section regarding RECLAIM participation and compliance). In addition, trading zones restrict movement of RTCs across the region. Because Redondo Beach is located in Zone 1 (South Coast Air Basin coastal zone) RTCs may only be obtained from Zone 1. The resulting new emissions (potential NOx increases) from the project and the required RTCs (NOx reductions or offsets) would be balanced to zero, or no net increase, annually within the local coastal zone. This means that the baseline loading of nitrogen from NOx would not actually change due to the proposed RBEP NOx emissions.

Appendix Bio-1 Figure Ndep-1a
Nitrogen portion[a] of the NOx Emissions Trends in South Coast Air Basin (tons/day, annual average)



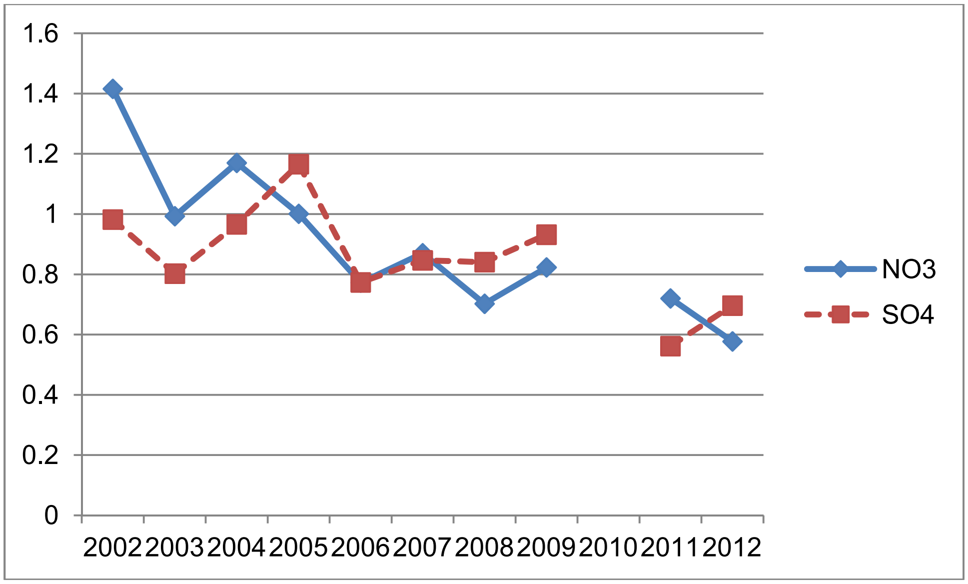
Source: The California Almanac of Emissions and Air Quality - 2013 Edition, Air Resources Board and Energy Commission staff analysis
Note: [a] The nitrogen portion of the NOx emissions is calculated based on the ratio between the molecular weight of nitrogen (14) and the molecular weight of NO_2 (46).

Appendix Bio-1 Figure Ndep-1b
Nitrogen portion[a] of the NH_3 Emission Trends in South Coast Air Basin (tons/day, annual average)



Source: The California Almanac of Emissions and Air Quality - 2013 Edition, Air Resources Board and Energy Commission staff analysis
Note: [a] The nitrogen portion of the NH_3 emissions is calculated based on the ratio between the molecular weight of nitrogen (14) and the molecular weight of NH_3 (17).

Appendix Bio-1 Figure Ndep-2
Nitrates (NO_3) and Sulfates (SO_4) Concentrations (µg/m^3)
Measured at San Gabriel Monitoring Station



Source: Interagency Monitoring of Protected Visual Environments (IMPROVE) and Energy Commission staff analysis

CONCLUSIONS

Staff calculates a conservative nitrogen deposition rate from the project that is likely to over-predict the project impact. Additionally, staff believes the modeling tools and background data identify a much higher rate of nitrogen deposition than is reasonably expected to occur. For more information on this, including the significance of modeled results, refer to the **BIOLOGICAL RESOURCES** section of this document.

Because AERMOD does not account for the chemical transformation of the nitrogen species, which is time and reaction dependent, the nitrogen deposition impacts of the project are likely to be overestimated by assuming complete conversion of all NOx and NH_3 emissions to depositional nitrogen. Further, the nitrogen emission inventory in the South Coast Air Basin has decreased more than 50 percent from 2002 to 2014 for oxides of nitrogen and ammonia combined. The use of the 2002 emissions inventory in the baseline nitrogen deposition rates probably overestimates baseline nitrogen deposition by a factor of two. In addition, because the project owner would be required to hold RTCs to comply with the regional NOx limits, the project would not result in any net increase in NOx emissions in South Coast Air Basin.

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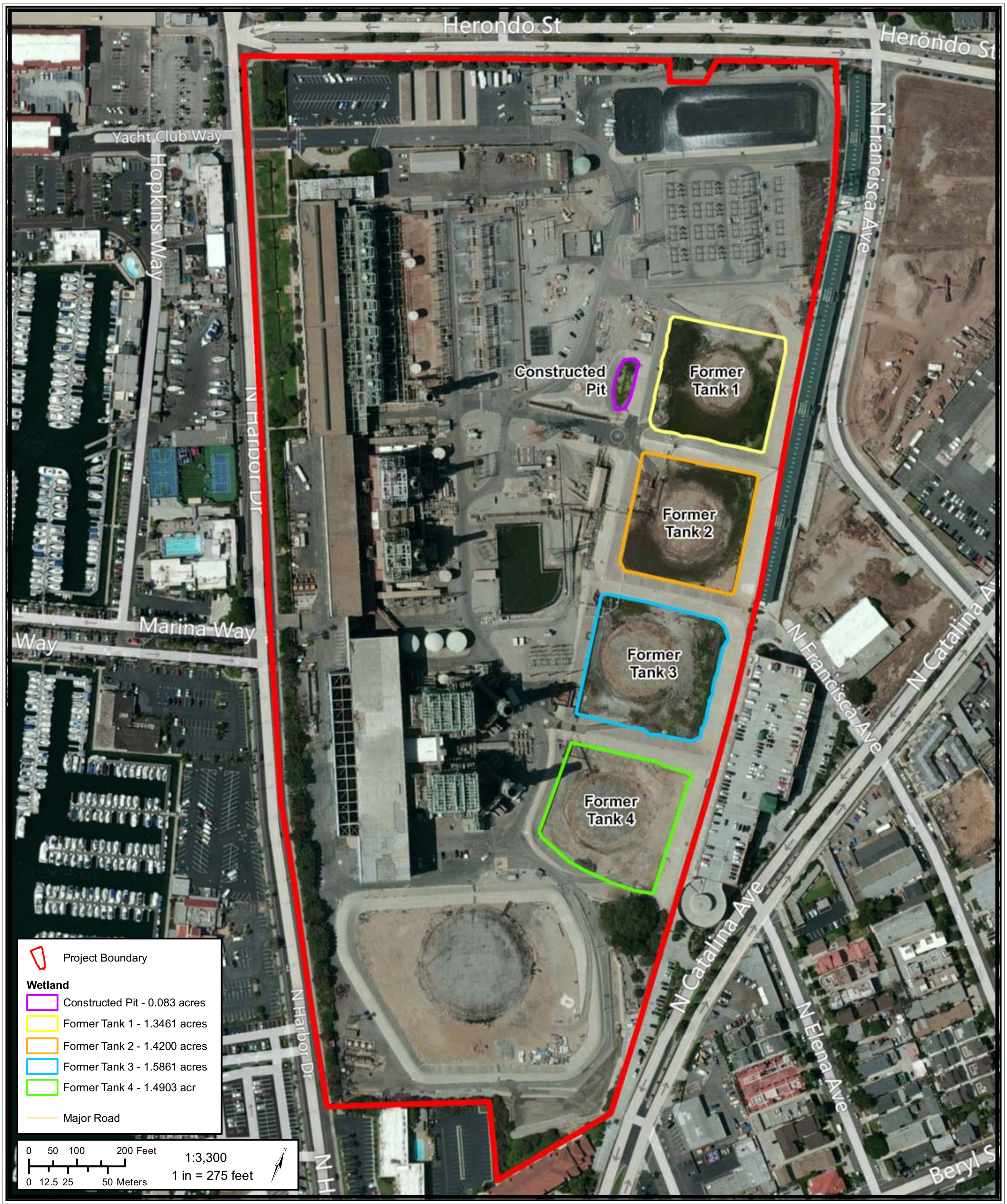
BIOLOGICIAL RESOURCES- FIGURE 1

Redondo Beach Energy Project - Coastal Commission Wetlands



BIOLOGICAL RESOURCES

CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: CH2MHill - October 2012, CEC Staff - Febuary 2014, OpenStreetMap - January 2014 and Bing Aerial.

BIOLOGICIAL RESOURCES- FIGURE 2

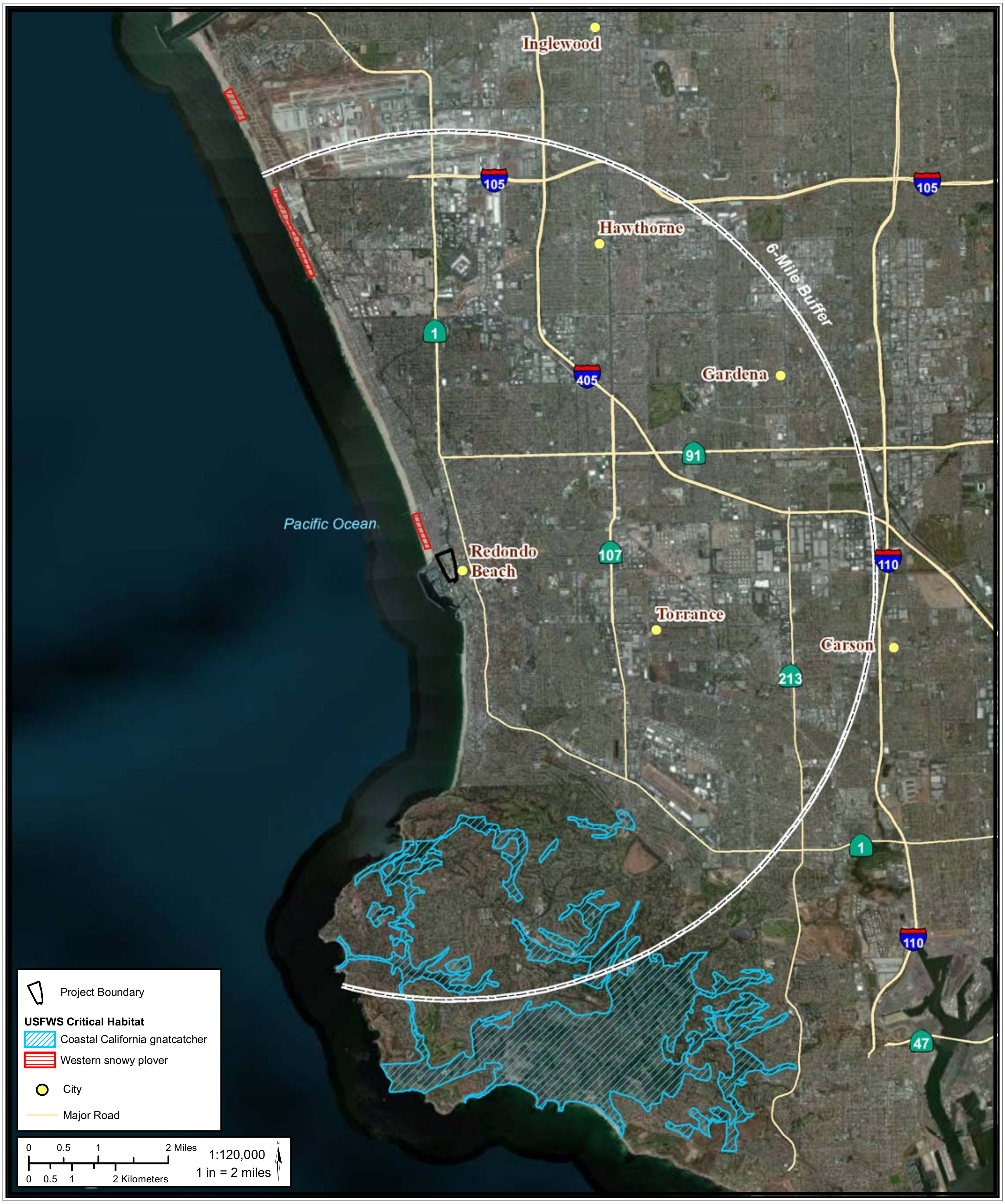
Redondo Beach Energy Project - Ecological Preserves, Wetland Preservation Sites, Designated Open Space

CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: CH2MHill - October 2012, U.S. Fish and Wildlife (USFWS) Critical Habitat - November 2013, OpenStreetMap - January 2014 and Bing Aerial.

BIOLOGICIAL RESOURCES- FIGURE 3

Redondo Beach Energy Project - USFWS Designated Critical Habitat

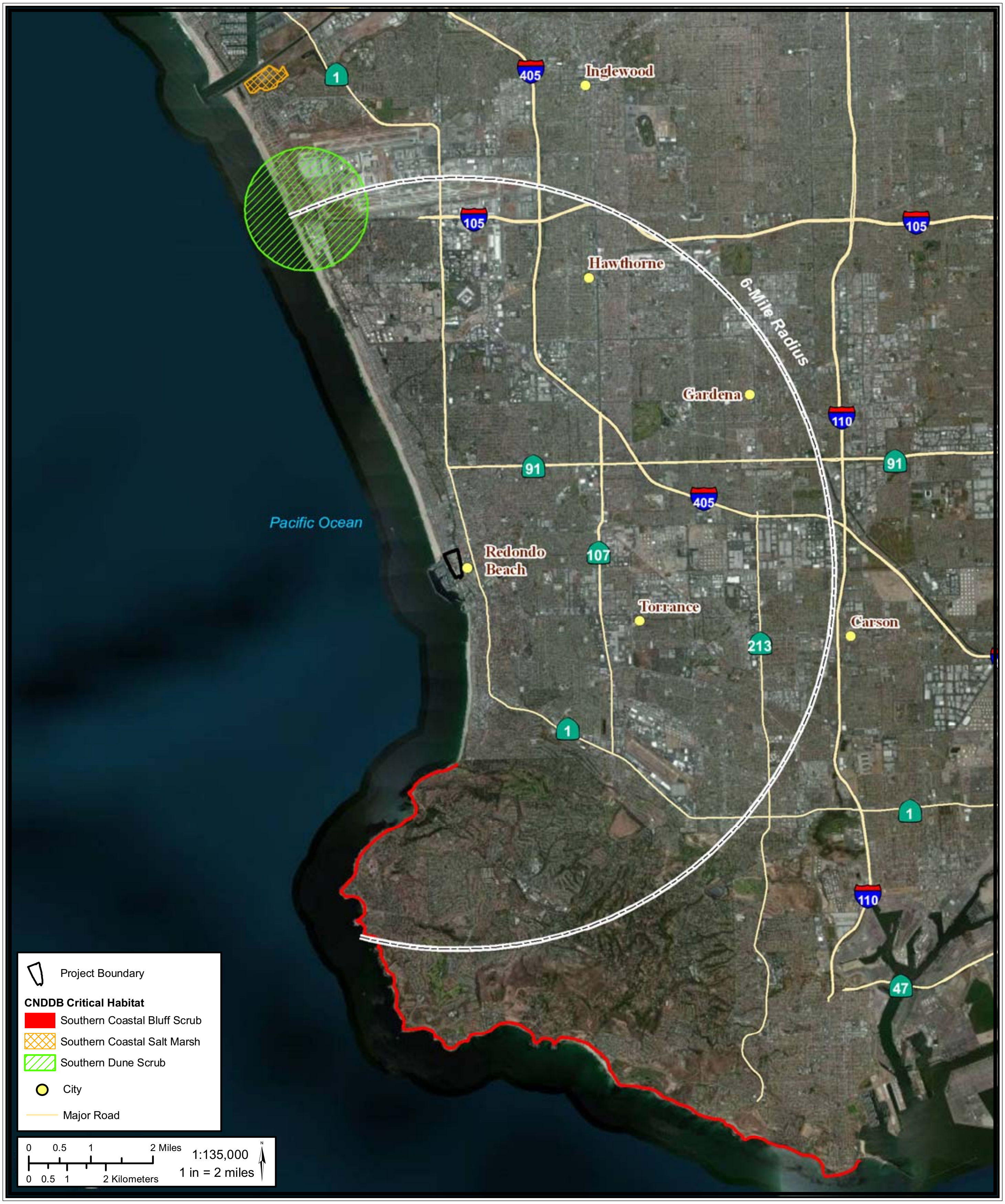


CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: CH2MHill - October 2012, U.S. Fish and Wildlife (USFWS) Critical Habitat - November 2013, OpenStreetMap - January 2014 and Bing Aerial.

BIOLOGICIAL RESOURCES- FIGURE 4

Redondo Beach Energy Project - CNDDB Sensitive Habitats



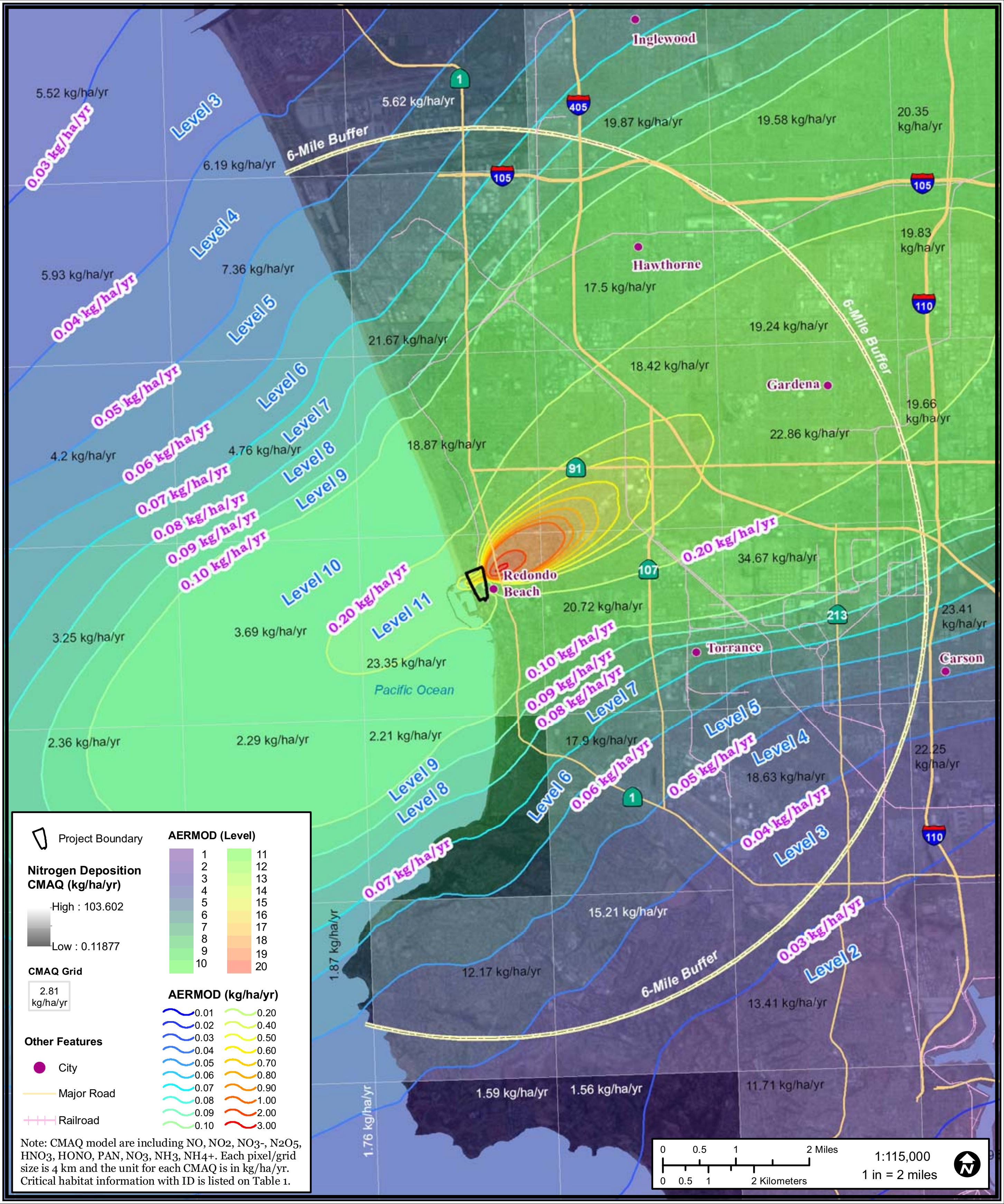
BIOLOGICAL RESOURCES

CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: CH2MHill - October 2012, California Department of Fish & Wildlife - California Natural Diversity Database (CNDDB) - April 2014, OpenStreetMap - January 2014 and Bing Aerial.

BIOLOGICIAL RESOURCES- FIGURE 5

Redondo Beach Energy Project - Nitrogen Deposition Plume



CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: ASPEN Febuary 2014, CEC Air Quality, University of California Riverside - March 2007, Bing Aerial, OpenStreetMap January 2014.

CULTURAL RESOURCES

Gabriel Roark, Thomas Gates, and Melissa Mourkas[1]

SUMMARY OF CONCLUSIONS

Staff concludes that the proposed Redondo Beach Energy Project could result in significant, direct impacts on a historical resource, the Redondo Beach Generating Station, as well as buried archaeological resources, which may qualify as historical or unique archaeological resources under the California Environmental Quality Act. The adoption and implementation of Conditions of Certification **CUL-1** through **CUL-10** would ensure that the applicant would be able to compensate for the historical and architectural merits of the historic Redondo Beach Generating Station and respond quickly and effectively to any archaeological discoveries made beneath the project site during construction-related ground disturbance.

As a result of ethnographic research, staff concludes that there are no ethnographic resources that will be impacted by the proposed project. The ethnographic background information provided in this assessment provides a context for one ethnographic resource that was found by staff to lack integrity, and also provides context for the other cultural resources disciplines and related resources that inform this cultural resources section.

As a result of the built-environment research, staff concludes that there are two potential built-environment historical resources in the Project Area of Analysis (PAA). The potential historical resources that would be directly impacted by the proposed project are the Redondo Beach Generating Station (RBGS) and the SEA Lab building across the street, once the water pumping station for RBGS. Staff concludes that the RBGS and the related SEA Lab are eligible for listing on the California Register for Historic Resources under Criteria 1 and 3, and retain sufficient levels of historical integrity with respect to location, design, setting, materials, workmanship, feeling and association to convey the resources' significance. The RBGS is located on the project site and is proposed to be demolished upon completion of construction of the proposed project. SEA Lab's integrity may be impacted by the removal of the RBGS, with which it is historically associated. Implementation of **CUL-9** and **CUL-10** would reduce the impacts to these resources to less than significant.

Staff has considered environmental justice populations (defined in the **SOCIOECONOMICS** section) in its analysis of the proposed project. Staff has not identified significant adverse direct, indirect, or cumulative cultural resources impacts that would affect environmental justice populations.

[1] Roark, archaeological resources; Gates, ethnographic resources; Mourkas, historic built environment resources.

INTRODUCTION

This cultural resources assessment identifies the potential impacts of the proposed Redondo Beach Energy Project (RBEP) on cultural resources. Cultural resources are defined under state law as buildings, sites, structures, objects, areas, places, records, manuscripts, and historic districts (Cal. Code Regs., tit.14, §§4852a, 5064.5(a)(3); Pub. Resources Code, §§5020.1(h, j), 5024.1[e][2, 4]). Three broad classes of cultural resources are considered in this assessment: prehistoric, ethnographic, and historic.

Prehistoric archaeological resources are those materials relating to prehistoric human occupation and use of an area. These resources may include sites and deposits, structures, artifacts, rock art, trails, and other traces of Native American human behavior. In California, the prehistoric period began over 12,000 years ago and extended through the eighteenth century until 1769, when the first Europeans settled in California.

Ethnographic resources are those materials important to the heritage of a particular ethnic or cultural group, such as Native Americans or African, European, or Asian immigrants. They may include traditional resource collecting areas, ceremonial sites, topographic features, value-imbued landscapes, cemeteries, shrines, or ethnic neighborhoods and structures. Ethnographic resources are variations of natural resources and standard cultural resource types. They are subsistence and ceremonial locales and sites, structures, objects, and rural and urban landscapes assigned cultural significance by traditional users. The decision to call resources "ethnographic" depends on whether associated peoples perceive them as traditionally meaningful to their identity as a group and the survival of their lifeways.[2]

Historic-period resources are those materials, archaeological and architectural, usually associated with Euro-American exploration and settlement of an area and the beginning of a written historical record. They may include archaeological deposits, sites, structures, traveled ways, artifacts, or other evidence of human activity. Under federal and state requirements, historical cultural resources must be greater than 50 years old to be considered of potential historic importance. A resource less than 50 years of age may be historically important if the resource is of exceptional importance.

For the proposed RBEP, staff provides an overview of the environmental setting and history of the project area, an inventory of the cultural resources identified in the project vicinity, and an analysis of the potential impacts from the proposed project using criteria from the California Environmental Quality Act (CEQA). The primary concern is to ensure that all potential impacts are identified and that conditions are set forth that ensure that impacts are mitigated below the level of significance.

If cultural resources are identified, staff determines whether there may be a project-related impact to them. If the cultural resources cannot be avoided, staff determines whether any of the impacted resources are eligible for the California Register of Historical Resources (CRHR). If impacted resources are eligible for the CRHR, staff recommends mitigation measures that ensure that impacts to the identified cultural resources are reduced to a less-than-significant level.

[2] A “lifeway,” as used herein, refers to any unique body of behavioral norms, customs, and traditions that structure the way a particular people carry out their daily lives.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

Projects proposed before the Energy Commission are reviewed to ensure that the proposed facilities would comply with all applicable laws (Pub. Resources Code, §25525; Cal. Code Regs., tit. 20, §§1702[n], 1744[b]). Although the Energy Commission has preemptive authority over local and state laws, it typically ensures compliance with local laws, ordinances, regulations, standards, plans, and policies (LORS).

See **Cultural Resources Table 1** for a summary of LORS applicable to the proposed project. Staff reviewed the City of Redondo Beach Harbor/Civic Center Specific Plan, Recreation and Parks Element, and Historic Preservation Plan and found no requirements that apply to the proposed facility (Redondo 2008; TLPG 2004). Therefore there are no local LORS that apply to the proposed project.

Cultural Resources Table 1
Laws, Ordinances, Regulations, and Standards

Applicable LORS	Description
State	
Pub. Resources Code, §§5097.98(b) and (e)	Requires a landowner on whose property Native American human remains are found to limit further development activity in the vicinity until s/he confers with the Native American Heritage Commission (NAHC)-identified Most Likely Descendents (MLDs) to consider treatment options. In the absence of MLDs or of a treatment acceptable to all parties, the landowner is required to reinter the remains elsewhere on the property in a location not subject to further disturbance.
Pub. Resources Code, §5097.99	§5097.99 prohibits the acquisition, possession, sale, or dissection with malice or wantonness of Native American remains or artifacts taken from a Native American grave or cairn.
Health and Safety Code, §7050.5	This code prohibits the disturbance or removal of human remains found outside a cemetery. It also requires a project owner to halt construction if human remains are discovered and to contact the county coroner.
Civil Code, §1798.24	Provides for non-disclosure of confidential information that may otherwise lead to harm of the human subject divulging confidential information
Government Code, §6250.10—California Public Records Act	Provides for non-disclosure of records that relate to archaeological site information and reports maintained by, or in the possession of, the Department of Parks and Recreation (DPR), the State Historical Resources Commission, the State Lands Commission, the NAHC, another state agency, or a local agency, including the records that the agency obtains through a consultation process between a California Native American tribe and a state or local agency.

SETTING

Information provided regarding the setting of the proposed project places it in its geographical and geological contexts and specifies the technical description of the project. Additionally, the archaeological, ethnographic, and historical backgrounds provide the contexts for the evaluation of the historical significance of any identified cultural resources within the project area of analysis (PAA).

REGIONAL SETTING

The proposed RBEP would be located in southwestern Los Angeles County (AES 2012a:Figure 1.1-2). As discussed in the AFC, the proposed project site is located in the Los Angeles Plain or Basin (AES 2012a:5.2-2; Schoenherr 1992:10). The Los Angeles Basin is situated at the northwestern end of the Peninsular Ranges geomorphic province. The proposed RBEP is situated in the northern portion of the plain, west of the San Andreas Fault and bounded by the Pacific Ocean on the west, the Santa Monica and San Gabriel mountains to the north, the San Gabriel Mountains to the east, and the San Pedro Hills to the south (Schoenherr 1992:Figure 8.2; USGS 1896). The Los Angeles Basin receives the bulk of its runoff and sediment from the Santa Ana Range and Santa Monica Mountains through the San Gabriel, Los Angeles, and Santa Ana rivers. (Schoenherr 1992:10.) The Los Angeles Basin is an alluvial plain that is generally underlain by deep sediments dating to the Holocene Epoch[3] (AES 2012a:5.4-2). Near the coast, sand dunes sit atop the alluvial sediments (AES 2012a:5.4-2; Poland et al. 1959:19).

PROJECT, SITE, AND VICINITY DESCRIPTION

The proposed project site is located in the urban, beachside city of Redondo Beach. The project site is surrounded on the north by a mixed residential and commercial zone of the city of Hermosa Beach; on the east by industrial and commercial properties; the south/southeast by residential and commercial properties; and the west by King Harbor and commercial properties. The project vicinity was situated on the El Segundo Sand Hills, although approximately half of the project site consisted of a salt lake from at least the nineteenth-century through the 1940s (Poland et al. 1959:19; USGS 1896). Early twentieth-century development in Redondo Beach included tourist attractions, the introduction of Henry Huntington's Big Red Cars trolley service and an early steam-generating electric plant at the current plant site which provided electric power for the Red Cars. After World War I (WW I) ended in 1918, the city expanded beyond its original townsite boundaries. The years following World War II (WWII), from 1945 on, saw a housing and development boom throughout Southern California. The current Redondo Beach Generating Station (RBGS) was built as a result of the demand for power from the development boom.

Environmental Setting

Identifying the kinds and distribution of resources necessary to sustain human life in an environment, and the changes in that environment over time, is central to understanding whether and how an area was used during prehistory and history. During the time that humans have lived in California, the region in which the proposed project is located has undergone several climatic shifts. These shifts have resulted in variable availability of vital resources, and that variability has influenced the scope and scale of human use of the project vicinity. Consequently, it is important to consider the historical character of local climate change, or the paleoclimate, and the effects of the paleoclimate on the physical development of the area and its ecology. The data adequacy supplement summarizes the paleoenvironment of the project vicinity (AES 2013b:5.3-4–5.3-6); staff adds site-specific information below.

[3] The Holocene Epoch is a unit of time used in geology and archaeology to designate the period between the current day and 11,700 B.P. (Cohen et al. 2013). The term "B.P." (Before Present) is an international dating convention that refers to the year 1950 as the present.

Overview

The proposed project site is situated at elevations of three to 20 feet above sea level (asl) on the El Segundo Sand Hills in the city of Redondo Beach. Current land uses in the project vicinity include residential and commercial development, industrial, wetland preserves, parklands and open space, landfill, and beaches. (AES 2012a:5.2-2, 5.4-1.)

The modern climate of the project vicinity is influenced by the adjacent open coastline and its presence in a semi-permanent high-pressure zone. Consequently, the local weather conditions are typically mild, with average daily highs of 63–84 degrees Fahrenheit (° F) and average daily lows of 45–63 ° F. Summers are dry and warm, punctuated by very hot weather, often caused by southeasterly Santa Ana winds. Winters are mild and wet, most precipitation falling between November and April, averaging about 14 inches annually. (AES 2012a:5.1-2, 5.1-3; Engstrom 2006:847.)

Paleoclimate and Ecology

The paleoclimate and ecology of the project vicinity is complex, belied by the fact that former climatic and ecological conditions in the area generally conform to the long-standing, three-part paleoclimatic framework for arid western United States. In this framework, the Holocene began with a moderately cool and moist period known as the Anathermal (ca. 10,000–7500 B.P.). Subsequently, the California climate appears to have warmed and dried during the Altithermal (ca. 7500–4000 B.P.). During the Medithermal (ca. 4000 B.P.–present), moisture and temperature conditions resembled those of today. (Moratto et al. 1978:148.) The wet winter/dry summer climate of southern California is thought to have persisted through much of these three climatic periods and may be about 160,000 years old (Masters and Aiello 2007:40). Locally, however, climate and ecology changed considerably over the last 12,000–10,000 years.

Paleobotanical studies suggest that a warming trend commenced during the terminal Pleistocene Epoch (15,000–11,750 B.P.) and continued into the Early Holocene (11,750–7000 B.P.). The amount of conifer pollen decreased and was accompanied by a simultaneous increase in the quantity of oak, chaparral, and herb pollen around 14,000–10,000 B.P. The rate of increase appears to have been rapid. (West et al. 2007:25.)

The warming trend—called the Altithermal or Holocene Climatic Optimum—continued throughout the Early Holocene, although cooling events are noticeable as well. For instance, between 8000 and 7000 B.P., the project vicinity is inferred to have been warmer and wetter than today (Altschul et al. 2007:35), but is followed by a cooler period about 7500–6800 B.P. During this latter interval, red abalone (*Haliotis rufescens*) became more abundant than black abalone in the intertidal zone (*H. carcherodii*), illustrating that climate change affects animal as well as plant life—changes which might be represented in the archaeological record. Overall, mean summer temperatures were higher and precipitation lower than present conditions. (Vellanoweth and Grenda 2002:75–77, 80.)

During the Middle Holocene (7000–4000 B.P.), the southern California climate remained predominantly warm and dry (Altschul et al. 2007:35; Vellanoweth and Grenda 2002:78). Dated pollen profiles illustrate this trend, with species favoring cooler and wetter settings (pine and fern) giving way to drought- and heat-tolerant plants (oaks, grasses, chenopods, and the sunflower family [Compositae][4]) throughout this interval (Vellanoweth and Grenda 2002:77–78). Despite the warm and dry conditions of the Middle Holocene, locally sufficient stream flows were available to freshwater marshes, such as Ballona Wetlands (Altschul et al. 2007:35). In such instances, indicator species of wetter conditions were abundant, despite an overall arid trend (Vellanoweth and Grenda 2002:77–78).

By 5000–4500 B.P., at the end of the Middle Holocene, sea level reached approximately present-day level, changing the character of near-ocean habitats going into the Late Holocene (4000 B.P.–present). Sea level rise increased tidal influence and direct reach into near-shore wetlands, changing water bodies like Ballona Wetlands from freshwater to largely saltwater features. Wetland salinity was moderated during pulses of freshwater inputs (Altschul et al. 2005:286.)

Surface sea temperature (SST) oscillated between warm and cold temperatures on a millennial timescale during the last 11,000 years. Cooling episodes occurred about every 1,500 years. Over the last 3,000 years, SST followed a tri-phase development:

1. 3000–1500 B.P.: SST was warm and relatively stable. Marine productivity was low.

2. 1500–650 B.P.: SST was very cold and unstable. Precipitation was low. Marked dry periods occurred at 1450–1150 and 970–700 B.P., corresponding with Stine's (1998) Medieval Climatic Anomaly or medieval drought periods. Between 1000 and 650 B.P., marine productivity was very high.

3. 650 B.P.–present: SST became warmer and more stable. The period of highest marine productivity in the Late Holocene occurred about 650–400 B.P., followed by low marine productivity. A severe dry interval occurred about 300–200 B.P., coincident with much of the Little Ice Age. (Kennett and Kennett 2000:383–385; Vellanoweth and Grenda 2002:79–80; West et al. 2007:25–26.)

The nineteenth-century climate on the southern California coast was a little different than today's climate. Northwesterly winds dominated then as today, although southeasterly winds were more frequent and intense, likened to hurricanes. The turn of the twentieth century heralded reduced influence of southeasterly winds and the Little Ice Age (450–50 B.P.) ended with five El Niño events in a 20-year period. (Engstrom 2006:850–851)

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[4] Grass and chenopod pollen, however, was relative sparse throughout sample taken (Vellanoweth and Grenda 2002:78).

Geology

The geology of the project vicinity is described in four sections of the AFC and a geotechnical study conducted in support of the AFC (AES 2012a:5.3-7, 5.4-2, 5.8-2–5.8-7, 5.11-1–5.11-2, 5.11-5, Figures 5.4-1a–b, 5.11-1; Ninyo & Moore 2011:3, 5–7, Appendix A). These discussions are not reproduced in full here, but are summarized for the reader's convenience, followed by a discussion of geological characteristics relevant to this PSA's cultural resources analysis.

The proposed project site is situated on placed fill and Quaternary[5] eolian (wind-deposited) sediments, according to the 30°-by-60° Long Beach geologic map examined by the applicant (AES 2012a:Figure 5.4-1a–b). The AFC and geologic literature present evidence that sediments are Holocene in age to a depth of ten feet below ground surface within the western portion of the PAA and to 30 feet below ground surface in the eastern portion of the PAA (AES 2012a:5.8-7).

Geomorphology

The discussion of the geomorphology of the proposed project area considers how and when the underlying soils and sediments developed, and provides a baseline physical context to assess whether surface and buried archaeological materials are likely to occur in the proposed project area.

The project vicinity contains most of the major landforms characteristic of the Los Angeles Basin. This basin is an alluvial plain ringed by the San Jacinto, Santa Rosa, and Laguna mountains, drained principally by the San Gabriel, Los Angeles, and Santa Ana rivers. These streams each deposit sediments from the mountains, forming separate alluvial fans as they make their way seaward. Closer to the proposed project site, the dominant landforms are beaches and low hillock dunes (foredunes) (Engstrom 2006:852).

The project vicinity is situated on the portion of coastline known as the Santa Monica Littoral Cell[6] (Masters and Aiello 2007:Figure 3.1), which consists of four principal geomorphic features: low, sandy shoreline; barrier spits and inlets; beach backed by low cliffs; sand dunes, some considerably higher (up to 100 feet) than the adjacent beaches; and shallow lagoons close to the ocean (Grenda and Altschul 1994:Figure 1; Poland et al. 1959:26). A summary of regional geomorphology from the terminal Pleistocene through the Holocene (ca. 20,000 B.P.–present) is presented below.

[5] The Quaternary Period encompasses the Pleistocene (2.588 million years ago–11,700 B.P.) and Holocene (11,700 B.P.–present day) epochs (Cohen et al. 2013). Without further description, therefore, Quaternary geologic formations may be taken to date anywhere from 2.588 million years ago to the present day.

[6] Littoral cells are natural compartments along coasts that contain a complete cycle of sedimentation: sources of sediment (e.g., eroding mountains), transport paths (such as streams), and sinks (places where much of the sediment accumulates and is typically retained) (CCC 1987:20).

20,000–11,000 B.P.

During this time, sea level was markedly lower than today, presenting a wider shoreline than is currently seen in southern California. As a result, Santa Monica Bay was far less pronounced than it is today. (Porcasi et al. 1999:16, Figure 1.) The coast was narrow and rocky, backed by 100–150-feet-tall sea cliffs. Stream action cut valleys onto the coastal plain, with sediment discharge lost to the ocean. The shoreline was energetic at this time owing to the action of large waves. Sea level rise increased wave energy across the continental shelf and flooded the incised valleys that formed from 20,000 to 14,000 B.P. Kelp forests developed near the break of the continental shelf. Estuaries expanded during the melt water pulses of 13,500 and 11,000 B.P., when stream flows increased considerably. Stream sediments, however, were deposited into the head of estuaries and did not reach the shore, which remained rocky. Kelp forests grew in extent and sea level sat approximately 180 feet below the present level. (Masters and Aiello 2007:40.)

10,000–8200 B.P.

This interval witnessed the development of quiet-water estuaries that fostered fish nurseries, shellfish beds, shorebird foraging, and marine mammal visitation. Deposition of sediment onto the shoreline was limited at this time. Hence, the coast remained rocky with cobble beaches and supported shallow reefs and large fish communities. At this juncture the ocean had transgressed to a point about 115 feet below modern sea level. (Masters and Aiello 2007:40.)

6000–5000 B.P.

Between 6000 and 5000 B.P., the southern California coast began its transition from a rocky shore coastline to a sandy beach condition, aided by shore platform-cutting waves. Shoaling estuaries became less productive and were replaced by sand and mudflats. (Masters and Aiello 2007:40.)

4000 B.P.–Present

During the Late Holocene (the last 4,000 years), large estuaries were replaced by shallow wetlands and lagoons, which were periodically closed by the formation of sand spits. During the last 2,000 years, “megadroughts” (see Stine 1998:51) lasting up to 200 years probably closed lagoons to direct ocean influence. “Megafloods” with a return period of 200–400 years reopened lagoons to the ocean. Kelp forests were limited to wave-cut platforms off rocky headlands. Shallow rocky reefs were smothered by sand on the inner shelf. Sand beaches accreted within the littoral cells, certainly during summers’ low-wave energy. (Masters and Aiello 2007:40.)

Native Plants and Animals in the Project Vicinity

The RBEP AFC describes the current suite of plants and animals of the project vicinity, with an emphasis on special-status species and sensitive ecological communities (AES 2012a:Section 5.2). Marshes in the project vicinity are sometimes described in terms of three distinct zones: low, middle, and high elevation. Staff’s description of local flora and fauna incorporates and draws from Section 5.2 of the AFC, but also expands the discussion to include non-special-status species important in human ecology[7]. Prior to urban development of Redondo Beach, natural habitats in the project vicinity included open beach, southern coastal salt marsh, southern coastal bluff scrub, southern dune scrub, and brackish water marsh (Old Salt Lake) (AES 2012a:5.2-3, 5.2-13). Further removed from the proposed project were the grasslands of the Los Angeles Basin, riparian woodland along streams, and woodlands in the foothills (AES 2012a:5.2-2). Under the heading “Local Plant Communities”, staff briefly describes the one project-vicinity plant community that was not treated in the AFC: open beach.

Local Plant Community: Open Beach

Northwest of the project site (and formerly also west and southwest), the project vicinity contained an open coastal strand, or sandy beach. Under natural conditions, the open, sandy beaches of the project vicinity support low and prostrate vegetation, often succulent or late-flowering varieties. These include shore sandbur (*Franseria chamissionis*), white-leaved saltbush (*Atriplex leucophylla*), sand verbena (*Abronia maritima*), and the non-native iceplants (*Mesembryanthemum* spp.). (Demcak 1990:4; Ornduff 1974:74.)

Local Fauna

Several animals frequent the coastal strand: western and California gulls (*Larus occidentalis* and *L. californicus*), sand crabs (*Emerita analoga*), razor clams (*Siliqua lucida*), surf and coquina clams, Pismo clams (*Tivela stultorum*), kelp flies (*Fucellia* and *Coelopa* spp.), wrack flies, rove and dune beetles, tiger beetles (Cicindelidae), pill bugs (Isopoda), and beach hoppers (*Orchestoidea californiana*) (CCC 1987:21; Demcak 1990:4; Johnson and Snook 1967:282, 441, 458, 460; Schoenherr 1992:635).

Coastal sand dunes and foredunes provided habitat for numerous animals: San Francisco tree lupine moth (*Grapholita edwardsiana*), Morro blue butterfly (*Icaricia icarioides moroensis*), Pheres blue butterfly (*Aricia icarioides pheres*), deer mouse (*Peromyscus maniculatis*), California vole (*Microtus californicus*), black legless lizard (*Anniella pulchra nigra*), northern harrier (*Circus cyaneus*), gray fox (*Urocyon cinereoargenteus*), and striped skunk (*Mephitis mephitis*) (CCC 1987:19).

Salt marshes provide habitat for numerous animals, notably several species of waterfowl, such as light-footed clapper rail, Belding’s savannah sparrow, California black rail (*Laterallus jamaicensis*), western snowy plover, California least tern, California brown pelican, salt marsh skipper, mallard (*Anas platyrhynchos*), and godwit (*Limosa* sp.). Additional waterfowl and shorebirds forage and inhabit salt marshes in spring and fall: brants (*Branta* spp.), pintails (*Anas* spp.), canvasback (*Aythya valisineria*), sandpipers (Scolopacidae Family), curlew (*Numenius americanus*), and willet (*Catoptrophorus semipalmatus*). (CCC 1987:23–24)

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[7] Scientific names for species discussed here are drawn from: AES 2012a:Section 5.2, Johnson and Snook 1967, Lightfoot and Parrish 2009; Moratto 1984:Appendix 1; Ornduff 1974; Schoenherr 1992. Where all scientific names are presented unambiguously in the AFC, they are not reproduced in this PSA section; the reader is instead referred to **AES 2012a:Section 5.2**.

Fish, shellfish, and other aquatic animals of salt marshes and mudflats include California killifish (*Fundulus parvipinnis*), bay goby (*Lepidogobius lepidus*), striped bass (*Morone saxatilis*), topsmelt (*Atherinops affinis*), starry flounder (*Platichthys stellatus*), moon snails (Polinices spp.), horn snail or horn shell (*Cerithidea californica*), fiddler crabs (*Uca crenulata*), ghost shrimp (Callianassidae Family), fat innkeeper (*Urechis caupo*), pea crabs (*Pinnotheres pisum*), scale worms (*Lepidonotus melanogrammus*), gobies (Gobiidae Family) and various other crabs, shrimp, clams, and worms. Salt marshes are also important to some mammals, such as California salt marsh shrew (*Sorex ornatus salicornicus*), harvest mouse (*Reithrodontomys megalotis catalinae*), and harbor seal (*Phoca vitulina*). (CCC 1987:24.)

Locally available shellfish species include abalone (*Haliotis* spp.), bean clam (*Donax gouldii*), black turban snail (*Chlorostoma funebralis*), California mussel (*Mytilus californianus*), littleneck clam or rock cockle (*Leukoma staminea*), olive snail (*Callianax biplicata*, formerly *Olivella* spp.), Pismo clam (*Tivela stultorum*), thick scallop (*Argopecten ventricosus*), and Venus clams or hardshell cockles (*Chione* spp.) (Lightfoot and Parrish 2009:271–272).

Pelagic or open-ocean fish in the project vicinity include anchovies (Engraulididae Family), chub mackerel (*Scomber japonicas*), Pacific bonito (*Sarda chiliensis*), leopard shark (*Triakis semifasciata*), Pacific angel shark (*Squatina californica*), Pacific barracuda (*Sphyraena argentea*), Pacific sardine (*Sardinops sagax*), shovelnose guitarfish (*Rhinobatos productus*), soupfin shark (*Galeorhinus galeus*), and yellowtail (*Seriola lalandi*). Near-shore fish in the area comprise cabezon (*Scorpaenichthys marmoratus*), California sheephead (*Semicossyphus pulcher*), surfperches (Embiotocidae Family), rockfishes (*Sebastes* spp.), kelp bass (*Paralabrax clathratus*), señorita (*Oxyjulis californica*), blacksmith (*Chromis punctipinnis*), bat ray (*Myliobatis californica*), and soupfin shark (*G. galeus*). (Lightfoot and Parrish 2009:273.)

Prior to development of the project vicinity, the area supported various mammals. Among marine mammals there were sea lions (Otariidae Family), sea otter (*Enhydra lutris*), and northern elephant seal (*Mirounga angustirostris*). In addition to the terrestrial mammals listed previously in this section, likely inhabitants of the project vicinity included ground squirrels (*Spermophilus* spp.), hares and rabbits (Leporidae Family), mule deer (*Odocoileus hemionus*), and woodrats (*Neotoma* spp.). (Lightfoot and Parrish 2009:275–277.)

Prehistoric Setting

The AFC summarizes the human prehistory of the project vicinity with an emphasis on regional trends. In the AFC's summary, the prehistoric setting relies on a recent synthesis of regional prehistory (Byrd and Raab 2007). This source, however, holds limited relevance for the project vicinity; Byrd and Raab (2007:215, Figure 14.1) covers the prehistory of the Southern Bight (south of Point Conception), whereas the project site is located in the Northern Bight (Palos Verdes Peninsula northward to the vicinity of Vandenberg Air Force Base (Glassow et al. 2007:191, Figure 13.2). Although these two geographic areas are contiguous, the quantity and quality of archaeological research in the two areas differ, as do known trends in prehistory. Staff therefore presents a summary of the Northern Bight's prehistory in this PSA to establish a relevant context for prehistoric archaeological resources in the project vicinity.

Glassow et al. (2007) divide northern bight prehistory into six periods:

1. Early Occupations/Paleocoastal Tradition (ca. 12,950–8950 cal B.P.)
2. Millingstone Horizon (ca. 8950–6950 cal B.P.)
3. Intermediate Cultures/Maritime Lifeway (6450–3950 cal B.P.)
4. Middle/Late Holocene Transition (3950–1949 cal B.P.)
5. Unnamed Period (1949–950 cal B.P.)
6. Unnamed/Protohistoric Period (950 cal B.P.–missionization)

Paleo-Coastal Tradition (ca. 12,950–8950 cal B.P.)

Evidence of early occupations, such as a Paleo-Coastal or Paleoindian tradition in the Northern Bight is relatively scanty. What archaeologists know of this early period of prehistory comes from a handful of archaeological sites:

- Arlington Springs Woman (CA-SRI-173): ca. 12,950 cal B.P.
- CA-SBA-1951: Clovis projectile point[8] (ca. 13,450–10,950 cal B.P.)
- Daisy Cave (CA-SMI-261): 11,450 and 9950–8950 cal B.P.
- Buried midden on Santa Rosa Island: 9250 cal B.P.
- Surf Site (CA-SBA-931): ca. 9950–9450 cal B.P.
- Malaga Cove Site (CA-LAN-138), Palos Verdes Peninsula, 9950–8950 cal B.P. (Glassow et al. 2007:191–192.)

The Paleo-Coastal Tradition is poorly defined in the Northern Bight. Archaeological traces from this time period indicate that Paleocoastal people ate shellfish, fished with gorge and line by about 9750 cal B.P., and left relatively few archaeological materials on the landscape. No milling equipment (ground-stone tools) have been found at Paleo-Coastal sites in the Northern Bight. Archaeologists are uncertain whether or how the Paleo-Coastal Tradition and Millingstone Horizon are related. (Glassow et al. 2007:192.)

Millingstone Horizon (ca. 8950–6950 cal B.P.)

Beginning late in the Early Holocene[9] and continuing into the Middle Holocene (8950–6950 cal B.P.), the Northern Bight's archaeological record presents a new culture and adaptive pattern known as the Millingstone Horizon, which persisted in some areas until 5400 cal B.P. (Glassow et al. 2007:192, 194). The Millingstone Horizon is a distinctive and widespread archaeological complex, found west of the Sierra Nevada from the Baja Peninsula north to Clear Lake (Jones 2008:Figure 1). The appearance of this archaeological horizon in the Northern Bight corresponds with the expansion of the southern coast's human population.

[8] Clovis points are a distinctive form of projectile point that frequently was fluted along its faces and possessed of a concave base. Clovis points seem to date to the 13,450–10,950 cal. B.P. interval across North America. (Cordell 1997:81; Rondeau et al. 2007:68.)

[9] Geoscientists divide the Holocene Epoch into three broad divisions: Early (11,500–7550 B.P.), Middle (7950–1450 B.P.), and Late (1450 B.P.–present).

Millingstone sites are recognizable by abundant millingstones and handstones (locally referred to as metates and manos, respectively). Most of the approximately 40 radiocarbon-dated Millingstone sites are located on or near the coast. The relative lack of interior Millingstone traces might not reflect a low inland population density. Rather, Millingstone archaeology in the interior might be buried under younger soils and sediments, or sometimes cannot be firmly dated to the Millingstone period for lack of dateable materials, such as bone and charcoal. (Glassow et al. 2007:194.)

Limited paleoenvironmental data are available for Millingstone Horizon archaeology in the Northern Bight. Oxygen isotope data from a marine sediment core indicate that ocean temperatures and marine life productivity were higher than present conditions during the Millingstone period. Some pollen data suggest that Millingstone-period vegetation communities were similar to those of today. Sea level was still rising between 8950 and 6950 cal B.P., but more slowly than before the Millingstone period. Early Holocene sea-level transgression into canyon mouths expanded the number and range of lagoons, estuaries, and tidal wetlands. (Glassow et al. 2007:194.)

The volume of Millingstone deposits and the number of artifacts suggest repeat site use and longer residential intervals than inferred for mainland Paleo-Coastal Tradition sites (Glassow et al. 2007:194). Typical Millingstone Horizon artifacts are described in the AFC's treatment of Middle Holocene archaeology (AES 2012a:5.3-11). To summarize, in addition to abundant handstones and millingstones, other stone plant-processing tools are frequently found at Millingstone sites. Hunting implements, such as dart and spear points, are uncommon. When present, projectile points are generally leaf-shaped. (Jones 2008:138.)

The AFC discusses the use of earth ovens at Millingstone sites for cooking yucca plants (AES 2012a:5.3-11). Other features found at Millingstone sites include large amounts of fist-sized and larger cobbles arranged in sheets with millingstones and handstones mixed in. Many cobbles in these rock accumulations have been burned, suggesting use in hearths or ovens. Also characteristic of open-coast Millingstone sites are dense accumulations of mussel shells and scattered Pismo clamshells (Glassow et al. 2007:194–195.)

Intermediate Cultures/Maritime Lifeway (6450–3950 cal B.P.)

A second type of archaeological culture or complex—not mentioned in the AFC (AES 2012a:5.3-11; Cardenas et al. 2012:2-2, 2-3)—is known from Middle Holocene Los Angeles County. Known as the Intermediate Cultures (6450–3950 cal B.P.), their emergence in the Northern Bight coincided with population increase, as archaeologists infer from the increased number of radiocarbon dates in the 6450–3950 cal B.P. interval. By 5950 cal B.P., radiocarbon frequencies were at least as high as those of 7950 cal B.P. Population might have decreased again around 4950 B.P., as the frequency of radiocarbon-dated archaeological materials is less than that of 6450–4950 B.P. This change is especially marked on the Channel Islands. (Glassow et al. 2007:196.) Site assemblages still contain handstones and millingstones, although both types of artifact exhibit significant changes from their Millingstone Horizon counterparts: Intermediate Cultures' millingstones are thicker and heavier, and handstones come in diverse shapes. Mortars and pestles appear in the archaeological record dating to about 5950 B.P., although at the Sweetwater Mesa Site (CA-LAN-267), mortars and pestles might date as early as pre-6450 cal B.P. Mortars from this period exhibit small, shallow depressions, unlike the large, deep depressions that are characteristic of later mortars. (Glassow et al. 2007:196–197.) Although archaeologists are uncertain about the precise function of early mortars and pestles—whether primarily for processing acorns and large seeds, or tubers and roots—it appears clear that the appearance of these new tools alongside handstones and millingstones mark the incorporation of new foods into the prehistoric diet. Many Intermediate sites lack mortars and pestles, and resemble Millingstone Horizon sites. (Glassow et al. 2007:197.)

Around 5950 cal B.P., the number of projectile points in Northern Bight archaeological sites increases, and the form of the artifacts shifts from leaf-shaped to side-notched. Presumably, hunting, especially of large game (such as deer), became more important among Intermediate Cultures as compared to the Millingstone Horizon. Alternatively, the Intermediate Cultures might have discarded their projectile points at locations more accessible to archaeologists. (Glassow et al. 2007:197.) The Intermediate Cultures are scantly represented on the mainland south of the Santa Barbara Channel (Glassow et al. 2007:199).

Middle/Late Holocene Transition (3950–1949 cal B.P.)

Approximately 2450 cal B.P., fishing technology shifted to the use of circular shell fishhooks. From 3950 to 2950 cal B.P., an increasingly maritime economic focus emerged in the Northern Bight, with occupations on the coast becoming more numerous. Fishing and regional exchange intensified, perhaps girding subsequent socioeconomic and political complexity in the region. Artifacts from residential and burial contexts suggest a transition from a more-or-less equal distribution of wealth and power to stratified wealth and status. (Glassow et al. 2007:200.)

As of about 2007, archaeologists have identified 54 archaeological sites that yielded radiocarbon dates between 3950 and 1949 cal B.P. in the Northern Bight. The majority of these sites are located on the Channel Islands (23 from Santa Cruz Island alone) rather than the mainland coast. The prehistoric diet during the Middle/Late Holocene transition broadened to include various marine and terrestrial habitats and species. The subsistence base consisted of acorns, islay or holly-leafed cherry[10] (*Prunus ilicifolia*), tubers, corms, and bulbs, as well as fish and sea mammals. Some archaeologists associate the incorporation of smaller animals and new plants into the transitional diet with the production of more refined mortars and pestles during this time period. (Glassow et al. 2007:200.)

A number of technological changes occurred during the Middle/Late Holocene Transition:

- Introduction of contracting-stem projectile points
- Introduction of notched stone sinkers/net weights
- Introduction of shell fishhooks about 2450 cal B.P.

Archaeologists hypothesize that the shift from side-notched to corner-notched projectile points reflects changes in hunting and/or warfare strategies. Some of the earliest examples of asphaltum basketry impressions and tarring pebbles occur alongside changes in projectile and fishing technology. (Glassow et al. 2007:200.)

[10] Lightfoot and Parrish (2009:266–267).

Settlement of the coast increased between 3950 and 2950 cal B.P. in the Northern Bight, accompanied by cultural elaboration and less emphasis on residential mobility. Over the course of the Middle/Late Holocene Transition, decreased residential mobility or sedentism is indicated by the following archaeological traits.

- Larger sites
- Higher density of artifacts and ecofacts
- Plant remains from all seasons present
- Large clusters of semisubterranean structures
- Presence of ceremonial structures
- Presence of cemeteries. (Glassow et al. 2007:202.)

Archaeologists see in these characteristics implications for prehistoric social organization and ideology. Overall, the presence of larger, more complex archaeological sites, ceremonial structures, and formal cemeteries suggests that status differentiation and ritualized behavior had developed on the Northern Bight. For example, burials in formal cemeteries often possess various and abundant beads, ornaments, and ritual items. Additionally, artifacts similar to historically documented ritual paraphernalia have been found at transitional sites on the mainland and Santa Cruz Island. Examples include eagle or bear claws, charmstones, pipes, bone tubes, whistles, and quartz crystals. (Glassow et al. 2007:202.)

Unnamed Period (1949–950 cal B.P.)

The interval following the Middle/Late Holocene Transition exhibits increasing complexity, with midden[11] sites becoming commonplace on the coast and well developed cemeteries. Glassow et al. (2007:203) does not mention any Los Angeles County examples, however. Notably, the plank canoe (*te'aat*) was in use beginning sometime after 1450 cal B.P., largely replacing the tule balsa and dugout canoe; some researchers estimate its introduction at 1150–950 B.P. (Glassow et al. 2007:203–204; McCawley 2002:46). The plank canoe, a seaworthy craft, enabled the occupants of the Northern Bight to acquire larger quantities of large, deep-sea fish (e.g., tuna and swordfish), and abetted frequent trade between the Channel Islands and mainland settlements (Glassow et al. 2007:204).

The bow and arrow appears in the archaeological record of the Northern Bight about 1450 cal B.P. Smaller than the dart points of the previous archaeological complexes, the earliest stone arrow tips were convex-based, leaf-shaped artifacts that were attached to the arrow shaft with asphaltum. The production of shell beads proliferated during this interval, and elaborate bone and stone ornaments and ritual items were also made. Utilitarian tools seem no more elaborate than in previous periods. (Glassow et al. 2007:204)

[11] Midden is organic habitation debris, usually dark in color and associated with the disposal of food and human waste over variable periods of time.

Unnamed/Protohistoric Period (950 cal B.P.–Missionization)

Microblades, microblade drills, beads, and bead debitage indicate that islanders made all beads after 750 B.P. for the regional exchange system that extended to “Chumash territory and beyond” (Glassow et al. 2007:207). Prior to 750 B.P. (ca. 1200–1000 cal B.P.), there is evidence for small-scale export of bead manufactures. The manufacture of shell beads and microblades was specialized by the Middle/Late Holocene Transition, about 800–750 cal B.P. By 750 cal B.P., the costly callus[12] olive snail (*Callianax biplicata*, formerly *Olivella biplicata*[13]) shell beads were being made and served as currency during the arrival of Europeans in California. Microblades shifted from a trapezoidal shape to a triangular one, and production was centralized on Santa Cruz Island. (Glassow et al. 2007:207.)

The dietary importance of fish increased after 1000 cal B.P. and remained important thereafter. Evidence of bead-making at this time has been found on eastern Santa Rosa Island. After 1300 cal B.P., the production of mortars and pestles increased exponentially at 16 sites on San Miguel Island. (Glassow et al. 2007:207.)

Recent archaeological research suggests that the Northern Bight supported hierarchically organized habitation sites centered on estuaries. Settlement sizes were highly variable across the Los Angeles Basin, reflecting differential resource availability. Researchers propose that some estuaries supported large habitation sites, others a “rancheria pattern” of small, dispersed associated habitations. (Glassow et al. 2007:210; Grenda and Altschul 2002a:128–129.) Grenda and Altschul (2002b:166) hold that groups at small estuaries were more mobile, part of the group dispersing in times of resource stress. Subsistence remains from Playa Vista/Ballona Creek support the idea that late prehistoric economies focused mainly on local estuarine, coastal, and near-coastal resources, incorporating a broad mix of terrestrial and marine resources. As stream-deposited sediments filled estuaries and coastal wetlands, late prehistoric populations shifted from harvesting lagoon shellfish to sandy shore shellfish. Fishing focused on near-shore species. (Glassow et al. 2007:210.)

Ethnographic Setting

Gabrielino-Tongva

The Gabrielino people and representative tribes are most directly related to the project vicinity. There are at least four subgroups of the Gabrielino: those of the Los Angeles Basin, those of the northern mountainous area including the inland San Fernando Valley, those of Santa Catalina and San Clemente islands, and those of San Nicolas Island. Some anthropologists question earlier linguists’ assertions that the Gabrielino were a Cupan (a language of the Uto-Aztecan stock of the Takic language family) speaking group. A close reading of Alfred Kroeber’s Gabrielino summary suggests that the Gabrielino of Santa Catalina Island may have set the trends of the larger culture that thrived on the mainland (Kroeber 1976:620–623). Kroeber has suggested more than four linguistic subgroups based upon language dialect differences (Bean and Smith 1978:538). The Gabrielino language has recently been identified as a stand-alone Takic language distinct from Cupan (Mithun 1999:539, 543–544).

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[12] The callus is the outer part of the olive snail’s shell, which consists of hard enamel (King 1978:59, Figure 4).

[13] Lightfoot and Parrish (2009:234).

The name 'Gabrielino' is derived from the Spanish missionaries who established Catholic missions in the Los Angeles basin in the late 1700s. Two missions were established in the soon to be renamed tribe's territory: San Gabriel Arcangel and San Fernando Rey de España, respectively named after Archangel Gabriel and Saint Ferdinand, King of Spain. Hence those indigenous Californians closest to Mission San Gabriel became known of as "Gabrielinos" and those closest to San Fernando Rey de España became known of as "Fernandenos". Prior to the Spanish period it has been suggested that the Los Angeles Basin Gabrielino referred to themselves as *Kumi vit* and the San Fernando Valley indigenous as *Pasekarum*. The San Fernando Valley used the same names to refer to the same groups of people (Bean and Smith 1978:548). However, a word that is combined with the suffix '*vit*' refers to a specific place or village and therefore would not be suitable in reference to a group of people occupying at least 50, if not 100 villages (Johnston 1962:10).

The word '*Tobikhar*' seems to have been used in self-description by those Gabrielinos in the 1800s that moved to the mission and the name translates as "settlers" and appears to reference the fact that some Gabrielino left their traditional villages, whether willfully or under forced duress, and settled near the missions (Hodge 1971:480). The words *Kizh* or *Kij* also appear in the literature but likely refer to people of a specific house and therefore would not be a name suitable for referencing a nation of people; although the word *Kizh* was mistakenly used by a German linguist to refer to the Gabrielino language. However, one Gabrielino group existent today, takes the word 'Kizh' to mean "houses" and refers to all people living in the Gabrielino style willow constructed house. The word '*Tongva*' was provided to the anthropologist C. Hart Merriam in 1902 by one Gabrielino speaker (Heizer 1968:105). Loosely translated as "people of the earth"[14], 'Tongva' has gained popularity since the 1990s and is often used in conjunction with the word 'Gabrielino' (McCawley 1996:10), although at least one Gabrielino group rejects the word 'Tongva'.

It is not known what the island groups called themselves or what they called their linguistic relatives on the mainland. A narrative provided by Emma Hardacre suggests that the indigenous of the Islands and particularly San Nicholas Island were killed or intermarried by "Kodiaks" brought by American fur traders to harvest the island's otter population. The remaining Island Gabrielinos were removed in 1835 with the exception of one woman who returned to the island in search of a lost infant. The woman did not find the lost infant but continued to live in isolation on the island. She was later discovered in 1853 and was removed to the mainland where the remaining Gabrielino speakers could not understand her dialect. (Hardacre 1971:272–284) Kroeber corroborates the "Lone Woman of San Nicholas" story (Kroeber 1976:633–635). Recently archaeologists have re-discovered the cave that the lone woman occupied during her 18 years of isolation (Schwartz and Vellanoweth 2013:391).

Some earlier references to the island dwellers and their immediate mainland coastal neighbors or relatives refer to the entire maritime adapted culture as the "Canalino Culture" (Johnston 1962:96; Moriarty 1969:16; Romer 1959:241). However, the usage, stemming from the earliest Spanish maritime explorations, appears to include both the cluster of southern island dwellers that tend to be affiliated with Gabrielino and the cluster of northern island dwellers that tend to be affiliated with Chumash. The Santa Catalina Island is named *Pimu* or *Pipimar*, and the Gabrielino from *Pipimar* were called *Pepimares* (translated as "people of

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[14] McCawley (1996:9–10) suggests that the world Tongva originally named either the Gabrielinos living near Tejon or a separate Gabrielino village called *Tonjwe*.

Pipimar") (Kroeber 1976:634, McCawley 1996:10). Despite not having a common name for the dwellers of the island, the ethnographers repeatedly credit the island cultures (and particularly the Santa Catalina Island dwellers), as the originators of the culture, including the Chinigchinix religious tradition that took hold with the mainland Gabrielino, and from the Gabrielino, spread to the Luiseno, Juaneno, and Diegueno/Kumeyaay cultures to the south and east (Kroeber 1976:621–622; Moriarty 1969:2).

Today, the names Gabrielino, Tongva, or Gabrielino Tongva seems to be the most preferred reference of all sub-groups. The name Gabrielino-Tongva will be used for the purposes of this report except when referring to specific tribal entities that have various self-selected names not spelled 'Gabrielino-Tongva'.

Traditional Territory of the Gabrielino-Tongva

The Gabrielino-Tongva is considered to prehistorically be the group with perhaps the greatest wealth and population, and controlled one of the richest territories in all of indigenous Southern California. Their territory consists of ocean islands and waters, coast line, riverine basins, and mountains that provided a diversity of resources. (Bean and Smith 1978: 538.) Their territory is located at the western terminus of one of the most established and extensive indigenous trade networks of North America.

The territorial boundaries, while imprecise, are defined here in a counterclockwise direction and starting in the southwestern area of the territory at the mouth of Aliso Creek.[15] The boundary follows the Aliso Creek up into the Santa Ana Mountains and crosses the Santa Ana Mountains near Trabuco Peak. Descending the eastern slopes of the Santa Ana Mountains the boundary runs towards the Santa Ana River and follows the river course up to where the San Andreas Rift and the Santa Ana River intersect. The boundary follows the rift in a northwest direction. The territory includes most if not all of the San Gabriel Mountains. The boundary curves back towards the ocean, following generally the area defined by Soledad Canyon. The territory includes all of the San Fernando Valley, includes the eastern slopes of the Simi Hills and then crosses the Santa Monica Mountains where the boundary line comes down to the coastline at approximately where the present town of Malibu is located. The territory includes the three ocean islands of San Nicolas, San Clemente and Santa Catalina, and the ocean waters surrounding the islands and between the islands and the mainland. (Heizer 1968:End Papers map; Hodge 1971:480 (Vol 1); Johnston 1962:Map; Kroeber 1976:620–621, Plate 57; McCawley 1996:3, 22–25; Moriarity 1969:5) The territory includes the Verdugo Mountains of which the central and highest peak was named Tongva Peak in 2006 (Chambers 2001:1–2).

The RBEP is located in the coastal portion of the Gabrielino-Tongva's mainland territory, approximately eight miles south of where Ballona Creek empties into the Pacific Ocean, and approximately three miles north of the Palos Verdes Hills. In the past there was, and now buried under the project site, is a salt pond, lake or lagoon. The formation of the salt bearing body of water is unknown and historically solicited some geological curiosity. There is no known creek or river that provided inflow from the land side of the salt lake. There is no known event(s) that suggests that this area was heavily inundated by the ocean to produce the abundance of salt historically removed from the lake. Freshwater did seep into the lake

[15] C. Hart Merriam (1968) suggests that the boundary is rather to the north along the Santa Ana River.

from the ocean side of the lake with the eastern or inland side of the lake exhibiting greater concentrations of salt. (Fuller 1940) There is also a historical report of fresh subsurface water within 20 yards from the edge of the lake and within 15 feet of the ground surface (Guinn 1907), leaving some to conclude that fresh water percolated up from beneath the bottom of the lake. The lake is reported to have dried up during the summer months. However, the mouths of creeks and rivers have also meandered over an extensive stretch of this coastline, making geomorphic related ethnographic location and formation predictions difficult. Various historians and anthropologists provide maps of Gabrielino-Tongva ethnographic village and camp locations (Heizer 1968:Map; Johnston 1962:Map; Kroeber 1976:Plate 57). A “Tongva Village” map, featured on two Gabrielino-Tongva tribal websites, also provides similar village and camp locations[16]. All of the maps and accompanying texts previously mentioned locate a village or camp site that is near the Salt Lake. The village name, provided in the literature variously as ‘Engnovangna’, ‘Ongoovanga’, or ‘Engva’[17], is thought to refer to the salt that was procured from the lake. The stretch of coastline from Ballona Creek to the mouth of the San Gabriel River is considered to have supported the mainland Gabrielino-Tongva villages most strongly affiliated with the Gabrielino-Tongva villages of the Catalina Island (Heizer 1968:111; Kroeber 1976:629, 630; McCawley 1996:66–68, 72, 113, 114, 157). A seminal map of Indian trails of aboriginal California depicts an ocean route between a Northern Catalina Island village site of Najquqar and Engnovangna (Davis: Map1; McCawley 1996:67, 79). There is also reference to a major trail coming from inland and terminating at the Salt Lake and Engnovangna (Fuller 1940; Johnston 1962:93).

Gabrielino-Tongva Affiliations and Relations with Other Indigenous Groups

The Gabrielino-Tongva maintained solid trade relations with all groups that surrounded them: The Chumash, the Tatviam, Serranno, Cahuilla, Luiseno and Juaneno (Bean and Smith 1978:547; Davis 1961:22). Through these intermediaries the Gabrielino-Tongva were known as far north as the southern Central Valley homelands of the Yokuts and to the east among the Yuman tribes of the Colorado River. Steatite, some of the best found in all of California, was traded from the Gabrielino-Tongva source located on Santa Catalina Island, out to the east as far as present day central Arizona. In addition, shellfish of the Gabrielino-Tongva coast provided superior source material for shell disc money. Marine mammals were in abundance along the Islands and mainland shores and off-shore rookeries. In long distance exchange, Gabrielino-Tongva received deer hides, obsidian and white clay pottery. A more local Los Angeles Basin trading network would have facilitated the exchange of the resources that result from the rich and local environment that constituted Gabrielino-Tongva and neighboring territories. There is some suggestion that local Gabrielino-Tongva trading occurred between the Islands and the coast and also between the coast and the inland villages. There is further suggestion that some animosity existed between coastal and inland Gabrielino-Tongva villages.

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[16] http://gabrielenoindians.org/Site/Gabrielino_Tribal_Council.html

[17] Engva, Engnovangna, Engnavanga and Ongoovanga are all used by various authors to refer to one place. ‘Engnovangna’ is used in this document to refer to the occupation site associated with Salt Lake, in lieu of other spellings unless the referent is used in a quote where it is spelled otherwise.

The Gabrielino-Tongva occupy the western end of one of the most extensive indigenous trade networks in the Southwest. The extensive trail system guided people and goods between the Southern California Coast and Central Arizona (Davis 1961). The regional indigenous trail network was of keen interest for the missionaries, intent on finding overland routes that allowed for transportation linkages to the established missions of New Mexico (Gates et al. 2013:4.3-136–4.3-141; Kessel 2002:253–287).

The literature suggests that the Gabrielino-Tongva were the center of the Jimson weed/datura/toloache cult (also referred to as the *Chingichngish*[18] religion) and that the neighboring Luiseno, Juaneno, and Chumash fashioned their similar ceremonies following the Gabrielino-Tongva lead (Bean and Smith 1978:548; Kroeber 1976:626–627; Moriarity 1969:2).

Sources of Ethnographic Data

The earliest ethnographic sources of information can be found in the records of the Spanish explorers and later missionary records. Of the various documents related to Spanish exploration and subsequent colonization, Father Boscana's manuscript on the religious beliefs of the Gabrielino-Tongva and neighboring tribes has provided invaluable information. The earliest attempt at Gabrielino-Tongva comprehensive ethnography can be attributed to Hugo Reid, a Scotsman, settler, naturalized Mexican citizen, and spouse of a Gabrielino woman, Victoria Reid. Reid documented place names and locations of Gabrielino villages and relied extensively on his wife and her relatives and contacts for his information. Reid's notes and letters have been published by Robert Heizer (Heizer 1968). Englehardt contains some ethnographic information in his writings on the California Missions in general (Englehardt 1908–1915) and specifically the two missions located within Gabrielino-Tongva territory (Englehardt 1927a, 1927b). C. Hart Merriam conducted seminal ethnographic research with one Gabrielino woman that produced valuable ethno-linguistic information, although it is not clear where the Merriam notes for the Gabrielino interviews are stored or published. Alfred Kroeber wrote the authoritative Gabrielino section included in the *Handbook of the Indians of California* (Kroeber 1976). John P. Harrington conducted ethnographic and linguistic studies that included ethnographic inquiry into the Chingichngish cult (Harrington 1933) and he produced a Gabrielino cultural element distribution list (Harrington 1942). Bernice Johnston produced a summary Gabrielino ethnohistory (Johnston 1962). Lowell Bean and Charles Smith co-wrote the Gabrielino section for the encyclopedic Handbook of North American Indians, Volume 8: California (Bean and Smith 1978). More recently William McCawley produced a Gabrielino ethnohistory (McCawley 1996) which was followed by a publication, co-written by Claudia Jurmain that is, in part, an ethnography of contemporary Gabrielino-Tongva people (Jurmain and McCawley 2009).

[18] There are six variant spellings of the name of the religious tradition. Bean and Smith (1978:548) clarify that the linguistic source is Luiseño and there is no known Gabrielino word for the religious tradition despite being considered to have originated with the Gabrielino and diffused to neighboring tribes.

Gabrielino-Tongva Economy, Resources and Material Culture

As stated earlier, the Gabrielino-Tongva territory consists of diverse landforms and a related diversity of resources. The territory includes ocean islands, the ocean, coastline beaches, estuaries, salt marshes, rivers, riverine basins or piedmonts, foothills and mountains. Gabrielino-Tongva were proficient at gathering acorns, sage, yucca, cacti, and a variety of plants, animals, and birds associated with the coastline salt marshes and estuaries. Sea fish, such as tuna and dolphins, were taken from the ocean and deer were harvested from the piedmont and mountains. Salt was gathered for daily consumption and for trade inland. The coastline extending between Ballona Creek and the Palo Verdes headlands is characterized as a calmer section of the Gabrielino-Tongva coastline and featured primary villages affiliated with secondary subsistence sites located inland (Bean and Smith 1978:539). The closest known coastal village site in proximity to the project area, Engnovangna, is located underneath and immediately adjacent to the project (McCawley 1996:61–63; Romani 1990:10–12).

Steatite was traded inland in raw and fashioned form, and was used to manufacture animal effigies, pipes, cooking utensils, arrow straighteners, and palettes (a type of armor plate). Asphaltum was used to assure water tight vessels including baskets and canoes, and was used to attach rare minerals, shells and beds to ceremonial dress. Bedrock and portable mortars predominated. The Gabrielino were uniquely known for specific ownership and transportation of personal mortars. Other utensils of common use were metates, mullers (pestles), mealing brushes, wooden stirrers, shell spoons, and wooden bowls. Deer scapulae were fashioned into saws. Bone, shell, wood and flints were fashioned into needles, awls, fishhooks, scrapers, flakers, wedges, shovels, projectile points, cane knives, and flint drills. Shell disc bead money was manufactured and used as local currency and was recognized as legitimate currency as far east as the Colorado River. Business transactions and obligations and payments on debt were tracked by knotting cordage. Ceremonial rattles were fashioned from gourds. Pottery does not show up in the various archaeological excavations of the area until the late mission period. Baskets were woven from rushes, grass, and various bushes. Various basket types included mortar hoppers, flat baskets, carrying and serving baskets, storage baskets and ceremonial baskets for grave offerings. Weapons for war or hunting consisted of war clubs, self- and sinew-backed bows, tipped and untipped cane arrows and throwing clubs and slings. Planked canoes, fashioned from wooden planks that were tied together with cordage and caulked with asphaltum, are a technological feat shared with the Chumash to the north and the Luiseno to the south. Marsh and estuary bodies of water were traveled by use of rush rafts. (Bean and Smith 1978:542; Heizer 1968:43–46; Kroeber 1978:628–632; McCawley 1996:111–142.)

Salt was used as a trade item, consumed in moderation, used in ceremony, and figured in the creation story (Davis 1962; Heizer 1968:23; Johnston 1962:62, 64, 70, 93).

Men and children went without clothing in the temperate climate. Women wore aprons of deerskin or the inner bark of willow or cottonwood trees. Capes used during cold or rainy seasons were made of deerskin, rabbit fur or bird skins woven together with milkweed or yucca fiber. Otter skins were also used and also traded inland. Ritual costumes were constructed of bird plumage, shells, and beads. Body paint was used during ceremonial events. (Bean and Smith 1978:540; Heizer 1968:23–24; McCawley 1996:11–13.)

Houses were domed, circular and covered with tule, fern or Carrizo reed mats. A large house could hold up to three or four families (50 people), and was perhaps 60 feet in diameter. Smaller diameter homes were as small as 12 feet in diameter. Willow post (and along the coastline and on the island sometimes whale rib bones) were inserted a pace apart around the circumference of the house. A smoke hole was left at the top of the dome and was covered with a tule mat. Houses along the coastline placed the doors to open towards the sea. The house entryway was also covered with mats. A trench was dug inside the door to catch any run-off that might make its way through the matted doorway. The floor was dirt, sprinkled with water and compacted. A hearth was fashioned with cobbles in the center of the house. The interior of the house was covered with more mats and rugs fashioned out of animal skin and fur made the house a very comfortable dwelling place. Houses in the interior and at higher elevations were semi-subterranean (two feet deep) in order to conserve heat.

Adjacent to houses were wind screens fashioned from posts buried in the ground and from which matting was suspended. These wind screens provided for open air kitchens that were used during fair weather. During inclement weather, cooking occurred around the indoor hearth. Large granary baskets also were placed adjacent to the main dwelling. The granary baskets, sometimes coated with asphaltum, sat upon posted platforms.

Common sweathouses were small semi-circular, semi-subterranean earth covered buildings reserved for adult male use. Sweathouses were sometimes built into banks of washes. The sweathouses were heated by direct fires that were placed near the door as the sweathouse was not fashioned with a smoke hole. The sweathouse was positioned in an area that provided near access to a water hole for bathing. A larger ceremonial sweathouse probably was also fashioned similar to the common sweathouse, but somewhat larger inside (12 feet diameter), and featured a smoke hole at the top that also functioned as an entrance that provided entry into the structure via a ladder. Menstrual huts were also constructed and frequented by women. It is not clear if the menstrual hut was also used for birthing (Heizer 1968:29).

Ceremonial open-aired enclosures placed near Chiefs' houses and near the center of villages, were made of willow posts and willow wicker. The interiors were decorated with feathers and painted posts. The ceremonial enclosures were used for the Chingichngish (toloache) cult. An effigy of the god Chingichngish and ceremonial sand paintings featuring depictions of the sun and moon, utilized for divination events, were placed within the enclosure. Only the most revered of the village male leadership, male initiates and female singers were permitted to enter. During funeral ceremonies, the grieving family members were allowed to enter the sacred enclosure. Some villages featured a second ceremonial enclosure that was not consecrated and that was used for practicing the initiation of the younger generation into the religion. Villages also featured leveled fields surrounded by posted fences for sporting events. Larger villages were thought to have populations of as many as 1,500 people. Cemeteries were located outside of, but immediately adjacent to, villages. Gravesites were marked by baskets or sandstone slabs decorated with etched figures commemorating the deceased. (Bean and Smith 1978:542; Kroeber 1976:628; McCawley 1996:27–30.)

Gabrielino-Tongva Political Organizations and Religious Practices

Because of the missionary conversion process, coupled with a high rate of disease for which Gabrielino-Tongva people were not immune, loss of traditional knowledge and a high rate of deaths left the Gabrielino-Tongva cultural traditions very fragmented by the time that anthropologists arrived to document what remained of the traditional culture. Therefore less is known about traditional Gabrielino political organization and religious practice.

The Gabrielino-Tongva seemed to have adhered to a moiety kinship structure likely of the "Dakota" system with Iroquois cousin terminology, similar to their neighboring Juaneno and Luiseno neighbors. In addition, crosscutting the kinship system were three social classes. Social classes tend to appear in societies that have evolved in environments that provide an abundance and diversity of resources. Gabrielino-Tongva society had an elite class of hereditary chiefs and the very wealthy. There was a middle or common class that were modestly wealthy and that were from fairly reputable lineages. There was a lower class of everyone else: the poor, disreputable, or those of ill fate. Marriage or wealth accumulations were the prime avenues for social movement within the class system. There were also social organizations and guilds that cross-cut village social structure and could include members from neighboring tribes. (Bean and Smith 1978:543, 545; McCawley 1996:10.)

Villages composed of non-localized segmentary lineages. One or two lineages may have dominated a particular village for a period of time but dominance was not permanent or guaranteed. Regardless of moiety or class affiliation, political autonomy occurred most effectively at the village or "tribelet" level, with the dominant lineage's leader assuming the village chief position. The leadership was manifest in the possession of the village sacred bundle and the possession of a chief name. Leadership tended to be passed through male descent, unless the other village lineage leads could agree that the either there was no one in the controlling lineage that existed, or there was no one of the dominant lineage that was competent to lead. Leadership at times could be passed to daughters. Village chiefs could combine and preside over more than one village and this could be done by alliance agreement or by having multiple wives, each in a different village. Larger villages could segment with some of the lineage forming a hamlet that still held allegiance to the parent village. A large and wealthy village could have multiple radiating hamlets or camps. Over time these smaller villages could rise to dominance and overshadow the parent village. A leader's responsibility was to protect the sacred bundle, collect taxes from the village houses, settle disputes, make decisions of war, negotiate peace treaties, and to generally live an exemplary life. The village leader could be assisted by an announcer, a tax collector/treasurer, general assistants and messenger/runners. However villages also had shamans who from time to time could trump the authority base of the village leader. (Bean and Smith 1978:544.)

Shamans gained their power and knowledge directly from the "Great Spirit" when conversing with the spirits while in Jimson Weed induced states. Shamans could cure or cause calamity and illness, divine, and knew, collected, and dispensed various herbal and animal remedies including the making of poisons for weapons. Gabrielino-Tongva practiced cremation of their deceased, including the burning of the deceased's personal belongings. Shamans were responsible for conducting the yearly mourning ceremonies for grieving families of the deceased. While village leaders or chiefs protected the sacred bundle, shamans were responsible for the spiritual protection of the sacred bundle. The Shamans from the Santa Catalina Island were considered to have been the most powerful and were accorded due respect. It was also thought that the Chingichngish religion was brought to the mainland by the religious leaders of the island. (Bean and Smith 1978:544; Johnston 1962:97)

Gabrielino-Tongva religious beliefs and practices are not well understood or documented but it appears that the Gabrielino-Tongva, and perhaps the Gabrielino-Tongva of Santa Catalina Island specifically, developed the Toloache cult which involved ritual consumption of Jimson Weed. This cult spread to distant tribal nations throughout Southern California and the southern Central Valley. The Jimson weed cult was most associated with the creator deity Chingichnich, who is attributed with fixing the world for humans. There is a pantheon of deities that surround Chingichnich. Participants, perhaps inducted into the cult during adolescence, gained insight into the nature of the world and the tribal and individual role and place in the universe; and that insight provided success in hunting, warring, or other activities of importance to the survival of the village over time. The Gabrielino-Tongva religion provided the society with a strict moral, political, economic, and legal code. (Kroeber 1976:626; McCawley 1996:143–169; Moriarty 1969.)

Gabrielino-Tongva Burial Knowledge and Practice

Burial beliefs and practices stem from the instructions of Chingichnich before he departed this world. There was a concept of an afterlife, place of heaven, and something similar to the Christian concept of purgatory. Upon death of the person, characterized as the breath leaving the person, it was understood that the heart of the person did not die, but through proper ritual was transported to heaven or purgatory. Heaven was thought to exist to the west, beyond San Clemente Island. In this “distant mountain in the sea” a benevolent god presided and all was good. For those who had imperfectly practiced Chingichnich’s instruction, purgatory was a place to the east “in the hills” where one’s heart would reside indefinitely until the god determined that proper penance had been performed. For the leaders of villages, the path to heaven was automatically assured so long as ritual consumption of a small portion of the deceased was conducted. After death, a wake would occur for a few days while general mourning commenced. The body was wrapped in a blanket, mat, net or seaweed. After the wake the body of the deceased was carried in procession to the village burial area where the burial commenced. Mainland Gabrielino-Tongva tended to conduct cremations while the Island Gabrielino-Tongva adhered to flexed burial practice. The hands were placed across the breast, and the entire body bound. That portion of the coastal mainland, from Ballona Creek to San Gabriel River where Island Gabrielino-Tongva had the strongest relations, tended to also practice flexed burial internment. For those villages adhering to cremation disposal of the deceased, the cremation remains were either interred or disposed of to the east of the village. Grave offerings were buried with deceased or, in the case of cremation, burned with the corpse. Some burials feature dog burials placed above the corpse. Gabrielino-Tongva saw the worlds of the living and the dead to be parallel places; therefore the items buried or burned with the deceased were intended to accompany the person to the afterworld where their statuses were recognized by the items that accompanied them. To loot a grave today is perceived by traditionally minded Gabrielino-Tongva to be a robbery of the deads’ status in another world. After the funeral ceremony, the living mourned for a year. Every fall, after the harvest ceremonies, an annual mourning ceremony was conducted for all of those who had passed in the past year. (Bean and Smith 1978:545–546; Heizer 1968:29–31; McCawley 1998:155–158.)

Contemporary Tribal Entities with Ethnographic Affiliations

There are various Gabrielino-Tongva tribes, nations and other organizations. Names are very similar and it is difficult at first glance to differentiate among the groups. The Native American Heritage Commission list provides additional tribal names that represent Gabrielino-Tongva people and culture. Tribal entities are listed below.

Gabrielino Band of Mission Indians – Kizh (Kitz) Nation

The Tribe does not affiliate with the name "Tongva" and instead prefers the name 'Kizh' (Kitz). They suggest that 'Kizh' refers to houses made of willow, tule and brush and refers to all the people that lived in such houses, ostensibly all "Gabrielinos". The tribal council of seven seeks federal recognition and is an advocate for the protection of cultural resources.

Gabrielino/Tongva San Gabriel Mission

No information available.

Gabrieleno/Tongva San Gabriel Band of Mission Indians

No information available.

Gabrielino Tongva Nation

No information produced by or directly representative of the Tongva Nation discovered online.

Gabrielino-Tongva Tribe

The Gabrielino–Tongva Tribe, historically part of the San Gabriel Band of Mission Indians, has offices in Los Angeles California. The tribe seeks federal recognition status, but has yet to receive recognition. They are guided by a council of four that collectively show expertise in business. The Tribe has been involved in efforts to establish a casino resort in the Los Angeles area.[19] The Tribe has requested that project ground-disturbing activities are monitored by tribal people.

Gabrielino/Tongva Indians of the California Tribal Council

Also referred to as the Gabrielino/Tongva Tribe of the Los Angeles Basin, their website covers the process and documentation of the tribe's elections[20].

Tongva Ancestral Territorial Tribal Nation

No information on this tribe was discovered online.

Ti'at Society/Intertribal Council of Pimu

No information concerning this tribe was discovered online.

[19] http://www.gabrielinotribe.org/

[20] http://www.tongvatribe.net/

Historic Setting

Spanish Period (1769–1821)

By the middle of the sixteenth century, Spain had emerged as the premier naval and military power in Western Europe with colonies in North and South America and a trading network throughout the Pacific. On September 28, 1542, Juan Rodriguez Cabrillo arrives in San Diego aboard the San Salvador and claims the land in the name of Spain (San Diego History Center 2012). In November 1602, Sebastian Vizcaino arrives in San Diego, surveys the coastline, and gets as far as Oregon (San Diego History Center 2012). In the late 1770s, Antonio Maria de Bucareli, the Viceroy of New Spain, "legitimized Spain's claim to Alta California by making it the new *Provincia de California* with a provisional capitol at the Presidio at Monterey" (Steiner 1999:6). Bucareli's plan was to use the missions to colonize the new province. While the Spanish explored the coast of present-day California in the mid-sixteenth century, it was not until the incursion of Russian and British explorers into what are now Alaska, British Colombia, Washington, and Oregon in the 1750s that serious attempts were made by the Spanish to colonize Alta California (Steiner 1999:4–6). It was Bucareli who ordered Juan Bautista de Anza to lead an exploration to establish a stable overland supply route from Sonora (present day Arizona), as well as from Mexico, in order to facilitate the colonization of California. Over 150 years would pass before the Spanish would attempt permanent settlement.

The Spanish colonization of California was achieved through a program of military-civilian-religious conquests. Soldiers secured areas for settlement by suppressing Indian and foreign resistance and establishing fortified structures called presidios. Civilians established pueblos (e.g., towns) and Spanish priests led the religious conquest effort by establishing missions and converting the Indians. The first of the 21 missions to be built in California by the Spanish was San Diego Alcala. Local Native American tribes were the dominant source of labor at the missions. In 1771 Father Junipero Serra founded Mission San Gabriel Arcangel, in present-day San Gabriel (Los Angeles County) (OCHS 2013). Mission San Juan Capistrano, in present-day San Juan Capistrano (Orange County) was founded on November 1, 1776 (OCHS 2013).

Large tracts of land were granted by the Spanish government to encourage settlement in Alta California. The Rancho San Pedro, where the city of Redondo Beach is now located, was an example of one of those large Spanish land grants.

Mexican Period (1821–1846)

In 1822, Mexico achieved independence from Spain, and California became an outpost of the Mexican Republic. By the 1840s, there was a steady migration of American settlers into California. Unable to stop the incursion, the Mexican government granted citizenship to all who would pledge to follow Mexican law. Many of these foreigners received land grants on which they established grazing and commercial operations.

Redondo Beach is situated on land that was once part of the Rancho San Pedro, granted by the Spanish military governor of California to Juan Jose Dominguez in March, 1784. The land was southwest of the El Pueblo de Los Angeles. The extent of the land grant included what now includes the cities of Redondo Beach, Hermosa Beach, Palos Verdes Peninsula, Torrance, Lomita, Wilmington, Gardena, Compton, Carson, Dominguez and Terminal Island.

The rancho was not very successful, even though Dominguez had doubled the size of his herd of cattle and horses during his tenure. Upon Juan Jose's death, his land went to his nephew, Sergeant Jose Cristobal Dominguez. Jose Cristobal's son Manuel Antonio y Fernando inherited the land from his father and was the first to actually take steps to make the rancho prosper.

The rancho has a complicated history. Manuel Dominguez had a 30-year career in public service under three different governments: Spain, Mexico and United States. Manuel lived on the rancho and built a home on Dominguez Hill, listed on the National Register of Historic Places in 1976 (Dominguez Rancho Adobe Museum, California Historical Landmark # 152). The land remained in the family and all the shares had been placed into a corporation controlled by the Dominguez sisters, Guadalupe, Susana and Maria. The property was then sold over the years and eventually divided up for development.

When California became Mexican territory in 1822, the Redondo Beach area was part of the Rancho San Pedro land grant covering approximately 43,000 acres bounded on the east by the San Gabriel River, on the west and southwest by the Pacific Ocean, and on the north by "a boundary of stone markers that extend westward from the San Gabriel River to the salt lake at Redondo Beach" (Duncan-Abrams and Milkovich 1995:11).

War broke out between the United States and Mexico in May 1846, with some decisive battles occurring in California. The American victory over Mexico was formalized in February 1848, with the signing of the Treaty of Guadalupe Hidalgo, and Mexico ceded all its land holdings north of the Gila and Rio Grande rivers to the United States. California was admitted as the thirty-first state in the Union on September 9, 1850.

American Period

In 1848, the discovery of gold at Sutter's Mill in northern California, near Sacramento, kick started the California Gold Rush. In 1850, California was granted statehood and its first 27 counties were established. Completion of the transcontinental railroad in 1869, and later the reach of Southern Pacific Railway and the Atchison, Topeka and Santa Fe Railway (ATSF, Santa Fe), into Southern California in 1876–1877, spurred a development boom. The ranchos gave way to townsite developments and resort destinations. Shipping and transportation via rail and ship now allowed for related business development to take place along the shoreline and interior areas of Southern California.

City of Redondo Beach

The Original Townsite

The Dominguez sisters sold a portion of their rancho in 1887, known as the Ocean Tract (approximately 433 acres), to the Redondo Beach Development Company. A townsite was laid out and sales of lots began (Johnson 1965:36–37). Only 40 lots were sold in the first two years. In 1889, the town's development plan was altered by a new investor, the Redondo Beach Improvement Company. In addition to forming the Redondo Hotel Company and the Redondo Railway Company, they also re-laid out the town. The north-south streets were given the names of Spanish women and the east-west streets were names after precious stones (Johnson 1965:39–40). These street names largely persist today. There is an established local register and National Register historic district, the Gertruda Avenue/Original

Townsite Historic Districts, which fall within these 1889 named street boundaries. These historic districts are listed in **Cultural Resources Table 5** and are located on Carnelian, Gertruda and Guadalupe Streets. The city of Redondo Beach was incorporated in 1892.

Railroads and Shipping

The ATSF railroad began serving Redondo Beach in 1889, with a terminal at the wharf. The Redondo Railway Company began narrow-gauge train service from Los Angeles in 1890. Regular train service was provided by both companies. (Johnson 1965:45–46). Passenger usage of the Redondo Railway increased over the years as the town became a tourist destination. In 1904, the Redondo Railway converted its steam engines to electric. Both lines led to the waterfront. It followed that the Hotel Redondo would add an incentive for the railroads to provide regular service. Later, a lumber yard in Redondo Beach would provide additional shipping opportunities for both the wharf and the railroads.

Henry Huntington invested in Redondo Beach in the early twentieth century in several ways: he purchased what was now known as the Los Angeles and Redondo Railway and folded it into the Pacific Electric Railway. He also purchased the holdings of the Redondo Land Company. The demand for electricity to run the Pacific Electric Railway and the “Big Red Cars” was the driving force behind the construction of the original steam electric plant at Redondo Beach in 1906. It was built as part of Huntington’s Pacific Light and Power Company, developed to provide electricity to the Los Angeles Railway Company. By 1910, nearing the end of his career, Huntington released most of his business interests, retaining the Los Angeles Railway Company and the Pacific Light and Power Company (Johnson 1965:63).

Steam Generation Electric Plants in California

Early History

In 1879, the Brush Plant in San Francisco was the first central generating station on the west coast to produce and distribute electricity on demand to customers. Prior to Thomas Edison’s invention of the incandescent electric light bulb in 1879, only the electric arc system was available, which turned out to be unsafe for indoor use. (Myers 1983:11.) Edison is also known for improving the generation and distribution systems for electricity, which truly opened up the consumer market. This “central station” concept was to become the cornerstone of the electric utility industry (Myers 1983:11).

Hydroelectric power was the dominant form of electric generation in California in 1920. By 1940, it grew to 89 percent of the market in California. However, by 1960, steam generating plants became the primary source of electricity in California as hydroelectric generation had fallen to 27 percent (JRP 2013:5).

Power generating plants constructed before World War II were typically housed in an architectural shell with a recognizable style of design. In the early part of the twentieth century, this was partly an outgrowth of the City Beautiful Movement. San Diego Consolidated Gas & Electric Company’s Station B (1911) and Sacramento’s PG&E Station A (1912) are examples of this early beaux arts-based Classical Revival presentation of an edifice housing the boilers, generators, and various facilities of a steam generating electric plant. The original Pacific Light and Power Company steam plant at Redondo Beach, constructed in 1906, was also emblematic of the Classical Revival style. All of these featured arched fenestration, distinct cornice details, rhythmic patterns of windows, columns or piers and spacious interior volumes housing the equipment.

Later examples adopted the architectural style of their times. The City of Vernon's Station A, built in 1932, is an excellent example of the Art Deco style of architecture popular at the time, especially in Southern California. A later addition to San Diego's Classical Revival style Station B (1928-1939) was constructed in the Spanish Revival and Art Deco styles.

The Predecessors of the Southern California Edison Company

The Southern California Edison Company (SCE) acknowledges three early predecessors; Holt and Knupp, the Santa Barbara Electric Light Company, and one individual entrepreneur (Myers 1983:13). Holt and Knupp, later known as the Visalia Electric Light and Gas Company, were responsible for lighting the streets of Visalia in 1886 as part of their Visalia Iron and Agricultural Works (Myers 1983:13). The Santa Barbara Electric Light Company was founded by General Samuel W. Backus in 1886 and on March 15, 1887, the company began providing power to homes, businesses, and hotels that had subscribed to the service as well as street lighting downtown (Myers 1983:17). The third predecessor of the SCE began when Charles R. Lloyd leased the power privileges at the Riverside Water Company's irrigation canal; near Highgrove the canal dropped 50 feet at one point and Lloyd planned to use this fall to generate electricity (Myers 1983:19). Eventually, Lloyd would incorporate his venture as the San Bernardino Electric Company (Myers 1983:20). Shortly after the steam powered systems in Visalia and Santa Barbara and the hydro powered system in Highgrove went online several other electric utilities began service and by the 1890s electric service was fairly wide-spread (Myers 1983:21–22). Initially power plants used direct current (DC) dynamos, which were limiting because the electricity could only travel a short distance, two to three miles, restricting the area that could be served. The introduction of alternative current (AC) dynamos extended this distance considerably. Almanrian William Decker, a San Antonio Light and Power engineer, invented a way in the early 1890s, to allow the step-up, step-down transformation of current and thereby, allowed distribution over long distances (Myers 1983:26). In a matter of months in 1892 and 1893, electric technology and the electric utility industry were revolutionized by two hydroelectric power plants in Southern California; the San Antonio plant proved the commercial feasibility of long-distance distribution and the Mill Creek plant is where the three-phase alternating current technology first appeared (Myers 1983:31). The Mill Creek plant continues to operate today. In 1894, the Los Angeles Edison Electric Company was formed to obtain a license from General Electric, Thomas Edison's company, to use the Edison name and patents in the Los Angeles area. In 1897, it merged with the West Side Lighting Company under the name the Edison Electric Company of Los Angeles (Myers 1983:37). As technology and the customer based allowed, the company grew. In 1901, John Barnes Miller became president; he was responsible for negotiating a number of mergers with the goal of creating a regional system (Myers 1983:40).

Southern California Edison

The Edison Electric Company reincorporated as the Southern California Edison Company in 1909. In 1917, SCE purchased the Pacific Light & Power Corporation from Henry Huntington, which was operating the Big Creek Hydroelectric plant in the Sierra Nevada, and the Redondo Beach Steam Station, originally built at the current RBGS site in 1906-1907. Big Creek was the primary source of electricity for Southern California until the post-war years. On the heels of the end of WWII, SCE constructed and updated numerous power plants to meet the expansion of industry and residential development in the area it served.

Post-War (WWII) Electric Power Generation in California

After World War II, steam-generated electricity underwent a significant expansion. Beginning in 1948, with the construction of Redondo Beach Steam Station, and over the ensuing several decades, ten new multiple-unit oil and gas-fired power plants came on line at coastal and inland sites in Southern California. Seven of these were Edison projects and three were Calelectric (California Electric Power Company) projects. (Myers 1983:208–209.) Calelectric's system was merged into Edison's on January 1, 1964 (Myers 1983:205).

The pent-up demand for electricity and electrical appliances after World War II sent utility companies scurrying for capacity. Usage jumped 14 percent between 1946 and 1947, but power firms could not get enough equipment to meet demand as labor troubles at manufacturers and reconversion to a peace-time economy stalled deliveries. But as the immediate post-war constraints alleviated themselves, the growth rate slowed to about 8 percent per year nationally from between 1947 and 1973. At this rate, utilities doubled the amount of electricity sold every nine to ten years. (Hirsh 2002.)

As noted in the previous subsection ("Southern California Edison Company"), SCE expanded and built many plants in the post-war years to accommodate the demand for electricity. The following plants were built in rapid-fire succession in Southern California: Etiwanda (1951), Redondo Beach Plant No. 2 (1952), El Segundo (1955), and Alamitos (1955). New units were added to all of these plants in the ensuing years into the mid-sixties. (JRP 2013:9.)

These new units constructed in the fifties and sixties were very similar to each other in design (JRP 2013:9). They evidenced that a transition had been made from indoor steam generating plants, with the components housed in architectural shells, to largely outdoor facilities generally lacking architectural merit or pretense. This is particularly evident at El Segundo Energy Center (ESEC), Etiwanda, Alamitos, and Huntington Beach. This is less evident at Redondo, where the original 1948 Plant 1, housed in an architectural shell in a defined style (Art Moderne) based on pre-World War II standards, transitioned to the later Plants 2 and 3 with less architectural embellishment and more open construction. This is discussed in more detail below and in **APPENDIX A**.

Redondo Beach Generating Station

RBGS is located on the site of an early steam electric generating plant built by Pacific Light and Power in 1906–1907. It was built by Henry Huntington to provide electric power for the Los Angeles Railway Company, also known as the Red Cars. In 1917, SCE purchased Pacific Light and Power. The steam station also provided hot water to the Redondo Beach bath house with a heated salt-water plunge (Smallwood 2014:15). It was, by this time, used only as a back-up power supply to the Big Creek Hydroelectric Plant. It was shut down in 1933. Due to the post-war demand for electricity, the old plant was demolished in 1946 and construction began on the Redondo Steam Station, now known as RBGS.

The first plant of RBGS (Plant 1) came online in 1948, and by 1949, it housed Units 1–4. Plant 2 (Units 5 and 6) was completed in 1956 and Plant 3 (Units 7 and 8) was completed in 1968.

Plant 1 is composed of the power facility, a connected administration building wing, gate house, and a water pumping station (pump house) located across what is now Harbor Drive. The pump house is the building now referred to as SEA Lab. These components of Plant 1, including the pump house, were designed and built in the Art Moderne style by Stone & Webster Corporation. The later Plants 2 and 3 are more representative of the post-war trend of SCE toward open-air construction of electric power generating plants in California. This semi-outdoor design, rather than enclosure in an architectural shell, became the standard during the SCE's expansion between 1950 and 1973.

Plant 1, with the Administration Building wing, and SEA Lab are excellent examples of the Art Moderne style of architecture. The doorway to the Administration Building is engraved overhead with the words Redondo Steam Station. While this group of RBGS buildings is utilitarian in nature, they exhibit key features of the Art Moderne style: repetitive pilasters framing window bays, and in the case of the Administration Building, an entryway marked by a heavy and pronounced surround with chamfered corners. The landscape is planted with a line of palm trees, *Washingtonia robusta*, along North Harbor Boulevard, and large, overgrown evergreen shrubs as foundation plantings. Based upon historical imagery seen at the Huntington Digital Library[21], it appears the palm trees were planted sometime after 1957. The Administration Building and Plant 1 are on a concrete pedestal raised above the sidewalk level containing the lawn areas and plantings. The concrete pedestal, raised lawn area, and wall leading to the gate house, are original to the 1948 construction date as seen in dated photographs. Both the SEA Lab and Administration Buildings are painted concrete, while Plant 1 is unpainted gray concrete.

[21] The Huntington Digital Library houses numerous historical photographs from Pacific Light & Power and Edison history. The online library may be viewed here: http://hdl.huntington.org/cdm/

Each building has some unique attributes that are unlike the others, and yet they read as a whole architecturally. The Administration Building has ganged windows on all three stories, whereas Plant 1 and SEA Lab have singular, tall glass-block windows in each bay extending to a good portion of the height of the buildings. Plant 1 has a clerestory row of smaller, double glass-block windows between the pilasters. SEA Lab has six bays with glass block windows separated by pilasters. SEA Lab has a non-original addition at the northeast corner which now functions as the entrance to the building. Windows in the administration building have been replaced but the original openings remain intact. Two of the original metal windows are extant on the east elevation of the building.

Plant 1's elevations are scored, whereas SEA Lab and the Administration Building are smooth concrete. Plant 1's North Harbor Boulevard façade is composed of 14 bays separated by pilasters.

The later additions of Plant 2 (1956) and Plant 3 (1965) mark the end of one era in architecturally-based steam electric plant design (and for that matter, hydroelectric plant design as well), and the beginning of the next era in design, namely the semi-outdoor and outdoor designs of the 1950s–1970s.This transition becomes one of the important themes of significance in the evaluation of this resource. The other two significance themes are the Stone & Webster Engineering Corporation, and Art Moderne Style of architecture, discussed below.

A more detailed description and photographs of the resource are found in **APPENDIX A**.

Stone & Webster Engineering Corporation

The Stone & Webster Engineering Corporation began as a partnership between Charles A. Stone and Edwin S. Webster in 1889. The company's long involvement with electric power generation began in 1890 with their first design/build contract for a hydroelectric generating plant in Maine. They were the designers of the extremely complicated Big Creek Hydroelectric system, requiring the construction of a 56-mile railroad line into the mountains along the San Joaquin River, a camp for the laborers and managers, and the series of dams and powerhouses themselves (Myers 1983:100–105).

Following the Big Creek project, Stone & Webster designed and built several facilities for SCE, including the Long Beach Steam Plant No. 2, a large facility with a series of power generating buildings in Classical Revival, Spanish Eclectic, and Art Moderne styles. Stone and Webster's extensive portfolio is not limited to electric power generation. The company had military contracts to build shipyards and various military facilities. Their feats of engineering and construction extended to the Rock Island Dam across the Columbia River and the 50-story Art Deco/Moderne RCA building in New York City. The RCA building bears some uncanny resemblances to the RBGS Plant 1, Administration Building and SEA Lab, with the obvious exception of its extreme verticality and Art Deco ornamentation at the tops of the window bays.

By the winter of 1941–1942, Stone & Webster had a total of one-million kW of steam generated power plant capacity in the process of design and construction. The World War II effort yielded Stone & Webster's most significant accomplishment to date: the company was retained by the United States government to design and build what is known as the Manhattan Project, in Oak Ridge, Tennessee, as well as ancillary facilities in Hanford, Washington and Los Alamos, New Mexico During the war period, the company undertook 78 power projects throughout the United States, West Indies, and Saudi Arabia (Stone & Webster 1946:131). This is in addition to a multitude of other industrial and manufacturing facilities completed during this period. Additional information about Stone & Webster may be found in **APPENDIX A**.

Art Moderne Architecture in Southern California

The three buildings that make up the RBGS Administration Building, Plant 1, and SEA Lab across the street, are compositions best described as Art Moderne. Identified by the applicant as Classical Moderne, likely in response to the vertical piers on the facades of each building, they are representative of a style that was popular throughout Southern California, and Los Angeles in particular, in the late 1920s, 1930s, and 1940s. The most obvious example is Los Angeles City Hall, built in 1928. Other well-known examples include the Los Angeles Times building (1935), the Wiltern Theatre and attached Pellissier building (1931), and the Fairfax Theatre (1930). Examples of more rudimentary buildings in the Art Moderne style are Samy's Camera at 431 South Fairfax in Los Angeles, the Cool-A-Coo building in Whittier, and the two-story hotel at 628 E. Anaheim Street in Long Beach. The 1948 Harbor Steam Plant in Wilmington was also executed in stripped-down Art Moderne style. What all of these buildings have in common are the verticality of the design elements. Whether it is the articulated corner piers in the case of Los Angeles City Hall, or the repetitive piers or pilasters across the facade in the RBGS buildings, the vertical emphasis is differentiated from the more horizontal Streamline Moderne style.

There are only a handful of Art Moderne buildings in Redondo Beach. There is a more detailed discussion of the evolution of the Art Moderne style and the Redondo Beach examples in **APPENDIX A**.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

Regulatory Context

California Environmental Quality Act

Various laws apply to the evaluation and treatment of cultural resources. CEQA requires the Energy Commission to evaluate resources by determining whether they meet several sets of specified criteria. These evaluations then influence the analysis of potential impacts to the resources and the mitigation that may be required to ameliorate any such impacts.

CEQA and the CEQA Guidelines define significant cultural resources under two regulatory definitions: historical resources and unique archaeological resources. A historical resource is defined as a "resource listed in, or determined to be eligible by the State Historical Resources Commission, for listing in the CRHR", or "a resource listed in a local register of historical resources or identified as significant in a historical resource survey meeting the requirements of Section 5024.1(g) of the Public Resources Code," or "any object , building, structure, site, area, place, record, or manuscript which a lead agency determines to be historically significant or significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California, provided the agency's determination is supported by substantial evidence in light of the whole record." (Cal. Code Regs., tit. 14, §15064.5[a].) Historical resources that are automatically listed in the CRHR include California historical resources listed in or formally determined eligible for the National Register of Historic Places (NRHP) and California Registered Historical Landmarks from No. 770 onward (Pub. Resources Code, §5024.1[d]).

Under CEQA, a resource is generally considered to be historically significant if it meets the criteria for listing in the CRHR. These criteria are essentially the same as the eligibility criteria for the NRHP. In addition to being at least 50 years old,[22] a resource must meet at least one (and may meet more than one) of the following four criteria (Pub. Resources Code, §5024.1):

- Criterion 1, is associated with events that have made a significant contribution to the broad patterns of our history;
- Criterion 2, is associated with the lives of persons significant in our past;
- Criterion 3, embodies the distinctive characteristics of a type, period, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or
- Criterion 4, has yielded, or may be likely to yield, information important to history or prehistory.

In addition, historical resources must also possess integrity of location, design, setting, materials, workmanship, feeling, and association (Cal. Code Regs., tit. 14, §4852[c]).

Even if a resource is not listed or determined to be eligible for listing in the CRHR, CEQA allows the lead agency to make a determination as to whether the resource is a historical resource as defined in Public Resources Code, sections, 5020.1(j) or 5024.1.

In addition to historical resources, archaeological artifacts, objects, or sites can meet CEQA's definition of a unique archaeological resource, even if it does not qualify as a historical resource (Cal. Code Regs., tit. 14, §15064.5[c][3]). Archaeological artifacts, objects, or sites are considered unique archaeological resources if "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 that 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.

3. Is directly associated with a scientifically recognized important prehistoric or historic event or person." (Pub. Resources Code, §21083.2[g].)

[22] The Office of Historic Preservation (OHP 1995:2) endorses recording and evaluating resources over 45 years of age to accommodate a five-year lag in the planning process.

To determine whether a proposed project may have a significant effect on the [cultural resources] environment, staff analyzes the proposed project's potential to cause a substantial adverse change in the significance of historical or unique archaeological resources. The significance of an impact depends on:

- The cultural resource affected;
- The nature of the resource's historical significance;
- How the resource's historical significance is manifested physically and perceptually;
- Appraisals of those aspects of the resource's integrity that figure importantly in the manifestation of the resource's historical significance; and
- How much the impact will change those integrity appraisals.

At Title 14, California Code of Regulations, section 15064.5(b), the CEQA Guidelines define a substantial adverse change as "physical demolition, destruction, relocation or alteration of the resource or its immediate surroundings such that the significance of an historical resource would be materially impaired."

HISTORICAL RESOURCES INVENTORY

The development of the inventory of historical resources in and near the proposed project area is the requisite first step in the assessment of whether the project might, under Public Resources Code section 21084.1, cause a substantial adverse change in the significance of a historical resource, and could, therefore, have a significant effect on the environment. The effort to develop the inventory has involved conducting a sequence of investigatory phases that includes doing background research, consulting with local Native American communities, conducting primary field research, interpreting the results of the inventory effort, as a whole, and evaluating whether found cultural resources are historically significant. This section discusses the methods and the results of each inventory phase, develops the historical resources inventory for the analysis of the proposed project, and interprets the inventory to assess how well it represents the archaeology of the project area of analysis (PAA).

Project Area of Analysis

The PAA is a concept that staff uses to define the geographic area in which the proposed project has the potential to affect cultural resources. The effects that a project may have on cultural resources may be immediate, further removed in time, or cumulative. They may be physical, visual, auditory, or olfactory in character. The geographic area that would encompass consideration of all such effects may or may not be one uninterrupted expanse. It may include the project area, which would be the site of the proposed plant (project site), the routes of requisite transmission lines and water and natural gas pipelines, and other offsite ancillary facilities, in addition to one or several discontiguous areas where the project could be argued to potentially affect cultural resources.

Staff defines the PAA as comprising (a) the proposed project site, and (b) an architectural study area to encompass one parcel beyond the proposed project site (AES 2012a:Figure 5.3-1a).

For ethnographic resources, the area of analysis is expanded to take into account sacred sites, traditional cultural properties (places), and larger areas such as ethnographic landscapes that may be far-ranging, including views that contribute to the historical significance of such historical resources. The NAHC assists project cultural resources consultants and staff in identifying these resources, and consultation with Native Americans and other ethnic or community groups may contribute to defining the area of analysis. For the proposed RBEP, staff identified one ethnographic resource, the Salt Lake, and so defined an area of analysis that includes the Salt Lake and related village or camp sites of Engnovangna.

No excavation is required or proposed within the architectural study area (outside the proposed project site). Demolition and excavation are proposed within the project site, however, to variable depths. The applicant expects demolition and construction-related excavation to reach as deep as ten feet below the current ground surface, except for the driving of foundation piles, which would require ground disturbance to 40 feet or more (AES 2012a:5.3-2; Cardenas et al. 2012:4-6). Other construction activities would involve digging to various depths (see **Cultural Resources Table 2**). This information defines the vertical limits of the PAA.

Cultural Resources Table 2
Depths of Major Excavations within the Proposed Project Site

Project Element	Proposed Depth (feet asl)	Proposed Depth (feet bgs)	Depth of Fill/ Previous Excavation (feet bgs)	References
CCGT/HRSG foundation slab	3.5	10	9.0–11.0 (after placing fill to 13.5 feet asl)	AES 2012a:2-21, 5.3-2
GSU transformers, concrete pad	3.5	10	9.0–11.0 (after placing fill to 13.5 feet asl)	AES 2012a:2-23, 5.3-2
ACC Pile Caps (14-inch diameter)	-26.5	≥ 40	9.0–11.0 (after placing fill to 13.5 feet asl)	AES 2012a:5.3-2; Ninyo & Moore 2011:24
STG Foundation	3.5	10	9.0–11.0 (after placing fill to 13.5 feet asl)	AES 2012a:2-21, 5.3-2
Inlets and storm drains (eastern PAA)	4.5–8.0	5.0–8.5	9.0–11.0 (after placing fill to 13.5 feet asl)	AES 2012a:2-15; Sarah Madams, personal communication 2014
New retention pond	3.5	10	9.0–11.0 (after placing fill to 13.5 feet asl)	AES 2012a:2-15, 5.3-2
Reconfigure 210,000-gal fire/service water storage tank	Unknown	Unknown	Unknown	AES 2012a:2-15
Fire water piping, hydrants	Unknown	4.5–7.5	Unknown	AES 2012a:2-16; Sarah Madams, personal communication 2014
Potable water, process water, and natural gas pipes	Unknown	5–8	Unknown	Sarah Madams, personal communication 2014
Gas pressure control station	6	10	Unknown	AES 2012a:2-15, 5.3-2
Service water tank 3	Unknown	Unknown	Unknown	AES 2012a:2-25
Install bare conductors	-6.5	20[a]	9.0–11.0 (after placing fill to 13.5 feet asl)	AES 2012a:2-34
OHTL poles	-6	18[a]	8	AES 2012a:3-1
Gas scrubber/filtering equipment	6	10	Unknown	AES 2012a:2-15, 5.3-2
Demolish RBGS Units 1–8	To foundation	0	Undetermined; not relevant	AES 2012a:2-1, 2-38
Demolish RBGS Auxiliary Boiler No. 1	To foundation	0	Undetermined; not relevant	AES 2012a:2-1, 2-38
Demolish main administrative building	To foundation	0	Undetermined; not relevant	AES 2012a:2-38
Dismantle and relocate Wyland Whaling Wall	To foundation	0	Undetermined; not relevant	AES 2012a:2-1, 2-38
Remove storm drains	6–7	9–10	≥ 9–10	AES 2012a:2-15; Sarah Madams, personal communication 2014
Remove water pipeline at eastern property line	6–7	13–14	≥ 13–14	Sarah Madams, personal communication 2014
Remove sanitary sewer (potential action)	6–7	9–10	≥ 9–10	Sarah Madams, personal communication 2014

Notes: a. Depth estimate based on staff analysis of the very similar Huntington Beach Energy Project (CEC 2013a:Cultural Resources Table 2). ACC = air-cooled condenser; CCTG = combined-cycle gas turbine; gal = gallon; GSU = generator step-up; HRSG = heat recovery steam generator; OHTL = overhead transmission line; PAA = project area of analysis; RBGS = Redondo Beach Generating Station; STG = steam turbine generator

Background Research

The background research for the present analysis employs information that the applicant and Energy Commission gathered from literature and record searches, and information that Energy Commission staff obtained as a result of consultation with affiliated Native American entities and the city of Redondo Beach. The purpose of the background information is to help formulate the initial cultural resources inventory for the present analysis, to identify information gaps, and to inform the design and the interpretation of the field research that will serve to complete the inventory.

Literature Review and Records Search

The literature review and records search portion of the background research attempts to gather and interpret documentary evidence of the known cultural resources in the project area of analysis. The source for the present search was the South Central Coastal Information Center (SCCIC) of the California Historical Resources Information System (CHRIS).

CHRIS Search

Methods

CH2M Hill, the cultural resources consultant to the applicant, requested a records search from the SCCIC for the proposed project on August 30, 2011[23] (SCCIC # 11782.8526). The records search covered the proposed project site and a one-mile radius surrounding it (AES 2012a:5.3-24). The records search, conducted by SCCIC staff on August 31, 2011, included examinations of the SCCIC's base maps of previous cultural resource studies and known cultural resources as well as:

- The NRHP listings.
- The CRHR listings.
- California Historical Landmarks listings.
- California Points of Historical Interest listings.
- Historic Property Data File (Galaz 2011:1; OHP 2011:163, 871–872, 877–916, 918).
- Archeological Determinations of Eligibility.
- Historic maps (COE 1944; USGS 1896). (Galaz 2011.)

In addition, staff conducted an online search for proposed projects and environmental impact analyses using the websites of the cities of Redondo Beach and Hermosa Beach. The purpose of this search was to identify cultural resource analyses that might not have been submitted to the SCCIC or were submitted after August 31, 2011.

[23] The AFC contains a records search request letter dated May 14, 2012 (Cardenas 2012). All other references to the records search in the AFC were associated with dates of August 30 and 31, 2011 (AES 2012a:5.3-24; Cardenas et al. 2012:3-1; Galaz 2011). Staff inquired in Data Request 61 whether a second records search was conducted in 2012 (CEC 2013:11). The applicant responded that its consultant conducted only one records search in August 2011 and that the date on the May 14, 2012 letter was a typographical error (AES 2013:10).

Results

The literature review and records search indicate that 39 previous cultural resource studies have been conducted in the records search area; of these, 13 cultural resource studies have been conducted within or adjacent to the PAA (**Cultural Resources Tables 3 and 4**).

Cultural Resources Table 3
Literature Review Results within or adjacent to the PAA

Author and Date of Study	SCCIC Study Number	Resources Identified
Kaufman 1976	LA-105	None (overview)
Demcak 1990	LA-2189	CA-LAN-1872/H (adjacent) Engnovangna (PAA) Old Salt Lake (PAA)
Van Wormer 1990	LA-2190	CA-LAN-1872/H (adjacent) Engnovangna (PAA) Old Salt Lake (PAA) Structures 1–3 (Weddle Woodcraft/Redondo Beach Planing Mill)
Lee 1990	LA-2201	CA-LAN-1872/H (adjacent) Engnovangna (PAA) Old Salt Lake (PAA) Structures 1–3 (Weddle Woodcraft/Redondo Beach Planing Mill)
McKenna 1991	LA-2499	None
Stickel 1993	LA-2904, -5741	None
McManus 1996	LA-3544	CA-LAN-1872/H (adjacent) Engnovangna (PAA) Old Salt Lake (PAA)
Hastey 1992	LA-3588	None (overview)
Duncan-Abrams and Milkovich 1995	LA-3609	None (historic context)
Hill 1985	LA-4323	None (research design)
Romani 1990	LA-5251	CA-LAN-1872/H (adjacent) Engnovangna (PAA) Old Salt Lake (PAA)
Bonner 2002	LA-6208	None
Thirtieth Street Architects 1986	LA-10852	None

Cultural Resources Table 4
Literature Review Results: Studies outside PAA, in Records Search Area

Author and Date of Study	SCCIC Study Number
Hector 1976	LA-206
Dillon 1980	LA-858
Woodward 1987	LA-1624
Wallace 1984	LA-2101
Hatheway 1983	LA-3265
Bucknam 1974	LA-3583
Maxwell 1991	LA-4171
Gray 1999	LA-4765
Sturm 1986	LA-5166
Sturm 1987	LA-5167
Dillon 1985	LA-5250
Mason 2001	LA-5915
Duke 2002a	LA-5917
Pletka 2003	LA-6205
McKenna 2003	LA-6206
Duke 2002b	LA-6207
McKenna 2002	LA-6990
Billat 2006	LA-8058
Bonner 2007a	LA-8799
Bonner 2007b	LA-9157
Bonner 2009	LA-9875
Carmack and Marvin 2004	LA-10068
Wlodarski 2005	LA-10069
McKenna 2009	LA-10333
Wallace 2008	LA-10652
MRS 2014	None

Of the 13 previous cultural resource studies conducted in the PAA, one was a regional archaeological research design (Hill 1985), two are regional overviews (Hastey 1992; Kaufman 1976), and one is a historic context statement (Duncan-Abrams and Milkovich 1995); these will not be discussed further in this subsection, as they do not report on survey work or cultural resources in the PAA. McKenna (1991) and Stickel (1993) report on records searches that cover the present PAA, but do not identify any cultural resources in the PAA. Bonner (2002) documents a negative-findings archaeological monitoring program. The only dedicated historic architectural survey in the PAA is described in Thirtieth Street Architects (1986); no cultural resources were identified in the PAA. The remaining five studies comprise a multi-disciplinary effort to document historic structures and archaeological resources immediately adjacent to the project site, within the architectural component of the RBEP PAA (Demcak 1990; Lee 1990; McManus 1996; Romani 1990; Van Wormer 1990). These studies consisted of records searches, archival research, archaeological and historic built-environment surveys, and archaeological excavations.

The literature review and records search indicate that a total of 87 cultural resources have been previously recorded in the records search area (**Cultural Resources Table 5**). Of these, 14 are located in the PAA (italicized resources in **Cultural Resources Table 5**).

Cultural Resources Table 5
Literature Review Results: Previously Recorded Cultural Resources

Resource Designation	Type	Description	Location	Significance	Source
Archaeological Resources					
P-19-127	Prehistoric site	Palmer-Redondo Site	Records search area		AES 2012a: Table 5.3-2
P-19-383	Prehistoric site		Records search area		AES 2012a: Table 5.3-2
P-19-1872/H	Prehistoric and historic site	Site of Weddle Woodcraft / Redondo Beach Planing Mill	PAA (1-parcel buffer)		AES 2012a: Table 5.3-2
P-19-186114	Prehistoric and historic site	Old Salt Lake	Project site	Local, CHL	AES 2012a: Table 5.3-2
Historic Built Environment Resources					
Dawn to Dusk Liquor	Commercial-residential	2 Hermosa Ave., Hermosa Beach	PAA (1-parcel buffer)	Not eligible	AES 2012a; Cardenas et al. 2012
121 Herondo Street	Residential	121 Herondo Street, Hermosa Beach	PAA (1-parcel buffer)	Not eligible	AES 2012a; Cardenas et al. 2012
County of Los Angeles, Beaches and Harbors Warehouse	Commercial-industrial	516 N. Broadway, Redondo Beach	PAA (1-parcel buffer)	Not eligible	AES 2012a; Cardenas et al. 2012
Triathlon Lab	Commercial	600 N. Catalina Ave., Redondo Beach	PAA (1-parcel buffer)	Not eligible	AES 2012a; Cardenas et al. 2012
Dive n' Surf, Inc.	Commercial	606 N. Catalina Ave., Redondo Beach	PAA (1-parcel buffer)	Not eligible	AES 2012a; Cardenas et al. 2012
South Bay Door & Window	Commercial-industrial	732 N. Catalina Ave., Redondo Beach	PAA (1-parcel buffer)	Not eligible	AES 2012a; Cardenas et al. 2012
Cannery Row	Commercial-industrial	604-606 N. Francisca Avenue	PAA (1-parcel buffer)	Not eligible	AES 2012a; Cardenas et al. 2012
610 N. Francisca Avenue	Commercial-industrial	610 N. Francisca Avenue, Redondo Beach	PAA (1-parcel buffer)	Not eligible	AES 2012a; Cardenas et al. 2012
King Harbor Marine Center	Commercial	831 N. Harbor Drive, Redondo Beach	PAA (1-parcel buffer)	Not eligible	AES 2012a; Cardenas et al. 2012
SEA Lab	Commercial-industrial-former pump house	1021 N. Harbor Drive, Redondo Beach	PAA (1-parcel buffer)	CRHR-eligible under Criteria 1 and 3	AES 2012a; Cardenas et al. 2012; Smallwood 2014
Redondo Beach Generating Station	Industrial District	1100 N. Harbor Drive, Redondo Beach	Project site	CRHR-eligible under Criteria 1 and 3.	AES 2012a; Cardenas et al. 2012; Smallwood 2014

Resource Designation	Type	Description	Location	Significance	Source
Structures 1–3	Historic industrial buildings	Weddle Woodcraft / Redondo Beach Planing Mill	PAA (1-parcel buffer)	Not eligible for CRHR, NRHP, or local listing (destroyed)	AES 2012a: Table 5.3-2
Metropolitan Bijou Theater	Commercial	1229-38 Hermosa Avenue, Hermosa Beach	Records search area	Local Landmark	Cardenas et al. 2012; Gazin 2013
Pier Avenue School / Hermosa Beach Community Center P-19-186751	Civic	710 Pier Ave., Hermosa Beach	Records search area	Local Landmark	Cardenas et al. 2012; Donnelly 2002
Bank of America Building	Commercial	90 Pier Ave., Hermosa Beach	Records search area	Local Landmark	Not attributed
Hermosa Hotel (now Surf City Hostel)	Commercial	20-26 Pier Ave., Hermosa Beach	Records search area	Local Landmark	Not attributed
Diamond Apartments P-19-177541	Residential	321 Diamond Street, Redondo Beach	Records search area	NRHP listed	Cardenas et al. 2012; Dyan 1991
Hermosa Valley School (Valley Vista School) LA-10068	School	1645 Valley Drive, Hermosa Beach	Records search area	Not eligible	Carmack and Marvin 2004
Sweetser Residence P-19-177599	Residential	417 E. Beryl Street, Redondo Beach	Records search area	NRHP listed	Cardenas et al. 2012; McAvoy 1984
Woman's Club of Redondo Beach P-19-177600	Commercial	400 S. Broadway, Redondo Beach	Records search area	NRHP listed	Cardenas et al. 2012; Loranger 1983
Redondo Beach Public Library; Moreton Bay Fig Tree P-19-177601	Civic/Historic Tree	309 Esplanade, Redondo Beach	Records search area	NRHP listed; CRHR listed	Cardenas et al. 2012
Cheetham House P-19-177668	Residential	625 Diamond Street, Redondo Beach	Records search area	Not eligible individually or as contributor to a district	Cardenas et al. 2012; McKenna 2003
Tumanjian Residence	Residential	219 S. Francisca Ave, Redondo Beach	Records search area	Not eligible individually or as contributor to a district	McKenna 2002
Neutra Apartments	Residential	1608 The Strand	Records search area	Potential local landmark[24]	
Unnamed	Residential	1602 The Strand	Records search area	Potential local	

[24] Potential Local Landmarks as identified by the City of Hermosa Beach. These resources are protected as if they are listed under Municipal Code 17.53. The Historic Resources listing was last updated in 2009.

Resource Designation	Type	Description	Location	Significance	Source
House				landmark	
Insomniac Coffee House	Commercial	53–57 Pier Avenue (now Loreto Plaza)	Records search area	Potential local landmark	
The Lighthouse	Commercial	36 Pier Avenue	Records search area	Potential local landmark	
Berth Hotel	Commercial	1042 The Strand	Records search area	Potential local landmark	
Sea Sprite Motel	Commercial	1016 The Strand	Records search area	Potential local landmark	
Charlie Chaplin House	Residential	32 10th Street	Records search area	Potential local landmark	
Mrs. Gooch's Building Hermosa Tabernacle Church	Commercial	526 Pier Avenue	Records search area	Potential local landmark	
Clark Stadium Building	Civic	Valley Drive	Records search area	Potential local landmark	
Grannnis Hotel & Apartments	Commercial/ Residential	24 11th Street	Records search area	Potential local landmark	
William W. Matthews House	Residential	31 8th Street	Records search area	Potential local landmark	
Del Mar Apartments	Residential	840 The Strand	Records search area	Potential local landmark	
Pitcher House	Commercial	300 Pacific Coast Highway	Records search area	Potential local landmark	
GTE Building	Industrial	102 Pacific Coast Highway	Records search area	Potential local landmark	
Matteson House	Residential	1040 Manhattan Avenue	Records search area	Potential local landmark	
Gertruda Avenue Historic District/Original Townsite Historic District P-19-177669[25]	Historic district	14 historic buildings on N. Gertruda Ave between 304 and 319	Records search area	LHD, NRHD, HOZ	
Original Townsite Historic District *P-19-177669*	Historic district	18 historic buildings on Carnelian, Gertruda, & Guadalupe Ave	Records search area	LHD, NRHD, NRHP	
North Catalina Historic District	Historic district	216 & 218 N. Catalina Ave	Records search area	LHD	
	A. S. Day House	108 Beryl Street	Records search area	Local Landmark	
	Albee House	607 Esplanade	Records search area	Local Landmark	
	American Legion Clubhouse	412 S. Camino Real	Records search area	Local Landmark	
	Brandt House	426 N. Gertruda Avenue	Records search area	Local Landmark	

[25] The Original Townsite NRHP District has different boundaries than the local district.

Resource Designation	Type	Description	Location	Significance	Source
	Carter House	709 Avenue C	Records search area	Local Landmark	
	Cholvin House	509 Garnet St	Records search area	Local Landmark	
	Crisler House	417 Miramar Dr	Records search area	Local Landmark	
	Davis House	501 Avenue B	Records search area	Local Landmark	
	Dorrington Apartments	108 N. Broadway	Records search area	Local Landmark	
	Emerald Street	824 Emerald Street	Records search area	Local Landmark	
	Gephart House	519 S.Catalina Avenue	Records search area	Local Landmark	
	Griffey House	227 Avenue C	Records search area	Local Landmark	
	Huffman House	612 Beryl Street	Records search area	Local Landmark	
	Hussong House	512 Garnet St	Records search area	Local Landmark	
	Johnson House	417 Emerald Street	Records search area	CRHR	
	Koch-Raymond House	303 N. Francisca Ave	Records search area	Local Landmark	
	Langworthy House	208 S Guadalupe Ave	Records search area	Local Landmark	
	Lowe House	510 Garnet St	Records search area	Local Landmark	
	Martin House	513 Garnet St	Records search area	Local Landmark	
	Mason House	133 N. Broadway Ave	Records search area	Local Landmark	
	Mayer House	115 Ruby Street	Records search area	Local Landmark	
	McFadden House	505 Garnet Street	Records search area	Local Landmark	
	Medlicott House	106 El Redondo	Records search area	Local Landmark	
	Miller House	311 N. Francisca Ave	Records search area	Local Landmark	
	Monstad House	559 Avenue A	Records search area	Local Landmark	
	Montague House	125 S. Irena Ave	Records search area	Local Landmark	
	Morrell House at Dominguez Park	298 Flagler Lane	Records search area	Local Landmark	
	Murray House	422 S.Guadalupe	Records search area	Local Landmark	
	Newlywed House	412 Pearl Street	Records search area	Local Landmark	
	Oklahoma Apartments	305 Emerald St	Records search area	Local Landmark	
	Perrin House	233 South Francisca Ave	Records search area	Local Landmark	
	Pfeifer/Dodge House	605 Garnet St	Records search area	Local Landmark	
	Pollock House	309 N. Francisca Ave	Records search area	Local Landmark	
	Putters House	105 N. Juanita Avenue	Records search area	Local Landmark	
	Queen Anne House at Dominguez	302 Flagler Lane	Records search area	Local Landmark	

Resource Designation	Type	Description	Location	Significance	Source
	Park				
	Query House	631 Emerald Street	Records search area	Local Landmark	
	Stamas House	313 N. Francisca Ave	Records search area	Local Landmark	
	Sweetser Guest House	507 N.Gertruda Avenue	Records search area	Local Landmark	
	Thomas House	323 S.Francisca	Records search area	Local Landmark	
	Vincent Park	Vincent Street	Records search area	Local Landmark	
	Wolfsberg House	511 Garnet Street	Records search area	Local Landmark	
Note: Resources shown in italics are located within the PAA. Abbreviations: Ave = avenue; CRHR = California Register of Historical Resources; HOZ = Historic Overlay Zone; LHD = Local Historic District; NRHD = National Register Historic District; NRHP-National Register of Historic Places					

Within the PAA are 11 built environment resources of historic age (45 years or older as of the date of the survey), including the existing RBGS. All of the resources are buildings or industrial structures. The applicant found none of the resources eligible for listing on either the NRHP or CRHR. After conducting additional research and evaluation, staff concludes that RBGS and SEA Lab are eligible for listing as historical resources on the CRHR under criteria 1 and 3. These are listed in **Cultural Resources Table 5**. RGBS was recorded by the applicant as a district and comprises 14 built-environment components (**Cultural Resources Table 6**).

Cultural Resources Table 6
Redondo Beach Generating Station (RBGS)

No.	Resource Designation	Type & Description	Date	Other
1	Administration Building	Office Building-Concrete Art Moderne	1948	Three stories, attached to Plant 1; circular driveway and mature landscape.
2	Foam Pump House	Exposed steel frame building	1948	No longer in use.
3	Primary Fuel Pump House	Corrugated metal rectangular building	1948	No longer in use.
4	Gas Service Structure	Corrugated metal building	1948	Elevated with a metal pipe railing.
5	Paint Shop	Corrugated metal building	1948	No longer in use.
6	Parking Garages (3)	Corrugated metal building with open garage bays	1948	Car parking.
7	Plant 1 (Units 1-4)	Concrete building-Art Moderne housing four boiler-turbine components	1948–1949	Exhaust stack(s) separate exterior structures(removed); switchyard
8	Plant 2 (Units 5-6)	Three-sided steel and concrete building housing two boiler-turbine components	1956	Exhaust stacks separate exterior structures
9	Plant 3 (Units 7-8)	Three-sided steel building housing boiler-turbine components	1968. 1980s 4^{th} wall added	“Whaling Wall”—1991, restored 2011
10	Water Pumps & Screens	Water system supplying sea water to main condenser for Plants 2 and 3	1956–1968	Ocean intake facility
11	Service Water House	Corrugated metal building	1948	

No.	Resource Designation	Type & Description	Date	Other
12	Stone & Webster Building Maintenance Shops	Corrugated metal building	1947	Support building from original construction of Plant 1.
13	230kV Switchyard & Control House	Switchyard with small concrete block building	1956–1968	Original use for fire water service.
14	Fuel Tank Site Footprints	Original fuel oil tanks (five) and concrete detention berms	1948–1968	Tanks removed in 2006

Within the one-mile literature review and records search area, the applicant identified 11 built environment resources of historic age. All of the resources are buildings. Three are not eligible for listing on any register, four are listed local landmarks in Hermosa Beach and Redondo Beach, and the balance are listed on the NRHP. These are listed in **Cultural Resources Table 7**. These resources are also summarized in **Cultural Resources Table 5**.

Cultural Resources Table 7
Built Environment Resources in the Literature Search Area

No.	Resource Designation	Type & Description	Location	Local/NRHP/CRHR Status	Recorded by
1	Metropolitan Bijou Theater	Commercial	1229-38 Hermosa Avenue, Hermosa Beach	Local Landmark	Cardenas et al. 2012; Gazin 2013
2	Pier Avenue School/Hermosa Beach Community Center *P-19-186751*	Civic	710 Pier Ave., Hermosa Beach	Local Landmark	Cardenas et al. 2012; Donnelly 2002
3	Bank of America Building	Commercial	90 Pier Ave., Hermosa Beach	Local Landmark	Not attributed
4	Hermosa Hotel (now Surf City Hostel)	Commercial	20-26 Pier Ave., Hermosa Beach	Local Landmark	Not attributed
5	Diamond Apartments *P-19-177541*	Residential	321 Diamond Street, Redondo Beach	NRHP listed	Cardenas et al. 2012; Dyan 1991
6	Hermosa Valley School (Valley Vista School) *LA-10068*	School	1645 Valley Drive, Hermosa Beach	Not eligible	Carmack and Marvin 2004
7	Sweetser Residence *P-19-177599*	Residential	417 E. Beryl Street, Redondo Beach	NRHP listed	Cardenas et al. 2012; McAvoy 1984
8	Woman's Club of Redondo Beach *P-19-177600*	Commercial	400 S. Broadway, Redondo Beach	NRHP listed	Cardenas et al. 2012; Loranger 1983
9	Redondo Beach Public Library; Moreton Bay Fig Tree *P-19-177601*	Civic/Historic Tree	309 Esplanade, Redondo Beach	NRHP listed	Cardenas et al. 2012
10	Cheetham House *P-19-177668*	Residential	625 Diamond Street, Redondo Beach	Not eligible individually or as contributor to a district	Cardenas et al. 2012; McKenna 2003
11	Tumanjian Residence	Residential	219 S. Francisca Ave., Redondo Beach	Not eligible individually or as contributor to a district	McKenna 2002
Note: Resources with identifiers in italics have been previously evaluated.					

Staff has identified 15 other built environment resources in Hermosa Beach within the one-mile literature review and records search area. These resources are identified by the city of Hermosa Beach as potentially eligible for listing on the local register and are protected under the City of Hermosa Beach Historic Resources Preservation Ordinance, Municipal Code Chapter 17.53. These resources appear on a map published as part of the city's General Plan in February 2009. These resources are listed in **Cultural Resources Table 8**. This table also lists two historic districts and 43 landmarks in Redondo Beach. Historic built-environment resources within one mile of the proposed project area depicted on **Cultural Resources Figure 1**.

Cultural Resources Table 8
Built Environment Resources in the Literature Search Area Not Summarized by Applicant in AFC or DA 5.3-1

No.	Resource Designation	Type & Description	Location	Year Built	Local/NRHP/CRHR Status
Hermosa Beach					
1	Neutra Apartments	Residential	1608 The Strand	1939	Potential Local Landmark[26]
2	Unnamed House	Residential	1602 The Strand	1927–1930	Potential Local Landmark
3	Insomniac Coffee House	Commercial	53–57 Pier Avenue (now Loreto Plaza)	Unknown: Period of Significance 1959–1963	Potential Local Landmark
4	The Lighthouse	Commercial	36 Pier Avenue	1930–1939	Potential Local Landmark
5	Berth Hotel	Commercial	1042 The Strand	1908–1945	Potential Local Landmark
6	Sea Sprite Motel	Commercial	1016 The Strand	1957–1958	Potential Local Landmark
7	Charlie Chaplin House	Residential	32 10th Street	1928–1929	Potential Local Landmark
8	Mrs. Gooch's Building Hermosa Tabernacle Church	Commercial	526 Pier Avenue	1925–1945	Potential Local Landmark
9	Clark Stadium Building	Civic	Valley Drive	unknown	Potential Local Landmark
10	Grannnis Hotel & Apartments	Commercial / Residential	24 11th Street	1914	Potential Local Landmark
11	William W. Matthews House	Residential	31 8th Street	1914–1925	Potential Local Landmark
12	Del Mar Apartments	Residential	840 The Strand	1923–1930	Potential Local Landmark
13	Pitcher House	Commercial	300 PCH	1926	Potential Local Landmark
14	GTE Building	Industrial	102 PCH	unknown	Potential Local Landmark
15	Matteson House	Residential	1040 Manhattan Avenue	1906–1925	Potential Local Landmark

[26] Potential Local Landmarks as identified by the City of Hermosa Beach. These resources are protected as if they are listed under Municipal Code 17.53. The Historic Resources listing was last updated in 2009.

No.	Resource Designation	Type & Description	Location	Year Built	Local/NRHP/CRHR Status
Redondo Beach					
Historic Districts					
	Gertruda Avenue Historic District (LHD)/ Original Townsite Historic District (NRHD) *P-19-177669*		14 historic buildings on N. Gertruda Ave 304–319	1907–1993	LHD, NRHD, HOZ
	Original Townsite Historic District *P-19-177669*		18 historic buildings on Carnelian, Gertruda, & Guadalupe Ave	1907–1924	LHD, NRHD, NRHP
	North Catalina Historic District		216 & 218 N. Catalina Ave	Pre-1895–1913	LHD
Landmarks					
1	A. S. Day House		108 Beryl St	1920	Local Landmark
2	Albee House		607 Esplanade	Pre-1906	Local Landmark
3	American Legion Clubhouse		412 S. Camino Real	1927	Local Landmark
4	Brandt House		426 N. Gertruda Avenue	1921	Local Landmark
5	Carter House		709 Avenue C	1925	Local Landmark
6	Cholvin House		509 Garnet Street	1913	Local Landmark
7	Crisler House		417 Miramar Drive	1928	Local Landmark
8	Davis House		501 Avenue B	1930	Local Landmark
9	Dorrington Apartments		108 N. Broadway	1907	Local Landmark
10	Emerald Street		824 Emerald Street	1890's	Local Landmark
11	Gephart House		519 S.Catalina Avenue	1913	Local Landmark
12	Griffey House		227 Avenue C	1930	Local Landmark
13	Huffman House		612 Beryl St	1920	Local Landmark
14	Hussong House		512 Garnet Street	1910	Local Landmark
15	Johnson House		417 Emerald Street	1911	CRHR
16	Koch-Raymond House		303 N. Francisca Avenue	1907	Local Landmark
17	Langworthy House		208 S Guadalupe Avenue	1911	Local Landmark
18	Lowe House		510 Garnet Street	1910	Local Landmark
19	Martin House		513 Garnet Street	1912	Local Landmark
20	Mason House		133 N. Broadway Ave	1913	Local Landmark
21	Mayer House		115 Ruby St	1910	Local Landmark
22	McFadden House		505 Garnet Street	1920	Local Landmark
23	Medlicott House		106 El Redondo	1924	Local Landmark
24	Miller House		311 N. Francisca Avenue	1922	Local Landmark
25	Monstad House		559 Avenue A	1911	Local Landmark
26	Montague House		125 S. Irena Avenue	1909	Local Landmark

No.	Resource Designation	Type & Description	Location	Year Built	Local/NRHP/CRHR Status
27	Morrell House at Dominguez Park		298 Flagler Lane	1906	Local Landmark
28	Murray House		422 S.Guadalupe	1936	Local Landmark
29	Newlywed House		412 Pearl St	1923	Local Landmark
30	Oklahoma Apartments		305 Emerald Street	1905	Local Landmark
31	Old Salt Lake Monument		1100 N. Harbor Drive		CRHR
32	Perrin House		233 South Francisca Avenue	1911	Local Landmark
33	Pfeifer/Dodge House		605 Garnet Street	1912	Local Landmark
34	Pollock House		309 N. Francisca Avenue	1922	Local Landmark
35	Putters House		105 N. Juanita Ave	1913	Local Landmark
36	Queen Anne House at Dominguez Park		302 Flagler Lane	1904	Local Landmark
37	Query House		631 Emerald Street	1922	Local Landmark
38	Stamas House		313 N. Francisca Avenue	1924	Local Landmark
39	Sweetser Guest House		507 N.Gertruda Avenue	1909	Local Landmark
40	Thomas House		323 S.Francisca	1892	Local Landmark
41	Vincent Park		Vincent St	1887	Local Landmark
42	Wolfsberg House		511 Garnet Street	1913	Local Landmark
43	Zurborg House		921 Emerald Street	ca.1923	Local Landmark
Abbreviations: CRHR = California Register of Historical Resources; HOZ = Historic Overlay Zone; LHD = Local Historic District; NRHD = National Register Historic District; NRHP = National Register of Historic Places; PCH = Pacific Coast Highway; St = street					

Additional Literature Review

Staff conducted additional research at the Energy Commission in-house library through inter-library loans services, California History Room of the California State Library in Sacramento, and online sources, as well as consulted the reports contained in the applicant's records searches to improve the historic map coverage acquired by the applicant (AES 2012a; Cardenas et al. 2012:3-1, Appendix 5.3C). The purpose of this research was to obtain a visual understanding of the natural and cultural development of the land in and around the PAA, identify locations of potential historic built environment and archaeological resources, and have a partial, chronological record of disturbances in the PAA. To this end, staff attempted to locate a detailed map of the PAA at ten-year intervals[27], beginning about A.D. 1769 and moving toward the present. All consulted historic maps are presented in **Cultural Resources Table 9**.

[27] Five- to ten-year intervals are widely regarded as a reasonable basis on which to observe mapped changes in landscapes and settlement patterns in historical research (Conzen 1990:189).

Cultural Resources Table 9
Historic Maps Consulted

Map Name	Scale	Survey Date	Reference
Patent Map of Rancho San Pedro	1 inch = 60 chains	December 1857	GLO 1858
Patent Map of Rancho los Palos Verdes	1 inch = 40 chains	September 1859	GLO 1880
Patent Map of Rancho Sausal Redondo	1 inch = 80 chains	1868	GLO 1875
Map of the County of Los Angeles	1 inch = 2 miles	About 1877	Wildy and Stahlberg 1877
Redondo Sheet	1 inch = 1 mile	1894	EDR 2011a; USGS 1896
Southern California, Sheet 1	1:250,000	About 1901	EDR 2011a
Map of the Ocean Beach Subdivision	1 inch = 200 feet	1902	Friel 1902
Sanborn Map of Redondo Beach	1 inch = 150 feet	1904	EDR 2011b
Sanborn Map of Redondo Beach	1 inch = 150 feet	1908	EDR 2011b
Sanborn Map of Redondo Beach	1 inch = 150 feet	1912	EDR 2011b
Sanborn Map of Redondo Beach	1 inch = 150 feet	1916	EDR 2011b
Torrance Quadrangle	1 inch = 2,000 feet	About 1924	EDR 2011a
Aerial Photograph	1 inch = 500 feet	1928	EDR 2011c
Torrance Quadrangle	1 inch = 2,000 feet	About 1934	EDR 2011a
Aerial Photograph	1 inch = 555 feet	1938	EDR 2011c
Redondo Quadrangle	1 inch = 1 mile	Surveyed 1923, aerial photographs taken 1942	COE 1944
Sanborn Map of Redondo Beach	1 inch = 150 feet	1946	EDR 2011b
Aerial Photograph	1 inch = 666 feet	1947	EDR 2011c
Redondo Quadrangle	1:50,000	About 1948	EDR 2011a
Long Beach Vicinity Quadrangle	1 inch = 2,000 feet	About 1951	EDR 2011a
Aerial Photograph	1 inch = 400 feet	1956	EDR 2011c
Sanborn Map of Redondo Beach	1 inch = 150 feet	1959	EDR 2011b
Redondo Beach Quadrangle	1 inch = 2,000 feet	About 1963	EDR 2011a
Aerial Photograph	1 inch = 666 feet	1965	EDR 2011c

Documents filed by the applicant for the RBEP project included a survey for built environment resources in the PAA. The survey and evaluation covered 11 resources within the PAA, including the RBGS and SEA Lab.

Native American Consultation

Methods

The Governor's Executive Order B-10-11, executed on September 19, 2011, directs state agencies to engage in meaningful consultation with California Indian Tribes on matters that may affect tribal communities. The California Resources Agency has adopted a Final Tribal Consultation Policy on November 20, 2012. The recently adopted policy extols informed decision making by collaboratively working with tribes to seek positive, achievable, and durable outcomes. The Energy Commission Siting Regulations require applicants to contact the NAHC for information on Native American sacred sites and a list of Native Americans interested in the project vicinity. The applicant is then required to notify the Native Americans on the NAHC's list about the project and include a copy of all correspondence with the NAHC and Native Americans and any written responses received, as well as a written summary of any oral responses in the AFC (Cal. Code Regs., tit. 20, §1704[b][2], Appendix B[g][2][D]).

The NAHC is the primary California government agency responsible for identifying and cataloging Native American cultural resources, providing protection to Native American human burials and skeletal remains from vandalism and inadvertent destruction, and preventing irreparable damage to designated sacred sites and interference with the expression of Native American religion in California. It also provides a legal means by which Native American descendents can make known their concerns regarding the need for sensitive treatment and disposition of Native American burials, skeletal remains, and items associated with Native American burials.

The NAHC maintains two databases to assist cultural resources specialists in identifying cultural resources of concern to California Native Americans, referred to by staff as Native American ethnographic resources. The NAHC's Sacred Lands database has records for areas, places, sites and objects that Native Americans consider sacred or otherwise important, such as cemeteries and gathering places for traditional foods and materials. Their Contacts database has the names and contact information for individuals, representing a group or themselves, who have expressed an interest in being contacted about development projects in specified areas.

Results

Staff requested information on the presence of sacred lands in the vicinity of the proposed project, as well as a list of Native Americans to whom inquiries should be sent to identify both additional cultural resources and any concerns the Native Americans may have about the proposed project.

Staff contacted the NAHC on December 21, 2012, and requested a search of the Sacred Lands File and a Native American contacts list. The NAHC responded on December 26, 2012, with a list of Native Americans interested in consulting on development projects in the project area. A check of the NAHC sacred lands files resulted in negative findings within the project site. Staff sent letters to all of the NAHC-listed tribes on October 14, 2013, inviting them to comment on the proposed project and offered to hold face-to-face consultation meetings if any tribal entities so requested. Follow-up phone calls were made by staff on December 17, 2013. Subsequent email and phone conversations also occurred on December 18, 2013. Staff received several comments from tribal entities that because the project area is known to contain cultural resources, tribal monitors should be required during project ground disturbing activities.

Consultation with Others

Staff consulted with the city of Redondo Beach planning staff with regards to the history of the area and locally listed historical resources prior to the city becoming an intervener. Redondo Beach Planning staff provided Energy Commission staff with a copy of the City of Redondo Beach Historic Context Statement (Duncan-Abrams and Milkovich 1995).

Environmental Justice/Socioeconomic Methods

In accordance with federal and state law, regulations, policies, and guidance, staff considered the proposed project's potential to cause significant adverse impacts on environmental justice populations (E.O. 12898; 40 C.F.R., §§1508.8, 1508.14; Cal. Code Regs., tit. 14, §§15064(e), 15131, 15382; Cal. Code Regs., tit. 20, §1704(b)(2), App. B(g)(7); CEQ 1997). **Socioeconomics Figure 1** indicates that an environmental justice population exists within a six-mile buffer of the proposed project area (see the **SOCIOECONOMICS** section of this PSA for a discussion of methods and composition of the environmental justice population). In addition, staff reviewed the ethnographic and historical literature, and corresponded with Native American tribes, to determine whether any additional environmental justice populations use or reside in the project area. These efforts are documented in the "Ethnographic Setting" and "Native American Consultation" subsections of this PSA.

Cultural Resources Distribution Models

One critical use of the information drawn together during the background research for a cultural resources analysis is to inform the design and the interpretation of the field research that will complete the cultural resources inventory for the analysis. The background research for the present analysis of the RBGS and SEA Lab, along with nine other built environment resources within the PAA, were recorded for the AFC (AES 2012a, 2013b). A further role of background research is to help develop predictive or anticipatory models of the distribution of cultural resources across the PAA. Such models of the types of archaeological, ethnographic, and built-environment resources, and the patterns of their distribution across and beneath the surface of the landforms of the PAA, provide the means to tailor more appropriate research designs for the field investigations that will complete a cultural resources inventory, and help gauge the degree to which the results of those investigations may reflect the actual population of archaeological, ethnographic, and built-environment resources in the PAA. Such models also provide important contexts for the ultimate interpretation of the results of those investigations.

Models of the distribution of prehistoric archaeological sites, of ethnographic resources, and of historical archaeological sites and built-environment resources, are developed here and draw on information above in the "Environmental Setting," "Prehistoric Setting," "Ethnographic Setting," and "Historic Setting" subsections, in addition to the above information in the "Background Research" subsection. Staff formulated data requests during the discovery phase of the present certification process on the basis of these models to ensure the collection of enough information to factually support the conclusions of this analysis. The discussions in the "Interpretation of Results" subsection below also employ the models.

Model of Prehistoric Archaeological Resources

The analysis of the information in the "Environmental Setting," "Prehistoric Setting," and "Background Research" subsections leads to the conclusion that the likelihood of prehistoric archaeological deposits across the surface of the PAA is low and subsurface prehistoric archaeological deposits might be present in the PAA.

According to the *Geomorphology* subsection in this portion of the PSA, the sandy ocean shoreline present today began to form between 6000 and 5000 B.P., and was in place by about 4000 B.P. Particularly in the last 4,000 years, sand spits and droughts periodically closed larger estuaries and open bays, producing shallow lagoons and wetlands attractive to waterfowl (Dillon 1997:11; Masters and Aiello 2007:40). The project site appears to have been unique in that approximately half of the PAA was occupied by Old Salt Lake until it was filled between 1947 and 1948 (EDR 2011a, 2011b, 2011c; GLO 1858; USGS 1896). While occupied by the salt lake, the PAA was dominated by three natural features: (1) the El Segundo Sandhills along the western margin of the PAA, (2) a saline lagoon covering much of the proposed project site, and (3) the lagoon fringe/alluvial plain (EDR 2011c; GLO 1858, 1875). Human habitation with respect to Old Salt Lake would have been restricted to the sand hills and lake margins. Although Old Salt Lake occupied much of the PAA from at least 1869 through the middle twentieth century, the location of estuaries, lagoons, and bolsas changed over the past 4,000–5,000 years (Engstrom 2006:852, 854). The surface of the PAA, therefore, cannot be assumed to have been uninhabitable for the entirety of the last 5,000 years. The resource base provided by the lake is known to have been a draw to human use and habitation of the project vicinity (AES 2012a:5.3-22; Cardenas et al. 2012:3-2; Fuller 1940; Wallace 1984). However, the extent of paving, prior excavation, and grading in the PAA renders the likelihood of encountering prehistoric archaeological resources on the ground surface very low.

Despite the low potential to identify prehistoric archaeological resources on the surface of the PAA, the present ground surface formed no more than approximately 4000 B.P., accounting for less than half of the span of human occupation on this coast. Prior to 4000 B.P., mean sea level was lower than today and watercourses and other aquatic features could have been positioned differently than in modern times, altering the suitability of the PAA for human habitation. Since pre-4000-B.P. landforms in the project vicinity are buried under the present land surface (unless eroded); the potential to encounter buried prehistoric archaeological resources during construction must be assessed.

The AFC presents an argument that previous ground disturbance at the proposed project site has reduced the likelihood of encountering buried archaeological resources to a low to moderate level. The AFC points out that construction of the existing RBGS and subsequent soil storage resulted in a large amount of ground disturbance and placement of fill. (AES 2012a:5.3-29; Cardenas et al. 2012:4-6, 5-9.) Staff agrees that prior disturbance and placement of fill reduces the probability of encountering intact buried archaeological resources.

Whether the applicant would encounter buried prehistoric archaeological deposits during construction depends on several factors, including the depositional character and the ages of the sedimentary deposits that construction would disturb, the presence of buried land surfaces or buried surfaces of ancient soils (paleosols), the duration or stability of any paleosols, the post-depositional character of geomorphic processes in the PAA, and the nature of past human activities in the area. The information provided in the AFC and staff analysis indicate that the proposed project site is in a depositional environment where buried former land surfaces and associated prehistoric archaeological materials have the potential to be found. Much or all of any such deposition would have occurred within the last 10,000 years. The *Environmental* and *Prehistoric* settings in this PSA show that marsh environments contain abundant resources, and in the present case were a draw to human use of the project vicinity. Given these qualities of the PAA, staff believes that the PAA might contain buried archaeological resources.

Model of Ethnographic Resources

Ethnography fulfills a supporting role for other anthropological disciplines as well as contributions on its own merits. Ethnography provides a supporting role to the discipline of archaeology by providing a cultural and historic context for understanding the people that are associated with the material remains of the past. By understanding the cultural milieu in which archaeological sites and artifacts were manufactured, utilized, or cherished, this additional information can provide greater understanding for identification efforts, making significance determinations per the National Historic Preservation Act (NHPA) or CEQA; eligibility determinations for the NRHP or the CRHR; and for assessing if and how artifacts are subject to other cultural resources laws, such as the Native American Graves Protection and Repatriation Act.

In addition, ethnography has merits of its own by providing information concerning ethnographic resources that tend to encompass physical places, areas, or elements or attributes of a place or area. Ethnographic resources have overlap and affinity to historic preservation property types referred to as cultural landscapes, traditional cultural properties (TCPs), sacred sites, heritage resources, historic properties, or historical resources that are areas or places, and specific historic property or historical resource types of sites, objects, buildings, structures, districts, areas or places. There is notable overlap in terminology when referring to ethnographic resources. Studies that focus on specific ethnographic resource types may also take on names such as ethnogeography, ethnobotany, ethnozoology, ethnosemantics, ethnomusicology, etc. In general, the ethnographic endeavor attempts to minimize human conflict by facilitating an iterative cross-cultural understanding and, by extension, self-awareness.

While several definitions of ethnographic resources can be found in historic preservation literature, the National Park Service (NPS) provides the most succinct and commonly used definition (NPS 2007:Chapter10):

> Ethnographic resources are variations of natural resources and standard cultural resource types. They are subsistence and ceremonial locales and sites, structures, objects, and rural and urban landscapes assigned cultural significance by traditional users. The decision to call resources "ethnographic" depends on whether associated peoples perceive them as traditionally meaningful to their identity as a group and the survival of their life ways.

Ethnographic Methods

Ethnographic methods, when applied to projects of limited size and scope, involve four steps.[28]

Step 1 involves reviewing the project description and mapped project location and, based upon the geographic and environmental setting, formulate preliminary guiding questions that may be asked of people with cultural affiliation to the project area.

[28] See Pelto 2013, Chapter 16 for an overview of applied ethnographic methods for conducting focused inquiry in limited timeframes.

Step 2 involves contacting, informally discussing with, (or formally interviewing) people that might have a cultural relationship or affiliation to a given area.

As Step 2 is being conducted, a parallel Step 3 involves an archival "search, retrieve, and assess" process that should be undertaken to provide supporting or conflicting information to what is being discovered through the discussion process. In addition to archive, book store, and other informational repositories (e.g., the internet), the people themselves or other ethnographers with previous experiences with the same people, may provide source materials. Findings in Step 3 may require a repetition of Step 2.

Step 4 involves field visit(s) that are intended to help the ethnographer triangulate between what people currently say, what people have written in the past, and what is actually or perceived to be in the project vicinity as a potential ethnographic resource.

Preliminary Guiding Questions

Based upon the project description and project location maps, two preliminary Guiding Questions were developed.

- Research specific Gabrielino-Tongva procurement and usage of resources, particularly salt, found in Southern California coastal environments and specifically the area near Redondo Beach.
- Research the history of Gabrielino-Tongva settlements in the coastal area near the project area and specifically research the Island Gabrielino-Tongva affiliations with mainland settlement in the coastal area at and immediately north and south of the project area.
- Research the role that marine resources, particularly salt, played in the long distance trade/trail network for which the project area was one of the trade network nodes on the western end of one of the most substantive trade/trail networks of North America.

As documented previously in this cultural resources section (*Native American Consultation*), staff made efforts to make preliminary contact with Gabrielino-Tongvas affiliated with the project area. One meeting was held with a representative of the Gabrielino Tongva Nation who expressed a need to have Native American monitors present during ground disturbing activities.

Because staff received minimal tribal responses, staff did not conduct ethnographic interviews with tribal people.

Archival Research

Staff made efforts to seek, obtain, and assess culturally relevant information from various archival sources. Information specifically sought related to the relation between Island and mainland Gabrielino-Tongva. The Bowers Museum located in Santa Ana, California, was visited to view Gabrielino-Tongva cultural material on display. The California History Room of the California State Library, located in Sacramento, was also used for retrieving ethnographic information beyond what was provided in the Smithsonian's Handbook of North American Indians, Volume 8, California, "Gabrielino" chapter.

Field Visit

Ethnographic staff visited the project area and its surroundings on October 8, 2013. The staff ethnographer's visual observation of the project site and vicinity did not result in the field identification of ethnographic resources because of the paved character of the area. However cultural resources were identified in the exposed soils of adjacent parcels.

Ethnographic Method Constraints

Constraints on the ethnographic methods described above are twofold:

1. there was minimal involvement of Gabrielino-Tongva identification of ethnographic resources, and

2. one identified ethnographic resource in the ethnographic PAA, the Salt Lake and village of Engnovangna, is buried, damaged, destroyed or excavated.

Model of Historical Archaeological Resources

The analysis of the information in the "Environmental Setting," "Historic Setting," and "Background Research" subsections leads to the conclusion that historic archaeological deposits are likely present in low frequency across the surface of the PAA and subsurface historic archaeological deposits are most likely present as well.

Although historic maps show that the project vicinity was dominated by sand hills and Old Salt Lake from the late nineteenth through middle twentieth centuries, squatters were known to inhabit marshy areas, and the project site's proximity to the ocean encouraged residential, industrial, and railroad development by the turn of the twentieth century. Buried historic archaeological resources in the PAA are therefore expected to consist of refuse deposits associated with domestic, railroad, and industrial disposal, as well as structural remains of the former salt works, Pacific Light & Power Company power plant, and Associated Oil Company's operations. (EDR 2011a, 2011b, 2011c; Friel 1902; GLO 1858; Los Angeles Sunday Herald 1903a, 1903b; USGS 1896)

Cultural Resources Inventory Fieldwork

The field efforts to identify cultural resources in the PAA consist of the applicant's pedestrian archaeological and historic built-environment surveys, and staff's field visits to the proposed project site (Smallwood 2014). No new cultural resources have been found in the PAA. On the basis of the applicant's background research for the present analysis and the results of the field efforts that are presently available, the total cultural resources inventory for the PAA includes no archaeological, one ethnographic resource, and 11 built-environment resources.

This section discusses the methods and the results of each field inventory phase and interprets the resultant inventory relative to the cultural resources distribution models above to assess how well the inventory represents the archaeology of the project area. Descriptions of each cultural resource in the inventory, evaluations of the eligibility of each resource for inclusion in the CRHR, assessments of project impacts on each known historical resource, consideration of and potential impacts on archaeological resources that may lie buried on the project site, and proposed mitigation measures for significant impacts may be found in the "California Register of Historical Resources Eligibility" and "Identification and Assessment of Direct Impacts on Built-Environment Resources and Proposed Mitigation" subsections below.

Pedestrian Archaeological Surveys

Methods

As stated in the AFC, an archaeologist meeting the Secretary of the Interior's professional qualifications surveyed the proposed project site on September 28–29, 2011. The proposed project site consisted primarily of buildings, structures, pavement, and hardscape, rendering ground surface visibility to zero except in a few areas of broken pavement and missing gravel. These areas were visually inspected as they were encountered. Within the 200-foot survey buffer, the archaeologist encountered streets, sidewalks, a concrete-lined canal, and an open area in the southeastern corner of the proposed project site. The archaeologist surveyed the latter area by walking transects spaced 30 feet apart; the other areas were visually examined as conditions allowed. (AES 2012a:5.3-28, 5.3-29, Figure 5.3-1a, 5.3-1b; Cardenas et al. 2012:4-6, Figure 1.)

Results

No archaeological resources were identified in the PAA as a result of the applicant's survey (AES 2012a:5.3-34; Cardenas et al. 2012:ES-1, 1-2, 4-6, 4-8, 5-9).

Results of Ethnographic Resources Investigations

Staff research and site visit leads staff to suggest that an ethnographic resource consisting of Salt Lake, the variously named ethnographic village of Engnovangna (represented in various archaeological reports), and a trail is present in the PAA.

Historic Built Environment Survey

Methods

As stated in the AFC, an architectural historian meeting the Secretary of the Interior's professional qualifications surveyed the proposed project site and properties within a one-parcel buffer and included those results in the AFC. The proposed project site consists primarily of buildings, structures, pavement, hardscape, and landscape elements.

On June 20, 2013, staff performed a survey of the project site as well as the surrounding area in order to determine potential impacts of the proposed project on built-environment resources. The city of Redondo Beach is rich in identified and listed historic resources. The adjacent city of Hermosa Beach has approximately 15 identified historic resources. **Cultural Resources Table 5** identifies 72 listed or eligible built environment resources or districts within one mile of the project area in both Redondo Beach and Hermosa Beach. Staff was able to conduct a reconnaissance survey of the majority of those resources. Staff performed a second survey of the project site and various built-environment resources in Redondo Beach on November 21, 2013, in conjunction with Josh Smallwood of Applied EarthWorks. Applied EarthWorks was retained by the Energy Commission to provide an independent historical resource evaluation of the RBGS and SEA Lab.

Based upon the historical resource evaluation (Smallwood 2014) and staff's own research and analysis, staff concludes that the only potential historical resources that could be impacted by the proposed project are the RBGS and SEA Lab. The RBGS is located on the project site and is proposed to be demolished upon conclusion of the construction of the proposed RBEP project. SEA Lab is located across Harbor Drive and is not identified as slated for removal or demolition as part of this project.

Results

The inventory of cultural resources in a PAA is the collective result of archival and literature research, discussions with local governments and public interest groups, and field investigations conducted both by staff and the applicant. For the proposed RBEP, these efforts, to date, have led to the identification of 11 built-environment cultural resources in the PAA. Of those 11, two are potentially eligible for listing as historical resources on the CRHR: the RGBS and SEA Lab. The description of this resource, staff recommendation on its historical significance, and recommendations as to whether the resource warrants further consideration under CEQA, are located below in the *Determining the Historical Significance of Cultural Resources* subsection of the PSA.

Cultural Resource Descriptions and Significance Evaluations

Staff has identified a total of 14 cultural resources in the PAA. Of these, one is a prehistoric archaeological and ethnographic resource (Old Salt Lake), two are historic archaeological resources (RBGS Railroad Spur and Lake View Road), and 11 are historic built environment resources (RBGS, 121 Herondo Street Residence, 831 N. Harbor Drive-King Harbor Marine Center, 732 N. Catalina Avenue-South Bay Door and Window, 610 North Francisca Avenue-Commercial, 606 North Catalina Avenue-Dive 'n' Surf Shop, 604–606 North Francisca Avenue-Cannery Row, 600 North Catalina Avenue-Triathlon Lab, 516 N. Broadway-County of Los Angeles Department of Beaches and Harbors Warehouse, and 2 Hermosa Avenue-Dawn to Dusk Liquors).

Archaeological and Ethnographic Resources

Old Salt Lake/Engnovangna (P-19-1872/H, P-19-186114, and CHL 373)

Old Salt Lake/Engnovangna, is an archaeological and ethnographic resource. The archaeological component of Old Salt Lake consists of artifacts and features related to prehistoric and historic-period Indian use of the lake and its surroundings, as well as historic archaeological materials pertaining to historic-period salt extraction, occupation, and the lumber industry. The ethnographic component of Old Salt Lake consists of associations with the lake itself, Engnovangna Village, and a trading trail. The archaeological components of Old Salt Lake are discussed first, followed by the ethnographic.

Archaeological Components

Old Salt Lake is represented archaeologically by artifacts and features recovered at site P-19-1872/H (now under the self-storage facility to the east of the project site), small middens found within the project site, and materials recovered from undisclosed, nearby locations (Demcak 1990; Wallace 1984). Overall, the AFC accurately summarizes the archaeological materials associated with the project site and P-19-1872/H (AES 2012a:5.3-26, 5.3-27; Cardenas et al. 2012:4-3, 4-4). The archaeological components of Old Salt Lake consist of small, shallow middens; core tools; marine shell; hammerstones; small projectile points; tarring pebbles; fire-affect rock (oven or hearth stones); fish hook fragments; pestles; mortar fragments; shell beads; freshwater turtle shells; stone chipping waste; glass beads; bone fragments; bricks; narrow-gage train tracks; glass fragments; a concrete foundation; three wood-frame structures; flooring; and the remains of furniture and clothing. (Demcak 1990; McManus 1996:4; Romani 1990; Van Wormer 1990:3; Wallace 1984.) The portion of Old Salt Lake/Engnovangna recorded as P-19-1872/H was found not to qualify as a historical or unique archaeological resource under CEQA and is now destroyed by or buried under a self-storage facility (McManus 1996; Romani 1990). West of P-19-1872/H, within the project site, Old Salt Lake/Engnovangna has been destroyed or buried during construction of the historic salt works and subsequent power generation facilities (AES 2012a:5.3-22; Cardenas et al. 2012:3-2).

Ethnographic Components

Old Salt Lake was known by Gabrielino-Tongva to provide an abundant source of salt. Salt was extracted through use of wooden shovels during the summer months when the Salt Lake dried enough to expose salt flats. The previous winter salt deposits were then exposed after the lake had evaporated enough water to expose the salt mineral. There is also a report of Gabrielino-Tongva extracting salt water and pouring the extraction into huge earthen bowls. The mineral was extracted after the water had evaporated from the bowls. The village of Engnovangna was reported to be adjacent to Salt Lake and appears to be located in various loci immediately north and east of Salt Lake. The historic, ethnographic and archaeological records inconsistently describe Engnovangna variably as a Gabrielino-Tongva village, historic village, camp, occupation site, or place. Salt was used in daily, moderate consumption, traded, and used in male and female initiation rituals. There is documentation that the roads leading from the inland to Salt Lake were originally Gabrielino-Tongva trails and that a common ocean route directly linked a village on Catalina Island with Engnovangna. The Spanish missionaries also gathered salt; but during the first decade of missionary establishment in the Los Angeles Basin, missionary entourages made month-long journeys to the salt fields in the Coachella/Imperial Valley. Gabrielino-Tongva accompanied the mission padres on those salt extraction journeys. In the 1830s, with the rise of Mexican ranchos, the local source of salt (renamed Las Salinas) was utilized. There is some evidence that the Spanish missionaries had also begun to use the local salt sources as there is some documentation of a successful move of the Mexican rancho leaders of San Pedro to begin taxing the missions for the use of the salt from Las Salinas. It is assumed that Indian laborers worked as Spanish Mission laborers at Salt Lake up to the time that the Spanish were taxed by the Mexican rancho of San Pedro.

Old Salt Lake is currently commemorated as a California State Historical Landmark (SHL). Because Old Salt Lake is listed as No. 373 it is not automatically eligible to the CRHR. Automatic eligibility of SHLs starts with the SHL No 770. The status of the current listing only affords protection to the commemorative plaque currently located at the northwest corner of the project site. Therefore, Salt Lake’s eligibility to the CRHR has not previously been ascertained.

In order to evaluate the resource as a historical resource one must establish a theme that derives from a historic context, provide a bounded area, define a period of significance, identify eligibility per at least one of the four criteria and determine integrity. As of this staff assessment, the Old Salt Lake is identified as an ethnographic resource and is being augmented with the Engnovangna village and related trail.

The historic context is provided earlier in this staff assessment in the ethnographic section. The theme is the extraction and use of a vital nutritional and religious mineral by Gabrielino-Tongva for consumptive use, trading, and rituals. Salt was also one of the commodities that Gabrielino missionary neophytes labored to extract on behalf of the Spanish missionaries.

Coupled to this theme are the occupation sites that might have changed over time, where Gabrielino first dwelt as villagers, perhaps as a place that accommodated long distance traders from the neighboring tribes, and later during the Spanish Mission era as a place occupied by Gabrielino laborers during salt extraction forays ensuing from the San Gabriel Mission. Also coupled to this resource is a reported trail that linked this area to a larger network of trade trails connecting Catalina Island to the broader southwestern indigenous landscape elsewhere labeled the Pacific to Rio Grande Trails Landscape. The boundary of the resource is of indeterminate delineation but includes the Old Salt Lake, the village of Engnovangna, and the immediate trail that issued from the lake and village. This boundary encompasses the entire RBEP site.

Periods of significance are defined by beginning and ending dates. The beginning date for this ethnographic resource is indeterminate because there is little knowledge of how early the place was used or occupied. Geologists have differing opinions as to how and, therefore, when the salt lake was formed. Because the root word for Engnovangna is ‘salt’ we can assume that the lake and village are connected entities. The various archaeological investigations conducted over the decades in the project vicinity place humans in the area as early as 12,950 cal B.P. However, the “Unnamed Protohistoric Period” (described earlier in this Staff Assessment) suggests that the coastal estuaries were increasingly utilized during this time period and settlements exhibited a core village area in a well established place with satellite occupational sites frequented on a seasonal basis. Both the ethnographic record and the archaeological evidence suggest that the Old Salt Lake/Engnovangna was utilized and occupied on a seasonal basis. Therefore, the beginning date is set at 950 cal B.P. to coincide with the Unnamed Protohistoric Period. The ending date is established as 1835 when records suggest that by then the Mexican Rancho San Pedro had issued a decree that placed a salt tax upon the Spanish missionaries.

Staff recommends that the ethnographic resource would be eligible per Criterion 1 for its association with events that have made a significant contribution to the broad patterns of California’s history and cultural heritage. This resource, being one of the only known places along the California coastline where such extraction took place, contributes to California’s history of resource extraction by at least three separate cultures (the Gabrielino-Tongva, Spanish, and Mexicans). The resource also contributes to our understanding of the Gabrielino-Tongva material, culinary, economic, and religious heritage.

Although staff has provided sufficient information for demonstrating a significance theme, general boundary, period of significance, and significance criteria justification, staff finds that the ethnographic resource lacks integrity. Salt Lake was bulldozed and covered in the 1940s. Besides the commemorative SHL designation, there is no visual indication on the ground of Salt Lake's existence. The various archaeological sites surrounding Salt Lake to the north, east and south—variably assumed in the literature to be the village of Engnovangna—have been damaged by development. Some of the sites have been excavated to conclusions that, at least surface, information potential has been extracted. The trail was converted to wagon roads that then became paved streets. The area where embarkation via the Gabrielino-Tongva watercraft heading toward Catalina Island would have occurred is now an established harbor.

Therefore, the ethnographic resource no longer conveys its significance and cannot be considered a historical resource for the purposes of CEQA. However, as-yet-unidentified, subsurface archaeological material could be found to contain information potential and qualify as a historical resource or unique archaeological resource under CEQA. In the event that such a discovery occurs, the resource could be associated with the ethnographic resource described and defined above. In such a case, archaeological materials should be evaluated for not only information potential (per Criterion 4), but also for the conveyance of heritage values that affiliated Gabrielino-Tongva may also ascribed to such objects per Criterion 1.

Lake View Road

Staff's review of historic maps and newspaper articles indicates that the PAA once contained a mixed residential/industrial subdivision called "Ocean Beach Subdivision". The subdivision was surveyed in 1902 and land sales were advertised from at least 1903 through 1905 (EDR 2011a, 2011b, Friel 1902; Los Angeles Sunday Herald 1903a, 1903b, 1904, 1905.) The majority of development occurred west of Old Salt Lake itself, with residential use concentrated in the northern and northwestern portion of the PAA, between 11th and 10th Streets (now Herondo Street and the driveway into the project site, respectively), as well as along the beach outside the PAA. At its zenith, Ocean Beach Subdivision contained 33 dwellings within the PAA alone, in addition to more than 30 industrial buildings and structures (Pacific Light and Power Company, Associated Oil Company, and lumber companies). A prominent feature of the subdivision was Lake View Road, a paved road that hugged the western shore of Old Salt Lake. Two railroads served Ocean Beach subdivision: one that ran north–south along Railroad Avenue (one city block east of present-day North Harbor Drive) and one that traversed Lake View Road. By 1947, construction of the RBGS obliterated all trace of Lake View Road (EDR 2011c). Apparently, the road was not demolished, but simply buried under fill; two monitoring wells (RW-9 and RW-19) were installed along the western margin of former Old Salt Lake in August 1999. In both wells, excavation was refused at 12 feet below ground surface and large pieces of asphalt were recovered from the wells. (Hamilton 1999a:5.) Based on the location of the wells, it appears that Lake View Road is buried under approximately 12 feet of fill in the PAA, although how much of the road remains is unknown, as well as whether anything remains of the passenger railroad track that once ran along Lake View Road. The burial of this feature also begs the question of whether older industrial and residential foundations, in addition to associated subsurface features, were also buried under fill after the superstructures were demolished. Staff presently does not have sufficient information to determine whether Lake View Road is a historical or unique archaeological resource for the purposes of CEQA.

RBGS Railroad Spur

During staff's June 20, 2013 site visit, staff archaeologist Gabriel Roark noted a pair of parallel cracks in the RBGS asphalt extending north–south. The cracks were spaced about the width of a standard-gage railroad track; examination of historic maps and aerial photographs shows that the location of these cracks corresponds to the location of a railroad spur that was built between 1948 and 1951 (EDR 2011a, 2011c). It appears, therefore, that the present asphalt surface obscures a railroad track associated with construction and perhaps operation of the RBGS.

During the site visit, a second section of the railroad spur was plainly visible on the ground surface at the southern end of the PAA. The subject section of railroad spur has its current southern terminus at a parking lot at the western end of the N. Broadway–N. Catalina Avenue intersection. The rail spur extends north from this terminus and curves to the northwest, toward RBGS Plant 3. Approximately 100 feet north of the parking lot, the rail spur crosses a concrete-lined drainage channel by a wooden plan bridge. Railroad ties are not visible, having been paved over.

It is unlikely that the RBGS Railroad Spur would be a contributing element to the RBGS and SEA Lab historic district (see “Historic Built Environment Resources” below), given that district's significance themes. The RBGS Railroad Spur could qualify as a historical resource under CEQA on its own merits, however. Additionally, a railroad spur that served the Pacific Light & Power Company plant once extended along the northern segment of the RBGS Railroad Spur from about 1916 until 1946 (EDR 2011a, 2011b, 2011c).

Historic Built Environment Resources

Staff reviewed the built environment resources within the records search area (one-mile radius from the PAA) and did not discover any resources that had the potential to be impacted in a significant way. These resources are captured in **Cultural Resources Table 5.** Staff did not identify any resources within the record search area, excluding the PAA that would be impacted by the RBEP.

Staff reviewed the applicant's evaluations of 11 historic-period built environment resources located within the PAA for CRHR eligibility. These are listed in **Cultural Resources Tables 5 and 7**. The resources are a mix of commercial, industrial and residential properties. Staff concurs with the applicant's conclusions on nine of the 11 evaluations and recommends that they are ineligible for listing on the CRHR under Criteria 1–4. A brief summary of those found ineligible for listing on the CRHR follows.

1. 121 Herondo Street **Residence**.1964. Two buildings combined into one with extensive renovations making it ineligible due to lack of integrity under Criteria 1–4.

2. 831 N. Harbor Drive-**King Harbor Marine Center**. ca 1957. Mid-century modern concrete block building lacking individual distinction or association with events or people, making it ineligible under Criteria 1–4.

3. 732 N. Catalina Avenue-**South Bay Door and Window**. 1911, 1957, 1961. Three buildings joined into one. A 1911 brick angled corner storefront with attached utilitarian wings from the mid-twentieth century does not retain integrity of design, workmanship, materials and setting, making it ineligible under Criteria 1–4.

4. 610 North Francisca Avenue-**Commercial**. 1946. A utilitarian warehouse-type one story building with no perceived architectural style or known historical associations, making it ineligible under Criteria 1–4.

5. 606 North Catalina Avenue-**Dive ‘n’ Surf** Shop. 1923. Polynesian Pop Style of architecture popularized in the mid-twentieth century. It does not retain its original 1923 design. Alterations have rendered the building ineligible under Criteria 1–4.

6. 604–606 North Francisca Avenue-**Cannery Row**. 1921–1925. Two buildings joined into one currently used as gallery space, functionally a warehouse. Significant alterations over time have made it ineligible for listing under Criteria 1–4.

7. 600 North Catalina Avenue-**Triathlon Lab**. 1946, 1962. Two connected buildings with an L-shaped footprint. French doors have been added to the buildings where service bays once were. The alterations and lack of associative historical values render the buildings ineligible for listing under Criteria 1–4.

8. 516 N. Broadway-**County of Los Angeles Department of Beaches and Harbors Warehouse**. 1923–1938. The corner storefront design has been altered over time and has no known associative historical values, therefore it appears to be ineligible for listing under Criteria 1–4.

9. 2 Hermosa Avenue-**Dawn to Dusk Liquors**. 1959. Concrete block side walls typical of mid-twentieth century buildings. The front is faced with stucco with clay tile awning-style roofs in a likely later “upgrade”. The building is stylistically mixed and lacking in integrity and therefore ineligible for listing under Criteria 1–4.

Redondo Beach Generating Station and SEA Lab

The RBGS and SEA Lab have been found by staff to be potentially eligible for listing as historical resources on the CRHR under Criteria 1 and 3 (Cal. Code Regs., tit. 14, §15064.5[a][3][A–D] and [4]). This conclusion differs from the applicant’s conclusions in the AFC that the resources are not eligible under Criteria 1–4. Staff indicated early in the application proceeding in the Issues Identification Report (CEC 2013b) published on July 5, 2013, that staff conclusions may differ from the applicant’s on the eligibility of these resources. In the interests of obtaining an independent historical evaluation of the RBGS and SEA Lab, the Energy Commission retained Applied EarthWorks (through Aspen Environmental Group) to provide an *Historical Resource Evaluation of the RBGS and SEA Lab* (Smallwood 2014). The report is attached to this section as **APPENDIX A** for easy reference. This evaluation built upon the survey and evaluation of the resources provided by the applicant in the AFC. The evaluation is augmented by staff photographs of the RBGS, presented in **Cultural Resources Figures 2–5** of this PSA. The context themes explored were broadened and included the following:

- City of Redondo Beach History and the Role of Power Plants
- Energy Development in California
- Southern California Edison’s Historical Role
- Stone & Webster Engineering Corporation’s Contributions to Energy Development and as the Design/Build Team for the RBGS

- The City Beautiful Movement and Public Utility Projects
- The Art Moderne Style of Architecture (Smallwood 2014:9–41.)

The result of the independent investigation was the conclusion that RBGS and SEA Lab appear eligible for the CRHR under Criteria 1 and 3. The themes of significance are drawn from the investigation outlined above: RBGS and SEA Lab are significant based upon trends and developments in California's energy history, the resource as a transitional work of a master (an important creative individual[29]), the Stone and Webster Engineering Corporation, and a notable example of Art Moderne architectural style. The period of significance is established as 1946–1968, although the period of significance varies for the different themes.

The following summarizes the significance evaluation of RBGS as provided by Smallwood (Smallwood 2014) and staff. More detailed information may be found in **APPENDIX A**.

CRHR Criterion 1: Association with Events that Have Made a Significant Contribution to the Broad Patterns of California's History and Cultural Heritage

RBGS and Sea Lab are significant for a direct association with an historic trend in the development of the newest generation of high-capacity steam-electric generation following the end of WWII. As one of the last architecturally-styled steam generating stations in Southern California, housing most of the equipment inside the volume of the building shell, it also is a unique example of the transition to semi-outdoor and outdoor style of building electric generating plants following WWII. It uniquely expresses both trends in one facility. It retains enough integrity of materials, workmanship, design, location, setting, feeling and association to convey its position on the design trend continuum. Therefore, it retains sufficient integrity to be considered eligible under Criterion 1.

CRHR Criterion 3: Embodies the Distinctive Characteristics of a Type, Period, Region or Method of Construction

RBGS Plant 1, which includes the Administration Building and SEA Lab, designed in the Art Moderne style, appears eligible under Criterion 3 for its architectural merit. While Plants 2 and 3 altered the original design and did not carry the Art Moderne style forward, they also are clearly differentiated from the Art Moderne buildings. Plant 2 defers to the original plant by stepping back from the façade and presenting a very plain façade in a reference to the high style of Plant 1. Plant 3 does not try to make any reference at all to the original buildings and has clearly taken its place in Post WWII outdoor station design. The RBGS Plant 1, including the Administration Building and SEA Lab, retains enough integrity of the materials, workmanship and design of the Art Moderne style to relay its significance as an excellent example of the Art Moderne style applied to a public utility. In addition, the integrity of the setting, location, feeling and association are intact. Therefore, RBGS and SEA Lab as a composition, retains sufficient historical features to convey its significance under Criterion 3.

It Represents the Work of an Important Creative Individual

[29] The CRHR language for Criterion 3 ("work of an important creative individual") is generally regarded as the equivalent of the NRHP Criterion C ("work of a master").

The RBGS and SEA Lab were designed and constructed by the Stone & Webster Engineering Corporation in 1946–1948, with additions in 1956 and 1968. It is not important simply for the association with a master engineering firm of its day, but for the fact that it represents a particular phase in the engineering work of Stone & Webster and is an important achievement bridging the Pre-WWII and Post-WWII designs for steam electric generation plants. The RBGS and SEA Lab retain a high degree of integrity in workmanship, materials, design, setting allocation, and association as it relates to the transition phase it represents in the work of Stone & Webster. Therefore, RBGS and SEA Lab are considered significant under this aspect of Criterion 3 and appears eligible for listing on the CRHR.

Interpretation of Results

Model of Prehistoric Archaeological Resources

The AFC hypothesized that the PAA has little potential to contain prehistoric archaeological resources on the ground surface because of the degree of surface disturbances and development. These expectations were borne out by the cultural resources inventory described in this PSA.

The AFC states that buried archaeological resource potential is low to moderate, assuming that most construction-related ground disturbance would occur in imported fill deposits. Staff conducted additional analysis to estimate the depth of fill across the proposed project site; whether and where proposed excavation would penetrate native sediments; and the age, characteristics, and preservation potential of any underlying native sediments.

The AFC and supporting documentation state that the project site rests atop 1.0 to12.5 ft of fill dirt,[30] based on mapped geotechnical borings. The thickness of placed fill is least at the bottom of existing retention basins, as the basins are ten to 11 feet in depth relative to the present ground surface. Earlier geotechnical and paleontological reports identify areas of fill up to 30 feet below ground surface, albeit without detailed mapping of these locations. (AES 2012a:5.3-7, 5.8-4, Appendix 1A; CH2M Hill 1997:3-5–3-6, 3-8–3-9, Appendix A; CH2M Hill and URS 2000:Appendix A; Hamilton 1999a:5–7, Appendix 1; Hamilton 1999b:5, Appendices 1–2; Miller 1971:54, 56, Figure 1; Ninyo & Moore 2011:3, Boring Logs 1–4, Figure 3.)

Project-specific borings and cone-penetration tests indicate that the underlying natural sediments are younger dune sand deposits, marsh sediments, and older dune sand deposits (AES 2012:5.3-7, 5.4-2; Ninyo & Moore 2011:6). Younger dune sand deposits, according to the AFC and staff research, date to within the last 10,000 years and are found from approximately 12.5 to 33 feet below ground surface (Poland et al. 1956:33). Marsh deposits were encountered anywhere from nine to 14 feet below ground surface in layers up to five to 15 feet thick. Beneath the marsh sediments are older dune sands that were variously found to underlay the younger dune sands in some areas, marsh sediments in others. The older dune sands extend at least to the bottom of geotechnical borings (51.5 feet below ground surface), possibly beyond. (AES 2012a:5.3-7; 5.4-24; Ninyo & Moore 2011:Boring Logs 1–4.)

[30] Note that the cultural resources section of the AFC incorrectly cites Ninyo & Moore (2011) as reporting “that the lake had been filled with approximately four to 16 feet of fill…” (AES 2012a:5.3-7). Rather, Ninyo & Moore (2011:3) states, “the area occupied by the previous lake had been backfilled to an *elevation* ranging from approximately four to 16 feet above MSL [mean sea level, emphasis added].” References to four–16 feet above sea level does not necessarily correspond to placement of fill four–16 feet thick.

Although radiocarbon dating is lacking for the El Segundo Sandhills, geologists generally regard them as Holocene in age. It is likely that the sandhills began forming at the end of the Pleistocene Epoch, however. (Poland a et al. 1959:19–20.) That some portion of the older dune sands in the PAA is Pleistocene in age at depths of approximately 27 to 30 feet or more below ground surface is supported by the discovery of a Pleistocene fossil at the RBGS (Jefferson 1991:46, 113; Miller 1971:54). Furthermore, Poland et al. (1959:27–28) documents that finer upper (younger) Holocene deposits rest almost conformably atop either coarser, lower Holocene deposits or modified lower Pleistocene land surfaces. About eight miles north of the project site, at the Hyperion Treatment Plant, an excavation revealed cemented sand dunes that probably represent a former land surface.

The fill deposits in the PAA would not contain intact prehistoric archaeological deposits. Depending on where the existing fill material was obtained, such deposits could contain archaeological materials with compromised integrity and/or human remains.

The younger dune sands in the PAA have the potential to variably protect and degrade the integrity of archaeological deposits. Archaeological materials can be transported on dune surfaces and within dunes by wind transport as well as avalanche deposits or slumping down the slipface of the dune, removing the materials from their primary context. On the other hand, dunes that have stabilized rapidly over archaeological deposits confer preservation potential. Landform stability and archaeological preservation potential is enhanced considerably in interdune deposits, where wind- resistant soil layers frequently develop as pond or marsh deposits. Preservation potential is also improved by the development of clay-rich or otherwise cemented paleosol, or former land surfaces. (Schiffer 1987:241–242; Waters 1992:188, 196–197.) Such conditions exist in the PAA where the marsh deposits associated with Old Salt Lake cover older dune sands. Archaeological preservation potential is therefore likely high in the PAA beneath the marsh deposits. The marsh deposits within the PAA occur between nine and 14 feet below ground surface (1.5 to 6.0 msl), and they directly overlie younger dune sands; an earlier geotechnical study encountered marsh deposits that were five to 15 feet thick (Ninyo & Moore 2011:7, Boring Logs 3–4). Below the fill level, the PAA appears to have moderate to high potential for buried archaeological resources.

Model of Historical Archaeological Resources

As discussed previously in this cultural resources section, the extent of disturbance and amount of pavement and superstructure covering the PAA makes it unlikely that historic archaeological resources would be or could be found on the present ground surface. The cultural resources inventory results corroborate this expectation, since no historic archaeological resources were identified on the surface of the PAA.

The potential for buried historic archaeological deposits to occur in the PAA appears moderate to high. Historic artifacts may have been brought to the PAA within the fill deposits, although these are unlikely to retain integrity. Fill deposits on industrial sites, however, can also bury historic artifacts and features such as structural remnants—artifact scatters formed of metal, concrete, and glass building fragments (resulting from demolition)—and refuse scatters associated with industrial disposal practices. Historic map reviews indicate that domestic archaeological remnants might be preserved under the project site, as it comprised a portion of the Ocean Beach Subdivision (EDR 2011b; Friel 1902). Any refuse scatters, too, may have been removed to allow construction of the present facilities. Nevertheless, the apparent preservation of Lake View Road beneath 12 feet of fill indicates that some historic features were simply buried to accommodate future phases of construction on the project site (Hamilton 1999a, 1999b). Historic archaeological potential is therefore moderate to high within the project site.

California Register of Historical Resources Eligibility

Two CRHR-eligible cultural resources have been identified in the PAA. The RBGS and SEA Lab have been found by staff to be potentially eligible for listing as historical resources on the CRHR under Criteria 1 and 3. This conclusion differs from the applicant's conclusions in the AFC. Staff indicated early on in the application proceeding in the Issues Identification Report (CEC 2013b) published on July 5, 2013, that staff conclusions may differ from the applicant's on the eligibility of these resources.

DIRECT/INDIRECT IMPACTS AND MITIGATION

Direct impacts to cultural resources are those associated with project development, construction, and operation. Construction usually entails surface and subsurface disturbance of the ground, and direct impacts to archaeological resources may result from the immediate disturbance of the deposits, whether from vegetation removal, vehicle travel over the surface, earth-moving activities, excavation, or demolition of overlying structures. Construction can have direct impacts on historic standing structures when those structures must be demolished or removed to make way for new structures or when the vibrations of construction impair the stability of historic structures nearby. New structures can have direct impacts on historic structures when the new structures are stylistically incompatible with their neighbors and the setting, feeling and association. New structures might also produce something harmful to the materials or structural integrity of the historic structures, such as emissions or vibrations.

Generally speaking, indirect impacts to archaeological resources are those which may result from increased erosion due to site clearance and preparation, or from inadvertent damage or outright vandalism to exposed resource components due to improved accessibility. Similarly, historic structures can suffer indirect impacts when project construction creates improved accessibility to resources by non-project-affiliated personnel and the potential for vandalism or greater weather exposure becomes possible.

Ground disturbance accompanying construction at a proposed plant site has the potential to directly affect archaeological resources, unidentified at this time. The potential direct, physical impacts of the proposed construction on unknown archaeological resources are commensurate with the extent of ground disturbance entailed in the particular mode of construction. This varies with each component of the proposed project. Placing the proposed plant into this particular setting could have a direct impact on the integrity of association, setting, and feeling of nearby standing historic structures.

Construction Impacts and Mitigation

Identification and Assessment of Direct Impacts on Archaeological Resources and Proposed Mitigation

Archaeological Resources on the Surface of the PAA

No archaeological resources have been identified on the surface of the PAA. Staff concludes that appropriate methods were employed to identify archaeological resources on the ground surface and therefore construction and operation of the proposed project would not result in direct impacts on this class of cultural resource.

Buried Archaeological Resources in the PAA

No positive identification of buried prehistoric archaeological resources has been made by staff or the applicant. Lake View Road has been identified at 12 feet below ground surface as a result of geotechnical borings (Hamilton 1999a, 1999b). The sediments under the proposed project site are of the right age to have supported the formation of archaeological resources from approximately 4000 B.P. through the twentieth century. Preservation potential exists for any such resources as well.

The likelihood that the proposed project would actually result in significant impacts to buried archaeological resources appears low. Consulting **Cultural Resources Table 2**, the record shows that six project elements are known to involve construction to a depth that would intersect non-fill sediments, where archaeological resources could be preserved. These project elements consist of the (1) proposed CCGT/HRSG foundation slab, (2) new retention pond, (3) two overhead transmission line pole foundations, (4) storm drain removals, (5) an optional sanitary sewer removal, and (6) bare conductors. The foundation slab would require excavation up to one foot into native sediments; excavation would most likely be accomplished via mass soil removal, assisted by an excavator. The new retention pond would be constructed by backhoe or excavator up to one foot into native sediments. The power poles would be excavated by a six-foot-diameter auger up to ten feet into native sediments and are likely to pierce marsh sediments. Storm drain removals and the optional sanitary sewer removal would be accomplished mainly by backhoe and could dig up to one foot into non-fill sediments. Bare conductors would be pressed into the ground surface some nine to 11 feet into native sediments. The proposed parking areas and laydown area do not involve subsurface ground disturbance and therefore would have no impact potential for buried archaeological resources.

The proposed excavations described in the previous paragraph all could damage or destroy buried, as-yet-unidentified, archaeological resources in the proposed project site. The potential for outright destruction is greatest with the proposed Block 2 foundation slab because it would require the greatest areal extent of digging. The power poles and bare conductors, on the other hand, have a relatively small footprint and would be more apt to damage buried archaeological resources rather than destroy them. Nevertheless, both the large- and small-footprint excavations could compromise the information potential of archaeological resources by altering the association of artifacts and features, as well as by damaging or destroying them. Such effects are considered significant impacts under CEQA.

The other proposed excavation and demolition activities summarized in **Cultural Resources Table 2** would probably be confined to fill dirt, which reduces the likelihood that these activities would result in impacts to archaeological resources that qualify as historical or unique archaeological resources for the purposes of CEQA. Caution is warranted based on three factors. First, at the time of this writing, staff does not know the depth of excavation and/or fill depth associated with the following proposed project elements (see **Cultural Resources Table 2**):

- Reconfigure 210,000-gallon fire/service water storage tank
- Fire water piping and hydrants
- Potable water, process water, and natural gas pipes
- Gas pressure control station
- Service water tank 3
- Gas scrubber/filtering equipment

The information currently lacking in **Cultural Resources Table 2** and the bulleted list above could alter staff's assessment of the proposed RBEP's impacts on cultural resources.

Second, fill placed in previously inhabited or built areas is sometimes used to bury structural remnants and features to facilitate subsequent construction. The presence of fill generally precludes the discovery of intact prehistoric archaeological resources (within the fill), but might blanket historic or prehistoric archaeology that rests on an earlier land surface. Third and finally, fill is sometimes obtained from properties that contain archaeological materials and human remains; such materials can become incorporated into the fill and be redeposited elsewhere. While rarely qualifying as historical or unique archaeological resources, the discovery of such material during construction still poses a management consideration, and the discovery of human remains—regardless of context—must be handled according to the applicable portions of the Public Resources Code and California Health and Safety Code.

In the present case, staff tentatively finds that the limited amount of excavation into non-fill sediments proposed renders the probability of encountering archaeological resources relatively low. It is therefore staff's position that existing information is adequate to assess potential impacts and that the Energy Commission's historic preservation responsibilities are best served to implement a comprehensive cultural resources mitigation and monitoring program for the proposed project. Implementation of a well-planned mitigation and monitoring program would reduce the potential project impacts to a less-than-significant level.

The AFC contains an outline of such a program, consisting of nine parts:

1. Designated Cultural Resources Specialist (CRS)
2. Construction Worker Training
3. Monitoring
4. Emergency Discovery
5. Site Recording and Evaluation

6. Mitigation Planning

7. Curation

8. Report of Findings

9. Inadvertent Discovery of Human Burials. (AES 2012a:5.3-36–5.3-38.)

Although staff agrees that these components are important to an effective mitigation and monitoring program, two important elements are missing from it. The first is a cultural resources mitigation and management plan (CRMMP) with an explicit research design and procedures for the treatment of archaeological and human remains discoveries that may occur during construction. The absence of explicit consideration of the resource types expectable in the PAA and the methods required to evaluate any such resources leaves important decision-making to the time least amenable to responsible historic preservation practice—the moment of inadvertent discovery. The second element missing from the AFC's proposed mitigation and monitoring program is a provision for construction monitoring by local tribal representatives. As described earlier under *Native American Consultation*, some consulted tribal representatives urged that tribal monitors be present during construction because archaeological materials encountered in the PAA would likely be related to their Gabrielino culture. In addition, there is a slight potential for buried ethnographic resources in the vicinity of the project and most likely affiliated with the Engnovangna Village mentioned in the ethnographic section above. Staff therefore proposes Conditions of Certification (Conditions) **CUL-1** through **CUL-8**, incorporating portions of the applicant's proposed mitigation measures, to reduce the RBEP's potential impacts to a less-than-significant level.

Identification and Assessment of Direct Impacts on Archaeological and Ethnographic Resources

One archaeological and ethnographic resource, the Salt Lake, Engnovangna Village and trail, has been identified in the PAA. Staff also finds that this resource lacks integrity and is not considered a historical resource for purposes of analyzing RBEP impacts to it. Therefore, staff does not expect that the proposed project would result in impacts on ethnographic resources.

Staff has also identified two historic archaeological resources on the project site: Lake View Road and the RBGS Railroad Spur. The encountered remnant of Lake View Road is situated about one foot below the proposed foundation excavations and is unlikely to be encountered or affected during construction. No excavation or demolition activities are proposed for the identified segments of the RBGS Railroad Spur. Accordingly, the proposed project would not result in impacts on these two cultural resources.

Identification and Assessment of Direct Impacts on Built-Environment Resources and Proposed Mitigation

The only potential built-environment historical resources that could be impacted by the proposed project are the RBGS and SEA Lab. The impact to the RBGS would be significant and unavoidable if demolition were to occur as proposed in the RBEP AFC. Impacts to SEA Lab are less severe, but the direct impacts would still be significant in the loss of context (setting, feeling and association) once the RBGS is removed. The removal of RBGS has the potential to cause a substantial adverse change to the environment under CEQA. As such, mitigation measures should be applied to ensure that impacts to the historical significance of the RBGS caused by the proposed RBEP are substantially lessened or reduced to a less than significant level. Criteria for identifying the significant and adverse impact of demolishing the RBGS are described in the CEQA Guidelines (Cal. Code Regs., tit. 14, §15064.5[b][2][C]).

CEQA also requires assessment in the environmental document of the feasibility of potential mitigation for impacts from the project (Cal. Code Regs., tit. 14, §15126.4 (a) (1) (A–B). For the RBEP, staff has considered several forms of mitigation to reduce project impacts to less than significant. Those are summarized below and take into account potential stakeholders, such as the city of Redondo Beach, the applicant and the community in the vicinity of the project.

Any mitigation discussed below is necessarily different than what the applicant proposed in the AFC as the applicant did not find the RBGS and SEA Lab to be a historic resource eligible for listing on the CRHR, and therefore, no mitigation was proposed.

There is more than one path to reducing the impacts to less than significant in the case of the proposed RBEP. One path is to be guided by the Secretary of the Interior's (SOI) Standards for Historic Preservation four treatment options: Preservation, Restoration, Rehabilitation and Reconstruction (Cal. Code Regs., tit. 14, §15064.5 [3]). In the case of RBGS, the *Rehabilitation* treatment standard would allow for both retaining historic fabric and altering the structures to accommodate new uses. An example of Rehabilitation treatment can be found in San Diego's Station B (discussed earlier on page 28), where the historic structures of architectural merit were retained and a condominium tower was added to the property. This approach retained significant historic fabric and added a clearly-differentiated new structure to the site. This is an example of implementation of Rehabilitation Standard No. 9[31]. Readers may view a short video featuring the Station B project, now known as the Electra, at this link: http://www.youtube.com/watch?v=wL-astDcFCE.

SEA Lab is a good example of application of the Rehabilitation standard, where a building has been altered for a new use but retains the majority of its original fabric and form. Creative planners could easily conjure up visions of a rehabilitated RBGS Plant 1 and Administration Building, making use of Plant 1's expansive interior volumes as the basis for a mixed-use development near the city's harbor and beaches. In a similar fashion, Sacramento's PG&E Station B will take advantage of its riverfront location, handsome architectural shell and grand interior volumes to provide the basis for a new Discovery Science Museum. The City of Redondo Beach Specific Plan or current land use designations would not at this time seem to support this type of mixed use and redevelopment for this property, as it is located in the Catalina Avenue Sub-Area which calls for Public Utility Land Uses, or upon closure of the AES Plant (RBGS), for Parks, Open Space and Recreation. Therefore, unless there is a strong directional shift in the city's planning toward some other kind of development on this site, a repurposing of the building might not be feasible without going through a zoning and

[31] Rehabilitation Standard No.9: New additions, exterior alterations, or related new construction will not destroy historic materials, features, and spatial relationships that characterize the property. The new work will be differentiated from the old and will be compatible with the historic materials, features, size, scale and proportion, and massing to protect the integrity of the property and its environment.

land use change. There is also public sentiment to consider, as the vast majority of the comments received by the Energy Commission to date have, when pertaining to aesthetics of the RBGS, described the RBGS as an eyesore, a derelict or just ugly. Staff questions whether there is sufficient community-based support for a redevelopment project of this type and concludes it is likely not a feasible alternative mitigation.

Preservation is a treatment option that was chosen for the City of Vernon's Station A (discussed earlier on page 28). The Energy Commission Conditions of Certification (CEC 2003) required preservation of this historic structure in its existing condition and an annual compliance report detailing the maintenance and preservation activities is submitted to the Energy Commission compliance project manager (CPM). The Preservation standard works best when there is a continuance of the original use of the historic resource. Vernon's Station A remains a viable, operating power plant providing back-up power supply to the new Malburg station on the same site. The Preservation standard would best be applied to RBGS if it were to remain an operating power plant. The applicant plans to replace the RBGS with a modern electrical generation plant offering many advantages over the old technology. Part of the impetus for replacing the plant is the mandate to eliminate the once-through cooling (OTC) process at the coastal plants. As discussed in the No Project (Retrofit) Alternative, this would include a basic retrofit of the RBGS to comply with State Water Resources Control Board's (SWRCB) OTC Policy[32], while still allowing the RBGS to continue operation. While it may be theoretically possible to retrofit the existing plant with dry-cooling, and continue operation of the plant, there are other compelling reasons (namely, the project objective of replacing dated and environmentally inferior technology with newer, efficient technology) to construct a new plant which provides benefits to the public. Therefore, staff concludes that application of the Preservation standard to an outdated electrical generating plant is not a feasible mitigation.

The *Restoration* standard is not evaluated here as an option as the power plant exists virtually unchanged from its dates of construction. Minor aesthetic changes such as the replacement windows, removal of Plant 1 stacks and the Whaling Wall mural have occurred since construction and could be restored to their original condition but it would seem to be an exercise that would accomplish little in informing the public about the historic significance of the resource. Therefore, staff does not recommend employing the Restoration standard as feasible mitigation. Likewise, the *Reconstruction* standard is applied only to resources that are no longer in existence or heavily damaged and is not applicable to RBGS as the resource is still extant.

If application of the Secretary of the Interior's Standards for *Rehabilitation*, *Restoration, Reconstruction* or *Preservation* are not feasible options as mitigation, another method is frequently employed to reduce impacts to less than significant. The Department of the Interior (DOI), through the Heritage Documentation Programs (HDP) of the National Park Service (NPS), has developed methods for documenting and recording historic buildings, engineering structures and landscapes. These are known as Historic American Building Survey/Historic American Engineering Record/Historic American Landscape Survey (HABS/HAER/HALS) documentation. HABS/HAER/HALS provides for complete recordation of a historic resource

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[32] Federal Clean Water Act §316(b) Regulation requiring removal of ocean water as cooling water from coastal power plants by 2020, implemented by the SWRCB.

through the use of large format photography, as-built or historical drawings and thorough evaluation of the resource. This is often done when a historical resource is slated for demolition or removal, or significant alteration is proposed to the extent that the loss of integrity would render the resource no longer eligible for listing on a historic register. The mitigation for the proposed demolition of electric power plant at Morro Bay included HAER documentation. The Morro Bay plant is an International Style complex designed by San Francisco architect William Gladstone Merchant. Prior to demolition, the Energy Commission conditions of certification require complete documentation of the power plant facilities under the HAER guidelines (CEC 2004).

For the RBGS, staff is recommending HAER documentation at Level I, as established by the most recent Guidelines for Architectural and Engineering Documentation issued by the National Park Service (NPS 2003)[33]. This mitigation represents a fair method of providing information about a historical resource to the community at large. Although HAER recordation is not a complete substitute for preserving the resource itself, it embodies a “fair approximation of the burden of historical preservation borne by the particular historical resource in question” (Aikens 2012). In some ways, the public will have more access to the resource upon completion of documentation and its availability at the local level, as well as other sources, such as the Library of Congress. Thus, the resource’s historical significance will also be more readily available to the public than through the mere existence of the resource. Staff concludes that HAER recordation at Level 1 and delivery to the public repositories listed in **CUL-10** reduces the adverse impacts of the project to the RBGS to less than significant.

CUL-9 requires the selection of an architectural historian who is qualified under the Secretary of the Interior’s Standards to complete the documentation per the guidelines (NPS 2003). **CUL-10** requires that the documentation be completed and submitted to the Library of Congress, California Energy Commission Library, California State Library, Huntington Library and the city of Redondo Beach. **CUL-10** requires that the documentation be completed and approved by the CPM at least 45 days prior to demolition or alteration of the RBGS. Implementation of **CUL-9** and **CUL-10** would reduce the impacts to these resources to less than significant.

Indirect Impacts

Neither the applicant nor staff has identified any indirect impacts on any cultural resources that qualify as historical resources or unique archaeological resources under CEQA. Staff believes, therefore, that mitigation for indirect impacts is not necessary for the proposed project.

[33] Guidelines for Architectural and Engineering Documentation, published by the Department of the Interior-National Park Service, in the Federal Register/Volume 68, No. 139/ Monday, July 21, 2003/Notices, pp. 43159 to 43162.

Operation Impacts and Mitigation

During operation of the proposed project, if a leak should develop in buried pipelines within the project site, repair of the buried utility could damage previously unidentified, subsurface archaeological resources in areas unaffected by the original excavation. The measures proposed above and below for the mitigation of impacts to previously unknown archaeological resources found during construction would also mitigate impacts that occur during operation-phase repairs.

Environmental Justice Impacts

Staff has not identified historical or unique archaeological resources in the PAA that are culturally important to identified environmental justice populations. As stated in the "Environmental Justice/Socioeconomic Methods" of this PSA section, staff has not identified a Native American environmental justice population in the PAA. Staff tentatively concludes that the proposed project would not result in environmental justice impacts due to effects on cultural resources.

Cumulative Impacts and Mitigation

A project may result in a significant adverse cumulative impact where its effects are cumulatively considerable. "Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects (Cal. Code Regs., tit. 14, §15130). Cumulative impacts to cultural resources in the project vicinity could occur if any other existing or proposed projects, in conjunction with the proposed RBEP, had or would have impacts on cultural resources that, considered together, would be significant. The previous ground disturbance from prior projects and the ground disturbance related to construction of the proposed RBEP and other proposed projects in the vicinity could have a cumulatively considerable effect on subsurface archaeological deposits, both prehistoric and historic. The alteration of the setting which could be caused by the construction and operation of the proposed RBEP and other proposed projects in the vicinity could be cumulatively considerable, but may or may not be a significant impact to cultural resources.

Staff has proposed conditions providing for identification, evaluation, and avoidance or mitigation of impacts to previously unknown archaeological resources that might be discovered during the construction of the proposed RBEP and qualify as historical or unique archaeological resources under CEQA.

Proponents of any other future projects in the vicinity of the RBEP could mitigate impacts to as-yet-undiscovered subsurface archaeological sites to less-than-significant levels by requiring construction monitoring, evaluation of resources discovered during monitoring, and avoidance or data recovery for resources evaluated as significant under CEQA. Impacts to human remains can be mitigated by following the protocols established by state law in Public Resources Code, section 5097.98. Since the impacts from the proposed RBEP would be mitigated to a less-than-significant level by the project's compliance with proposed Conditions **CUL-1** through **CUL-8**, and since similar protocols can be applied to other projects in the area, staff does not expect any incremental effects on cultural resources of the proposed RBEP to be cumulatively considerable when viewed in conjunction with other projects.

Considered in conjunction with the potential removal and reconstruction of other Southern California steam-generating plants from the 1950s to 1970s (such as El Segundo Energy Center [ESEC], and Huntington Beach Energy Project [HBEP]), the loss of the RBGS would add to the loss of information relative to the development of electric steam power generation in the twentieth century in California. However, as RBGS and SEA Lab are the only resources assumed to be eligible for listing on the CRHR, mitigation through implementation of **CUL-9** and **CUL-10** would reduce potential cumulative impacts to less than significant. The evaluations that have been completed for ESEC, HBEP and RBGS record a portion of that history and the future recordation by way of HAER documentation for RBGS, as required in **CUL-9** and **CUL-10**, would provide the opportunity to add information to the knowledge base that already exists.

In the scenario where a choice is made to repurpose the existing RBGS and apply the SOI's Standards for Rehabilitation, the impacts of nearby development on Harbor Drive and Catalina Avenue is less than significant on the historical resource as the RBGS already exists in a mixed-use environment. Therefore, changes to setting, feeling and association would be minimal and less than significant.

COMPLIANCE WITH LORS

If the conditions of certification below and those that staff might propose in the Final Staff Assessment (FSA) are properly implemented, the proposed RBEP would result in a less-than-significant impact on known and newly identified cultural resources. The proposed project would therefore be in compliance with the applicable state laws, ordinances, and standards listed in **Cultural Resources Table 1**.

CONCLUSIONS AND RECOMMENDATIONS

Staff finds that the proposed project would result in a substantial adverse change to a historical resource, the Redondo Beach Generating Station (RBGS). Additionally, the project could result in damage to as-yet-unidentified archaeological resources that qualify as historical or unique archaeological resources under CEQA, which is a significant impact under that act. However, staff finds that implementation of Conditions **CUL-1** through **CUL-10** would reduce these impacts to a less-than-significant level. Staff recommends that the Commission adopt these cultural resources Conditions.

CUL-1 and **CUL-2** are administrative conditions that set out the qualifications and roles of those who will implement the balance of the conditions, and the information that the project owner will supply them to help them fulfill those roles. **CUL-3** requires the project owner to provide a specific plan (Cultural Resources Mitigation and Monitoring Plan, or CRMMP) to guide construction monitoring and the evaluation and treatment of inadvertently discovered archaeological resources or human remains, in light of what is known about regional prehistoric, ethnography, and history. **CUL-5** provides for training of project owner staff and the construction management/implementation team regarding basic cultural resource identification and compliance with these proposed conditions and the provisions of the CRMMP. **CUL-6** defines the scope of monitoring by qualified archaeologists and Native Americans required to implement the CRMMP and other proposed Conditions. **CUL-7** defines the protocols, responsibilities, and timeframes involved in responding to inadvertent archaeological or human remains discoveries. **CUL-8** describes the manner in which the project owner and the CPM are to conduct cultural resources inventory and analysis in the event that procurement of fill must occur at off-site, non-commercial properties. **CUL-4** requires that the project owner prepare a final report of all cultural resources activities undertaken during construction of the proposed project and the Energy Commission's responsibility as lead agency to review this document to verify accuracy and complete implementation of the cultural resources mitigation and monitoring program. **CUL-9** and **CUL-10** require the applicant to complete Historic American Engineering Record documentation of the RBGS to preserve the historical and architectural merits of the resource through archival and photographic documentation, as well as public presentation of the record in local and State libraries.

PROPOSED CONDITIONS OF CERTIFICATION

CUL-1 Prior to the start of construction-related ground disturbance or grading, boring, and trenching, as defined in the Compliance Conditions for this project; or surface grading or subsurface soil work during pre-construction activities or site mobilization, the project owner shall obtain the services of a Cultural Resources Specialist (CRS) and one or more alternate CRSs. The project owner shall submit the resumes and qualifications for the CRS, CRS alternates, and all technical specialists to the compliance project manager (CPM) for review and approval.

The CRS shall manage all cultural resources monitoring, mitigation, curation, and reporting activities, and any pre-construction cultural resources activities (i. e., geoarchaeology or data recovery, unless management of these is otherwise provided for), in accordance with the conditions for the proposed project. The CRS shall obtain the services of Cultural Resources Monitors (CRMs), Native American Monitors (NAMs), and other technical specialists, as needed, to assist in monitoring, mitigation, and curation activities. The project owner shall ensure that the CRS makes recommendations regarding the eligibility for listing in the CRHR of any cultural resources that are newly discovered or that may be affected in an unanticipated manner.

No construction-related ground disturbance or grading, boring, and trenching, as defined in the Compliance Conditions for this project; or surface grading or subsurface soil work during pre-construction activities or site mobilization shall occur prior to CPM approval of the CRS and alternates.

Approval of a CRS may be denied or revoked for reasons including, but not limited to, non-compliance on this or other Energy Commission projects and for concurrent service as CRS on an unmanageable number of Energy Commission projects, as determined by the CPM. After all construction-related ground disturbance is completed and the CRS has fulfilled all responsibilities specified in these cultural resources conditions, the project owner may discharge the CRS, if the CPM approves. With the discharge of the CRS, these cultural resources conditions no longer apply to the construction activities of this power plant.

If, during operation of the power plant, circumstances develop that would require ground disturbance in soils or sediments previously undisturbed during project construction, no surface grading or subsurface soil work shall occur prior to submission of a Petition to Modify or Amend and CPM review and approval of a project-specific protocol for addressing unanticipated discoveries, consistent with the approved CRMMP.

CULTURAL RESOURCES SPECIALIST

The resumes for the CRS and alternate(s) shall include information demonstrating to the satisfaction of the CPM that their training and backgrounds conform to the U.S. Secretary of the Interior’s Professional Qualifications Standards, as published in Title 36, Code Fed. Regs., part 61. In addition, the CRS and alternate CRS(s) shall have the following qualifications:

1. Qualifications appropriate to the needs of the project, including a background in anthropology, archaeology, history, architectural history, or a related field;

2. At least three years of archaeological or historical, as appropriate (per nature of predominant cultural resources on the project site), resources mitigation and field experience in California; and

3. At least one year of experience in a decision-making capacity on cultural resources projects in California and the appropriate training and experience to knowledgably make recommendations regarding the significance of cultural resources.

The resumes of the CRS and alternate CRS shall include the names and telephone numbers of contacts familiar with the work of the CRS/alternate CRS on referenced projects and demonstrate to the satisfaction of the CPM that the CRS/alternate CRS has the appropriate training and experience to implement effectively the Conditions.

CULTURAL RESOURCES MONITORS

CRMs shall have the following qualifications:

1. a B.S. or B.A. degree in anthropology, archaeology, historical archaeology, or a related field, and one year experience monitoring in California; or

2. an A.S. or A.A. degree in anthropology, archaeology, historical archaeology, or a related field, and four years experience monitoring in California; or

3. enrollment in upper division classes pursuing a degree in the fields of anthropology, archaeology, historical archaeology, or a related field, and two years of monitoring experience in California.

CULTURAL RESOURCES TECHNICAL SPECIALISTS

The resume(s) of any additional technical specialist(s), e.g., historical archaeologist, historian, architectural historian, and/or physical anthropologist, shall be submitted to the CPM for approval.

Verification:

1. At least 45 days prior to the start of ground disturbance, the project owner shall submit the resume for the CRS and alternate(s) to the CPM for review and approval.

2. At least ten days prior to a termination or release of the CRS, or within ten days after the resignation of a CRS, the project owner shall submit the resume of the proposed new CRS, if different from the alternate CRS, to the CPM for review and approval. At the same time, the project owner shall also provide to the proposed new CRS the AFC and all cultural resources documents, field notes, photographs, and other cultural resources materials generated by the project.

3. At least 20 days prior to ground disturbance, the CRS shall provide a letter naming CRMs and providing their résumés to demonstrate that the identified CRMs meet the minimum qualifications for cultural resources monitoring required by this condition of certification.

4. At least five days prior to additional CRMs beginning on-site duties during the project, the CRS shall provide letters and résumés to the CPM identifying the new CRMs and their qualifications.

5. At least ten days prior to any technical specialists, other than CRMs, beginning tasks, the resume(s) of the specialists shall be provided to the CPM for review and approval.

6. At least ten days prior to the start of ground disturbance, the project owner shall confirm in writing to the CPM that the approved CRS will be available for onsite work and is prepared to implement the cultural resources conditions.

CUL-2 Prior to the start of construction-related ground disturbance or grading, boring, and trenching, as defined in the Compliance Conditions for this project; or surface grading or subsurface soil work during pre-construction activities or site mobilization, if the CRS has not previously worked on the project, the project owner shall provide the CRS with copies of the AFC, data responses, confidential cultural resources reports, all supplements, the Energy Commission cultural resources FSA, and the cultural resources conditions of certification from the Final Decision for the project. The project owner shall also provide the CRS and the CPM with maps and drawings showing the footprints of the power plant, all linear facility routes, all access roads, and all laydown areas. Maps shall include the appropriate USGS quadrangles and a map at an appropriate scale (e.g., 1:24,000 and 1 inch = 200 feet, respectively) for plotting cultural features or materials. If the CRS requests enlargements or strip maps for linear facility routes, the project owner shall provide copies to the CRS and CPM. The CPM shall review map submittals and, in consultation with the CRS, approve those that are appropriate for use in cultural resources planning activities. No ground disturbance shall occur prior to CPM approval of maps and drawings, unless such activities are specifically approved by the CPM.

If construction of the project would proceed in phases, maps and drawings not previously provided shall be provided to the CRS and CPM prior to the start of each phase. Written notice identifying the proposed schedule of each project phase shall be provided to the CRS and CPM.

Weekly, until ground disturbance is completed, the project construction manager shall provide to the CRS and CPM a schedule of project activities for the following week, including the identification of area(s) where ground disturbance will occur during that week.

The project owner shall notify the CRS and CPM of any changes to the scheduling of the construction phases.

Verification:

1. At least 40 days prior to the start of ground disturbance, the project owner shall provide the AFC, data responses, confidential cultural resources documents, all supplements, and the FSA to the CRS, if needed, and the subject maps and drawings to the CRS and CPM. The CPM will review submittals in consultation with the CRS and approve maps and drawings suitable for cultural resources planning activities.

2. At least 15 days prior to the start of ground disturbance, if there are changes to any project-related footprint, the project owner shall provide revised maps and drawings for the changes to the CRS and CPM.

3. At least 15 days prior to the start of each phase of a phased project, the project owner shall submit the appropriate maps and drawings, if not previously provided, to the CRS and CPM.

4. Weekly, during ground disturbance, the project owner shall provide a schedule of the next week's anticipated project activity to the CRS and CPM by letter, e-mail, or fax.

5. Monthly, during ground disturbance, the project owner shall provide an email progress report to the CPM, interested Native Americans and other interested parties.

6. Within five days of changing the scheduling of phases of a phased project, the project owner shall provide written notice of the changes to the CRS and CPM.

CUL-3 Prior to the start of construction-related ground disturbance or grading, boring, and trenching, as defined in the Compliance Conditions for this project; or surface grading or subsurface soil work during pre-construction activities or site mobilization, the project owner shall submit the Cultural Resources Monitoring and Mitigation Plan (CRMMP), as prepared by, or under the direction of, the CRS, to the CPM for review and approval. The CRMMP shall follow the content and organization of the draft model CRMMP, provided by the CPM, and the authors' name(s) shall appear on the title page of the CRMMP. The CRMMP shall identify measures to minimize potential impacts to sensitive cultural resources. Implementation of the CRMMP shall be the responsibility of the CRS and the project owner. Copies of the CRMMP shall reside with the CRS, alternate CRS, each CRM, and the project owner's on-site construction manager. No ground disturbance shall occur prior to CPM approval of the CRMMP, unless such activities are specifically approved by the CPM.

The CRMMP shall include, but not be limited to, the following elements and measures:

1. The following statement included in the Introduction: “Any discussion, summary, or paraphrasing of the conditions of certification in this CRMMP is intended as general guidance and as an aid to the user in understanding the conditions and their implementation. The conditions, as written in the Commission Decision, shall supersede any summarization, description, or interpretation of the conditions in the CRMMP. The Cultural Resources conditions of certification from the Commission Decision are contained in Appendix A.”

2. A proposed general research design that includes a discussion of archaeological research questions and testable hypotheses specifically applicable to the project area, and a discussion of artifact collection, retention/disposal, and curation policies as related to the research questions formulated in the research design. The research design will specify that the preferred treatment strategy for any buried archaeological deposits is avoidance. A specific mitigation plan shall be prepared for any unavoidable impacts to any CRHR-eligible (as determined by the CPM) resources. A prescriptive treatment plan may be included in the CRMMP for limited data types.

3. Specification of the implementation sequence and the estimated time frames needed to accomplish all project-related tasks during the ground-disturbance and post-ground–disturbance analysis phases of the project.

4. Identification of the person(s) expected to perform each of the tasks, their responsibilities, and the reporting relationships between project construction management and the mitigation and monitoring team.

5. A description of the manner in which Native American observers or monitors will be included, the procedures to be used to select them, and their role and responsibilities.

6. A description of all impact-avoidance measures (such as flagging or fencing) to prohibit or otherwise restrict access to sensitive resource areas that are to be avoided during ground disturbance, construction, and/or operation, and identification of areas where these measures are to be implemented. The description shall address how these measures would be implemented prior to the start of ground disturbance and how long they would be needed to protect the resources from project-related effects.

7. A statement that all encountered cultural resources over 50 years old shall be recorded on Department of Parks and Recreation (DPR) 523 forms and mapped and photographed. In addition, all archaeological materials retained as a result of the archaeological investigations (survey, testing, data recovery) shall be curated in accordance with the California State Historical Resources Commission’s *Guidelines for the Curation of Archaeological Collections*, into a retrievable storage collection in a public repository or museum.

8. A statement that the project owner will pay all curation fees for artifacts recovered and for related documentation produced during cultural resources

investigations conducted for the project. The project owner shall identify three possible curation facilities that could accept cultural resources materials resulting from project activities.

9. A statement demonstrating when and how the project owner will comply with Health and Human Safety Code 7050.5(b) and Public Resources Code 5097.98(b) and (e), including the statement that the project owner will notify the CPM and the NAHC of the discovery of human remains.

10. A statement that the CRS has access to equipment and supplies necessary for site mapping, photography, and recovery of any cultural resource materials that are encountered during ground disturbance and cannot be treated prescriptively.

11. A description of the contents, format, and review and approval process of the final Cultural Resource Report (CRR), which shall be prepared according to Archaeological Resource Management Report (ARMR) guidelines[34].

Verification:

1. Upon approval of the CRS proposed by the project owner, the CPM will provide to the project owner an electronic copy of the draft model CRMMP for the CRS.

2. At least 30 days prior to the start of ground disturbance, the project owner shall submit the CRMMP to the CPM for review and approval.

3. At least 30 days prior to the start of ground disturbance, in a letter to the CPM, the project owner shall agree to pay curation fees for any materials generated or collected as a result of the archaeological investigations (survey, testing, data recovery).

4. Within 90 days after completion of ground disturbance (including landscaping), if cultural materials requiring curation were generated or collected, the project owner shall provide to the CPM a copy of an agreement with, or other written commitment from, a curation facility that meets the standards stated in the California State Historical Resources Commission's *Guidelines for the Curation of Archaeological Collections*, to accept the cultural materials from this project. Any agreements concerning curation will be retained and available for audit for the life of the project.

CUL-4 The project owner shall submit the final Cultural Resources Report (CRR) to the CPM for approval. The final CRR shall be written by or under the direction of the CRS and shall be provided in the ARMR format. The final CRR shall report on all field activities including dates, times and locations, results, samplings, and analyses. All survey reports, DPR 523 forms, data recovery reports, and any additional research reports not previously submitted to the CHRIS and the State Historic Preservation Officer (SHPO) shall be included as appendices to the final CRR.

[34] As published in California State Parks Office of Historic Preservation (OHP) (1990) or subsequent revisions to the 1990 version of the ARMR guidelines.

If the project owner requests a suspension of ground disturbance and/or construction activities, then a draft CRR that covers all cultural resources activities associated with the project shall be prepared by the CRS and submitted to the CPM for review and approval on the same day as the suspension/extension request. The draft CRR shall be retained at the project site in a secure facility until ground disturbance and/or construction resumes or the project is withdrawn. If the project is withdrawn, then a final CRR shall be submitted to the CPM for review and approval at the same time as the withdrawal request.

Verification:

1. Within 30 days after requesting a suspension of construction activities, the project owner shall submit a draft CRR to the CPM for review and approval.

2. Within 90 days after completion of ground disturbance (including landscaping), the project owner shall submit the final CRR to the CPM for review and approval. If any reports have previously been sent to the CHRIS, then receipt letters from the CHRIS or other verification of receipt shall be included in an appendix.

3. Within ten days after CPM approval of the CRR, the project owner shall provide documentation to the CPM confirming that copies of the final CRR have been provided to the SHPO, the CHRIS, the curating institution, if archaeological materials were collected, and to the tribal chairpersons of any Native American groups requesting copies of project-related reports.

CUL-5 Prior to, and for the duration of, construction-related ground disturbance or grading, boring, and trenching, as defined in the Compliance conditions of certification for this project; or surface grading or subsurface soil work during pre-construction activities or site mobilization, the project owner shall provide Worker Environmental Awareness Program (WEAP) training to all new workers within their first week of employment at the project site, along the linear facilities routes, and at laydown areas, roads, and other ancillary areas. The cultural resources part of this training shall be prepared by the CRS, may be conducted by any member of the archaeological team, and may be presented in the form of a video. The CRS is encouraged to include a Native American presenter in the training to contribute the Native American perspective on archaeological and ethnographic resources. During the training and during construction, the CRS shall be available (by telephone or in person) to answer questions posed by employees. The training may be discontinued when ground disturbance is completed or suspended, but must be resumed when ground disturbance, such as landscaping, resumes.

The training shall include:

1. A discussion of applicable laws and penalties under law;

2. Samples or visuals of artifacts that might be found in the project vicinity;

3. A discussion of what such artifacts may look like when partially buried, or wholly buried and then freshly exposed;

4. A discussion of what prehistoric and historical archaeological deposits look like at the surface and when exposed during construction, and the range of variation in the appearance of such deposits;

5. Instruction that the CRS, alternate CRS, and CRMs have the authority to halt ground disturbance in the area of a discovery to an extent sufficient to ensure that the resource is protected from further impacts, as determined by the CRS;

6. Instruction that employees, if the CRS, alternate CRS, or CRMs are not present, are to halt work on their own in the vicinity of a potential cultural resources discovery, and shall contact their supervisor and the CRS or CRM, and that redirection of work would be determined by the construction supervisor and the CRS;

7. An informational brochure that identifies reporting procedures in the event of a discovery;

8. An acknowledgement form signed by each worker indicating that they have received the training; and

9. A sticker that shall be placed on hard hats indicating that environmental training has been completed.

No ground disturbance shall occur prior to implementation of the WEAP program, unless such activities are specifically approved by the CPM.

Verification:

1. At least 30 days prior to the beginning of ground disturbance, the CRS shall provide the cultural resources WEAP training program draft text, including Native American participation, and graphics, along with the informational brochure to the CPM for review and approval.

2. At least 15 days prior to the beginning of ground disturbance, the CPM will provide to the project owner a WEAP Training Acknowledgement form for each WEAP-trained worker to sign.

3. Monthly, until ground disturbance is completed, the project owner shall provide in the Monthly Compliance Report (MCR) the WEAP Training Acknowledgement forms of workers who have completed the training in the prior month and a running total of all persons who have completed training to date.

CUL-6 Prior to the start of construction-related ground disturbance or grading, boring, and trenching, as defined in the Compliance conditions for this project; or surface grading or subsurface soil work during pre-construction activities or site mobilization, the project owner shall notify the CPM and all interested Native Americans of the date on which ground disturbance will ensue. The project owner shall ensure that the CRS, alternate CRS, or CRMs monitor full time all of the above specified ground disturbance at the project site, along the linear facilities routes, and at laydown areas, roads, and other ancillary areas, to ensure there are no impacts to undiscovered resources and to ensure that known resources are not impacted in an unanticipated manner.

Full-time archaeological monitoring for this project shall be the archaeological monitoring of ground-disturbing activities within those areas of the project site where ground disturbance would reach native sediments (see **Cultural Resources Table 2**), for as long as the activities are ongoing. Where excavation equipment is actively removing dirt and hauling the excavated material farther than 50 feet from the location of active excavation, full-time archaeological monitoring shall require at least two monitors per excavation area. In this circumstance, one monitor shall observe the location of active excavation and a second monitor shall inspect the dumped material. For excavation areas where the excavated material is dumped no farther than 50 feet from the location of active excavation, one monitor shall both observe the location of active excavation and inspect the dumped material.

The project owner shall obtain the services of one or more Native Americans to monitor ground disturbance within the project site. Contact lists of interested Native Americans and guidelines for monitoring shall be obtained from the NAHC. Preference in selecting a monitor shall be given to Native Americans with traditional ties to the area where the project is located, but the project owner shall make a reasonable and good faith effort to accommodate equally all groups expressing the desire to monitor. If efforts to obtain the services of at least one qualified Native American monitor, acceptable to all groups that want monitoring, are unsuccessful, the project owner shall immediately inform the CPM. The CPM may either identify potential monitors or allow ground disturbance to proceed without a Native American monitor.

The research design in the CRMMP shall govern the collection, treatment, retention/disposal, and curation of any archaeological materials encountered.

On forms provided by the CPM, CRMs shall keep a daily log of any monitoring and other cultural resources activities and any instances of non-compliance with the conditions of certification and/or applicable LORS. Copies of the daily monitoring logs shall be provided by the CRS to the CPM, if requested by the CPM. From these logs, the CRS shall compile a monthly monitoring summary report to be included in the MCR. If there are no monitoring activities, the summary report shall specify why monitoring has been suspended.

The CRS or alternate CRS shall report daily to the CPM on the status of the project’s cultural resources-related activities, unless reducing or ending daily reporting is requested by the CRS and approved by the CPM.

In the event that the CRS believes that the current level of monitoring is not appropriate in certain locations, a letter or e-mail detailing the justification for changing the level of monitoring shall be provided to the CPM for review and approval prior to any change in the level of monitoring.

The CRS, at his or her discretion, or at the request of the CPM, may informally discuss cultural resources monitoring and mitigation activities with Energy Commission technical staff.

Cultural resources monitoring activities are the responsibility of the CRS. Any interference with monitoring activities, removal of a monitor from duties assigned by the CRS, or direction to a monitor to relocate monitoring activities by anyone other than the CRS shall be considered non-compliance with these conditions of certification.

Upon becoming aware of any incidents of non-compliance with the conditions of certification and/or applicable LORS, the CRS and/or the project owner shall notify the CPM by telephone or e-mail within 24 hours. The CRS shall also recommend corrective action to resolve the problem or achieve compliance with the conditions. When the issue is resolved, the CRS shall write a report describing the issue, the resolution of the issue, and the effectiveness of the resolution measures. This report shall be provided in the next MCR for the review of the CPM.

Verification:

1. At least 30 days prior to the start of ground disturbance, the CPM will notify all Native Americans with whom the Energy Commission communicated during the project review of the date on which the project's ground disturbance will begin.

2. At least 30 days prior to the start of ground disturbance, the CPM will provide to the CRS an electronic copy of a form to be used as a daily monitoring log.

3. Monthly, while monitoring is on-going, the project owner shall include in each MCR a copy of the monthly summary report of cultural resources-related monitoring prepared by the CRS and shall attach any new DPR 523A forms completed for finds treated prescriptively, as specified in the CRMMP.

4. At least 24 hours prior to implementing a proposed change in monitoring level, the project owner shall submit to the CPM, for review and approval, a letter or e-mail (or some other form of communication acceptable to the CPM) detailing the CRS's justification for changing the monitoring level.

5. Daily, as long as no cultural resources are found, the CRS shall provide a statement that "no cultural resources over 50 years of age were discovered" to the CPM as an e-mail or in some other form of communication acceptable to the CPM.

6. At least 24 hours prior to reducing or ending daily reporting, the project owner shall submit to the CPM, for review and approval, a letter or e-mail (or some other form of communication acceptable to the CPM) detailing the CRS's justification for reducing or ending daily reporting.

7. Within 15 days of receiving them, the project owner shall submit to the CPM copies of any comments or information provided by Native Americans in response to the project owner's transmittals of information.

CUL-7 The project owner shall grant authority to halt ground disturbance to the CRS, alternate CRS, and the CRMs in the event of a discovery. Redirection of ground disturbance shall be accomplished under the direction of the construction supervisor in consultation with the CRS.

In the event that a cultural resource over 50 years of age is found (or if younger, determined exceptionally significant by the CPM), or impacts to such a resource can be anticipated, ground disturbance shall be halted or redirected in the immediate vicinity of the discovery sufficient to ensure that the resource is protected from further impacts. If the discovery includes human remains, the project owner shall comply with the requirements of Health and Human Safety Code § 7050.5(b) and shall additionally notify the CPM and the NAHC of the discovery of human remains. No action with respect to the disposition of human remains of Native American origin shall be initiated without direction from the CPM. Monitoring, including Native American monitoring, and daily reporting, as provided in other conditions, shall continue during the project's ground-disturbing activities elsewhere, while the halting or redirection of ground disturbance in the vicinity of the discovery shall remain in effect until the CRS has visited the discovery, and all of the following have occurred:

1. The CRS has notified the project owner and CPM within 24 hours of the discovery, or by Monday morning if the cultural resources discovery occurs between 8:00 AM on Friday and 8:00 AM on Sunday morning, including a description of the discovery (or changes in character or attributes), the action taken (i.e., work stoppage or redirection), a recommendation of CRHR eligibility, and recommendations for data recovery from any cultural resources discoveries, whether or not a determination of CRHR eligibility has been made.

2. If the discovery would be of interest to Native Americans, the CRS has notified all Native American groups that expressed a desire to be notified in the event of such a discovery.

3. The CRS has completed field notes, measurements, and photography for a DPR 523 "Primary" form. Unless the find can be treated prescriptively, as specified in the CRMMP, the "Description" entry of the DPR 523 "Primary" form shall include a recommendation on the CRHR eligibility of the discovery. The project owner shall submit completed forms to the CPM.

4. The CRS, the project owner, and the CPM have conferred, and the CPM has concurred with the recommended eligibility of the discovery and approved the CRS's proposed data recovery, if any, including the curation of the artifacts, or other appropriate mitigation; and any necessary data recovery and mitigation have been completed.

Ground disturbance may resume only with the approval of the CPM.

Verification:

1. At least 30 days prior to the start of ground disturbance, the project owner shall provide the CPM and CRS with a letter confirming that the CRS, alternate CRS, and CRMs have the authority to halt ground disturbance in the vicinity of a cultural resources discovery, and that the project owner shall ensure that the CRS notifies the CPM within 24 hours of a discovery, or by Monday morning if the cultural resources discovery occurs between 8:00 AM on Friday and 8:00 AM on Sunday morning.

2. Unless the discovery can be treated prescriptively, as specified in the CRMMP, completed DPR 523 forms for resources newly discovered during ground disturbance shall be submitted to the CPM for review and approval no later than 24 hours following the notification of the CPM, or 48 hours following the completion of data recordation/recovery, whichever the CRS decides is more appropriate for the subject cultural resource.

3. Within 48 hours of the discovery of a resource of interest to Native Americans, the project owner shall ensure that the CRS notifies all Native American groups that expressed a desire to be notified in the event of such a discovery, and the CRS must inform the CPM when the notifications are complete.

4. No later than 30 days following the discovery of any Native American cultural materials, the project owner shall submit to the CPM copies of the information transmittal letters sent to the chairpersons of the Native American tribes or groups who requested the information. Additionally, the project owner shall submit to the CPM copies of letters of transmittal for all subsequent responses to Native American requests for notification, consultation, and reports and records.

5. Within 15 days of receiving them, the project owner shall submit to the CPM copies of any comments or information provided by Native Americans in response to the project owner's transmittals of information.

CUL-8 If fill soils must be acquired from a non-commercial borrow site or disposed of to a non-commercial disposal site, unless less-than-five-year-old surveys of these sites for archaeological resources are documented to and approved by the CPM, the CRS shall survey the borrow and/or disposal site(s) for cultural resources and record on DPR 523 forms any that are identified. When the survey is completed, the CRS shall convey the results and recommendations for further action to the project owner and the CPM, who will determine what, if any, further action is required. If the CPM determines that significant archaeological resources that cannot be avoided are present at the borrow site, other conditions shall apply. The CRS shall report on the methods and results of these surveys in the final CRR.

Verification:

1. As soon as the project owner knows that a non-commercial borrow site and/or disposal site will be used, he/she shall notify the CRS and CPM and provide documentation of previous archaeological survey, if any, dating within the past five years, for CPM approval.

2. In the absence of documentation of recent archaeological survey, at least 30 days prior to any soil borrow or disposal activities on the non-commercial borrow and/or disposal site(s), the CRS shall survey the site(s) for archaeological resources. The CRS shall notify the project owner and the CPM of the results of the cultural resources survey, with recommendations, if any, for further action.

CUL-9 Prior to the start of demolition or alteration of the existing RBGS Plants 1, 2 and 3, and the Administration Wing of Plant 1, including appurtenant facilities, the project owner shall provide the CPM with the name and statement of qualifications of an architectural historian who will prepare Historic American Engineering Record (HAER) Level I documentation of the existing RBGS and appurtenant facilities, including SEA Lab.

The statement of qualifications for the architectural historian shall include all information needed to demonstrate that the architectural historian meets the necessary qualifications, including:

a) Meets the Secretary of the Interior's Professional Standards for architectural history;

b) Has at least five years experience in recording twentieth-century American architecture and engineering structures;

c) Names and contact information of contacts familiar with the architectural historian's work on referenced projects.

Verification: At least 120 days prior to the start of demolition or alteration of the existing RBGS Plants 1, 2 and 3, and the Administration Wing of Plant 1, including appurtenant facilities the project owner shall submit the name and statement of qualifications of its architectural historian to the CPM for review and approval.

CUL-10 Prior to demolition of the existing RBGS Plants 1, 2 and 3, and the Administration Wing of Plant 1, including appurtenant facilities, the architectural historian retained by the project owner shall prepare HAER Level I documentation of the RBGS Plants 1, 2 and 3, and the Administration Wing of Plant 1, including appurtenant facilities and SEA Lab. This will include large format photography (views of the overall site, individual buildings, building details and interiors, a full set of measured drawings depicting historic or existing conditions), a descriptive and historical narrative of the RBGS and the contexts of the Art Moderne style of architecture, the work of Stone and Webster and trends in steam electric generating plant design pre-World War II and post World War II in the United States and California. This documentation shall be completed in accordance with the Guidelines for Architectural and Engineering Documentation, published by the Department of the Interior-National Park Service, in the Federal Register/Volume 68, No. 139/ Monday, July 21, 2003/Notices, pp. 43159 to 43162.

Verification: At least 45 days prior to demolition or alteration of the existing RBGS Plants 1, 2 and 3, the Administration Wing of Plant 1 and appurtenant facilities, the HAER documentation shall be provided to the CPM for review and approval.

HAER documentation at Level 1 shall be provided to the Library of Congress and the California Energy Commission Library. The project owner shall consult with the California State Library, Huntington Library and city of Redondo Beach and provide to those facilities the documentation in a format that the repository can accommodate and/or prefers. A record of those consultations shall be submitted to the CPM for review and approval.

Within 30 days after the CPM approval of the HAER, the project owner shall provide a copy of the transmittal letters to the CPM of the HAER documentation to the Library of Congress, Energy Commission Library, California State Library, Huntington Library, and city of Redondo Beach.

CULTURAL RESOURCES ABBREVIATION AND ACRONYM GLOSSARY

ACC	air-cooled condenser
ACHP	Advisory Council on Historic Preservation
AFC	Application for Certification
ARMR	Archaeological Resource Management Report
asl	above sea level
bgs	below ground surface
Cal. Code	
Regs.	California Code of Regulations
CCC	California Coastal Commission
CCGT	combined cycle gas turbine
CEC	California Energy Commission
CEQ	Council on Environmental Quality
CEQA	California Environmental Quality Act
C.F.R.	Code of Federal Regulations
CHRIS	California Historical Resources Information System
COE	Corps of Engineers, U.S. Army
Conditions	Conditions of Certification
CRHR	California Register of Historical Resources
CPM	Compliance Project Manager
CRM	Cultural Resources Monitor
CRMMP	Cultural Resources Monitoring and Mitigation Plan
CRR	Cultural Resource Report
CRS	Cultural Resources Specialist
DPR	Department of Parks and Recreation (State of California)
DPR 523	Department of Parks and Recreation cultural resources recordation form

EDR	Environmental Data Resources, Inc.
E.O.	Executive Order (presidential)
ESEC	El Segundo Energy Center
° F	degrees Fahrenheit
FSA	Final Staff Assessment
gal	gallon(s)
GLO	General Land Office
HABS	Historic American Building Survey
HAER	Historic American Engineering Record
HALS	Historic American Landscape Survey
HDP	Heritage Documentation Programs
HRSG	heat recovery steam generator
LA	Los Angeles [County]
LORS	laws, ordinances, regulations, and standards
MCR	Monthly Compliance Report
MLD	Most Likely Descendent
MRS	Marine Research Specialists
NAHC	Native American Heritage Commission
NAM	Native American Monitor
NHPA	National Historic Preservation Act
NPS	National Park Service
NRHP	National Register of Historic Places
OHP	Office of Historic Preservation
PAA	Project Area of Analysis
PCH	Pacific Coast Highway (State Route 1)
PSA	Preliminary Staff Assessment

RBEP	Redondo Beach Energy Project
RBGS	Redondo Beach Generating Station
SBA	Santa Barbara [County]
SCCIC	South Central Coastal Information Center
SHL	State Historical Landmark
SHPO	State Historic Preservation Officer
SMI	San Miguel Island
SOI	Secretary of the Interior
SRI	Santa Rosa Island
SST	sea surface temperature
Staff	Energy Commission cultural resources technical staff
STG	steam turbine generator
TCP	traditional cultural property
TLPG	The Lightfoot Planning Group
USGS	U.S. Geological Survey
WEAP	Worker Environmental Awareness Program

REFERENCES

The *tn: 00000* in a reference below indicates the transaction number under which the item is catalogued in the Energy Commission's Docket Unit. The transaction number allows for quicker location and retrieval of individual items docketed for a case or used for ease of reference and retrieval of exhibits cited in briefs and used at Evidentiary Hearings.

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Historical Resource Evaluation of the Redondo Beach Generating Station and SEA Lab

1021 and 1100 North Harbor Drive, Redondo Beach, Los Angeles County, California

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ABSTRACT

AES Southland, LLC (AES) is proposing to remove the existing Redondo Beach Generating Station (RBGS), and replace it with a smaller, cleaner, and more efficient natural gas power plant. The RBGS Project area encompasses approximately 50 acres (ac) at 1100 North Harbor Drive in the city of Redondo Beach, Los Angeles County, California. The application process is being carried out through the California Energy Commission (Energy Commission) and South Coast Air Quality Management District. The proposed RBGS Project (Project) is subject to compliance with the California Environmental Quality Act (CEQA), as amended. Applied EarthWorks, Inc. (Æ) was retained to conduct a historical resources evaluation of the RBGS and SEA Lab in accordance with CEQA.

AES purchased the RBGS from Southern California Edison Company (SCE) in 1998. Constructed by SCE in 1946–1948, and historically known as the Redondo Steam Station, the original facilities included the Administration wing, Plant 1, and the pump house (SEA Lab) all of which were built in the Art Moderne architectural style. Plant 2 was built in 1956 and Plant 3 was built in 1968, both of which are vernacular forms of industrial architecture. For the purposes of evaluating the RBGS as a historic-period facility, the SEA Lab at 1021 North Harbor Drive, owned by AES, is included as a historical component of the Redondo Steam Station. It was designed and built in 1946–1948 as the pump station that supplied seawater for cooling the turbines at Plant 1.

To comply with various regulatory requirements, Æ, under contract with Aspen Environmental Group, and on behalf of the Energy Commission, evaluated the significance of the Redondo Steam Station/RBGS and SEA Lab and assessed its eligibility for inclusion in the California Register of Historical Resources (CRHR). Historical research indicated that the Redondo Steam Station/RBGS and SEA Lab have a complex history as an evolving system of architecture and engineering. The Redondo Steam Station was originally designed and built by master engineers Stone & Webster Engineering Corporation to operate as a high-capacity steam-electric plant with the ability for additional plants to be added to meet future energy demands. Construction of Plants 2 and 3 during the historic period fulfilled the plant's planned ultimate expansion.

The Redondo Steam Station was one of a number of natural gas and oil-fired steam-driven electric power plants constructed by SCE during the post-World War II (WWII) era. However, today the RBGS is unique because of its direct association with a historic trend and transition in the development of the newest generation of high capacity steam-electric plants immediately following the end of WWII. That association extends to its architectural design and construction by an engineering giant at that time, Stone & Webster Engineering Corporation. In addition, the original buildings of the historical Redondo Steam Station, including the Administration wing, Plant 1, and the pump house (SEA Lab) exhibit architectural merits as a large Art Moderne-styled public utility building complex.

The results of this investigation conclude that the Redondo Steam Station/RBGS and SEA Lab appear eligible for the CRHR under Criteria 1 and 3, and retain sufficient levels of historical integrity with respect to *location, design, setting, materials, workmanship, feeling, and association* to convey the resource's significance. The relevant themes for which the Redondo

Steam Station/RBGS and SEA Lab are significant are based on events and trends in California's energy development history, the resource as a transitional work of Stone & Webster Engineering Corporation, and notable design and execution of the Art Moderne architectural style in a large public utility building complex. The Redondo Steam Station/RBGS and SEA Lab are significant at the southern California regional level and the Redondo Beach local level for their historical associations and architectural and engineering merits. The period of significance varies under these different themes, but overall, begins with the original construction in 1946 and encompasses the period in which the addition of Plants 2 and 3 occurred, 1956–1968.

CONTENTS

List of Figures

1 INTRODUCTION

On November 20, 2012 AES Southland, LLC submitted an Application for Certification (AFC) to the California Energy Commission seeking permission to construct and operate a power generation facility, the Redondo Beach Energy Project (RBEP), located at 1100 North Harbor Drive in the City of Redondo Beach, Los Angeles County, California (Figure 1). The site for the proposed project is southeast of and adjacent to the North Harbor Drive and Herondo Street intersection and would utilize 10.5 acres (ac) in addition to, a 2.2 ac existing switchyard located entirely within the approximately 50-ac footprint of the existing Redondo Beach Generating Station (RBGS), an operating power plant.

The RBGS and SEA Lab are situated within a portion of the Rancho San Pedro (Dominguez) land grant in Township 4 South, Range 14–15 West, San Bernardino Base Meridian, as depicted on the Redondo Beach, CA, 7.5' USGS Quadrangle (Figure 2); elevation is approximately 17 feet (ft) above mean sea level (amsl). More specifically, the RBGS and SEA Lab are situated in the northwestern portion of South Redondo Beach. The RBGS is located on the southeastern corner of Herondo Street and North Harbor Drive, while the SEA Lab is located across the street to the west of the RBGS, on the southwest corner of Yacht Club Way and North Harbor Drive (Figure 3). The RBGS occupies a large, irregularly shaped tract of land covering approximately 50 ac, encompassing Assessor's Parcel Numbers (APNs) 7503-013-014, 7503-013-015, 7503-013-819, and 7503-013-820. The SEA Lab facility occupies APNs 7503-013-821 and -822.

The RBEP is a proposed natural-gas fired, combined-cycle, air-cooled electrical generating facility with a net generating capacity of 496 megawatt (MW), which will replace, and be constructed on the site of the RBGS. RBEP will consist of one three-on-one, combined-cycle gas turbine power block with three natural-gas-fired combustion turbine generators (CTG), three supplemental-fired heat recovery steam generators (HRSG), one steam turbine generator (STG), an air-cooled condenser, and related ancillary equipment. Other equipment and facilities to be constructed include natural gas compressors, water treatment facilities, emergency services, and administration and maintenance buildings. The existing RBGS Units 1 through 8 and auxiliary boiler No. 17 would be demolished as part of the project. Units 1, 2, 3, and 4 are currently retired, while Units 5, 6, 7, and 8 are currently in use. The Wyland Whaling Wall (an on-site artistic feature) would be dismantled and moved to a new location directly in front of the proposed power block.

1.1 SCOPE AND PURPOSE OF REPORT

The California Energy Commission staff has requested that Applied Earthworks, Inc. (Æ), under contract with Aspen Environmental Group, conduct an Architectural Assessment for the RBEP AFC (12-AFC-03). The focus of this study is evaluating the RBGS Administration, Unit 1 and SEA Lab buildings for eligibility for listing on California Register of Historical Resources (CRHR) and therefore to determine if they are historical resources under CEQA (Section 15064.5 (a)(2)-(3) of the CEQA Guidelines and Section 5024.1 of the California Public Resources Code). This background information will be used by Energy Commission staff to write the Cultural Resources section of the RBEP Preliminary and Final Staff Assessment (PSA/FSA).

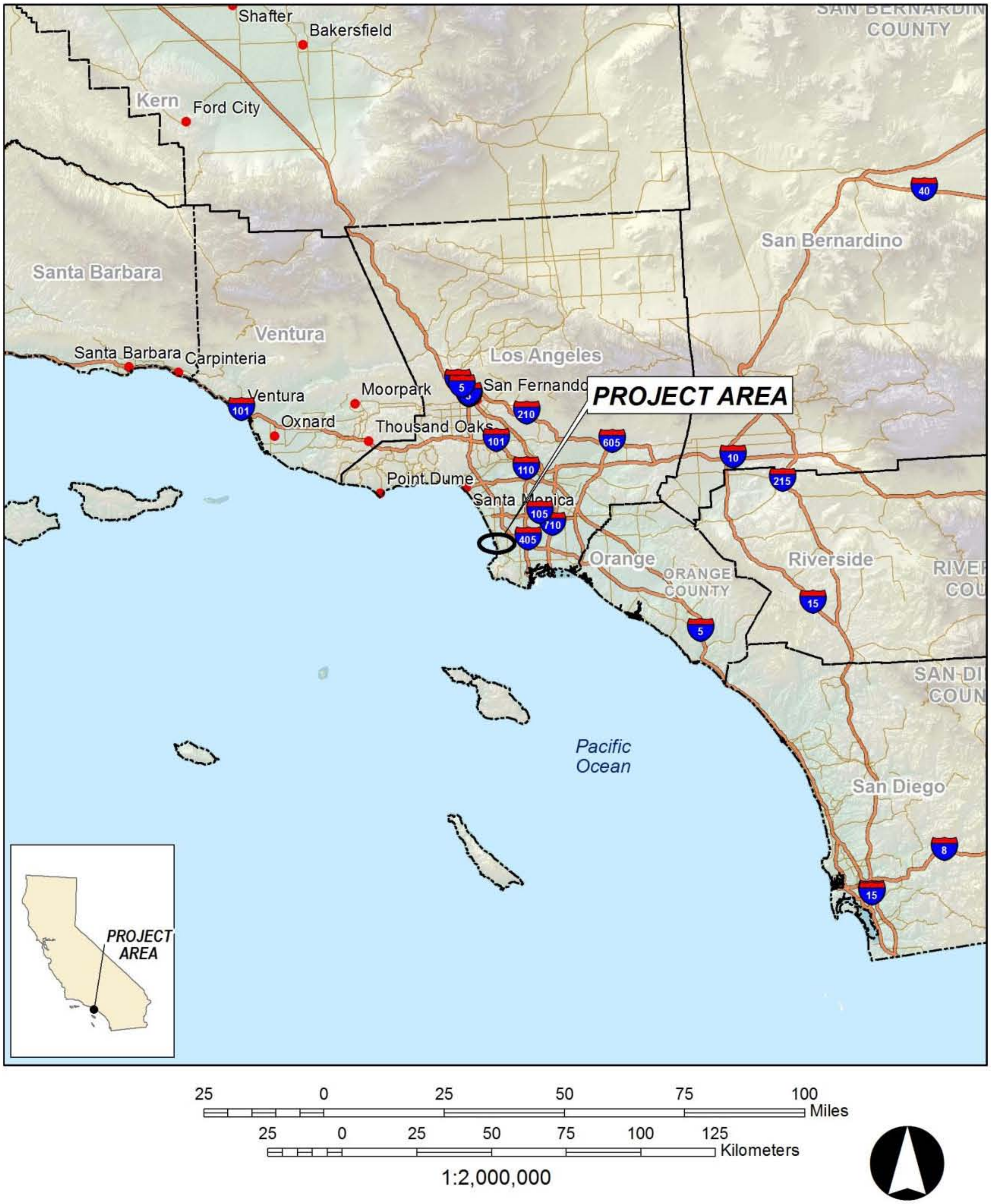

Figure 1 Project vicinity.

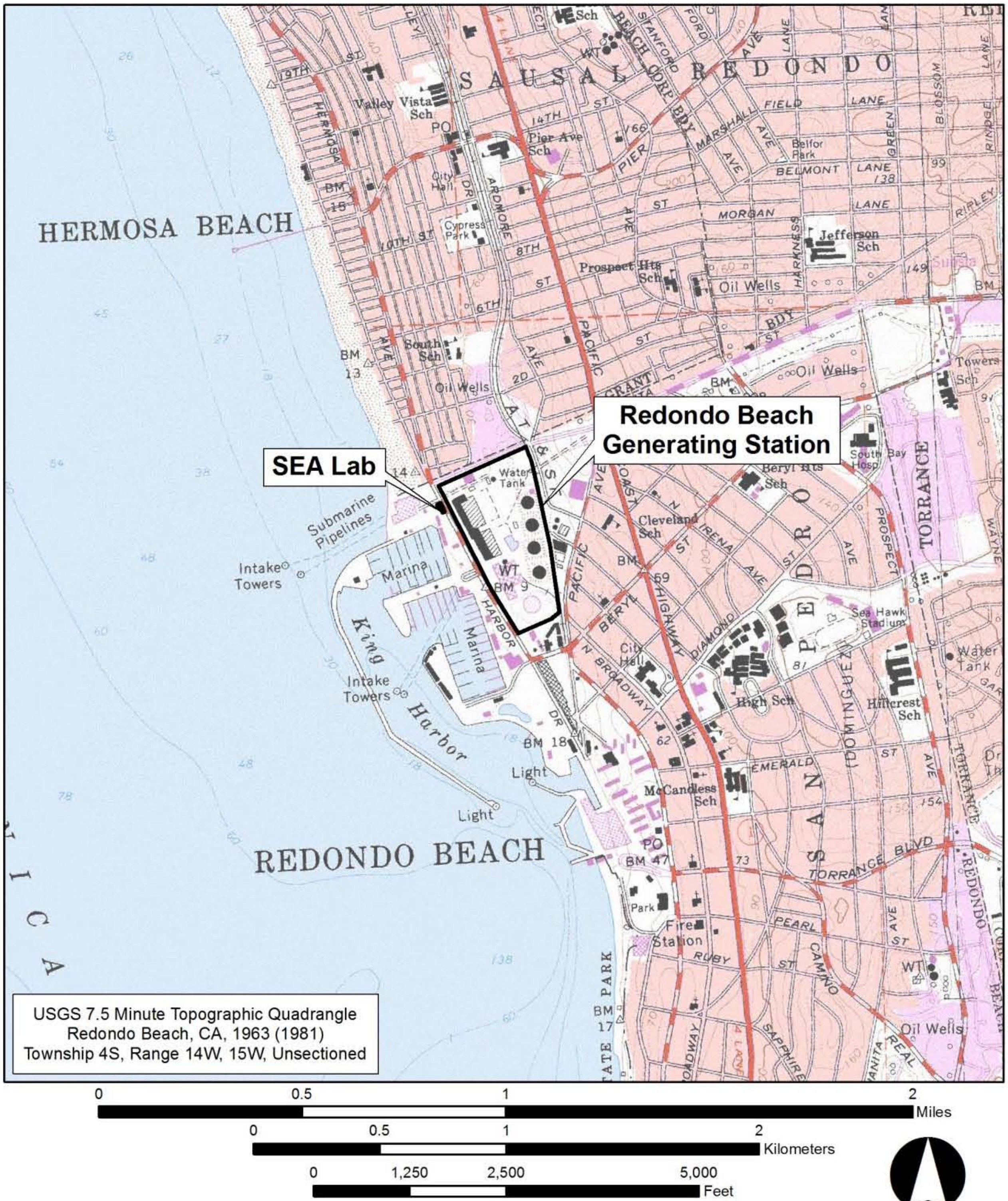

Figure 2 Location of RBGS and SEA Lab on U.S. Geological Survey map.

Figure 3 Location of RBGS and SEA Lab depicted on an aerial photograph.

Historically known as the Redondo Steam Station, the original facilities of the RBGS were constructed in 1946–1948. The RBGS was one of a number of natural gas and oil-fired steam-driven electric power plants constructed by SCE during the post-World War II (WWII) era. AES purchased the RBGS from Southern California Edison Company (SCE) in 1998. For the purposes of evaluating the RBGS as a historic-period facility, the SEA Lab at 1021 North Harbor Drive, located across the street between the ocean and the RBGS, is included as a historical component of the facility because it was designed and built in 1946–1948 as the pump station that supplied seawater for cooling the turbines at Plant 1. The SEA Lab currently houses a marine science learning center operated by the Los Angeles Conservation Corps.

The RBGS compound contains the Administration wing and Plant 1, built in 1946–1948 in the Art Moderne architectural style, Plant 2 built in 1956 and Plant 3 built in 1968, and ancillary structures erected over its lifetime. Several of the stacks, fuel-oil containers, and other ancillary structures dating to the historic-period have been removed in recent years.

Æ developed the scope of work in consultation with Melissa Mourkas, Planner II with the Energy Commission. Æ Principal Investigator, Susan Goldberg served as Project Director, and Æ Historic Preservation Manager Victoria Smith served as Project Manager. Josh Smallwood, M.A., RPA, carried out the built-environment survey, historical background research, significance evaluations, and authored the report. A historical resources built-environment survey of the Project area was conducted by Æ architectural historian Josh Smallwood on November 21, 2013.

1.2 REGULATORY CONTEXT

The California Energy Commission is the lead agency (for licensing thermal power plants 50 megawatts and larger) under CEQA and has a certified regulatory program under CEQA. Under its certified program, the Energy Commission is exempt from having to prepare an environmental impact report. Its certified program, however, does require environmental analysis of the project, including an analysis of alternatives and mitigation measures to minimize any significant adverse effect the project may have on the environment.

Generally, a cultural resource shall be considered "historically significant" if the resource is 50 years old or older, possesses integrity of *location, design, setting, materials, workmanship, feeling,* and *association*, and meets the requirements for listing on the CRHR under any one of the following criteria:

1) Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage;

2) Is associated with the lives of persons important in our past;

3) Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values; or,

4) Has yielded, or may be likely to yield, information important in prehistory or history. (Title 14 CCR, § 15064.5)

1.3 REPORT ORGANIZATION

This report documents the results of a historical resources investigation for the proposed RBEP Project. Chapter 1 has introduced the scope of the work and regulatory context. Chapter 2 provides the methods and procedures of the investigation. Chapter 3 provides a detailed historic context with which the historical significance of the Redondo Steam Station/RBGS/SEA Lab can be evaluated. Chapter 4 provides a description of the resource. A formal evaluation of the historical significance of the Redondo Steam Station/RBGS/SEA Lab is provided in Chapter 5. Conclusions are included in Chapter 6, followed by bibliographic references in Chapter 7, and personnel qualifications in Chapter 8.

2 METHODS

Three basic tasks were carried out to complete the documentation and historical evaluation of the RBGS and SEA Lab. First, research regarding the history of Redondo Beach, the Redondo Steam Station, Stone & Webster Engineering Corporation, Art Moderne architecture, and the development and progression of steam-electric plants in California was reviewed. Second, Æ architectural historian Josh Smallwood, M.A., carried out an architectural survey of the RBGS and SEA Lab on November 21, 2013. The field inspection served to describe and document the various buildings and structural components or facilities found at the RBGS and SEA Lab. Finally, Æ applied the CRHR criteria within the historic context defined through the background research to evaluate the historical significance of the RBGS and SEA Lab. Each of these steps is described in greater detail below.

2.1 BACKGROUND RESEARCH

Background research had two goals: (1) to gather as much specific data as possible about the history and operation of the Redondo Steam Station (present-day RBGS and SEA Lab) and (2) to collect sufficient general information to construct a historic context for the evaluation of the Redondo Steam Station/RBGS/SEA Lab. Primary historical data related to the construction and modification of the Redondo Steam Station was obtained in November 2013 from a number of sources, including the following:

- files of the California Energy Commission;
- published literature such as William A. Myers' (1983) *Iron Men and Copper Wires: A Centennial History of the Southern California Edison Company*, James C. Williams' (1997) *Energy and the Making of Modern California*, and Heinz Termuehlen's (2001) *100 Years of Power Plant Development*;
- historical photographs from the archives of the Huntington Digital Library;
- early twentieth century fire insurance maps of the Sanborn Map Company;
- Los Angeles County Assessor maps; and
- quadrangle maps of the United States Geological Survey (USGS) dated 1896, 1934, 1951, and 1963, photorevised 1972.

The *City of Redondo Beach Historic Context Statement* (Duncan-Abrams and Milkovich 1995) was consulted for specific history on the development of Redondo Beach. A brief reconnaissance of Art Moderne style buildings identified in the City's Historic Context Statement was carried out to assess their current condition, and compare their size, scale, mass, and overall design with that of the Art Moderne-styled Administration wing, Plant 1, and pump house (SEA Lab).

Lori Price's (2012a; 2012b) California Department of Parks and Recreation (DPR 523) recording forms for both the RBGS and SEA Lab were reviewed for accuracy, completeness, and evaluation methods.

2.2 DOCUMENTATION

Æ architectural historian Josh Smallwood carried out an architectural survey of the RBGS and SEA Lab on November 21, 2013. Smallwood performed the task by walking the grounds of the RBGS, entering the Administration wing and proceeding through Plant 1, Plant 2, and Plant 3. Once leaving Plant 3, Smallwood walked to the southeastern corner of the property while viewing the former locations of oil tanks. He then walked northwesterly through the center of the property to inspect the locations of stacks, transformer buses, and other equipment and ancillary structures, completing the survey back at the northern elevation of the Administration wing. He then proceeded to the SEA Lab, entering through the front door on the northern elevation, exiting the west elevation, and circling back around to the eastern elevation. As Smallwood inspected each of the facilities, he took photographs and detailed notes pertaining to each building and their relationships. Upon returning from the field, Smallwood documented the Redondo Steam Station/RBGS/SEA Lab as a historical built-environment resource on a California DPR Primary Record (DPR 523A), Building, Structure, and Object Record (DPR 523B), and Continuation Sheets (523L). These forms describe the resource and summarize its significance. Photographs were taken with an 8.0 megapixel digital camera with 6x optical zoom lens. The completed DPR forms and selected photographs are provided in Appendix A of this report.

2.3 EVALUATION

The historical significance evaluation of the Redondo Steam Station/RBGS/SEA Lab applied the CRHR eligibility criteria with reference to the context presented in Chapter 3. Whereas the criteria provide the general standards of significance, the historic context delineates the specific themes to which a resource may be related. Significance is based on how well the subject resource represents one or more of these themes based on its specific history and the historical events and people associated with the resource, as well as its inherent qualities (i.e., engineering or architectural merits, and potential to represent or yield information about the past).

3 HISTORIC CONTEXT

This historic context is developed for the purposes of evaluating the historical significance of the Redondo Steam Station/RBGS/SEA Lab and its eligibility for the CRHR under Criterion 1 (association with an important historical event), Criterion 2 (association with an important historical figure), Criterion 3 (architectural and/or engineering merits, work of a master), and Criterion 4 (data potential). A context for understanding the Redondo Steam Station/RBGS/SEA Lab is best presented through a discussion of the history and development of Redondo Beach; the history of steam power generation and natural gas development in California; the history of steam-electric plants in Redondo Beach; the Art Moderne architectural style; the City Beautiful Movement; the history of SCE; and the history of Stone & Webster Engineering Corporation.

In the following sections, important historical themes are summarized, with specific detail given to historical developments relative to the background of the RBGS and its historical associations and architectural/engineering merits. This discussion is meant to aid in the understanding of the history of the RBGS and its role in the history of power plant development and service in California. The historic context will prove invaluable to evaluating the significance of the RBGS under all four CRHR Criteria.

3.1 HISTORY AND DEVELOPMENT OF REDONDO BEACH

Sources of information on the development and growth of Redondo Beach were reviewed to generate a comprehensive historical background for evaluating the significance of the RBGS within the context of the City's overall history. This section is important for understanding the role that the RBGS played in Redondo Beach's growth and development, and its place in the local history. The historical background of the city of Redondo Beach is best presented by adhering to the familiar divisions of local history that have become standardized in the area's literature. Beginning with the early Spanish exploration of the region in the 1540s and 1760s, the progression covers the initial settlement and activities that occurred in the region during the early and mid-1800s, and continues with formation and development of the town of Redondo Beach since the 1880s. Further development of the region has occurred since WWII. The following discussion of Redondo Beach history draws heavily from the *City of Redondo Beach Historic Context Statement* (Duncan-Abrams and Milkovich 1995).

3.1.1 Spanish Exploration and Mexican Occupation of the South Coast Region

The Portuguese navigator, Juan Rodriguez Cabrillo, sailing under the Spanish flag, commanded the first expedition along the California coast in 1542. As he sailed the southern California coastline, he gave names to several geographical features, including San Pedro Bay, Santa Catalina Island, and Santa Monica Bay, where he is believed to have dropped anchor on October 9, 1542. Although the territory was placed under Spanish rule at that time, the territorial lands were not explored until 1769 when the King of Spain sent a party of missionaries to colonize California, creating missions up and down the coast one day's journey apart.

Many of the soldiers of these early Spanish exploration parties were subsequently granted large tracts of land in payment for their services, which began the Rancho system in California. When

California became Mexican territory in 1822, the Redondo Beach area was part of the Rancho San Pedro land grant covering approximately 43,000 ac bounded on the east by the San Gabriel River, on the west and southwest by the Pacific Ocean, and on the north by "a boundary of stone markers that extend westward from the San Gabriel River to the salt pond at Redondo Beach" (Duncan-Abrams and Milkovich 1995:11). The Rancho boundaries encompassed the historical town of Redondo Beach including the salt ponds and present-day RBGS facility, as well as modern Torrance, Gardena, and Compton.

With the cession of California to the United States following the Mexican-American War, the 1848 Treaty of Guadalupe Hidalgo provided that the previous Mexican land grants would be honored. As required by the Land Act of 1851, a claim for Rancho San Pedro was filed with the Public Land Commission, and in 1854, the United States Government approved the patent for Rancho San Pedro, which confirmed its ownership to Manuel Dominguez. Dominguez later sold about 215 ac (including the salt pond once located on the RBGS grounds) to two Los Angeles merchants, Henry Allanson and William Johnson, who organized the Pacific Salt Works (Duncan-Abrams and Milkovich 1995:12).

3.1.2 The Early American Period (1848–1890s)

The war that began in 1846 between the United States and Mexico ended Mexican rule and eventually brought an end to the now-romanticized Rancho lifestyle, as Euro-American settlers flooded Alta California during the second half of the nineteenth century. The territory was annexed by the United States in 1848. The discovery of gold and other precious metals after the annexation drew a stampede of hopeful miners to California, increasing demand for beef and other cattle products throughout the state, but especially in northern California. Ranchos continued to earn their keep through the cattle industry and other pastoral pursuits through the 1870s. However, the Los Angeles area's economy was booming in the 1880s, and as land was subdivided into smaller farm-sized parcels and town lots, it was obvious that the Los Angeles coastal region was focused on town building. Many of the towns located along the water's edge promoted themselves as potential harbor locations, hoping to draw in commercial and industrial activity.

The Southern Pacific Railway reached southern California in 1876, followed by the competing Atchison, Topeka and Santa Fe (AT&SF) Railway in 1887. The completion of the two transcontinental railways, particularly the latter, was a huge catalyst for economic development in southern California. A frantic rate war between the two railroad giants drastically drove down the cost of traveling to southern California from the East Coast.

During the boom period of the late-1880s, the town of Redondo Beach was formed. The Redondo Beach Company, managed by Charles Silent and partners N. R. Vail and Dan McFarland, had purchased 1,000 ac from the Dominguez family heirs. The Company took advantage of the natural topography, and in 1887, designed a seaside village built in tiers above the beach. The community was primarily devoted to residential resort development and wharf-related industry (Duncan-Abrams and Milkovich 1995:9). Promotion of the bay at Redondo Beach as a deep-water harbor and principal port for the Los Angeles area failed to take hold due to the destructive waves found there and more advantageous locations for harbors at San Pedro and Santa Monica. Despite this, Redondo Beach opened its first wharf in June, 1889 (Duncan-

Abrams and Milkovich 1995:13). The AT&SF Railway Company selected Redondo Beach as its Los Angeles terminus, choosing to avoid competition with its rivals at San Pedro. The Pacific Coast Oil Company, needing a facility to contain the oil being pulled from the Los Angeles Basin, established oil storage tanks along the AT&SF Railway in Redondo Beach (Duncan-Abrams and Milkovich 1995:14). Lumber yards and planing mills also sprung up in Redondo Beach at this time to support the massive development and growth of the area. It was during the 1890s that the salt works near the present-day RBGS developed into an industrial district.

J. C. Ainsworth and R. R. Thompson, developers of the Redondo Beach Improvement Company, completed construction of an iron wharf at the end of Emerald Street, and the elegant 225-room Hotel Redondo in 1890 (Duncan-Abrams and Milkovich 1995:14). Further to the north at Diamond Street, a pebble beach known for its semi-precious stones was promoted to tourists as Moonstone Beach. Ainsworth and Thompson also constructed the Redondo Railway, which provided passenger service to Redondo Beach from Los Angeles and abroad. Electric rail service in the town expanded through the turn of the twentieth century, as did the number of piers along the ocean where the rails stopped. Steamers from the Pacific Steamship Company stopped at Redondo four times a week, at one of its three piers, as part of regular runs between San Francisco and San Diego. Due to the success and growth of Redondo Beach over just a few short years as a residential, commercial, and industrial waterfront community, the town incorporated as a city in 1892.

3.1.3 The Twentieth Century

Incorporation brought with it the need to provide municipal services to the community, such as street and residential lighting. During the first few years of incorporation the city contracted with various small electric franchises with little satisfaction. The city's growth during this time was stymied by the depression years of the late 1890s and by the turn of the twentieth century Redondo Beach had become a sleepy seaside resort (Myers 1983:59). This all turned around in 1905, after real estate and electric power magnate Henry Huntington purchased the interests of Ainsworth and Thompson's Redondo Beach Improvement Company and the Los Angeles and Redondo Railway, with visions of revitalizing the community. The town immediately experienced a growth spurt that incorporated an inland area forever after known as North Redondo. The older, original town of Redondo Beach became known as South Redondo, with the industrial area along Herondo Avenue, and 190th Street forming the dividing line between North and South.

The following year, in 1906, Huntington was awarded a contract to construct a large steam-generated electric power plant in Redondo Beach, located in the industrial area where the salt works once existed (on the grounds of the present-day RBGS; Figures 4–8). With plenty of oil for fuel, and ocean water for cooling the generators, the location was optimal for a generating station. Charles C. Moore & Company of San Francisco built the plant over a span of two years (Myers 1983:59). The largest of its kind west of Chicago, the plant began operation in 1907, and in 1910, it became part of Huntington's new company, the Pacific Light & Power Corporation (Gnerre 2011; Myers 1983:59). The plant supplied electricity to Huntington's Big Red Car electric rail service as well as to the residential and commercial customer base in the Redondo area. SCE purchased the Pacific Light & Power Corporation along with the steam-electric plant at Redondo Beach from Huntington in 1917. Over the first decade of the twentieth century,

Figure 4 Redondo Beach and vicinity around 1896, including the "Salt Pond" once situated on the RBGS property.

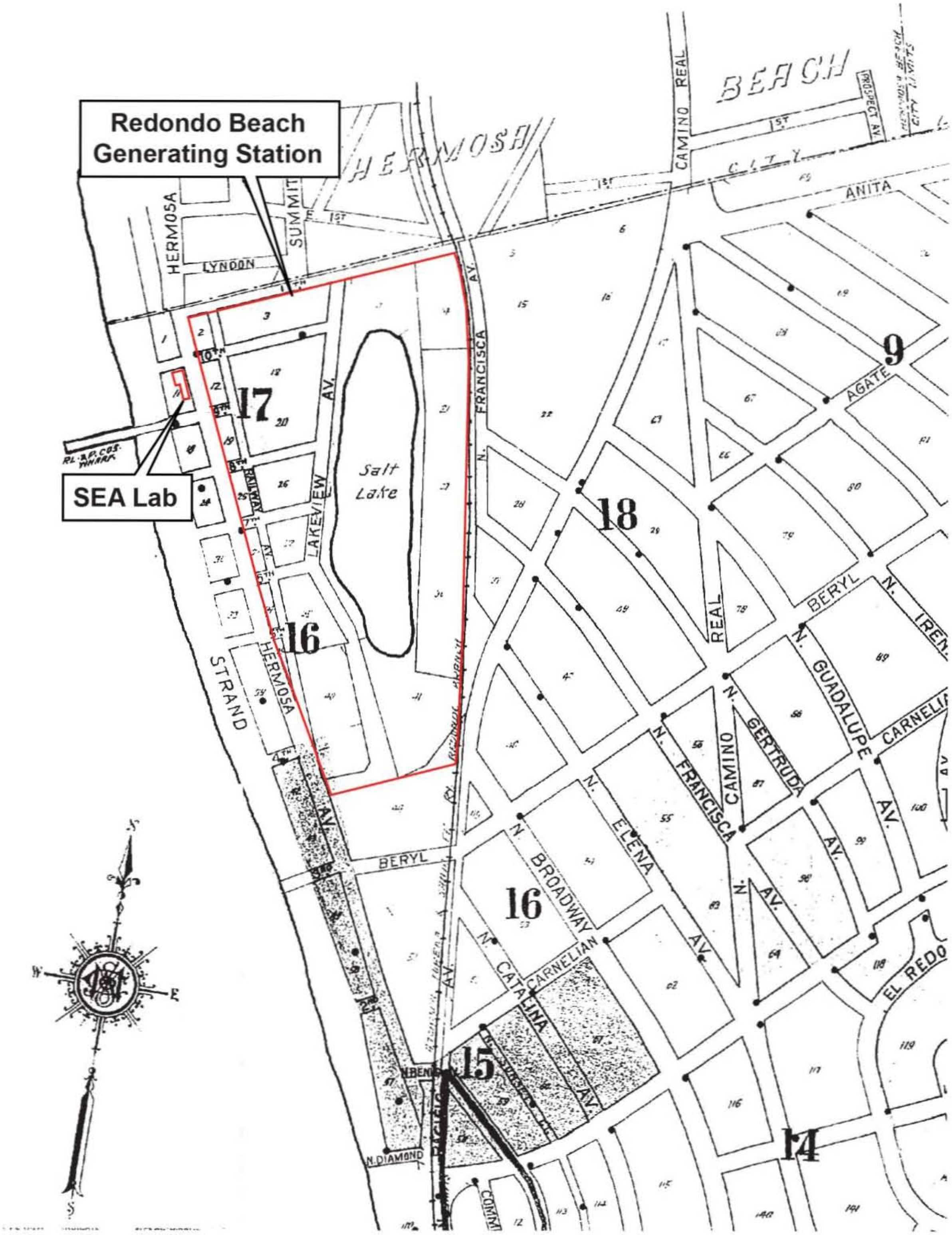

Figure 5 Sanborn Map Company Index map of Redondo Beach, dated December, 1916, depicting the locations of the RBGS and SEA Lab. Note the Pacific Light & Power Corporation's intake pier adjacent to the SEA Lab parcel.

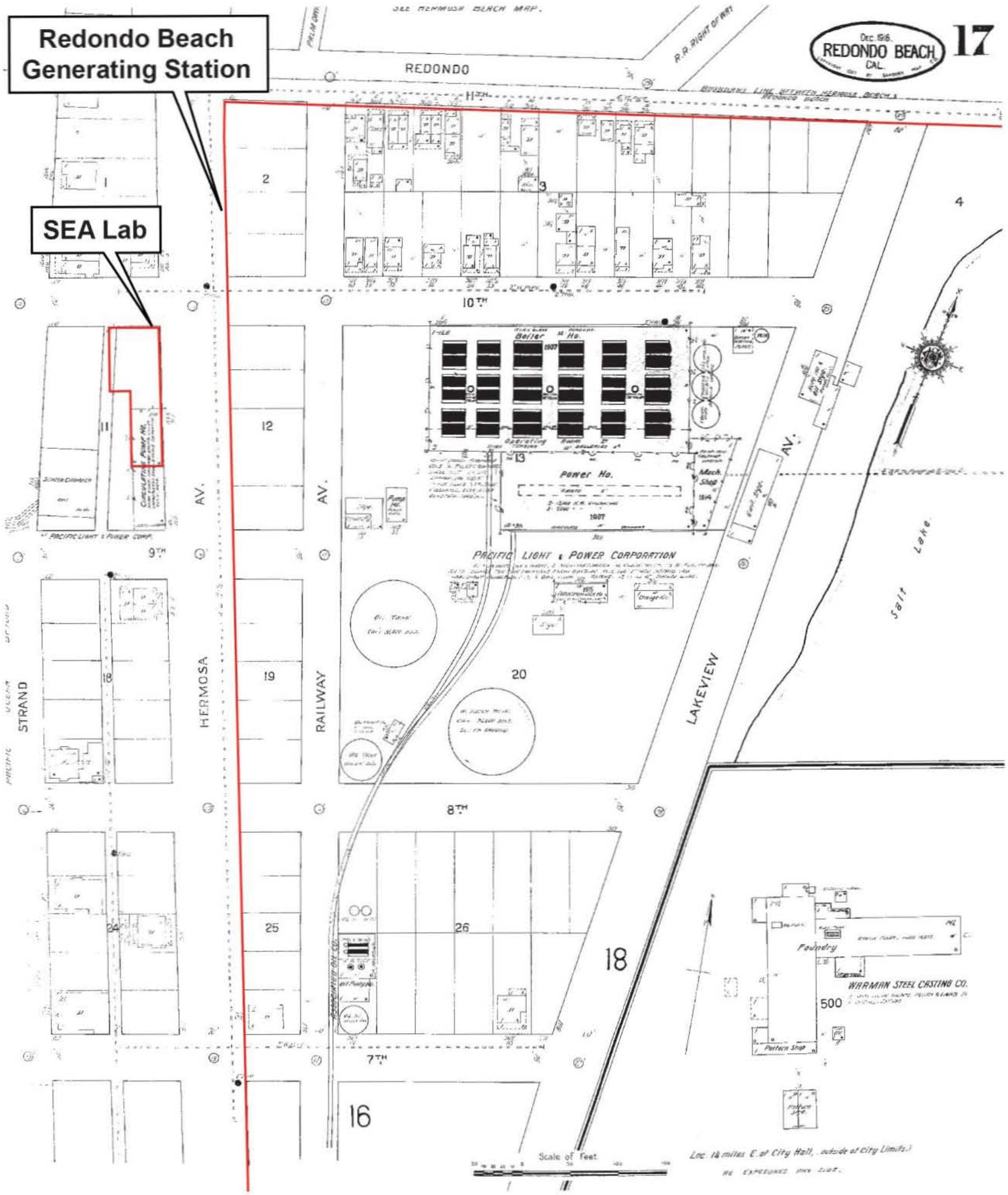

Figure 6 Sanborn Map Company Sheet 17 of Redondo Beach, dated December, 1916, depicting the locations of the RBGS and SEA Lab. Note the Pacific Light & Power Corporation's "Power House" on the RBGS parcel, and the "screen chamber" and "Circulating Pump House" on and adjacent to the SEA Lab parcel.

Figure 7 The first Redondo Beach steam-electric power plant, circa 1916, operated by Huntington's Pacific Light & Power Corporation (Huntington Digital Library).

Figure 8 The seawater pump house and intake pier at the first Redondo Beach steam-electric power plant, circa 1923 (Huntington Digital Library).

Huntington invested millions in resort improvements and built several tourist attractions, including a Mission-style pavilion, a casino, and an enormous bath house with a heated salt water plunge. The warm water for the pools was pumped from the steam-electric plant as a byproduct of the cooling water system. The Intake Pier carried the pipes that sucked cool water from the ocean to the plant (Figure 9).

Figure 9 Redondo Beach and vicinity around 1934, including the RBGS and SEA Lab parcels, then occupied by Redondo Beach's first steam plant, operated by SCE.

A roller coaster, carousel, and other amusements were added in 1913, and a designated tent city attracted tourists to camp at the beach during the summer months. The electric rail systems provided easy travel between Redondo Beach and Los Angeles to points inland and up and down the coast. Redondo Beach was once again a major resort destination. However, violent storms in 1915 and 1919 destroyed Wharfs 1 and 2, and diminishing freight deliveries led to the removal of Wharf 3 in 1925 (Historical Commission of Redondo Beach 2005:63–74). In 1916, a V-shaped pleasure pier was constructed in place of Wharf 1.

While the 1900s brought a sense of revitalization and growth to Redondo Beach, the 1910s was a period of disappointment in the city's economy. Standard Oil Company stopped using the port at Redondo Beach for shipping crude oil to Alameda in favor of a refinery they had recently built at El Segundo (Duncan-Abrams and Milkovich 1995:21). The AT&SF Railway transferred its business to San Pedro, and Huntington turned his focus to the Big Creek hydroelectric project in the Sierras in favor over his steam plant in Redondo Beach to supply power to the Los Angeles area. A small fishing industry catering primarily to tourists and locals emerged for a few years during the 1910s, but it soon faded due to more preferred markets in the San Pedro area. As mentioned above, storms ravaged the city's beachfront during the 1910s, tearing apart wharfs, the roller coaster, and damaging businesses along the beach.

A housing boom in the 1920s following the end of World War I resulted in the annexation and expansion of the city's boundaries beyond the original townsite, and was the principal force in the local economy during that time. The city established a Planning Commission and set zoning regulations within the community, designating the section of town near the old salt lake, lumber yards, and Pacific Light & Power Corporation's steam plant as the industrial section (Duncan-Abrams and Milkovich 1995:34). The Hotel Redondo, for a long time being an unsuccessful endeavor, closed its doors and was sold for scrap lumber in 1925. The Endless Pier was damaged from storms and demolished in 1928, and replaced by a new horseshoe-shaped pier in 1929. A new wharf, constructed by Captain Hans C. Monstad, was built in 1926 to provide landings for fishing boats and leisure vessels. It was also in the 1920s that the city's attitude about industry along the beachfront changed. Instead, residents sought to emphasize the town's potential as a resort and residential community, as explained by Duncan-Abrams and Milkovich (1995:31):

> Some Redondo Beach residents were gathering opposition to the smelly industrial operations on the beach. A section of attractive homes had grown up inland of the lumber yard, and its residents were tired of the pollution from the lumber mills. Other residents were displeased by the noise and disruption of the trains going to Wharf #3 along the ocean front [Duncan-Abrams and Milkovich 1995:31].

As a result of the community's complaints, in 1923 the City proposed to withdraw Pacific Electric Railway's control of the wharf. If they were successful, the railroad would not be able to carry freight inland, and therefore, ships would no longer have a need to port at the Redondo wharf. This event would also mark the end of business for the lumber yards that were dependent on the wharf for shipments of lumber. Protests from the lumber companies and their more than 200 employees extended Pacific Electric Railway's use of the wharf until 1926 (Duncan-Abrams and Milkovich 1995:31). That year, Pacific Electric Railway shut down operations and dismantled the wharf—the last of the original three piers built at Redondo—marking the end of Redondo's shipping port era.

Due to a deep water canyon off the shore of Redondo Beach that attracted numerous fish, sport fishing had always been part of the community's economy, and carried many residents through the Great Depression years. Businesses reliant on the tourist trade on the other hand suffered and fell into decay. The Redondo Beach steam-electric plant, by then used by SCE solely as a back-up for power emergencies, was shut down in 1933, and the machinery dismantled in 1935 (Gnerre 2011). It would stand empty and abandoned for more than a decade. Amongst a depressed economy, an interest in high-stakes gambling had reached the community, establishing the commercial beachfront as a gamblers paradise, with opportunities stretching three miles off shore to popular gambling barges (Duncan-Abrams and Milkovich 1995:33). An unwelcomed gangster element soon followed, and citizen groups rallied to create enough pressure to close down the gambling houses, eventually ridding Redondo Beach of its gambling problem. As a final blow, a breakwater project that was completed in 1939 with the help of a $300,000 bond issue and a $245,000 grant proved to be of poor design, resulting in destruction of a great deal of property along the beach front during a winter storm later that year.

Construction and development in many towns across the United States was placed on hold by Americans' entrance into WWII in 1941. While the city of Redondo Beach was unable to attract war-time industry growing in the Los Angeles area, residential development expanded during WWII as new families working in Los Angeles-based defense plants chose to live in Redondo Beach and the vicinity (Duncan-Abrams and Milkovich 1995:42). Suddenly, areas of the original city and outward expanses that had not been built prior to the war began infilling with new housing. Tract-style housing predominated, while some builders constructed their own styles of homes on individual lots.

In 1940, the City of Redondo Beach purchased the abandoned SCE steam plant that had stood vacant for five years, "undoubtedly hoping to identify war related industrial uses for the complex" (Duncan-Abrams and Milkovich 1995:42). After the war, however, people moved to the South Coast region in great numbers, and the housing market grew rapidly. Ironically, in 1946, SCE concluded that it needed a steam-electric plant to supply power to the South Coast region, and acquired the property once again to build a new plant on the site. The former plant building and stacks were torn down in August 1946, and the Stone & Webster Engineering Corporation began construction of the new plant, which became operational in 1948 (Gnerre 2011; Figures 10–16).

As elsewhere across the United States following the end of WWII, Redondo Beach experienced a substantial growth in residential and commercial development which in-filled already developed areas and expanded the city's boundaries in every direction. Following a devastating storm in 1953 that caused extensive damage to city streets and private property, work began on King Harbor and Marina in 1956 (City of Redondo Beach 2013; Figure 17). Construction of the Redondo Beach Generating Station continued through the 1950s and 1960s to build additional units in order to meet the South Coast region's growing demand for steam-generated electric power (Figure 17).

Figure 10 Redondo Beach and vicinity around 1951, including the RBGS and SEA Lab parcels, then occupied by SCE's Redondo Beach steam plant. Note the submarine pipeline and intake towers projecting off the beach in front of the pump house.

Figure 11 SCE's Redondo Beach steam-electric power plant, circa 1956, from a bird's-eye view toward the east. Notice the SEA Lab/former pumping plant in its original form (Huntington Digital Library).

Figure 12 SCE's Redondo Beach steam-electric power plant, circa 1956, from a bird's-eye view toward the north (Huntington Digital Library).

Figure 13 SCE's Redondo Beach steam-electric power plant, circa 1956, from a street-view toward the east (Huntington Digital Library).

Figure 14 SCE's Redondo Beach seawater pump house from the grounds of the RBGS, circa 1956, view toward the northwest (Huntington Digital Library).

Figure 15 SCE's Redondo Beach seawater pump house and intake pier from the top of the Administration wing, circa 1956, view toward the west (Huntington Digital Library).

Figure 16 SCE's Redondo Beach seawater intake pier, circa 1956, view to the east toward the RBGS (Huntington Digital Library).

Figure 17 Redondo Beach and vicinity around 1972, including the RBGS and SEA Lab parcels. Note the submarine pipeline and intake towers have been moved farther to the north to make way for the construction of King Harbor and Marinas.

While primarily residential, North Redondo is home to some of the city's major industry and commercial development, including aerospace and engineering firms that are part of southern California's long-lived aerospace legacy. In the early 1960s at the height of the Cold War era, the sprawling 110-ac Space Technology Laboratories was built in North Redondo. Once home to aerospace giants TRW and Northrup Grumman Corporation, and known today simply as Space Park, the facility played host to the development of some of the nation's most advanced and secret missiles and aircraft. Today, about 7,500 people work at Space Park among the 47 buildings spread across the complex (Hennigan 2011). Relying today primarily on a tourist and resort industry, South Redondo Beach boasts of its piers and harbor for fishing and boating recreation, restaurants, hotels, and shopping (City of Redondo Beach 2013).

3.1.4 The Importance of Redondo Beach's Power Plants, 1906–Present

The historical importance of Redondo Beach's steam-driven electric power plants that have existed along the coastline at the Old Salt Works throughout the twentieth century is best summarized in the discussions of two prominent sources in the study of Redondo Beach history: *The Daily Breeze* (Gnerre 2011), and the *City of Redondo Beach Historic Context Statement* (Duncan-Abrams and Milkovich 1995:21), from which the following discussion draws heavily.

In 1902, real estate and electric trolley magnate Henry Huntington organized the Pacific Light and Power Company to provide steam-generated electricity to his Los Angeles Railway Company (Gnerre 2011). The growth in the area's population and in his electric trolley business created a demand for more electric generating capacity. By March 1906, Huntington had secured a deal to construct a large steam-generated electric power plant in Redondo Beach at a cost of $1.25 million. Described as the largest steam-power plant to be built west of Chicago, it had enough capacity to supply Huntington's railroad and a substantial residential customer base in the Redondo area. Construction began in May 1906, and the plant came online early in 1907 (Gnerre 2011). The plant was expanded in 1910 to meet the growing community's increasing need for electric power. These early plants required as many as 150 men to operate them, which meant numerous jobs and economical stability for the residents of Redondo Beach. Following the activation of Redondo Beach's first electric power plant in 1907, Huntington's Big Creek hydroelectric project was placed online in 1913, bringing a substantial supply of electric power to southern California. As Gnerre (2011) reports,

> Plans that had been made to import that electric power to Los Angeles were sped up after a burst water pipe flooded the Redondo steam plant in November 1913, bringing many of the city's streetcars to a halt. The decision was made to go to the new system of bringing power in from Big Creek, and the Redondo Beach plant became far less important, and was placed on standby as Huntington changed his company's emphasis from steam to hydroelectric power [Gnerre 2011, n.p.].

In 1917, SCE purchased the Pacific Light & Power Corporation, including the Big Creek hydroelectric plant and the Redondo Beach steam plant from Huntington. Having sufficient power coming in from Big Creek, SCE only used the Redondo Beach steam plant as a backup for use in power emergencies. The steam plant was shut down in 1933, and its machinery was dismantled in 1935 as part of a Depression-era recycling program (Gnerre 2011). The building and its smokestacks stood empty for more than a decade until in 1946, SCE announced that it would build a modern steam plant on the site at a cost of $38 million.

The older steam plant building and its three chimneys were demolished in August 1946, and the Stone & Webster Engineering Corporation began immediate construction on the new plant. The first power unit at SCE's new steam plant came online on February 26, 1948, with two additional units operating in April and August, 1948, and a fourth unit added in October, 1949. Units 5 and 6 were completed in 1956, and Units 7 and 8 were added in 1968 (Gnerre 2011).

In the *City of Redondo Beach Historic Context Statement* (Duncan-Abrams and Milkovich 1995), the authors state the importance of the power plant in the growth of the city.

> Henry Huntington's Pacific Light and Power Company and later, California Edison, provided employment opportunities for men living within the Redondo Beach community. This in itself was important for the city's economic development. However, the presence of the Edison Company in Redondo Beach held additional significance. By the early 1920s, residential growth throughout Southern California was dependent upon the availability of domestic electricity. Any number of residential subdivisions could be planned, but without proper electrical services development plans could not proceed beyond the planning stage. Edison's decisions of where to concentrate its funding for electrical expansion directly impacted a community's ability to achieve its future expansion and development aspirations. As a result, the presence and involvement of Edison in Redondo Beach was seen by the leaders of this community as vital to their ability to obtain a full growth potential and maintain a competitive edge over neighboring cities. It is little wonder that Redondo Beach was the first community in California to establish an "Edison Club." Throughout the 1920s and well into the 1940s, this club served as one of the city's most active social organizations and was viewed as an important link between the corporation and the community at large [Duncan-Abrams and Milkovich 1995:21].

As these two sources make clear, both the Pacific Light & Power Company's steam plant and SCE's steam plant were directly responsible, in part, for the successful growth and development of the Redondo Beach community during the twentieth century.

3.2 ENERGY DEVELOPMENT IN CALIFORNIA

In order to comprehend the RBGS's place within the context of energy production in California, one must first understand the history and development of electrical transmission, hydroelectric generation, steam-electric generation, and natural gas production in California, and how they interconnect with each other. The following sections discuss these various topics.

3.2.1 Electrical Transmission

During the 1880s, a number of electric utility companies were introduced throughout California. At first, technology relied on low-voltage direct current (DC) which could only be transmitted short distances (about 3 miles [mi]). Thus, only urban areas close to the power generation source could benefit from electric utility. Only after Nikola Tesla and William Stanley were able to develop an alternating current (AC) was an electrical system able to transmit higher voltages over longer distances. In 1890, four California cities—Santa Barbara, Visalia, Pasadena, and Highgrove—were the first to use this new technology in their power plants (Adams 2010:68–72).

The transformer, or converter as it was called, was developed at that same time to reduce the voltage and allow it to be transmitted to residences. Several new advancements were made during the late 1890s, including transformers that could convey much higher voltages than in previous years—10,000 volts, instead of 1,000—and transmit the power as much as 28 mi. By 1899, the Edison Electric Company had built the longest line in the state, transmitting electricity from a powerhouse at the headwaters of the Santa Ana River to downtown Los Angeles, a distance of 83 mi. Bay Counties Power Company built a 142-mi-long transmission line in 1901 that brought power from the Colgate Powerhouse in the Sierra Nevada to the city of Oakland. The length of transmission lines continued to expand during the first two decades of the twentieth century.

3.2.2 Hydroelectric Power Plants

California's population was increasing rapidly during the railroad-supported growth boom period of 1880–1910, and with that growth followed a high demand for electricity. Hydroelectric systems had been developing across the state since the 1890s wherever water flows could be tapped for electrical power. The first long-distance transmission line system to carry hydroelectric power across the state was the 118-mi-long 75 kV line from the Kern River No. 1 hydroelectric plant to Los Angeles, constructed in 1907–1908. By the 1910s, hydroelectric companies established throughout California provided a network of long-distance electric transmission lines across the state, connecting the hydroelectric powerhouses to their customers many miles away.

Some of the largest and most significant hydroelectric projects in California were constructed during the great expansion era of the 1920s and 1930s, including the Big Creek Hydroelectric System and the Central Valley Project. The Big Creek Hydroelectric System generated a total of 424,500 kilowatts (kw) in 1930, operating across 36 mi of tunnels and included 11 dams, five powerhouses, and numerous penstocks, camps, roads, and railroads. It was the largest and most important hydropower project in California during the period 1911–1929 (Shoup et al. 1988:155–156). The effect of the project was a substantial transformation of the Big Creek region—an area of several hundred square miles that had been relatively uninhabited prior to the project—to one of the greatest hydroelectric systems in the world in 1930.

The Hoover Dam and powerhouse were completed by 1936 to supply electric power to southern California, Arizona, and Nevada. The first three Francis turbine-generators began operating in the latter half of 1936, followed by two more generators in 1937, two in 1938, and two in 1939. With an installed capacity of 704,800 kw in 1940, the Hoover Dam hydroelectric plant was given the distinction of the largest hydroelectric facility in the world, until surpassed by Grand Coulee Dam in 1949 (Reclamation 2004). A final generator unit was placed in service in 1961, bringing the maximum generating capacity to 1,334,800 kw.

3.2.3 Steam-Electric Power Generation

The earliest steam-electric generating plants were equipped with steam locomotive engines attached to large flywheels which functioned much like a generator rotor. The first steam turbine generator to produce electric power was built in 1884 by British engineer Sir Charles Parsons (Termuehlen 2001:11). Improvements in the design followed quickly due to a rising demand for electric power during the 1890s.

Steam power generation has been an important part of California's power production throughout the twentieth century, although its importance was second to hydroelectric generation during the previous century, and at least through the 1950s when massive hydroelectric generating stations were being constructed throughout the state. Rapid construction of new steam-electric power stations and expansion of older steam plants in the 1940s resulted in increased production of electrical power throughout the state during the 1950s, with steam-electric generation providing more of that electric power than hydro (Williams 1997:374 [Table C-14]). By the 1960s, hydroelectric power accounted for less than 30 percent of all electrical power generated in California. While new construction and expansion of existing hydroelectric plants occurred during the 1960s, by 1970, hydroelectric plants continued to account for less than one-third of all electricity generated in California (Williams 1997:374 [Table C-14]).

Both SCE and Pacific Gas & Electric Company (PG&E), California's largest electrical utility providers, were building large-scale steam-driven electric generation plants as early as the 1920s. The search for more efficient and reliable sources of electrical power generation was likely due to a convergence of various factors in the mid-to-late 1920s, including intermittent droughts that affected the production capacity of hydroelectric plants, improved steam generator technology, and newly tapped sources of natural gas reserves in the San Joaquin Valley. SCE operated a steam-driven electric plant on Terminal Island in Long Beach beginning in 1911. The Los Angeles Department of Water & Power (LADWP) constructed a steam-driven electric plant at Seal Beach in 1925, and in 1928, PG&E built a steam-driven electric plant in Oakland known as "Station C." In 1929, the Great Western Power Company (absorbed by PG&E in 1930) built a large steam plant on San Francisco Bay (Coleman 1952:298; Williams 1997:277–283).

Natural-gas powered steam-driven electrical generating facilities expanded during the WWII and post-WWII era. Expansion of the existing electric generating systems was needed due to a growing wartime defense industry, a population boom and swell in housing development that spread outward from traditional city limits, as well as commercial and industrial growth throughout the state. Steam turbine power plants were less expensive and quicker to build than hydroelectric plants, and most of the more favorable sites for hydroelectric generation had already been developed. Therefore, California's energy industry turned to steam plants as the favored option for expanding production of electricity during the post-WWII-era development boom. As a result, dozens of new steam generation plants were built throughout California, chiefly by PG&E, SCE, LADWP, and in San Diego County by San Diego Gas & Electric Company (SDG&E) (Herbert and Walters 2006:4; Williams 1997:277–278).

In an article dated January 1950 and titled, *Steam Power Gains on Hydro in California*, PG&E's Vice-president and Chief Engineer, I.C. Steele explains that the post-WWII-era generation of steam plants were more economical to build and operate, and vastly more important to the generating capabilities than they were in the decades prior to WWII (Steele 1950):

> During the early years of the company, when most of the power was generated in hydroelectric plants, the principal function of the steam plant was for standby use in the event of power failure, and to supplement hydro during peak hours. The more recent trend has been toward the use of steam power to carry large blocks of steady load. Also many of the favorable hydroelectric sites have been developed and a limited number of

> sites now remain which can be economically developed. Therefore, the movement toward the construction of steam plant capacity is destined to become greater in future years. Ten years ago the steam plant capacity of the company represented 30 percent of its total installed capacity. Today it is 42 percent, and at the end of 1951, it will approximate 54 percent of the company's total generating capacity [Steele 1950:17].

Between 1945 and 1948, more than $4 billion was spent by privately financed electric power companies in the U.S. to construct steam-electric plants or additions, with another $5 billion of new construction of oil and natural gas-fired steam-electric plants proposed over the period of 1949–1951 (Steele 1950:17–18). Within the first few years after the end of WWII, steam-electric power generation surpassed hydroelectric power for the first time ever in California's history.

As explained by Myers (1983) in *Iron Men and Copper Wires: A Centennial History of the Southern California Edison Company*, it was after WWII that SCE, too, undertook a significant expansion of steam-electric generation, and their Redondo Beach Steam Station was at the forefront of the movement:

> Until World War Two, both Edison and Calectric (California Electric Power Company) were predominantly hydro companies, with steam essentially used in standby service to meet peak demands or emergency situations. Following the war, however, new sites to construct large hydro plants adequate to meet most of Southern California's burgeoning demand for electricity simply were not available, so both companies were forced to rely most heavily upon steam plants. In 1946, this tremendous construction program got underway when work began on the new Redondo Beach Steam Station on the site of the former Pacific Light and Power plant. Over the next 27 years, ten new multiple-unit, oil and gas-fired power plants were built at coastal and inland sites in Southern California, seven by Edison and three by Calectric [Myers 1983:208].

The post-WWII era was the peak expansion of steam generating capacity for both SCE and PG&E. In fact, most of the oil and natural gas-fired steam plants currently in use in southern California were installed during the period between 1950 to 1970 (Herbert and Walters 2006:5). This new generation of plants was designed and built differently that the previous generation; they were built economically by minimizing structural material, by creating outdoor or semi-outdoor turbo-generator units, and they were designed to be expanded in the future if the market warranted (Herbert and Walters 2006:5).

This new generation of steam-driven plants relied on technological advancements in design and function. In addition, they were fueled by new, abundant sources of natural gas that would eventually out-price and replace oil as a more economical fuel. These sources of natural gas, as discussed below, were not available until construction of the first interstate pipeline to transport natural gas from Texas to southern California in 1946–1948 (Bridge 1946:62–63).

3.2.4 Natural Gas Development in California

During the industrial revolution of the late eighteenth century in Europe, scientists began to manufacture gas from coal for artificial lighting. Coal was heated in closed iron retorts to produce gas, which was then transported short distances to the point of consumption. During the early years of the manufactured gas industry, the technology to transport gas long distances did not exist, so there was a manufactured gas plant (MGP) in every large city, sometimes several in the case of the largest cities. Early in the nineteenth century, use of manufactured gas technology expanded from Britain to the East Coast of the United States. These MGPs, associated gas distribution networks, and their controlling companies were fundamental building blocks leading to the later development of a natural gas industry.

The first commercial use of natural gas in the United States was in Fredonia, New York, in the 1820s (Peebles 1980:52; Smith and Wimberly 1948:237). William Hart dug a shallow well that successfully produced natural gas flow that was pumped through hollowed-out logs to supply a few gaslights in the town. Later Hart, who was also a gunsmith, manufactured a lead pipe gas line to transport the natural gas.

Technology improved, and by 1891 the Indiana Natural Gas and Oil Company built the first high-pressure transmission lines from its gas production fields in northern Indiana to Chicago; a distance of 120 mi (Smith and Wimberly 1948:237; Tussing and Barlow 1984:34). These pioneering efforts were expanded during the early twentieth century in several parts of the country. Between 1909 and 1913, long-distance gas transmission lines were constructed in different parts of the country, including one from Kern County to Los Angeles, California (Tussing and Barlow 1984:30–34). During the same period, gas made the transition from use primarily for lighting to use for heating, operating home appliances, industry, and electricity generation.

The late 1920s and early 1930s saw a boom in newly discovered natural gas fields. At the same time, technological improvements allowed larger-sized pipes and the ability to traverse even greater distances. Three new major gas fields were central to this boom. These were located in the Texas panhandle area, in Louisiana, and in California's San Joaquin Valley. Pipelines of up to 26 inches in diameter were used to transport natural gas hundreds of miles, and in one case just over 1,000 mi (Tussing and Barlow 1984:34–35). California's Standard Pacific (Stanpac) gas pipeline transported natural gas from the San Joaquin Valley in Kern County to the San Francisco Bay Area (Tussing and Barlow 1984:34–35).

Natural gas was more efficient and economical than manufactured gas. As natural gas became more important and dependable, manufactured gas experienced a gradual decline. MGPs were slowly phased out over the course of the first half of the twentieth century. The MGP companies and their distribution networks often evolved to become part of the natural gas industry (Peebles 1980:55). California saw little new development of natural gas pipelines during the Great Depression and WWII era, although the demand for natural gas to fuel California's growing industrial and commercial centers skyrocketed during WWII. Defense activities in 1941 boosted gas sales to almost four times the amount sold in 1930, and by 1945 the demand had increased another 150 percent (Coleman 1952:306). While the tremendous demands of the war effort had cut into existing reserves, no new major discoveries were made within California (Coleman 1952:306). The availability of oil well gas, principally from the Kettleman field near Bakersfield, had decreased steadily from its production peak in 1941 and the supply of natural gas in the state was dwindling (*Engineering* 1951:613–616; Joseph 1949:33–36).

A boom in natural gas pipeline construction occurred soon after WWII as a resurgent U.S. and world economy created a higher demand for fuel (Peebles1980:55; Smith and Wimberly 1948:

240–241). After the war, the "phenomenal post-war increase in the demand for gas, both for industrial and domestic purposes" was most pronounced in the rapidly developing western states (*Engineering* 1951:613–616). A 1943 analysis determined that there were no known long-lived, dependable, and economical sources of natural gas in California (Bridge 1946:62). It was, therefore, "vitally necessary" to seek and obtain a major out-of-state source "without delay" (Bridge 1946:62). The demand for natural gas in California was cutting deeply into declining local reserves, while most gas in the vast Permian Basin in western Texas and eastern New Mexico, produced in conjunction with oil, was wasted for lack of a nearby market (Bridge 1946:62–63). To take advantage of this source, in 1946 Southern California Gas Company, Southern Counties Gas Company, and El Paso Natural Gas Company began construction of the first interstate pipeline to transport natural gas from Texas to southern California (Bridge 1946:62–63). Natural gas became the paramount fuel for most of California's domestic and industrial uses—heating homes, cooking food, and fueling industrial furnaces and most steam-electric plants (Parsons 1958:1).

3.3 SOUTHERN CALIFORNIA EDISON

The Redondo Steam Station/RBGS and SEA Lab was constructed in 1946–1948 for SCE as one of their first in a new generation of steam-electric plants following the end of WWII. SCE is one of the largest electric utility companies in California, serving more than 13 million people throughout 15 counties (OAC 2009). Headquartered in Rosemead, California, SCE has been providing electric power to the region for more than 120 years. Their service territory covers approximately 430 cities and unincorporated areas, with a total customer base of approximately 4.8 million residential and business accounts. The following discussion of the history of SCE is heavily drawn from William A. Myers' (1983) definitive history, *Iron Men and Copper Wires: A Centennial History of the Southern California Edison Company*.

The earliest history of the SCE Company dates back to the 1880s, when its first ancestral utility providers were organized (Myers 1983:8, 13). By 1886, the earliest of the predecessor companies, Holt and Knupp, illuminated the streets of Visalia, California (Myers 1983:13). Other small utility companies followed suit and were soon generating electricity for street lights to towns throughout southern and central California. Demand for electricity grew during the 1890s, and several different Southern California electric companies emerged to produce electric power from various hydro facilities in the region.

In Los Angeles, the Los Angeles Electric Company had been operating since 1882, but was unable to fill the demand for residential and industrial electric power service (Myers 1983:32). In 1896, the West Side Lighting Company incorporated after successfully supplying power to the County courthouse and soon after, the Los Angeles No. 1 Station was completed and the company was providing service to residential areas. On December 1 1897, West Side Lighting Company had merged with Los Angeles Edison Electric Company to form Edison Electric Company of Los Angeles. The new company immediately set to work to install an underground conduit system to provide service between their Los Angeles No. 2 substation and downtown Los Angeles (Myers 1983:37). This was the first Edison-type D.C. underground system to be installed in the Southwestern U.S. Continuing to expand the following year; Edison Electric Company purchased the Southern California Power Company, who was constructing a power station on the upper reaches of the Santa Ana River.

In February 1899, Edison Electric Company completed the Santa Ana River No. 1 hydroelectric plant and began transmitting 33kV to Los Angeles over the 83-mile-long Santa Ana River Line (Myers 1983:38). At that time, it was the highest-voltage, longest-distance transmission line ever built in the U.S. With major sources of electric power assured, the company purchased the systems of existing smaller companies and expanded its customer base in Los Angeles and the surrounding area. Edison Electric Company constructed new hydroelectric plants in the San Bernardino region on Lytle Creek, Santa Ana River, and Mill Creek at the turn of the century. In 1904, they added Los Angeles No. 3, an 8,000 kilowatt steam station near the Los Angeles River, which utilized the newest, highly efficient steam turbine technology (Myers 1983:43).

Between 1902 and 1907, the company built the Kern River hydroelectric plant, which more than doubled the company's generating capacity. Electricity from Kern River No. 1 was delivered to southern California by way of a 118-mi-long, 75kV transmission line, which at that time was the highest-voltage line in the nation. It was also the first electric line to be carried entirely on steel towers instead of wood poles. The company's accomplishments in the expansion of its facilities and service area during the first decade of the twentieth century led to reincorporation on July 6, 1909 as the Southern California Edison Company (Myers 1983:47). At that time, it served over 600,000 customers throughout Los Angeles, and outward as far east as Redlands and north to Santa Barbara.

Immediately following the reincorporation, the new SCE Company made plans for "a major construction program to upgrade its transmission and generating systems" (Myers 1983:48). The smaller, obsolete steam plants in their system were retired and replaced with larger facilities incorporating the newest steam turbine technology. Construction of the first of these new steam plants, SCE's Long Beach Steam Plant, began in 1910. Three gigantic vertical steam turbines were installed and put into service in 1911–1914, producing a tremendous 47,500 kilowatts of power. Seawater from the Cerritos Channel in Long Beach Harbor provided the system's cooling water. A network of 66kV steel tower transmission lines connected the plant to SCE's switching station, which then transferred power to Colton, Santa Ana, Santa Monica, and Pasadena (Myers 1983:49).

On May 26, 1917, SCE purchased Henry Huntington's Pacific Light & Power Corporation, including the Big Creek hydroelectric system that had been completed in 1913 at the cost of $12 million. It was able to deliver 60,000 kW of power to southern California from Powerhouse No. 1 and No. 2 in the Sierra Nevada Mountains. Following the purchase and merger, SCE spent a dozen years (1917 to 1929) in construction to expand the Big Creek hydroelectric project, enlarging the first two powerhouses and adding three new ones. Big Creek became the major source of southern California electricity until the 1950s.

Construction of the Hoover Dam and Powerhouse between 1930 and 1936 resulted in a hydroelectric facility that would produce five billion kilowatt-hours of electricity a year for southern California, Arizona, and Nevada. SCE held the contract to provide some of that power to its Southern California customers. However, the 1930s was a difficult time for SCE, as it was for most Americans. Debilitating economic problems during the Great Depression meant a lull in activity and decreased sales of electric power. Heavy flooding in 1938 caused the company to shut down some utilities for several days, and the need to rebuild or abandon others (Myers 1983:174–175).

During WWII, electric power demand increased 94 percent to meet the needs of southern California's highly developed industries, such as aircraft plants, shipyards, steel industries, oil refineries, tire plants, automobile factories, ordnance works, and numerous military bases (Myers 1983:193). With electric power coming from the Big Creek system, Hoover Dam, and its other plants, SCE had sufficient electric power capabilities to furnish the needs of the war effort if it operated at full capacity. However, wartime power demand soon absorbed the reserve margin, and the capacity of many of their existing facilities was increased by adding new power generating units.

Amidst a population explosion and development boom in southern California that immediately followed the end of WWII, SCE had to increase capacity to keep up with the new wave of demand. The industries that had settled in the region during the war continued to prosper. Military men who had been stationed or trained in California during the war were now returning with their families and friends. Housing and commercial development spread over the region to fill the needs of the post-war newcomers. On April 12, 1951, SCE placed its one millionth meter into service (Myers 1983:200). The post-war boom lasted through the 1970s. Between 1951 and 1964, another one million customers were added, and in 1978, the total was 3 million customers. The only way the company could keep up with the demand was to undertake an enormous expansion of its generating capacity with construction of new steam plants and additions to existing hydro plants.

Over a period of 27 years between 1946 and 1973, 10 new oil and natural gas fired electric power plants were built in southern California by SCE and another utility, Calectric, who merged with SCE in 1964 (Myers 1983:205–208). One of the first steam plants constructed as part of this substantial expansion program was the Redondo Steam Station in 1946, designed and built as an indoor facility based on the standards of the pre-WWII era. Over the next few years, SCE transitioned the design of their plants to a semi-outdoor design, which became the standard during the company's expansion period between 1950 and 1973 (JRP Historical Consulting 2013:9). As a result of the post-WWII era construction program, SCE was able to increase their generating capacity from 1.2 million kilowatts in 1945, to 15.5 million kilowatts in 1983.

In 1980, SCE was the first electric utility company to make a large-scale commitment to the development of renewable and alternative energy sources such as wind power, geothermal, solar, fuel cells, cogeneration and hydroelectric generation (Edison International 2013). Throughout the 1990s, SCE expanded their international presence with power generation facilities in the United Kingdom, Australia, Indonesia, Italy, Turkey, the Philippines, and Thailand. By 1996, Edison International was formed as a parent company of SCE to reflect the movement toward a global utility company. SCE sold the RBGS to AES Corporation/AES Redondo Beach, LLC in 1998 (Price 2012:5).

3.4 STONE & WEBSTER ENGINEERING CORPORATION

Stone & Webster Engineering Corporation designed and constructed SCE's Redondo Beach Steam Station (today's RBGS) in 1946–1948. The firm's history began in Boston in December, 1889, when Charles A. Stone and Edwin S. Webster, both recently graduated from Massachusetts Institute of Technology (MIT), formed their partnership as consulting electrical engineers (Public Utilities Fortnightly 1989:15). At first they spent much of their time testing wiring, insulation, and appliances. In 1890, they landed their first big contract to design and construct a small hydroelectric generating plant in Maine, along with a mile-long transmission line to convey the electricity to the Warren Paper Mill nearby; the project was later recognized as one of the country's earliest electric transmission systems.

By the turn of the twentieth century, Stone & Webster had diversified to include engineering, construction, and management of power plants fueled by either coal or hydroelectric generation. The company also constructed city lighting and electric railway systems. By 1906, the firm had major engineering projects in six states and was undergoing rapid growth. By the 1910s, approximately 14 percent of the nation's electric generating capacity had been designed, engineered, and built by Stone & Webster Engineering Corporation (Public Utilities Fortnightly 1989:15; Grant 2004: 369).

During WWI, Stone & Webster secured a number of U.S. military contracts to design and build arsenals, military bases, airfields, camp facilities, and shipyards. Most notable of its projects was the Hog Island Shipyard in Philadelphia, which employed 35,000 workers, had numerous launching bays, and was able to assemble cargo ships at an unprecedented rate (Grant 2004: 369; Public Utilities Fortnightly 1989:15). By the 1920s, the company had expanded in the United States and abroad, and was involved in the construction of increasingly larger power plants, power stations, transmission lines, laboratories, factories, refineries, warehouses, and other structures. Some of these included Henry Huntington's Big Creek–San Joaquin River Hydroelectric Project, and the 18.2-mi-long tunnel from the Catskills to supply fresh water to Manhattan Island (Grant 2004:369; Myers 1983:104).

Stone & Webster had been designing and building facilities for SCE, such as the Long Beach Steam Plant No. 2, since at least 1924 (Myers 1983:196). During the 1930s, Stone & Webster entered into other types of engineering projects, including construction of the Rock Island Dam across the Columbia River in Washington (1929–1933), the 50-story RCA building in New York City, and a natural gas pipeline in Texas and New Mexico (Grant 2004:369). Through the rest of the 1930s, Stone & Webster continued to design and build various plant facilities, and by 1940 they became involved in the petroleum and chemical industry.

During WWII, the Stone & Webster Engineering Corporation was one of the few companies around that had the experience necessary to take on the engineering and construction of plants specially developed for the war effort to produce cartridge cases, steel castings, bombsights, aviation, and other precision instruments, TNT, Uranium 235, ammonia, and a long list of other chemicals (Public Utilities Fortnightly 1989:15; Grant 2004:369; Stone & Webster Engineering Corporation 1946). When the Japanese cut off the world's supply of natural rubber, Stone & Webster engineers were responsible for designing and building all of the plants in the U.S. to produce synthetic, butyl rubber (Allen 1989:15).

But it was Stone & Webster's involvement in the Manhattan Project, which devised the atomic bomb later dropped on Hiroshima, Japan, that was their most acclaimed accomplishment in the wartime effort (Allen 1989:15). Stone & Webster chose a 90 square mile tract of land at Oak Ridge, Tennessee for the location of one of three facilities spread across the U.S. (the other two were at Hanford, WA and Los Alamos, NM). As Stone & Webster Engineering Corporation (1946) explains in their *Report to the People*:

> In June, 1942, Stone & Webster Engineering Corporation established a completely separate engineering organization employing at its peak 800 engineers, draftsmen, and other workers who labored in utmost secrecy under constant guard. For three years this organization carried out its part of a secret which has been described as the most important and best-kept secret in the history of the world [Stone & Webster Engineering Corporation 1946:13].

At Oak Ridge, they designed and built an electromagnetic separation plant, a gaseous diffusion separation plant, a Plutonium production plant, and a city to house the 75,000 people that ultimately worked at the site (Stone & Webster Engineering Corporation 1946:15). Parallel hills shielded the plants from each other and protected workers and their families from premature explosions. Their electromagnetic plant was the first in the world to produce large amounts of the separated isotope of Uranium. Acting as agent to the War Department, Stone & Webster developed supplies of Uranium and other raw ingredients, the metallurgical process which subsequently produced Plutonium, and the electromagnetic process for producing Uranium 235. The firm designed and built laboratories, experimental plants, and production plants which contributed to the development and production of the atomic bomb, and its delivery at Hiroshima, Japan on August 5, 1945 (Stone & Webster Engineering Corporation 1946:8–12).

During WWII, Stone & Webster continued to "design, construct, modernize, and adapt steam power plants" to meet the war industry's demand for electric power (Stone & Webster Engineering Corporation 1946:130). From 1939 to 1945, Stone & Webster completed 78 power projects in the U.S., West Indies, and Saudi Arabia, to supply power to the war industry. In 1941–1942, they had a total of "1,000,000 kw of steam power plant capacity in process of design and construction," although it is important to point out that much of it was to increase the capacity of existing plants (Stone & Webster Engineering Corporation 1946:131). As explained in *A Report to the People* (Stone & Webster Engineering Corporation 1946:133), "when the enemy struck, power plants built for peace went to war…when the nation needed more power to back up the men at the front, new plants were built."

Immediately following WWII, Stone & Webster was primarily involved in contracts "related to shifting from wartime activities back to a civilian economy" (Allen 1989:17). In Canada, the firm built a paper mill, chemical plants, hydro facilities, and Molson brewery. In the U.S., they designed and built natural gas containers in Chicago, a printing plant in Pennsylvania, the Shamrock Hotel in Houston, and manufacturing plants for Westinghouse and General Electric Company in the northeast.

At the same time, the firm became immersed in the growing demand for chemical processing and refining facilities, and was instrumental in building interstate natural gas pipelines and compressor stations. The nation's utilities "were anxious to expand and improve their facilities" (Allen 1989:16). Due to this surge in the development of alternative power sources, about 60 percent of Stone & Webster's business in 1946 was devoted to energy projects (Allen 1989:17).

In the late-1940s, steam electric plants across the nation accounted for only 16 percent of Stone & Webster's contracts. In 1946–1948, Stone & Webster designed and constructed SCE's Redondo Beach Steam Station (today's RBGS). Between 1948 and 1950, the firm was contracted by PG&E to design and construct the Kern Steam Plant near Bakersfield, Hunters Point Steam Plant in San Francisco, and the Moss Landing Steam Plant on Monterey Bay (Steele 1950:18–21).

By the 1950s, there was a world-wide demand for plastics, which required the production of ethylene. Stone & Webster's chemical process business was booming, as they "were engineering ethylene plants worldwide for most every major oil company" (Allen 1989:18). At the same time, the spread of automation, industry, and increased home-use of electricity heightened the demand for power during the 1950s. During this period, Stone & Webster built a large number of hydroelectric, coal, and oil-fired generating units as new plants and also at existing plants. The projected growth rate raised concerns on whether or not utilities could build fast enough to meet demand and created concerns about the adequacy of the nation's power generating capabilities.

Out of this concern, the nuclear power era was born. In 1954, the Atomic Energy Commission initiated plans to construct the world's first full-scale nuclear plant at Shippingport, Pennsylvania to generate electric power. Stone & Webster competed for the contract with about 90 other engineering firms and won, completing the project in 1957 (Allen 1989:18). The firm engineered and built a large percentage of the nation's commercial nuclear power plants in the 1970s, and continues to assist in upgrading and enhancing nuclear facilities for both military and civilian applications, providing plant services to more than 90 percent of the commercial power reactors in the U.S.

Since the 1950s, Stone & Webster has been involved in the improved performance and increased output of fossil-fueled power plants worldwide. They helped develop new processes for clean combustion of coal, worked on hydro facilities across the U.S., and by the 1980s had become involved in alternative energy such as solar and geothermal, having "engineered more geothermal plants than anyone else" (Allen 1989:20). They have specialized in the design and construction of various chemical plants and refineries, and have engineered more than 100 ethylene plants worldwide, representing around 35 percent of the world's capacity.

Stone & Webster's involvement in infrastructure projects also increased after WWII. They designed and engineered railway and other transit systems, as well as associated maintenance facilities, airports, and road and bridge rehabilitation programs. Finally, as an IBM business partner in the 1970s, Stone & Webster established computer-based management systems. The advanced control system they developed for use in the petrochemical industry and in wastewater treatment plants provided continuous monitoring of all plant operations to maximize production.

3.5 APPLYING CONCEPTS OF THE CITY BEAUTIFUL MOVEMENT TO PUBLIC UTILITY PROJECTS

The following section discusses the City Beautiful Movement of the late nineteenth and early twentieth century and how the concepts of that movement were applied to public utility projects. The purpose of the discussion is to assess whether or not the RBGS is an example of the City Beautiful Movement.

The City Beautiful Movement of the late nineteenth and early twentieth century was inspired by, and a reaction to, the haphazard urban growth during the industrial revolution of the late nineteenth century, and a desire to create order and beauty in the urban landscape. Originally a response to overcrowding and poor planning practices in Chicago and Washington, D.C., the movement coincided with the municipal reform efforts of the Progressive Era (Chicago Historical Society 2005). The objective of social reformers of that time was to make cities more ordered, aesthetically pleasing, enhance civic pride, and improve public morale. The City Beautiful Movement influenced professional planners, architects, and designers who would be responsible for the progression in urban planning in the twentieth century.

One of the principal reformers of the City Beautiful Movement was landscape architect and city designer, Frederick Law Olmsted. Perhaps Olmsted is best recognized for his design of Central Park in New York City in 1850, but his work spanned the late nineteenth century, creating a number of parks in Boston, such as the Emerald Necklace, and entire communities, such as Riverside, a suburb of Chicago (Library of Congress n.d.). He also designed college campuses, state capitols, private estates, and the grounds for the 1893 Columbian Exposition and World's Fair in Chicago.

To achieve the goals of the Movement, many architects and designers chose to combine Beaux Arts and Neo-classical (Classical Revival) architecture that was popular around the turn of the century with natural landscaping in the design of public spaces (Library of Congress n.d.). One of the best examples of this was the redesigning of the U.S. Capitol in Washington, D.C. over the first two decades of the twentieth century under the McMillan Plan of 1902. The redesign resulted in the removal of slum communities that had built up around the Capitol, and construction of the National Mall, Reflecting Pool, and Lincoln Memorial. The success of the City Beautiful Movement in Washington, D.C. directly influenced subsequent plans for the beautification of cities across the U.S.

A number of early twentieth-century public utility projects throughout the U.S. were designed following the concept of the City Beautiful Movement of that time. Two such projects in California were PG&E's Sacramento River Steam Plant Station B (Station B), built in 1912, and the Sacramento River Water Treatment Plant (SRWTP), built in 1921 (Boghosian 2010; Melvin and Miller 2011). Station B was designed by Willis Polk, a notable San Francisco Bay area architect. The majority of the buildings in Station B are of the Classical Revival style, with some bearing elements of the Beaux Arts Movement in their ornate detailing. The western elevation, facing the Sacramento River, is the primary façade and features the most striking architectural expressions (Figure 18). It exhibits a tall arched opening with a classical door frame surmounted with an ornate cartouche of sculpted male figures and floral and scroll motifs of the Beaux Arts style. Below the pediment, the words "Pacific Gas and Electric Company" are engraved in the concrete. The exterior design of the building, including pediments, arches, cornice, and mocked courses of stone, reflect the principal elements of Classical Revival architecture (Boghosian 2010:1). The Classical Revival and Beaux Arts architecture and park-like plan of the facility, with its layout of walkways and greens along the Sacramento River, are tributes to the City Beautiful Movement as expressed by Polk. Due to its important historical associations and architectural merits, it was nominated and listed on the National Register of Historic Places (NRHP) in 2010 (Boghosian 2010).

Figure 18 Pacific Gas & Electric's Sacramento River Steam Plant Station B built in 1912 is an example of Classical Revival and Beaux Arts architecture. The grounds exhibit a park-like setting, one of the key elements of the City Beautiful Movement. Photograph taken November 14, 2012.

The administration building and pumping station at the SRWTP facility were constructed in the Neo-Classical style of architecture, which is unusually graceful for a public works building. The facility also hosts a park like setting that implements the City Beautiful ideals in a utilitarian project. The facility design featured a symmetrical layout set on a north-south and east-west axis, a park-like setting and tree-lined streets, and views focused on the plant's two monumental buildings. Inscribed on the cornice of the Neoclassical Revival style Pump Station building is "And Everything Shall Live Whithersoever the River Cometh, Ezekiel XLVII-9" (Melvin and Miller 2011:2). Below the entablature of the conical roof of the Neoclassical Revival Head House are the names of notable engineers and scientists, as well as two inscriptions, "And The Glowing Sand Shall Become A Pool And The Thirsty Ground Springs Of Water" and "To Protect The Health Of The People Is A Fundamental Duty Of The Commonwealth." In front of the buildings is a circular island, and between them a courtyard of trees, lawn, sidewalks, fountain, and a flagpole (Melvin and Miller 2011:16–17). Due to its architectural merits, the SRWTP has been evaluated as eligible for the NRHP, the CRHR, and the Sacramento Register of Historic and Cultural Resources (Melvin and Miller 2011:1).

The best and possibly only example of the City Beautiful Movement in Redondo Beach is the Veterans Memorial Park at 309 Esplanade Avenue, one mile south of the RBGS. The 6.3-ac park, dedicated as a City Park in 1923, surrounds an 11,400-square-foot Spanish Revival-style building with Classical Revival features (Figure 19). Originally built in 1930 as the Redondo

Beach Public Library the building is now a Community Center used for weddings, banquets, and other special events. It is listed on the NRHP for its architectural merits, but the National Park Service does not distinctly recognize the property as a project of the City Beautiful Movement (NRHP #81000158). Sitting on a hill overlooking the Pacific Ocean, the grounds around the building feature large domestic shade trees (including a Moreton Bay fig tree), tall palms, grassy lawns, decorative walkways, a veteran's memorial, playground, and Senior Center.

Figure 19 The Redondo Beach Public Library built on the grounds of the City Park in 1930 is an example of Spanish Revival and Classical Revival architecture applied to a public building, as influenced by the City Beautiful Movement (NPS 2013).

3.6 THE ART MODERNE STYLE OF ARCHITECTURE

Constructed in 1946–1948, the design of the Redondo Beach Generating Station was influenced by one of the most popular architectural styles of the period: Art Moderne. The following section discusses the development of Art Moderne architecture in the U.S., followed by a section that discusses Art Moderne architecture in Redondo Beach.

The Art Moderne style was popular during the 1930s–1940s and was inspired by science, technology, and industry. Fashionable among designers of industrial and commercial buildings, but also applied to residential buildings, its design was more volumetric and streamlined than traditional forms, and featured hard-edge and vertical relief forms, often highlighted with repetitive blocks of windows.

Glass blocks and concrete were materials frequently used to achieve smooth, rounded corners or hard square edges, and aluminum and steel were often used for doors and windows. While larger, industrial forms of Art Moderne stressed vertical lines, the Streamline Moderne form used for commercial and residential construction was achieved through horizontal lines, flat roofs, narrow bands of windows, steel tube railings, and curved glass. Pop expressions of the style exist, which often employed port holes and other circular elements, or neon lights and glossy tiles. Walker (2002) explains the Art Moderne movement in his book, *American Homes*:

> Art Moderne, sometimes called Moderne, Modernistic, or Depression Moderne, was a style that consciously strove for an architectural expression to compliment the machine age. It was a unique American style although it was part of the International style movement, it borrowed from the French Nouveau, and was somewhat influenced by Art Deco. Art Moderne was inspired by America's love affair with machines—the airplane, the car, the train, and the toaster. It was a new machine art: honest, simple, and above all, functional [Walker 2002:220].

Streamline Moderne is considered an evolution of the earlier Art Deco style of ornamentation that was popular in American architecture during the 1920s and 1930s. Art Deco originated in the 1925 French art exposition at Le Musée des Arts Décoratifs, a display of nouveau design from around the world. Art Deco was not labeled as a separate category from Modernism until a much later retrospective on the 1925 exposition (Bryn Mawr College n.d.). Following the Paris exposition, Art Deco engulfed many of the decorative arts in American culture, including furniture, pottery, flatware, household and industrial machinery, and interior design. The powerful and beautiful ornamentation was inspired by geometry, botany, color, and even American Indian and Egyptian motifs, and Pre-Columbian Mayan structures. Originating during a boom-period in the development of the United States, the popularity of Art Deco continued well into the depression years of the 1930s:

> American Art Deco conveyed both beauty and strength in a time when economic depression left much of the country unemployed and embittered. During the 1930s many public buildings were decorated in the Art Deco style, exuding nationalism through massive structures with great coloring, inspiring murals and strong sculpture reminiscent of Roman republicanism. Following World War II, the war's enormous costs led America into a period of toned-down post-war architecture where ornamentation was abandoned in favor of simplicity and regimented design [Bryn Mawr College n.d.]

As the 1930s progressed, the Moderne movement moved toward streamlining, a concept first conceived by industrial designers who stripped Art Deco design of its ornamentation in favor of the aerodynamic pure-line concept of motion and speed that had developed during that time. As a result, an array of designers quickly ultra-modernized and streamlined the designs of everyday objects. Manufacturers of clocks, radios, telephones, cars, furniture, and many other household appliances embraced the concept. The Streamline Moderne was a reaction to austere economic times, replacing sharp angle ornamentation of the previous Art Deco style with simple, aerodynamic curves and lines. Exotic materials and colors were replaced with concrete and glass.

The Art Moderne style, especially Streamline Moderne, was applied to household appliances such as clocks, sewing machines, radios, telephones, vacuum cleaners, refrigerators, and even pencil sharpeners. Streamlining became a widespread design practice in industries producing automobiles, railroad cars, buses, and other vehicles in the 1930s and 1940s. Streamlining and functionalism were very important elements in Modernist industrial design at that time, both intended to attract the attentions of consumers.

3.6.1 Art Moderne Architecture in Redondo Beach

Art Moderne-style architecture is not well represented within the city of Redondo Beach. In the *City of Redondo Beach Historic Context Statement* (Duncan-Abrams and Milkovich 1995:39), the authors indicate there are two "Moderne"-style buildings within the city that stand out as representative of the years between 1923 and 1939: Redondo Union High School's science building at 800 Diamond Street, and the Eagle's Lodge at 128 S. Catalina Avenue. However, they also indicate that the Spanish Colonial-style, represented by numerous residential and commercial buildings, appears to be the most common architectural style from that period.

On November 21, 2013, Æ architectural historian Josh Smallwood carried out a brief reconnaissance along Catalina Avenue and Diamond Street, which revealed that the two "Moderne" buildings described in the *City of Redondo Beach Historic Context Statement* (Duncan-Abrams and Milkovich 1995:39) still remain (Figures 20 and 21). The recently restored Redondo Beach Eagles Lodge at 128 S. Catalina Avenue is an excellent example of the Streamline Moderne style, while the high school science building is a modest example of the Art Moderne style with Art Deco ornamentation. Otherwise, the city appears to lack many examples of Art Moderne architecture. None of the buildings listed on the City's Historical Resources Register or Historical Resources Inventory "A" list are identified as Art Moderne architecture.

Figure 20 The recently restored Streamline Moderne-style Redondo Beach Eagles Lodge, 128 S. Catalina Avenue (northeast corner of Garnet Street). Photograph taken November 21, 2012.

As mentioned above, the Art Moderne style of architecture is not well represented within the city of Redondo Beach. The subject of this study is the evaluation of the historical significance of the RBGS, or Redondo Steam Station, following criteria of the CRHR. Dating to 1946–1948, the Administration wing and Plant 1 of the RBGS is an excellent example of the Art Moderne style applied to a massive public utility building. The SEA Lab situated across Harbor Drive and of contemporaneous construction is also an Art Moderne style building, although it is of much smaller scale and has been altered. The following chapters provide a description of the RBGS and SEA Lab building, followed by an evaluation of their historical significance with regard to the criteria of the CRHR.

Figure 21 The Art Deco/Art Moderne-style science building at Redondo Union High School, 800 Diamond Street (southeast corner of N. Francisca Avenue). Photograph taken November 21, 2012.

4 DESCRIPTION OF RESOURCE

This chapter identifies the primary components of the Redondo Steam Station/RBGS/SEA Lab that were recorded by Smallwood during the November 21, 2013 field inspection for this study. Because a detailed record already exists for every building and structure contained at the RBGS (Price 2012a), it was not necessary to duplicate those efforts here. Instead, the focus is on the primary buildings of the RBGS and SEA Lab, and their relation to the design, construction, and later development of the historic-period Redondo Steam Station.

4.1 THE REDONDO STEAM STATION/RBGS/SEA LAB

The Administration wing, Plant 1, and SEA Lab building of the Redondo Steam Station were built in 1946–1948 by Stone & Webster Engineering Corporation for SCE. At that time, the facility included the Administration wing and Plant 1, landscaped grounds, parking lot, the pump house across the street, and an approximately 1,200-foot-long intake pier that stretched from the beach to the Pacific Ocean. Plant 2 was constructed at the rear of Plant 1 in 1956, and Plant 3 was constructed at the rear of Plant 2 in 1968. The addition of Plant 2 in 1956 and Plant 3 in 1968 fulfilled the planned ultimate expansion of the original Redondo Steam Station.

The steam plant was originally designed and built to be fueled by both oil and natural gas-powered boilers, but has since been converted to natural gas only. Today, the RBGS contains eight steam-generating power units. The four units at Plant 1 (Units 1–4) are retired but remain in place, while the other four units in Plants 2 (Units 5 and 6) and Plant 3 (Units 7 and 8) are still operational.

The Administration wing, Plant 1, and the SEA Lab building of the Redondo Steam Station, originally constructed in 1946–1948 by Stone & Webster Engineering Corporation for SCE, are an excellent example of the Art Moderne style of architecture applied to a large public utility building complex (Figures 22, 23). They each exhibit repetitive panels of tall, vertical relief-formed columns separated by panels of windows. The fenestration and relief columns are symmetrically arranged, which is a formal approach to Art Moderne design, clearly revealing a classical influence.

4.1.1 Administration wing

The Administration wing is a rectangular, three-story and basement projection on the northern elevation of the facility, and is aligned on a northeast-southwest axis. It measures approximately156 ft long, 45 ft wide, and 42 ft tall. The building is constructed of concrete masonry on a rigid steel frame and rests on a reinforced-concrete slab foundation. It is surmounted by a flat roof of concrete and steel. The exterior walls are painted peach and cream colors. Historical photographs indicate this color scheme post-dates 1956 (Figure 13).

The vast majority of the original windows have been replaced with black aluminum-framed sliding windows topped with a transom, although the original window openings themselves have not been altered. The primary façade, facing northwesterly, features a central entryway accentuated by a wide concrete border relief, with etched dentils along the top, and etched column relief at either side of the doorway (Figures 22, 23).

Figure 22 The Administration wing and Plant 1 of the Redondo Steam Station (photograph taken November 21, 2013, view to the east).

Figure 23 The primary façade (northern elevation) of the Administration wing (photograph taken November 21, 2013, view to the southeast).

Above the doorway is an inscription that reads, “REDONDO STEAM STATION” (see Figure 23). A wide stoop, painted blue, and bordered by concrete piers, fronts the entryway. It has two flights of concrete steps separated in the center by an iron handrail. An aluminum-framed glass double door topped with transom provides entry. A wheelchair lift is located on the west side of the stoop. Entering through the front doorway, the interior of the Administration wing features a small lobby and entrance hall that leads directly to an elevator. The entrance hall is surfaced with polished red brick, while the lobby, separated by an iron railing, is carpeted. The walls are painted white and decorated with historical photographs of Redondo Beach. Hanging on the north wall, next to the entrance, is a brass plaque that reads, “REDONDO STATION / SOUTHERN CALIFORNIA EDISON COMPANY / STONE & WEBSTER ENGINEERING CORPORATION / DESIGNERS AND CONSTRUCTORS.” On the south wall is a 1940s-vintage Otis elevator. It has tall, narrow wood doors and is set into a wood frame painted white with gray trim. On the first floor, behind closed doors, is a small storage and work shop. Offices are located on the second and third floors.

At the front of the northwestern elevation of the Administration wing is a circular driveway and landscaped island. The island contains a flagpole at the center, flanked by low shrubs, with taller palms at each end. Landscape grass and trees decorate the front grounds of the Administration wing, including a Moreton Bay fig tree at the northeasterly corner, and three large evergreen trees on the northwesterly corner.

4.1.2 Plant 1

Plant 1 is a massive rectangular wing attached to the rear of the Administration building (see Figure 22). Aligned on a northwest-southeast axis, it measures approximately 488 ft long, 75 ft wide, and 60 ft tall. The interior of the building comprises a ground floor surmounted by a large open story. The building is constructed of a rigid steel frame sheathed with concrete masonry walls. It rests on a reinforced-concrete slab foundation, and is surmounted by a flat roof of concrete and steel. The north elevation is partly visible over the top of the Administration wing, but the primary façade, facing west, stretches several hundred feet along Harbor Drive. The exterior walls are raw, unpainted smooth, gray concrete, giving the appearance of a massive, monolithic structure. The color appears original. Tall, vertical column reliefs, or pilasters, are repeated along the length of the exterior walls. Filling the wall spaces between each pilaster are tall, vertical panels of glass block windows, with small, double window panels above, adding to the repetitive rhythm along the exterior wall. Rounded hoods hang at the bottom of each column of windows, providing ventilation to the interior. The interior of Plant 1 retains many of its original features, such as the control room and four turbo-generator units placed online in 1949 (Figures 24, 25).

A landscaped lawn fronts the westerly elevation along Harbor Drive. The lawn is framed by a short concrete wall which separates it from the sidewalk. It features a field of grass and a mixed arrangement of palm trees, hedge rows, and shrubs. Streetlamps are positioned at spaced intervals to illuminate the sidewalk at night. While the landscaped grounds are pleasant in their appearance, they are a simple, mixed arrangement of planned and unplanned plantings of vernacular design, and do not exhibit any key features of the City Beautiful Movement, such as a park-like setting with fountains, walkways, benches, or other public uses of space, or Neo-classical or Beaux Arts style architecture that is commonly associated with the Movement.

Figure 24 Interior view of Plant 1 showing one of the four original generators housed in the indoor facility (photograph taken November 21, 2013, view to the north).

Figure 25 The control room at Plant 1 (photograph taken November 21, 2013).

4.1.3 Plant 2

Sharing the southeast wall of Plant 1 is Plant 2, completed in 1956. Plant 2 measures approximately 375 ft long, 60 ft wide, and is of slightly shorter height than Plant 1. It is recessed slightly farther from the street than Plant 1, and has less landscaped ground in front of it due to most of that space being paved with asphalt and used for parking and storage. Another major difference between Plant 1 and Plant 2 is that Plant 1 is fully enclosed by four walls, while Plant 2 is a semi-enclosed building having only three walls (Figure 26). The east elevation provides the open-air effect of the building's plan, with direct exposure to the facilities at that location.

The semi-outdoor designed building is constructed of a rigid steel frame sheathed with pre-fabricated concrete wall panels. It rests on a reinforced-concrete slab foundation, and is surmounted by a flat roof of concrete and steel. The exterior walls are smooth, unpainted, rectangular panels of prefabricated gray concrete, which appears to be the original color. A series of louvered vent openings is repeated along the upper portion of the wall, but the building lacks any other decorative elements and is purely utilitarian in its modern industrial design.

Figure 26 The semi-outdoor design of Plant 2 is revealed by this photograph of the interior (photograph taken November 21, 2013; view to the south).

4.1.4 Plant 3

Plant 3 is a semi-enclosed open-air structure, having no wall on the northern elevation, and portions of the roof panel removed (Figure 27). Constructed in 1968, it is a completely separate building located to the southeast of Plant 2. It measures approximately 505 ft long, 100 ft wide,

Figure 27 The semi-outdoor design of Plant 3 (photograph taken November 21, 2013; view to the south).

and comparable in height to Plant 2. The western elevation is completely shrouded by a concrete panel structure painted with a Robert Wyland mural known as "Gray Whale Migration" dedicated June 24, 1991. The building is constructed of a rigid steel frame clad with pre-fabricated concrete wall panels. It rests on a reinforced-concrete slab foundation, and is surmounted by a steel-framed flat roof covered with concrete panels. The exterior walls are smooth, unpainted, rectangular panels of prefabricated concrete.

4.1.5 SEA Lab

The SEA Lab, originally constructed in 1946–1948 as the circulating pump house that pumped seawater from the Pacific Ocean to the steam plant for cooling the generators, is located across the street (across Harbor Drive) to the west of the Administration wing and Plant 1 (Figures 28, 29). In 1974, SCE converted the pump house to serve as the Edison Marine Research Laboratory, and today, the SEA Lab facility is a marine science education center operated by the Los Angeles Conservation Corps. Based on historical USGS maps, the ocean water intake pier was removed and the pipeline intake was submerged by at least the early 1950s. The SEA Lab is an irregularly-shaped one-story building comprising the original L-shaped form plus a later addition to the northern and northwestern elevations. The original portion of the building measures approximately 125 ft long, 48 ft wide, and 25 ft tall, aligned on a northwest-southeast axis. The Art Moderne architectural style and design of the building is similar as that of Plant 1, but on a much more modest scale. The building is constructed of a rigid steel frame clad with concrete masonry walls. It rests on a reinforced-concrete slab foundation, and is surmounted by a flat roof of steel framing and concrete panels, bordered by a short parapet.

Figure 28 View of the eastern elevation (primary façade) of the Redondo Steam Station's former pump house, now the SEA Lab (photograph taken November 21, 2013, view to the west).

Figure 29 View of the primary façade (eastern elevation along Harbor Drive) and northern elevation of the Redondo Steam Station's former pump house, now the SEA Lab (photograph taken November 21, 2013, view to the southwest).

The exterior walls are painted a cream color with peach trim along the parapet, and a mural of marine life painted along the lower wall. Black-and-white historical photographs indicate the original color was likely gray (Figures 14 and 15). The present color scheme was likely added sometime after its conversion in 1974. Tall, vertical column reliefs are repeated along the length of the exterior walls. Filling the bays created between each pilaster are tall, columnar panels of glass block windows.

The primary façade, facing east toward Harbor Drive, exhibits six tall vertical panels of glass block windows separated by concrete relief columns (see Figures 28, 29). The northern elevation features a 56 ft long by 27 ft wide room addition. Aluminum-framed windows have been added to the northern and western elevations, although it is unclear whether or not they fill pre-existing window spaces. A glass block window on the addition contains glass blocks of different size and style than those found in the original windows. The circulating water pumps and adjacent intake pier that once existed have been removed, leaving only the building itself as a remnant of the former pump house.

Historically, the SEA Lab building functioned as the seawater pump house serving the needs of the Redondo Steam Station's Plant 1, and today it is the last remaining element of the plant's seawater intake system. It was an integral part of an architecturally designed public utility complex. The historical significance of the SEA Lab building under CRHR Criteria lies in its historical association with the Administration wing and Plant 1 as part of the larger system of steam-electric generation at the historical Redondo Steam Station.

The intake system that the pump house once operated on was not a technological advancement within the design and construction of steam-electric plants in the post-WWII era, although it was the first dual-intake system (Steele 1950:17-21). Huntington's Pacific Light & Power Corporation power plant that existed in Redondo Beach from 1906–1933 had a similar ocean water intake system although it pumped the hot water from his plant to his popular saltwater plunge nearby, rather than pumping it back into the ocean offshore. The Redondo Steam Station seawater intake system was of relatively standard design for twentieth century steam-electric plants and its design was even improved upon in the decades that followed. However, like the overall design of the Redondo Steam Station's Administration wing and Plant 1, the pump house was one of the last in a generation of architecturally-styled plant facilities, and was one of the first in the post-WWII generation of high-capacity steam-electric plants.

The pump house was designed in the Art Moderne style similar to Plant 1 of the Redondo Steam Station. The building is a modest rendition of the Art Moderne style, small in size and plain and utilitarian in appearance. While it is a modest rendition of the Art Moderne style, it was designed to match the Administration wing and Plant 1, and therefore, it is an integral part of a designed system of architecture applied to a public utility building complex.

Historical photographs of the north, south, east, and west elevations indicate each elevation had a door for entry or a window, and none of the elevations featured any special architectural design to set one elevation or entry apart from the other (refer back to Figures 11, 14, and 15). Perhaps this is why an addition was constructed on the north elevation that would appeal to the public and attract visitors upon converting the building to its use as a marine science laboratory. The Harbor Drive elevation appears to constitute the primary façade, and it has not been substantially altered. Doorways along Harbor Drive were plain and simple rectangular spaces within a column of glass blocks. When compared to historical photographs, the present-day SEA Lab building retains sufficient levels of its historical appearance, design, and construction to be easily identified as having a direct association with the Administration wing and Plant 1 of the historical Redondo Steam Station.

5 SIGNIFICANCE EVALUATION

This chapter presents Æ's evaluation of the Redondo Steam Station/RBGS and SEA Lab for CRHR eligibility based on the four criteria provided in Chapter 2 of this report. The Redondo Steam Station was one of a number of natural gas and oil-fired steam-driven electric power plants constructed by SCE during the post-WWII era. However, today the RBGS is unique because of its historical associations and architectural and engineering merits.

The following discussion of the historical significance of the Redondo Steam Station/RBGS and SEA Lab is broken into the four criteria for historical significance under the CRHR. In addition, the RBGS and SEA Lab are evaluated together, rather than separately as previously recorded by Price (2012a, 2012b). The present-day RBGS and SEA Lab facilities share a common historical background, originating as integrated facilities of the historical Redondo Steam Station, as designed and constructed by the Stone & Webster Engineering Corporation for SCE in 1946–1948. Together they form a coherent whole. The addition of Plant 2 in 1956 and Plant 3 in 1968 fulfilled the planned ultimate expansion of the original Redondo Steam Station.

5.1 EVALUATION OF THE REDONDO STEAM STATION/RBGS AND SEA LAB

CRHR Criterion 1: The RBGS and SEA Lab (including the Administration wing, Plants 1, 2, and 3, the pump house and associated facilities at the Redondo Steam Station) is found through this investigation to be historically significant under CRHR Criterion 1 (*association with events that have made a significant contribution to the broad patterns of California's history and cultural heritage*). Namely, the Redondo Steam Station is significant for its direct association with a historic trend in the development of the newest generation of high capacity steam-electric plants following the end of WWII. It is one of the last of the generation of architecturally styled indoor-type steam-electric plants built in the southern California region, and is one of the earliest representations of the generation of high-capacity steam-electric power plants constructed by SCE in the post-war expansion period.

The Redondo Steam Station, known today as the RBGS, and including the SEA Lab building, was built immediately following the end of WWII, at the height of the post-war technological boom period. After WWII, SCE undertook a significant expansion of steam-electric generation, and their Redondo Steam Station was at the forefront of the movement, although more importantly, it was part of a transitional phase between the prior class of steam-electric plants and the future generation. The Redondo Steam Station was designed and built as an indoor facility based on the standards of the pre-WWII era. Over the next few years, SCE transitioned the design of their plants to a semi-outdoor design, which became the standard during the company's expansion period between 1950 and 1973. As such, the design of the Redondo Steam Station's primary buildings was vastly different from almost every other steam plant constructed by SCE during the post-WWII era.

Designed in the Art Moderne style, the Redondo Steam Station was one of the last of the architecturally-styled indoor-type steam-electric plants built in the Southern California region, but it was also designed to operate with the newest technology, and to be expanded in the future if the market warranted it. Between the 1950s–1973, SCE began construction of numerous semi-outdoor designed plants. This newest wave of plants was built economically by minimizing structural material (lacking architectural styling), and by creating outdoor or semi-outdoor turbo-generator units. Additions of Plants 2 and 3 at the Redondo Steam Station occurred under this new concept.

Within the context of this transitional period, the Redondo Steam Station is directly associated with a historic trend in the development of the newest generation of steam-electric plants following the end of WWII. The period of significance for this important historical association spans from its construction, which began in 1946, to the addition of Plant 2 in 1956 and Plant 3 in 1968, a period which fulfilled its planned ultimate expansion.

Construction on the Redondo Steam Station began in 1946 and was completed in 1948. It was during those same years that California secured a reliable and abundant source of natural gas through construction of El Paso Natural Gas Company's first interstate pipeline to transport natural gas from Texas to southern California. The culmination of these events allowed for the growth and prosperity of Redondo Beach and the surrounding areas during the post-WWII-era development boom. As such, the Redondo Steam Station is directly associated with a pattern of events that made a significant contribution to the growth and development of Redondo Beach and the surrounding area. The period of significance for this important historical association spans from its construction, which began in 1946, to the addition of Plant 2 in 1956 and Plant 3 in 1968.

Integrity under CRHR Criterion 1: The Administration wing and Plant 1 of the original Redondo Steam Station, and Plants 2 and 3 of the RBGS retain excellent integrity, as the majority of the original interior and exterior components are still intact, including many of the mechanical and structural components dating to the period of significance. The Redondo Steam Station and Plants 2 and 3 of the RBGS are at their original *location* and their *design*, *materials*, and *workmanship* remain largely intact. Their *setting* within the RBGS property remains intact, although the immediate surrounding area beyond the RBGS has been further developed since its initial construction. The RBGS retains sufficient historical character and features to convey *feeling* and *association* with regard to its significance under CRHR Criterion 1.

Therefore, the Administration wing and Plant 1 of the Redondo Steam Station appear to retain sufficient integrity to convey their significance as one of the earliest in a new generation of post-WWII era steam-electric power plants despite some minor alterations that have occurred with the recent removal of various structures such as oil tanks, stacks, and other ancillary outdoor components. Plants 2 and 3 are acceptable forms of later additions to Plant 1, as they were constructed during the post-WWII era following the design principles which fulfilled the plant's planned ultimate expansion.

While the SEA Lab building no longer operates as a pump house, it appears to retain sufficient levels of historical integrity with regard to *location, design, setting, materials, workmanship, feeling, and association,* to be considered eligible for the CRHR under Criterion 1 for this same historical significance. The SEA Lab building is at its original *location*, and its *design*, *materials*, and *workmanship* remain sufficiently intact to be recognized as the original pump house. While the immediate surrounding area beyond the RBGS and SEA Lab have been developed, the RBGS property remains largely intact, and therefore, one of the most important aspects of the *setting* of the SEA Lab still remains. The SEA Lab is recognizable from historical photographs despite the minor alterations that have occurred on its northern and northwestern elevations. Thus, the SEA Lab retains sufficient historical character to convey *feeling* and *association* with regard to its significance under CRHR Criterion 1.

In summary, the RBGS and SEA Lab (including the Administration wing, Plants 1, 2, and 3, the pump house and associated facilities at the Redondo Steam Station) are found in this investigation to retain sufficient levels of historical integrity with respect to *location, design, setting, materials, workmanship, feeling, and association,* to be considered eligible for the CRHR under Criterion 1. The Redondo Steam Station was one of the last of the generation of architecturally styled indoor-type steam-electric plants built in the southern California region, and is one of the earliest representations of the generation of high-capacity steam-electric power plants constructed by SCE in the post-war expansion period. For these reasons, the Redondo Steam Station/RBGS retains sufficient integrity to be considered eligible for the CRHR under Criterion 1 for its direct association with a historic trend and transition in the development of the newest generation of high capacity steam-electric plants following the end of WWII.

CRHR Criterion 2: None of the individual buildings or structures at the RBGS and SEA Lab, nor the historical Redondo Steam Station as a whole, appears eligible for the CRHR under Criterion 2 (*association with the lives of persons important in our past*). There is no evidence they are directly associated with the productive life of an individual of historical significance. While the historical Redondo Steam Station is important for its association with Stone & Webster Engineering Corporation (see below), that association does not extend to the productive life of either Charles A. Stone or Edwin S. Webster because there is no indication that either of them had any direct association with the design and/or construction of the Redondo Steam Station, or that the Redondo Steam Station best represents either individual's significant accomplishments. There is no indication that either the RBGS or SEA Lab is directly associated with the productive life of any other individuals of historical significance.

CRHR Criterion 3 (for architectural merits): The Administration wing, Plant 1, and pump house (SEA Lab) of the Redondo Steam Station appears to meet CRHR Criterion 3 (*embodies the distinctive characteristics of a type, period, region, or method of construction*). Namely, for architectural merits as an excellent example of the Art Moderne style of architecture applied to a large public utility building complex, and as one of the last architecturally styled indoor-type steam-electric plants built in the southern California region. The massive Administration and Plant 1 building, rigid and monolithic in its appearance, constructed of immense walls of concrete decorated with tall relief columns separated by slender, towering panels of glass block windows, embodies the distinctive characteristics of the Art Moderne style which was popular in the middle twentieth century. The pump house was designed to match the Administration wing and Plant 1, and therefore, it is an integral part of a coherent architectural plan applied to a public utility building complex. Therefore, all three parts of the building complex appear to meet CRHR Criterion 3 for their architectural merits. Plants 2 and 3 are of the semi-outdoor design and lack any architectural styling. They are vernacular in form and of standard design for plants constructed from about 1950 to 1973. Thus, they do not appear eligible under CRHR Criteria 3.

As one of the last occurring architecturally styled indoor-type steam-electric plants built in the southern California region, and one of the only among SCE's post-WWII-era generation of plants, the architectural significance of the Administration wing, Plant 1, and pump house under this theme of CRHR Criterion 3 appears to be at a regional level. The associated period of significance spans from the facility's construction, which began in 1946, to the addition of Plant 2 in 1956. While the Art Moderne style of architecture was used in the design of numerous industrial, commercial, and public utility buildings constructed in southern California and the Los Angeles region during the 1930s and 1940s, the style is not well represented in the city of Redondo Beach. Thus, the architectural significance also appears to be at a local level within the city.

As mentioned above, a second wave of post-WWII generation plants was constructed by SCE between 1950 and 1973. This new wave of steam plants differed from previous in that they were built economically by minimizing structural material (no architectural styling), and by creating outdoor or semi-outdoor turbo-generator units. Additions of Plants 2 and 3 at the Redondo Steam Station occurred under this new design approach, and under this theme of CRHR Criterion 3 they should not be considered alterations, but rather, should be considered part of the transition between two different classes of steam-electric power plants. Under this theme, the RBGS facility as a whole appears to have architectural merits for its clear illustration of a transition between the two classes of post-WWII-era power plant construction that followed different principles: the earlier class being the architecturally styled indoor-type steam-electric plant which occurred 1946–1948, and the later class being the construction of the economical semi-outdoor type power plant which occurred from 1950 to 1973. This transition of the two classes is important within the development history of power plants and is well illustrated at the RBGS/SEA Lab between the original construction (1946–1948) and the later additions (1956–1968). Thus, the RBGS/SEA Lab facility appears to be significant under this theme of CRHR Criterion 3. The period of significance under this theme begins with the original construction in 1946 and encompasses the period in which the addition of Plants 2 and 3 occurred, 1956–1968. Constructed during this period by SCE, the RBGS/SEA Lab appears to be significant under this theme at the southern California regional level.

Integrity under CRHR Criterion 3 (for architectural merits): As discussed above, the Administration wing, Plant 1, and pump house (SEA Lab) of the Redondo Steam Station appears to meet CRHR Criterion 3 for their architectural merits, as an excellent example of the Art Moderne style of architecture applied to a large public utility building complex, and as one of the last in a generation of architecturally-styled indoor-type steam-electric plants built in the southern California region. While the addition of Plant 2 in 1956 and Plant 3 in 1968 are considered alterations of the original design under this theme, they are merely attached to the rear of Plant 1 and are structures that could easily be removed, if desired. They do not obstruct the primary north and west elevations of Plant 1 from public view, nor do they detract from the overall appearance and architectural design of the Administration wing and Plant 1. The original color of the pump house was likely the same as Plant 1, an unpainted finished concrete. The existing mural is considered a mild alteration that could easily be reversed, and does not substantially detract from the overall design and appearance of the building. The original paint color on the Administration wing is unknown, but it was likely a bare, gray concrete.

While most of the windows in the Administration wing of the Redondo Steam Station have been replaced, the design and appearance of the replacements conform to the overall design of the building without a substantial loss of integrity. An example of the original steel-framed casement windows still remains on the rear of the Administration wing as a testament to the type of windows that likely were present on the rest of the building. In addition, the interior spaces of the Administration wing and Plant 1 retain much of their historical character, as all, or nearly all, of the original mechanical components are still intact, such as generators, control panels, and elevators dating to the period of significance. As discussed above, the SEA Lab has had minor additions to the northern and northwestern elevations, but the primary façade, facing Harbor Drive, retains most of its original character and appearance.

In addition, other alterations have occurred at the RBGS with the recent removal of various outdoor structures such as oil tanks, stacks, and other ancillary structures. While those outdoor structures were historically a part of the larger complex's function as a power station, they do not directly relate to the architectural merit of the buildings under consideration.

The Administration wing, Plant 1, and the pump house (SEA Lab) of the historical Redondo Steam Station retain integrity of *location*, as they have not been moved from their original location. Their *design*, *materials*, and *workmanship* remain largely intact. Their *setting* within the Station compound remains intact, although the immediate surrounding area beyond the RBGS has been further developed since its initial construction. The Redondo Steam Station retains sufficient historical character and features to convey *feeling* and *association* with regard to its significance under CRHR Criterion 3.

Therefore, the Administration wing, Plant 1, and the pump house (SEA Lab) of the historical Redondo Steam Station appear to retain sufficient historical integrity to relay their significance as a post-WWII-era Art Moderne-style power plant despite some minor alterations that have occurred. In summary, these original buildings of the Redondo Steam Station appear eligible for the CRHR under Criterion 3 for architectural merits as an excellent example of the Art Moderne style of architecture applied to a large public utility building complex, and as one of the last in the generation of architecturally styled indoor-type steam-electric plants built in the southern California region.

CRHR Criterion 3 (for association with Stone & Webster): In addition to its merits for architectural style under CRHR Criterion 3, the Redondo Steam Station, including the Administration wing, Plant 1, and the pump house (SEA Lab) appears to meet Criterion 3 of the CRHR because it *represents the work of an important creative individual*. The Redondo Steam Station was designed by Stone & Webster Engineering Corporation, masters in the field of engineering at the time of its construction in 1946–1948. Stone & Webster were involved in the design and construction of numerous large public utility, infrastructure, and wartime projects across the United States throughout the twentieth century, and thus, the Redondo Steam Station cannot be significant for that association alone. Rather, the facility is historically significant because the Redondo Steam Station represents a particular phase in the evolution of the type of engineering work that Stone & Webster were contracted to perform. Similar to the reasons that the Redondo Steam Station is significant for its association with an important historical event or trend, the Redondo Steam Station is significant for its association with an engineering giant of that time, Stone & Webster, as one of their earliest contracts to construct the newest generation of high-tech, high-capacity steam-electric plants at the front end of the post-WWII technological boom period. The Redondo Steam Station was an especially important example of Stone & Webster's steam-electric plants because it was a transitional piece of work, borrowing elements of the previous era such as the Art Moderne style and the indoor type design, and blending them with the newest ideas in post-WWII design and technology.

Stone & Webster are known to have designed and built, or expanded, steam-electric power plants elsewhere across the U.S. during the post-WWII era. SCE constructed a series of modernized plants in southern California between 1950 and 1973 under a modernized concept of minimizing structural material (no architectural styling), and by creating outdoor or semi-outdoor units. However, the Redondo Steam Station appears to stand in a class of its own when compared to these other plants because it bridged both periods of design. The transition incorporated the earlier principles of power plant design such as an architecturally-styled building and indoor-type plant, as well as some of the post-WWII design principles of installing high-tech, high-capacity turbo-generators, with room to expand as needed, and the ability to run on both oil and natural gas. The Redondo Steam Plant proved to be of quality design over the next few decades. Plant 2 was added in 1956 and Plant 3 was added in 1968, evolving into the present-day RBGS facility. The significance of the facility's association with Stone & Webster is at least a regional level because it was a project for SCE. Other facilities designed and built by the Stone & Webster Engineering Corporation are not known to exist in Redondo Beach's historic building inventory, and therefore, the significance of the facility's association with Stone & Webster extends to the local level as well. The associated period of significance spans from its construction, which began in 1946, to the addition of Plant 2 in 1956.

Integrity under CRHR Criterion 3 (for association with Stone & Webster): The Administration wing and Plant 1 of the RBGS, and the pump house (SEA Lab) appear to retain sufficient levels of historical integrity to convey the Redondo Steam Station's historically significant association with Stone & Webster Engineering Corporation.

While the addition of Plant 2 in 1956 and Plant 3 in 1968 may be considered alterations of Stone & Webster's originally designed steam-electric plant, the firm designed the Redondo Steam Station to be expanded in order to meet future demand. Thus, additions to increase capacity would not constitute a substantial alteration if the additions are spread across the facility in such a manner that they do not compromise the historical integrity of the Administration wing, Plant 1, and the pump house. Plant 2 and Plant 3 are merely attached to the rear of Plant 1 and are structures that could easily be removed, if desired. They do not obstruct the primary north and west elevations from public view, nor do they detract from the overall appearance and design of the Administration wing and Plant 1. In addition, the interior spaces of the Administration wing and Plant 1 retain excellent integrity, as all, or nearly all, of the original mechanical components are still intact, such as generators, control panels, and elevators dating to the period of significance.

The Administration wing, Plant 1, and the pump house (SEA Lab) of the historical Redondo Steam Station retain integrity of *location*, as they have not been moved from their original location. Their *design*, *materials*, and *workmanship* of these buildings remain largely intact. Their *setting* within the Station compound remains intact, although the immediate surrounding area beyond the RBGS has been further developed since its initial construction. The Redondo Steam Station retains sufficient historical character and features (such as the Stone & Webster plaque on display in the Administration wing) to convey *feeling* and *association* with regard to its significance under CRHR Criterion 3 for its association with Stone & Webster Engineering Corporation.

Therefore, the historical Redondo Steam Station as designed and constructed by Stone & Webster, including the Administration wing, Plant 1, and the pump house (SEA Lab) appear to retain sufficient integrity to relay their significance as one of Stone & Webster's earliest examples of the post-WWII generation of steam-electric power plants. In summary, these key buildings of the historical Redondo Steam Station appear to retain sufficient levels of historical integrity with respect to *location, design, setting, materials, workmanship, feeling, and association,* to be considered eligible for the CRHR under Criterion 3 for their association with Stone & Webster Engineering Corporation.

CRHR Criterion 4: None of the individual buildings or structures at the RBGS and SEA Lab, nor the system as a whole, appears eligible for the CRHR under Criterion 4 (*has yielded, or may be likely to yield, information important in prehistory or history*). No important information can be yielded from the intensive study of the RBGS and SEA Lab facilities that is not already known, or that cannot be obtained through traditional avenues of research, such as published literature, as-built plans, and engineering layouts. None of the buildings or structures at the RBGS and SEA Lab *is the principle source of information* for the study of mid-twentieth-century steam-electric plants, Art Moderne architecture, or Stone & Webster engineering practices.

5.1.1 An Assessment of the Landscaped Grounds at RBGS

The landscaped grounds of the present-day RBGS, including the grass lawns framed with a concrete border, and the circular drive at the front entrance of the Administration wing, are original features dating to the Redondo Steam Station's period of significance for Art Moderne architectural merits (1946–1956) based on their appearance in historical photographs (refer to Figures 11–13). The shrubbery along the west side of Plant 1, compared to historical photographs has lost its original intended repetitive effect and does not continue to exhibit the design that it once did. The juniper/cypress trees and a Morton Bay fig tree at the entrance to the Administration building, the row of palm trees along Harbor Drive, and a hedge row along Harbor Drive do not appear to be original plantings dating to the period of significance (refer to Figures 11–13). A group of palms at the entrance to the Administration building, and a group of Morton Bay fig trees at the southeastern edge of the RBGS facility do not appear original, and the fig trees may have grown on their own accord.

While the landscaped grounds are pleasant in their appearance, they are a simple, mixed arrangement of planned and unplanned plantings of vernacular design, with no apparent merits in the field of landscape design or landscape architecture. The landscaped grounds are not known to be designed by a master of landscape design, and they are not examples of the City Beautiful Movement. More specifically, they do not exhibit any key features of the City Beautiful Movement, such as a park-like setting with fountains, walkways, benches, or other public uses of space, or Neo-classical or Beaux Arts style architecture that is commonly associated with the Movement.

However, the grass lawns framed with a concrete border and the circular drive at the front entrance of the Administration wing are original design features of the Redondo Steam Station, dating to the period of significance for architectural merits (1946–1956) and association with an important historical trend (1946–1968). These features are complimentary to the overall historical design, layout, and appearance of the facility's primary building (the Administration wing and Plant 1). As such, they contribute to the historical integrity of the Administration wing and Plant 1 with regard to the aspects of *design*, *setting*, *feeling*, and *association* under CRHR Criteria 1 and 3.

6 CONCLUSION

The results of this investigation conclude that the Redondo Steam Station/RBGS and SEA Lab appear eligible for the CRHR under Criteria 1 and 3, and retain sufficient levels of historical integrity with respect to *location, design, setting, materials, workmanship, feeling,* and *association* to convey the property's significance. The relevant themes for which the Redondo Steam Station/RBGS and SEA Lab are significant are based on events and trends in California's energy development history, the property as a transitional work of Stone & Webster Engineering Corporation, and Art Moderne architecture as applied to a large public utility building complex. The Redondo Steam Station/RBGS and SEA Lab are significant at the southern California regional level and the Redondo Beach local level for their historical associations and architectural and engineering merits. The period of significance varies under these different themes, but overall, it begins with the original construction in 1946 and encompasses the period in which the addition of Plants 2 and 3 occurred, 1956–1968.

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8 PERSONNEL QUALIFICATIONS

Josh Smallwood, Architectural Historian/Historical Archaeologist (M.A., Historic Preservation, Savannah College of Art and Design, Savannah, Georgia, 2008), has 16 years of experience in California conducting historical and archaeological studies, and 9 years of experience recording and evaluating historic-period buildings, engineering structures, and built environment features. Smallwood meets the Secretary of the Interior's Professional Qualifications Standards for Architectural Historian and Historical Archaeologist.

APPENDIX A

California Historical Resource Inventory Record
(DPR 523 Forms)

P1. Other Identifier: Æ-2685-1

P2. Location: a. County Los Angeles ☐ **Not for Publication** ☒ **Unrestricted**

b. USGS 7.5' Quadrangles Redondo Beach, Calif. **Date** 1963, photo-revised 1981

T4S; **R**14–15W; within a portion of the Rancho San Pedro (Dominguez) land grant; San Bernardino **B.M.**

Elevation: Approximately 17 feet above mean sea level

c. Address Redondo Beach Generating Station, 1100 North Harbor Drive, Redondo Beach, CA 90277
SEA Lab (former pump house), 1021 North Harbor Drive, Redondo Beach, CA 90277

d. UTM: NAD 83, Zone 11; **Front entrance to Administration wing:** 370,819 **mE** / 3,746,620 **mN**
Northeast corner of SEA Lab: 370,748 **mE** / 3,746,600 **mN**

e. Other Locational Data: The Redondo Beach Generating Station (RBGS), also known as the Redondo Steam Station, is located in Redondo Beach, and more specifically, is situated in the northwestern portion of South Redondo Beach. It is located on the southeastern corner of Herondo Street and North Harbor Drive. The SEA Lab is located across the street to the west of the RBGS, on the southwest corner of Yacht Club Way and North Harbor Drive. The RBGS occupies a large, irregularly-shaped tract of land covering approximately 50 acres, encompassing Assessor's Parcel Numbers (APNs) 7503-013-014, 7503-013-015, 7503-013-819, and 7503-013-820. The SEA Lab facility occupies APNs 7503-013-821 and -822.

P3a. Description: The RBGS and SEA Lab have both previously been recorded in detail as two separate facilities (Price 2012a; 2012b). This record serves as an update to the previous records, and combines the RBGS and SEA Lab (formerly the steam station's pump house) together as part of the historical Redondo Steam Station (see Smallwood 2013). The Administration wing, Plant 1, and SEA Lab building of the Redondo Steam Station were built in 1946–1948 by Stone & Webster Engineering Corporation for Southern California Edison (SCE). At that time, the facility included the Administration wing and Plant 1, landscaped grounds, parking lot, the pump house across the street, and an approximately 1,200-foot-long intake pier that stretched from the beach to the Pacific Ocean. Plant 2 was constructed at the rear of Plant 1 in 1956, and Plant 3 was constructed at the rear of Plant 2 in 1968. The addition of Plant 2 in 1956 and Plant 3 in 1968 fulfilled the planned ultimate expansion of the original Redondo Steam Station.

The steam plant was originally designed and built to be fueled by both oil and natural gas-powered boilers, but has since been converted to natural gas only. Today, the RBGS contains eight steam-generating power units. The four units at Plant 1 (Units 1–4) are retired but remain in place, while the other four units in Plants 2 (Units 5 and 6) and Plant 3 (Units 7 and 8) are still operational.

The Administration wing, Plant 1, and the SEA Lab building of the Redondo Steam Station, originally constructed in 1946–1948 by Stone & Webster Engineering Corporation for SCE, are an excellent example of the Art Modern style of architecture applied to a large public utility building complex (Figures 1–11). They each exhibit repetitive panels of tall, vertical relief-formed columns separated by panels of windows. The fenestration and relief columns are symmetrically arranged, which is a formal approach to Art Moderne design, clearly revealing a classical influence. The Administration wing is a rectangular, three-story and basement projection on the northern elevation of the facility, and is aligned on a northeast-southwest axis. It measures approximately156 feet long, 45 feet wide, and 42 feet tall. The building is constructed of concrete masonry on a rigid steel frame and rests on a reinforced-concrete slab foundation. It is surmounted by a flat roof of concrete and steel. The exterior walls are painted with peach and cream colors. The vast majority of the original windows have been replaced with black aluminum-framed sliding windows topped with a transom, although the original window openings themselves have not been altered. The primary façade, facing northwesterly, features a central entryway accentuated by a wide concrete border relief, with etched dentils along the top, and etched column relief at either side of the doorway (Figures 2, 3). Above the doorway is an inscription that reads, "REDONDO STEAM STATION" (Figure 4). A wide stoop, painted blue, and bordered by concrete piers, fronts the entryway. It has two flights of concrete steps separated in the center by an iron handrail. An aluminum-framed glass double door topped with transom provides entry. A wheelchair lift is located on the west side of the stoop. Entering through the front doorway, the interior of the Administration wing features a small lobby and entrance hall that leads directly to an elevator. The entrance hall is surfaced with polished red brick, while the lobby, separated by an iron railing, is carpeted. The walls are painted white and decorated with historical

P3a. Description: (continued): photographs of Redondo Beach. Hanging on the north wall, next to the entrance, is a brass plaque that reads, "REDONDO STATION / SOUTHERN CALIFORNIA EDISON COMPANY / STONE & WEBSTER ENGINEERING CORPORATION / DESIGNERS AND CONSTRUCTORS." On the south wall is a 1940s-vintage Otis elevator. It has tall, narrow wood doors and is set into a wood frame painted white with gray trim. On the first floor, behind closed doors, is a small storage and work shop. Offices are located on the second and third floors.

At the front of the northwesterly elevation of the Administration wing is a circular driveway and landscaped island. The island contains a flagpole at the center, flanked by low shrubs, with taller palms at each end. Landscape grass and trees decorate the front grounds of the Administration wing, including a Moreton Bay fig tree at the northeasterly corner, and three large evergreen trees on the northwesterly corner.

Plant 1 is a massive rectangular wing attached to the rear of the Administration building (Figure 1). Aligned on a northwest-southeast axis, it measures approximately 488 ft long, 75 ft wide, and 60 ft tall. The interior of the building comprises a ground floor surmounted by a large open story. The building is constructed of a rigid steel frame sheathed with concrete masonry walls. It rests on a reinforced-concrete slab foundation, and is surmounted by a flat roof of concrete and steel. The north elevation is partly visible over the top of the Administration wing, but the primary façade, facing west, stretches several hundred feet along Harbor Drive. The exterior walls are raw, unpainted smooth, gray concrete, giving the appearance of a massive, monolithic structure. Tall, vertical column reliefs, or pilasters, are repeated along the length of the exterior walls. Filling the wall spaces between each pilaster are tall, vertical panels of glass block windows, with small, double window panels above, adding to the repetitive rhythm along the exterior wall. Rounded hoods hang at the bottom of each column of windows, providing ventilation to the interior. The interior of Plant 1 retains many of its original features, such as the control room and four turbo-generator units placed online in 1949 (Figures 6, 7).

A landscaped lawn fronts the westerly elevation along Harbor Drive (Figure 1). The lawn is framed by a short concrete wall which separates it from the sidewalk. It features a field of grass and a mixed arrangement of palm trees, hedge rows, and shrubs. Cobra-style streetlamps are positioned at spaced intervals to illuminate the sidewalk at night.

Sharing the southeast wall of Plant 1 is Plant 2, completed around 1956. Plant 2 measures approximately 375 feet long, 60 feet wide, and is of slightly shorter height than Plant 1. It is recessed slightly farther from the street than Plant 1, and has less landscaped ground in front of it due to most of that space being paved with asphalt and used for parking and storage. Another major difference between Plant 1 and Plant 2 is that Plant 1 is fully enclosed by four walls, while Plant 2 is a semi-enclosed building having only three walls (Figure 8). The east elevation provides the open-air effect of the building's plan, with direct exposure to the facilities at that location. The building is constructed of a rigid steel frame sheathed with pre-fabricated concrete wall panels. It rests on a reinforced-concrete slab foundation, and is surmounted by a flat roof of concrete and steel. The exterior walls are smooth, unpainted, rectangular panels of prefabricated concrete. A series of louvered vent openings is repeated along the upper portion of the wall, but the building lacks any other decorative elements and is purely utilitarian in its design.

Plant 3, constructed in 1968, is a completely separate building located to the southeast of Plant 2 (see Price 2012). It measures approximately 505 feet long, 100 feet wide, and comparable in height to Plant 2. The western elevation is completely shrouded by a concrete panel structure painted with a Robert Wyland mural known as "Gray Whale Migration." Plant 3 is a semi-enclosed open-air structure, having no wall on the northern elevation, and portions of the roof panel removed (Figure 9). The building is constructed of a rigid steel frame clad with pre-fabricated concrete wall panels. It rests on a reinforced-concrete slab foundation, and is surmounted by a steel-framed flat roof covered with concrete panels. The exterior walls are smooth, unpainted, rectangular panels of prefabricated concrete.

The SEA Lab, originally constructed in 1946–1948 as the circulating pump house that pumped seawater from the Pacific Ocean to the steam plant for cooling the generators, is located across the street (across Harbor Drive) to the west of the Administration wing and Plant 1. In 1974, Southern California Edison converted the pump house to serve as the Edison Marine Research Laboratory, and today, the SEA Lab facility is a marine science education center operated by the Los Angeles Conservation Corps. Based on historical USGS maps, the ocean water intake pier was removed and the pipeline intake was submerged by at least the early 1950s.

P3a. Description: (continued): The SEA Lab is an irregularly-shaped building comprising the original L-shaped form plus a later addition to the northern and northwestern elevations (Figures 10, 11). The original portion of the building measures approximately 125 feet long, 48 feet wide, and 25 feet tall, aligned on a northwest-southeast axis. The Art Moderne architectural style and design of the building is similar as that of Plant 1, but on a much more modest scale. The building is constructed of a rigid steel frame clad with concrete masonry walls. It rests on a reinforced-concrete slab foundation, and is surmounted by a flat roof of steel framing and concrete panels, bordered by a short parapet. The exterior walls are painted a cream color with peach trim along the parapet, and a mural of marine life painted along the lower wall. Tall, vertical column reliefs are repeated along the length of the exterior walls. Filling the bays created between each pilaster are tall, columnar panels of glass block windows. The primary façade, facing east toward Harbor Drive, exhibits six tall vertical panels of glass block windows separated by concrete relief columns. The northern elevation features a 56 feet long by 27 feet wide room addition. Aluminum-framed windows have been added to the northern and western elevations, although it is unclear whether or not they fill pre-existing window spaces. A glass block window on the addition contains glass blocks of different size than those found in the original windows. The circulating water pumps and adjacent intake pier that once existed have been removed, leaving only the building itself as a remnant of the former pump house.

Historically, the SEA Lab building functioned as the seawater pump house serving the needs of the Redondo Steam Station's Plant 1, and today it is the last remaining element of the plant's seawater intake system. It was an integral part of an architecturally designed system. The historical significance of the SEA Lab building under CRHR Criteria lies in its historical association with the Administration wing and Plant 1 as part of the larger system of steam-electric generation at the historical Redondo Steam Station.

The SEA Lab building is the last surviving element of the Redondo Steam Station's original seawater intake system. The intake system that the pump house once operated on was not a technological advancement within the design and construction of steam-electric plants in the post-WWII era, although it was the first dual-intake system (Steele 1950:17-21). Huntington's Pacific Light & Power Corporation power plant that existed in Redondo Beach from 1906–1933 had a similar ocean water intake system although it pumped the hot water from his plant to his popular saltwater plunge nearby, rather than pumping it back into the ocean offshore. The Redondo Steam Station seawater intake system was of relatively standard design for twentieth century steam-electric plants and its design was even improved upon in the decades that followed. However, like the overall design of the Redondo Steam Station's Administration wing and Plant 1, the pump house was one of the last in a generation of architecturally-styled plant facilities, and was one of the first in the post-WWII generation of high-capacity steam-electric plants.

The pump house was designed in the Art Moderne style similar to Plant 1 of the Redondo Steam Station (Figures 12–15). The building is a modest rendition of the Art Moderne style, small in size and plain and utilitarian in appearance. While it is a modest rendition of the Art Moderne style, it was designed to match the Administration wing and Plant 1, and therefore, it is an integral part of a designed system of architecture applied to a public utility building complex.

Historical photographs of the north, south, east, and west elevations indicate each elevation had a door for entry or a window, and none of the elevations featured any special architectural design to set one elevation or entry apart from the other (Figures 12–15). Perhaps this is why an addition was constructed on the north elevation that would appeal to the public and attract visitors upon converting the building to its use as a marine science laboratory (Figures 8, 9). The Harbor Drive elevation appears to constitute the primary façade, and it has not been substantially altered. Doorways along Harbor Drive were plain and simple rectangular spaces within a column of glass blocks. When compared to historical photographs, the present-day SEA Lab building retains sufficient levels of its historical appearance, design, and construction to be easily identified as having a direct association with the Administration wing and Plant 1 of the historical Redondo Steam Station.

P3b. Resource Attributes: HP9. Public utility

P4. Resources Present: ☒ Building ☒ Structure ☐ Object ☐ Site ☐ District ☐ Element of District ☐ Other: This resource is a public utility formed by a compound of buildings and structures. It does not constitute a "district" in the traditional sense or use of the term.

P5a. Photograph or Drawing: See attached Continuation sheets for photographs

P5b. Description of Photo: All photographs were taken on November 21, 2013.

P6. Date Constructed/Age of Sources: □ Prehistoric ☒ Historic □ Both

P7. Owner and Address: AES Redondo Beach, LLC, 1100 North Harbor Drive, Redondo Beach, CA 90277

P8. Recorded by: Josh Smallwood, Applied EarthWorks, Inc., 3550 E. Florida Avenue, Suite A, Hemet, CA 92544

P9. Date Recorded: November 21, 2013

P10. Survey Type: Reconnaissance level built-environment survey

P11. Report Citation: Josh Smallwood (2014): *Historical Resource Evaluation of the Redondo Beach Generating Station and SEA Lab, 1021 and 1100 North Harbor Drive, Redondo Beach, Los Angeles County, California.* Applied EarthWorks, Inc., Hemet, California. Prepared for California Energy Commission, Sacramento, California.

Attachments: □ None ☒ Location Map ☒ Site Map ☒ Continuation Sheet ☒ Building, Structure, and Object Record □ Archaeological Record □ District Record □ Linear Feature Record □ Milling Station Record □ Rock Art Record □ Artifact Record □ Photograph Record Other:

B1. **Historic Name:** Redondo Steam Station
B2. **Common Name:** Redondo Beach Generating Station and SEA Lab
B3. **Original Use:** Steam-electric power plant B4. Present Use: Same, although Plant 1 is retired, and the pump house has been converted to a marine science education center known as SEA Lab.

B5. **Architectural Style:** The Administration wing, Plant 1, and SEA Lab building of the Redondo Steam Station are constructed in the Art Modern style, while Plants 2 and 3 and the ancillary buildings are all vernacular forms.

B6. **Construction History:** (Construction date, alterations, and date of alterations) The Administration wing, Plant 1, and SEA Lab building (former pump house) of the Redondo Steam Station were built in 1946–1948 by Stone & Webster Engineering Corporation for SCE. The pump house across the street, and an approximately 1,200-foot-long intake pier that stretched from the beach to the Pacific Ocean were once part of the system. Plant 2 was constructed at the rear of Plant 1 in 1956, and Plant 3 was constructed at the rear of Plant 2 in 1968.

B7. **Moved?** ☒ No □ Yes □ Unknown **Date:** **Original Location:**

B8. **Related Features:** The RBGS compound contains numerous facilities and ancillary buildings, as recorded in detail by Price (2012). Landscape grass and trees and a circular driveway decorate the grounds of the Administration wing and Plant 1, including a Moreton Bay fig tree, large cypress and palm trees, hedge rows, and shrubs.

B9a. **Architect:** Stone & Webster Engineering Corporation for Southern California Edison **b. Builder:** Same

B10. **Significance:**
Theme Post-WWII era steam-electric power plants
Area Redondo Beach, Los Angeles County, Southern California region
Period of Significance 1946–1956 (indoor-type steam electric plant in the Art Moderne architectural style); 1956–1968 (additions of semi-outdoor plants of vernacular form);
Property Type Public utility
Applicable Criteria CRHR Criteria 1 and 3

The following discussion of the historical significance of the RBGS and SEA Lab is broken into the four criteria for historical significance under the CRHR. In addition, the RBGS and SEA Lab are evaluated together, rather than separately as previously recorded by Price (2012a, 2012b). The present-day RBGS and SEA Lab facilities share a common historical background, originating as integrated facilities of the historical Redondo Steam Station, as designed and constructed by the Stone & Webster Engineering Corporation for SCE in 1946–1948 (Figures 10–13). Together they form a coherent whole. The addition of Plant 2 in 1956 and Plant 3 in 1968 fulfilled the planned ultimate expansion of the original Redondo Steam Station.

Evaluation of the Redondo Steam Station/RBGS and SEA Lab

CRHR Criterion 1: The RBGS and SEA Lab (including the Administration wing, Plants 1, 2, and 3, the pump house and associated facilities at the Redondo Steam Station) is found through this investigation to be historically significant under Criterion 1 of the CRHR for its direct association with a historic trend in the development of the newest generation of high capacity steam-electric plants following the end of WWII. It is one of the last of the generation of architecturally styled indoor-type steam-electric plants built in the southern California region, and is one of the earliest representations of the generation of high-capacity steam-electric power plants constructed by SCE in the post-war expansion period.

The Redondo Steam Station, known today as the RBGS, and including the SEA Lab building, was built immediately following the end of WWII, at the height of the post-war technological boom period. After WWII, SCE undertook a significant expansion of steam-electric generation, and their Redondo Steam Station was at the forefront of the movement, although more importantly, it was part of a transitional phase between the prior class of steam-electric plants and the future generation. The Redondo Steam Station was designed and built as an indoor facility based on the standards of the pre-WWII era. Over the next few years, SCE transitioned the design of their plants to a semi-outdoor design, which became the standard during the company's expansion period between 1950 and 1973. As such, the design of the Redondo Steam Station's primary buildings was vastly different from almost every other steam plant constructed by SCE during the post-WWII era.

Designed in the Art Moderne style, the Redondo Steam Station was one of the last of the architecturally-styled indoor-type steam-electric plants built in the Southern California region, but it was also designed to operate with the newest technology, and to be expanded in the future if the market warranted it. Between the 1950s–1973 SCE began construction of numerous semi-outdoor designed plants. This newest wave of plants was built economically by minimizing structural material (lacking architectural styling), and by creating outdoor or semi-outdoor turbo-generator units. Additions of Plants 2 and 3 at the Redondo Steam Station occurred under this new concept.

Within the context of this transitional period, the Redondo Steam Station is directly associated with a historic trend in the development of the newest generation of steam-electric plants following the end of WWII. The period of significance for this important historical association spans from its construction, which began in 1946, to the addition of Plant 2 in 1956 and Plant 3 in 1968, a period which fulfilled its planned ultimate expansion.

Construction on the Redondo Steam Station began in 1946 and was completed in 1948. It was during those same years that California secured a reliable and abundant source of natural gas through construction of El Paso Natural Gas Company's first interstate pipeline to transport natural gas from Texas to southern California. The culmination of these events allowed for the growth and prosperity of Redondo Beach and the surrounding areas during the post-WWII era development boom. As such, the Redondo Steam Station is directly associated with a pattern of events that made a significant contribution to the growth and development of Redondo Beach and the surrounding area. The period of significance for this important historical association spans from its construction, which began in 1946, to the addition of Plant 2 in 1956 and Plant 3 in 1968.

Integrity under CRHR Criterion 1: The Administration wing and Plant 1 of the original Redondo Steam Station, and Plants 2 and 3 of the RBGS retain excellent integrity, as the majority of the original interior and exterior components are still intact, including many of the mechanical and structural components dating to the period of significance. The Redondo Steam Station and Plants 2 and 3 of the RBGS are at their original *location* and their *design*, *materials*, and *workmanship* remain largely intact. Their *setting* within the RBGS property remains intact, although the immediate surrounding area beyond the RBGS has been further developed since its initial construction. The RBGS retains sufficient historical character and features to convey *feeling* and *association* with regard to its significance under CRHR Criterion 1.

Therefore, the Administration wing and Plant 1 of the Redondo Steam Station appear to retain sufficient integrity to convey their significance as one of the earliest in a new generation of post-WWII era steam-electric power plants despite some minor alterations that have occurred with the recent removal of various structures such as oil tanks, stacks, and other ancillary outdoor components. Plants 2 and 3 are acceptable forms of later additions to Plant 1, as they were constructed during the post-WWII era following the design principles which fulfilled the plant's planned ultimate expansion.

While the SEA Lab building no longer operates as a pump house, it appears to retain sufficient levels of historical integrity with regard to *location, design, setting, materials, workmanship, feeling, and association,* to be considered eligible for the CRHR under Criterion 1 for this same historical significance. The SEA Lab building is at its original *location*, and its *design*, *materials*, and *workmanship* remain sufficiently intact to be recognized as the original pump house. While the immediate surrounding area beyond the RBGS and SEA Lab have been developed, the RBGS property remains largely intact, and therefore, one of the most important aspects of the *setting* of the SEA Lab still remains. The SEA Lab is recognizable from historical photographs despite the minor alterations that have occurred on its northern and northwestern elevations. Thus, the SEA Lab retains sufficient historical character to convey *feeling* and *association* with regard to its significance under CRHR Criterion 1.

In summary, the RBGS and SEA Lab (including the Administration wing, Plants 1, 2, and 3, the pump house and associated facilities at the Redondo Steam Station) are found in this investigation to retain sufficient levels of historical integrity with respect to *location, design, setting, materials, workmanship, feeling, and association,* to be considered eligible for the CRHR under Criterion 1. The Redondo Steam Station was one of the last of the generation of architecturally styled indoor-type steam-electric plants built in the southern California region, and is one of the earliest representations of the generation of high-capacity steam-electric power plants constructed by SCE in the post-war expansion period. For these reasons, the Redondo Steam Station/RBGS retains sufficient integrity to be considered eligible for the CRHR under Criterion 1 for its direct association with a historic trend and transition in the development of the newest generation of high capacity steam-electric plants following the end of WWII.

CRHR Criterion 2: None of the individual buildings or structures at the RBGS and SEA Lab, nor the historical Redondo Steam Station as a whole, appears eligible for the CRHR under Criterion 2 for their direct association with the productive life of an individual of historical significance. While the historical Redondo Steam Station is important for its association with Stone & Webster Engineering Corporation (see below), that association does not extend to the productive life of either Charles A. Stone or Edwin S. Webster because there is no indication that either of them had any direct association with the design and/or construction of the Redondo Steam Station, or that the Redondo Steam Station best represents either individual's significant accomplishments. There is no indication that either the RBGS or SEA Lab is directly associated with the productive life of any other individuals of historical significance.

CRHR Criterion 3 (for architectural merits): The Administration wing, Plant 1, and pump house (SEA Lab) of the Redondo Steam Station appears to meet CRHR Criterion 3 for architectural merits, as an excellent example of the Art Moderne style of architecture applied to a large public utility building complex, and as one of the last architecturally-styled indoor-type steam-electric plants built in the Southern California region. The massive Administration and Plant 1 building, rigid and monolithic in its appearance, constructed of immense walls of concrete decorated with tall relief columns separated by slender, towering panels of glass block windows, embodies the distinctive characteristics of the Art Moderne style which was popular in the middle twentieth century. The pump house was designed to match the Administration wing and Plant 1, and therefore, it is an integral part of a coherent architectural plan applied to a public utility building complex. Therefore, all three parts of the building complex appears to meet CRHR Criterion 3 for their architectural merits. Plants 2 and 3 are of the semi-outdoor design and lack any architectural styling. They are vernacular in form and of standard design for plants constructed from about 1950 to 1973. Thus, they do not appear eligible under CRHR Criterion 3.

As one of the last occurring architecturally-styled indoor-type steam-electric plants built in the Southern California region, and one of the only among SCE's post-WWII era generation of plants, the architectural significance of the Administration wing, Plant 1, and pump house under this theme of CRHR Criterion 3 appears to be at a regional level. The associated period of significance spans from the facility's construction, which began in 1946, to the addition of Plant 2 in 1956. While the Art Moderne style of architecture was used in the design of numerous industrial, commercial, and public utility buildings constructed in Southern California and the Los Angeles region during the 1930s and 1940s, the style is not well represented in the city of Redondo Beach. Thus, the architectural significance also appears to be at a local level within the city.

As mentioned above, a second wave of post-WWII generation plants was constructed by SCE between 1950 and 1973. This new wave of steam plants differed from previous in that they were built economically by minimizing structural material (no architectural styling), and by creating outdoor or semi-outdoor turbo-generator units. Additions of Plants 2 and 3 at the Redondo Steam Station occurred under this new design approach, and under this theme of CRHR Criterion 3 they should not be considered alterations, but rather, should be considered part of the transition between two different classes of steam-electric power plants. Under this theme, the RBGS facility as a whole appears to have architectural merits for its clear illustration of a transition between the two classes of post-WWII era power plant construction that followed different principles: the earlier class being the architecturally-styled indoor-type steam-electric plant which occurred 1946–1948, and the later class being the construction of the economical semi-outdoor type power plant which occurred from 1950 to 1973. This transition of the two classes is important within the development history of power plants and is well illustrated at the RBGS/SEA Lab between the original construction (1946–1948) and the later additions (1956–1968). Thus, the RBGS/SEA Lab facility appears to be significant under this theme of CRHR Criterion 3. The period of significance under this theme begins with the original construction in 1946 and encompasses the period in which the addition of Plants 2 and 3 occurred, 1956–1968. Constructed during this period by SCE, the RBGS/SEA Lab appears to be significant under this theme at the Southern California regional level.

Integrity under CRHR Criterion 3 (for architectural merits): As discussed above, the Administration wing, Plant 1, and pump house (SEA Lab) of the Redondo Steam Station appears to meet CRHR Criterion 3 for their architectural merits, as an excellent example of the Art Moderne style of architecture applied to a large public utility building complex, and as one of the last in a generation of architecturally-styled indoor-type steam-electric plants built in the southern California region. While the addition of Plant 2 in 1956 and Plant 3 in 1968 are considered alterations of the original design under this theme, they are merely attached to the rear of Plant 1 and are structures that could easily be removed, if desired. They do not obstruct the primary north and west elevations of Plant 1 from public view, nor do they detract from the overall appearance and architectural design of the Administration wing and Plant 1. The original color of the pump house was likely the same as Plant 1, an unpainted finished concrete. The existing mural is considered a mild alteration that could easily be reversed, and does not substantially detract from the overall design and appearance of the building. The original paint color on the Administration wing is unknown, but it was likely a bare, gray concrete.

While most of the windows in the Administration wing of the Redondo Steam Station have been replaced, the design and appearance of the replacements conform to the overall design of the building without a substantial loss of integrity. An example of the original steel-framed casement windows still remains on the rear of the Administration wing as a testament to the type of windows that likely were present on the rest of the building. In addition, the interior spaces of the Administration wing and Plant 1 retain much of their historical character, as all, or nearly all, of the original mechanical components are still intact, such as generators, control panels, and elevators dating to the period of significance. As discussed above, the SEA Lab has had minor additions to the northern and northwestern elevations, but the primary façade, facing Harbor Drive, retains most of its original character and appearance.

In addition, other alterations have occurred at the RBGS with the recent removal of various outdoor structures such as oil tanks, stacks, and other ancillary structures. While those outdoor structures were historically a part of the larger complex's function as a power station, they do not directly relate to the architectural merit of the buildings under consideration.

The Administration wing, Plant 1, and the pump house (SEA Lab) of the historical Redondo Steam Station retain integrity of *location*, as they have not been moved from their original location. Their *design*, *materials*, and *workmanship* remain largely intact. Their *setting* within the Station compound remains intact, although the immediate surrounding area beyond the RBGS has been further developed since its initial construction. The Redondo Steam Station retains sufficient historical character and features to convey *feeling* and *association* with regard to its significance under CRHR Criterion 3.

Therefore, the Administration wing, Plant 1, and the pump house (SEA Lab) of the historical Redondo Steam Station appear to retain sufficient historical integrity to relay their significance as a post-WWII-era Art Moderne-style power plant despite some minor alterations that have occurred. In summary, these original buildings of the Redondo Steam Station appear eligible for the CRHR under Criterion 3 for architectural merits as an excellent example of the Art Moderne style of architecture applied to a large public utility building complex, and as one of the last in the generation of architecturally styled indoor-type steam-electric plants built in the southern California region.

CRHR Criterion 3 (for association with Stone & Webster): In addition to its merits for architectural style under CRHR Criterion 3, the Redondo Steam Station, including the Administration wing, Plant 1, and the pump house (SEA Lab), was designed by Stone & Webster Engineering Corporation, masters in the field of engineering at the time of its construction in 1946–1948. Stone & Webster were involved in the design and construction of numerous large public utility, infrastructure, and wartime projects across the United States throughout the twentieth century, and thus, the Redondo Steam Station cannot be significant for that association alone. Rather, the facility is historically significant because the Redondo Steam Station represents a particular phase in the evolution of the type of engineering work that Stone & Webster were contracted to perform. Similar to the reasons that the Redondo Steam Station is significant for its association with an important historical event or trend, the Redondo Steam Station is significant for its association with an engineering giant of that time, Stone & Webster, as one of their earliest contracts to construct the newest generation of high-tech, high-capacity steam-electric plants at the front end of the post-WWII technological boom period. The Redondo Steam Station was an especially important example of Stone & Webster's steam-electric plants because it was a transitional piece of work, borrowing elements of the previous era such as the Art Moderne style and the indoor type design, and blending them with the newest ideas in post-WWII design and technology.

Stone & Webster are known to have designed and built, or expanded, steam-electric power plants elsewhere across the U.S. during the post-WWII era. SCE constructed a series of modernized plants in Southern California between 1950 and 1973 under a modernized concept of minimizing structural material (no architectural styling), and by creating outdoor or semi-outdoor units. However, the Redondo Steam Station appears to stand in a class of its own when compared to these other plants because it bridged both periods of design. The transition incorporated the earlier principles of power plant design such as an architecturally-styled building and indoor-type plant, as well as some of the post-WWII design principles of installing high-tech, high-capacity turbo-generators, with room to expand as needed, and the ability to run on both oil and natural gas. The Redondo Steam Plant proved to be of quality design over the next few decades. Plant 2 was added in 1956 and Plant 3 was added in 1968, evolving into the present-day RBGS facility. The significance of the facility's association with Stone & Webster is at least a regional level because it was a project for Southern California Edison. Other facilities designed and built by the Stone & Webster Engineering Corporation are not known to exist in Redondo Beach's historic building inventory, and therefore, the significance of the facility's association with Stone & Webster extends to the local level as well. The associated period of significance spans from its construction, which began in 1946, to the addition of Plant 2 in 1956.

Integrity under CRHR Criterion 3 (for association with Stone & Webster): The Administration wing and Plant 1 of the RBGS, and the pump house (SEA Lab) appear to retain sufficient levels of historical integrity to convey the Redondo Steam Station's historically significant association with Stone & Webster Engineering Corporation.

While the addition of Plant 2 in 1956 and Plant 3 in 1968 may be considered alterations of Stone & Webster's originally designed steam-electric plant, the firm designed the Redondo Steam Station to be expanded in order to meet future demand. Thus, additions to increase capacity would not constitute a substantial alteration if the additions are spread across the facility in such a manner that they do not compromise the historical integrity of the Administration wing, Plant 1, and the pump house. Plant 2 and Plant 3 are merely attached to the rear of Plant 1 and are structures that could easily be removed, if desired. They do not obstruct the primary north and west elevations from public view, nor do they detract from the overall appearance and design of the Administration wing and Plant 1. In addition, the interior spaces of the Administration wing and Plant 1 retain excellent integrity, as all, or nearly all, of the original mechanical components are still intact, such as generators, control panels, and elevators dating to the period of significance.

The Administration wing, Plant 1, and the pump house (SEA Lab) of the historical Redondo Steam Station retain integrity of *location*, as they have not been moved from their original location. Their *design*, *materials*, and *workmanship* of these buildings remain largely intact. Their *setting* within the Station compound remains intact, although the immediate surrounding area beyond the RBGS has been further developed since its initial construction. The Redondo Steam Station retains sufficient historical character and features (such as the Stone & Webster plaque on display in the Administration wing) to convey *feeling* and *association* with regard to its significance under CRHR Criterion 3 for its association with Stone & Webster Engineering Corporation.

Therefore, the historical Redondo Steam Station as designed and constructed by Stone & Webster, including the Administration wing, Plant 1, and the pump house (SEA Lab) appear to retain sufficient integrity to relay their significance as one of Stone & Webster's earliest examples of the post-WWII generation of steam-electric power plants. In summary, these key buildings of the historical Redondo Steam Station appear to retain sufficient levels of historical integrity with respect to *location, design, setting, materials, workmanship, feeling, and association,* to be considered eligible for the CRHR under Criterion 3 for their association with Stone & Webster Engineering Corporation.

CRHR Criterion 4: None of the individual buildings or structures at the RBGS and SEA Lab, nor the system as a whole, appears eligible for the CRHR under Criterion 4 for their data potential. No important information can be yielded from the intensive study of the RBGS and SEA Lab facilities that is not already known, or that cannot be obtained through traditional avenues of research, such as published literature, as-built plans, and engineering layouts. None of the buildings or structures at the RBGS and SEA Lab *is the principle source of information* for the study of mid-twentieth century steam-electric plants, Art Moderne architecture, or Stone & Webster engineering practices.

An Assessment of the Landscaped Grounds

The landscaped grounds of the present-day RBGS, including the grass lawns framed with a concrete border, and the circular drive at the front entrance of the Administration wing, are original features dating to the Redondo Steam Station's period of significance for Art Moderne architectural merits (1946–1956) based on their appearance in historical photographs (refer to Figures 10 and 11). The shrubbery along the west side of Plant 1, compared to historical photographs has lost its original intended repetitive effect and does not continue to exhibit the design that it once did. The evergreen trees and a Morton Bay fig tree at the entrance to the Administration building, the row of palm trees along Harbor Drive, and a hedge row along Harbor Drive do not appear to be original plantings dating to the period of significance (refer to Figures 1, 10, and 11). A group of palms at the entrance to the Administration building, and a group of Morton Bay fig trees at the southeastern edge of the RBGS facility do not appear original, and the fig trees may have grown on their own accord.

While the landscaped grounds are pleasant in their appearance, they are a simple, mixed arrangement of planned and unplanned plantings of vernacular design, with no apparent merits in the field of landscape design or landscape architecture. The landscaped grounds are not known to be designed by a master of landscape design, and they are not examples of the City Beautiful Movement. More specifically, they do not exhibit any key features of the City Beautiful Movement, such as a park-like setting with fountains, walkways, benches, or other public uses of space, or Neo-classical or Beaux Arts style architecture that is commonly associated with the Movement.

However, the grass lawns framed with a concrete border and the circular drive at the front entrance of the Administration wing are original design features of the Redondo Steam Station, dating to the period of significance for architectural merits (1946–1956) and association with an important historical trend (1946–1968). These features are complimentary to the overall historical design, layout, and appearance of the facility's primary building (the Administration wing and Plant 1). As such, they contribute to the historical integrity of the Administration wing and Plant 1 with regard to the aspects of *design*, *setting*, *feeling*, and *association* under CRHR Criteria 1 and 3.

B11. Additional Resource Attributes: (List attributes and codes) HP30. Trees/vegetation

B12. References:

Price, Lori D.
2012a California Department of Parks and Recreation recording forms, Redondo Beach Generating Station. On file, California Energy Commission, Sacramento.

Price, Lori D.
2012b California Department of Parks and Recreation recording forms, SEA Lab. On file, California Energy Commission, Sacramento.

Smallwood, Josh
2014 *Historical Resource Evaluation of the Redondo Beach Generating Station and SEA Lab, 1021 and 1100 North Harbor Drive, Redondo Beach, Los Angeles County, California.* Applied EarthWorks, Inc., Hemet, California. Prepared for California Energy Commission, Sacramento, California.

B13. Remarks:

B14. Evaluator: Josh Smallwood **Date of Evaluation:** December, 2013

(This space reserved for official comments.)

(Sketch Map with north arrow required.)

See site maps on pages 23–24.

Recorded by: Josh Smallwood **Date** November 21, 2013 ☒ **Continuation** ☒ **Update**

Figure 1. The Administration wing and Plant 1 of the Redondo Steam Station (photograph taken November 21, 2013, view to the east).

Primary #
HRI #
Trinomial

Resource Name or # Redondo Beach Generating Station and SEA Lab

Recorded by: Josh Smallwood **Date** November 21, 2013 ☒ **Continuation** ☒ **Update**

Figure 2. Overview of the primary façade (northern elevation) of the Administration wing (photograph taken November 21, 2013, view to the south).

Primary #
HRI #
Trinomial
Resource Name or # Redondo Beach Generating Station and SEA Lab

Recorded by: Josh Smallwood **Date** November 21, 2013 ☒ **Continuation** ☒ **Update**

Figure 3. The primary façade (northern elevation) of the Administration wing (photograph taken November 21, 2013, view to the southeast).

Figure 4. Detail of the Administration wing's front entry (photograph taken November 21, 2013, view to the south).

Figure 5. A brass plaque hangs on the wall in the lobby of the Administration wing, identifying the building as a work of the Stone & Webster Engineering Corporation.

Figure 6. Interior view of Plant 1 showing one of the four original generators housed in the indoor facility (photograph taken November 21, 2013, view to the north).

Primary #
HRI #
Trinomial
Resource Name or # Redondo Beach Generating Station and SEA Lab

Recorded by: Josh Smallwood **Date** November 21, 2013 ☒ **Continuation** ☒ **Update**

Figure 7. The control room at Plant 1 (photograph taken November 21, 2013).

Figure 8. The semi-outdoor design of Plant 2 is revealed by this photograph of the interior (photograph taken November 21, 2013; view to the south).

Recorded by: Josh Smallwood **Date** November 21, 2013 ☒ **Continuation** ☒ **Update**

Figure 9. The semi-outdoor design of Plant 3 (photograph taken November 21, 2013; view to the south).

Resource Name or # Redondo Beach Generating Station and SEA Lab

Recorded by: Josh Smallwood **Date** November 21, 2013 ☒ **Continuation** ☒ **Update**

Figure 10. View of the eastern elevation (primary façade) of the Redondo Steam Station's former pump house, now the SEA Lab (photograph taken November 21, 2013, view to the west).

Figure 11. View of the primary façade (eastern elevation along Harbor Drive) and northern elevation of the Redondo Steam Station's former pump house, now the SEA Lab (photograph taken November 21, 2013, view to the southwest).

Figure 12. SCE's Redondo Beach steam-electric power plant, circa 1956, from a bird's-eye view toward the east. Notice the SEA Lab/former pumping plant in its original form (Huntington Digital Library).

Figure 13. SCE's Redondo Beach steam-electric power plant, circa 1956, from a street-view toward the east (Huntington Digital Library).

Primary #
HRI #
Trinomial
Resource Name or # Redondo Beach Generating Station and SEA Lab

Recorded by: Josh Smallwood **Date** November 21, 2013 ☒ **Continuation** ☒ **Update**

Figure 14. SCE's Redondo Beach seawater pump house from the grounds of the RBGS, circa 1956, view toward the northwest (Huntington Digital Library).

Figure 15. SCE's Redondo Beach seawater pump house and intake pier as seen from the top of the Administration wing, circa 1956, view toward the west (Huntington Digital Library).

State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION
465320018

SKETCH MAP

Primary #

Trinomial

***Resource Name or #:** Redondo Beach Generating Station and SEA Lab

***Drawn by:** E. Rapp ***Scale:** 1 inch equals 300 feet ***Date of map:** 12/10/2013

State of California — The Resources Agency
DEPARTMENT OF PARKS AND RECREATION

LOCATION MAP

Primary #

Trinomial

Trinomial CA-ccc-####

***Resource Name or #:** Redondo Beach Generating Station and SEA Lab

***Scale:** 1:24,000

***Map Name:** Redondo Beach, CA USGS 7.5' quadrangle

***Date:** 1963 (1981)

1 0.5 0 1 Miles

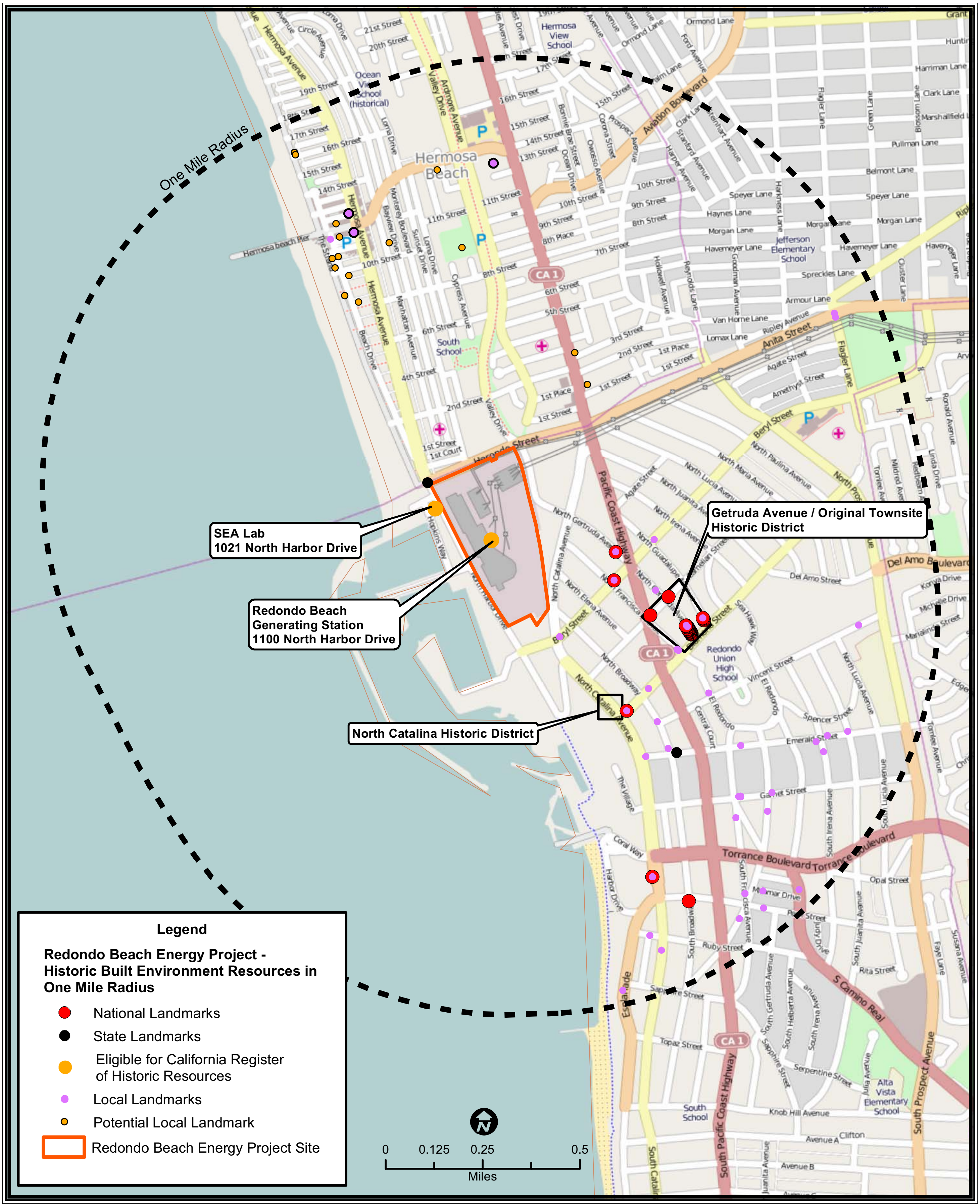
1,000 0 1,000 2,000 3,000 4,000 5,000 6,000 7,000 Feet

1 0.5 0 1 Kilometers

TRUE NORTH

CULTURAL RESOURCES - FIGURE 1

Redondo Beach Energy Project - Built Environment Historic Resources within One Mile of Project



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: Open Street Map, City of Redondo Beach, Cty of Hermosa Beach, CEC Staff

CULTURAL RESOURCES - FIGURE 2
Redondo Beach Energy Project - Images

View of Administration Building and Plant 1

View of Main Entrance to Administration Building

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION
SOURCE: Staff 7/2013 & 11/2013

CULTURAL RESOURCES - FIGURE 3
Redondo Beach Energy Project - Images

View of Harbor Drive Elevation of Plant 1

Plaque in Main Lobby

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION
SOURCE: Staff 7/2013

CULTURAL RESOURCES - FIGURE 4
Redondo Beach Energy Project - Images

Interior View of Plant 1 and Turbines Located Inside the Plant

View of Glass Block Windows in Plant 1 and Concrete Walls from Interior

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION
SOURCE: Staff 7/2013

CULTURAL RESOURCES - FIGURE 5
Redondo Beach Energy Project - Images

View of Control Room in Plant 1

View of Circular Drive, Moreton Bay Fig Tree and Relationship to SEA Lab

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION
SOURCE: Staff 7/2013

HAZARDOUS MATERIALS MANAGEMENT

Brett Fooks, PE and Geoff Lesh, PE

SUMMARY OF CONCLUSIONS

Staff's evaluation of the proposed Redondo Beach Energy Project (RBEP), along with staff's proposed mitigation measures, indicates that hazardous materials use at the site would not present a significant impact to the public. With adoption of the proposed conditions of certification, the proposed project would comply with all applicable laws, ordinances, regulations, and standards. In response to California Health and Safety Code, section 25531 et seq., AES Southland Development, LLC (AES-SLD) (the applicant) would be required to develop a risk management plan. To ensure the adequacy of this plan, staff's proposed conditions of certification require that the risk management plan be submitted for concurrent review by the Redondo Beach Fire Department (RBFD) and Energy Commission staff. In addition, staff's proposed conditions of certification require staff review and approval of the risk management plan prior to delivery of any hazardous materials to the RBEP project site. Other proposed conditions of certification address the issue of the transportation, storage, and use of aqueous ammonia and site security.

INTRODUCTION

The purpose of this hazardous materials management analysis is to determine if the proposed RBEP has the potential to cause significant impacts on the public as a result of the use, handling, storage, or transportation of hazardous materials at the proposed site. If significant adverse impacts on the public are identified, Energy Commission staff must also evaluate the potential for facility design alternatives and additional mitigation measures to reduce those impacts to the extent feasible.

This analysis does not address the potential exposure of workers to hazardous materials used at the proposed facility. Employers must inform employees of hazards associated with their work and provide them with special protective equipment and training to reduce the potential for health impacts associated with the handling of hazardous materials. The **WORKER SAFETY AND FIRE PROTECTION** section of this document describes applicable requirements for the protection of workers from these risks.

Aqueous ammonia (19 percent ammonia in aqueous solution) would be used to control oxides of nitrogen (NOx) emissions through selective catalytic reduction. The use of aqueous ammonia significantly reduces the risk that would otherwise be associated with the use of the more hazardous anhydrous form of ammonia. Use of the aqueous form eliminates the high internal energy associated with the anhydrous form, which is stored as a liquefied gas at high pressure. The high internal energy associated with the anhydrous form of ammonia can act as a driving force in an accidental release, which can rapidly introduce large quantities of the material to the ambient air and result in high down-wind concentrations. Spills associated with the aqueous form are much easier to contain than those associated with anhydrous ammonia, and emissions from such spills are limited by the slow mass transfer from the surface of the spilled material.

Other hazardous materials, such as mineral and lubricating oils, cleaning detergents, and welding gasses would be present at the proposed RBEP project. No acutely toxic hazardous materials would be used on site during construction, and none of these materials pose significant potential for off-site impacts as a result of the quantities on site, their relative toxicity, their physical state, and/or their environmental mobility. Handling of hazardous materials during construction would follow best management practices (BMPs) to minimize environmental effects (RBEP 2012a, Sections 5.5.3 and 5.5.4).

Although no natural gas is stored, the project would involve the handling of large amounts of natural gas. Natural gas poses some risk of both fire and explosion. The proposed RBEP would connect to an existing Southern California Gas Company (SoCalGas) high-pressure natural gas pipeline located onsite on the east side of the site.(RBEP 2012a, Sections 4.0 and 5.5.6.2.6). The RBEP project would also require the transportation of aqueous ammonia to the facility. This document addresses all potential impacts associated with the use and handling of hazardous materials.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

The following federal, state, and local laws and policies apply to the protection of public health and hazardous materials management. Staff's analysis examines the project's compliance with these requirements.

Hazardous Materials Management Table 1
Laws, Ordinances, Regulations, and Standards

Applicable LORS	Description
Federal	
The Superfund Amendments and Reauthorization Act of 1986 (42 USC §9601 et seq.)	Contains the Emergency Planning and Community Right To Know Act (also known as SARA Title III).
The Clean Air Act (CAA) of 1990 (42 USC 7401 et seq. as amended)	Established a nationwide emergency planning and response program and imposed reporting requirements for businesses that store, handle, or produce significant quantities of extremely hazardous materials.
The CAA section on risk management plans (42 USC §112(r)	Requires states to implement a comprehensive system informing local agencies and the public when a significant quantity of such materials is stored or handled at a facility. The requirements of both SARA Title III and the CAA are reflected in the California Health and Safety Code, section 25531, et seq.
49 CFR 172.800	The U.S. Department of Transportation (DOT) requirement that suppliers of hazardous materials prepare and implement security plans.
49 CFR Part 1572, Subparts A and B	Requires suppliers of hazardous materials to ensure that all their hazardous materials drivers are in compliance with personnel background security checks.
The Clean Water Act (CWA) (40 CFR 112)	Aims to prevent the discharge or threat of discharge of oil into navigable waters or adjoining shorelines. Requires a written spill prevention, control, and countermeasures (SPCC) plan to be prepared for facilities that store oil that could leak into navigable waters.
Title 49, Code of Federal Regulations, Part 190	Outlines gas pipeline safety program procedures.

Applicable LORS	Description
Title 49, Code of Federal Regulations, Part 191	Addresses transportation of natural and other gas by pipeline: annual reports, incident reports, and safety-related condition reports. Requires operators of pipeline systems to notify the DOT of any reportable incident by telephone and then submit a written report within 30 days.
Title 49, Code of Federal Regulations, Part 192	Addresses transportation of natural and other gas by pipeline and minimum federal safety standards, specifies minimum safety requirements for pipelines including material selection, design requirements, and corrosion protection. The safety requirements for pipeline construction vary according to the population density and land use that characterize the surrounding land. This part also contains regulations governing pipeline construction (which must be followed for Class 2 and Class 3 pipelines) and the requirements for preparing a pipeline integrity management program.
Federal Register (6 CFR Part 27) interim final rule	A regulation of the U.S. Department of Homeland Security that requires facilities that use or store certain hazardous materials to submit information to the department so that a vulnerability assessment can be conducted to determine what certain specified security measures shall be implemented.
State	
Title 8, California Code of Regulations, section 5189	Requires facility owners to develop and implement effective safety management plans that ensure that large quantities of hazardous materials are handled safely. While such requirements primarily provide for the protection of workers, they also indirectly improve public safety and are coordinated with the Risk Management Plan (RMP) process.
Title 8, California Code of Regulations, section 458 and sections 500 to 515	Sets forth requirements for the design, construction, and operation of vessels and equipment used to store and transfer ammonia. These sections generally codify the requirements of several industry codes, including the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, the American National Standards Institute (ANSI) K61.1 and the National Boiler and Pressure Vessel Inspection Code. These codes apply to anhydrous ammonia but are also used to design storage facilities for aqueous ammonia.
California Health and Safety Code, section 25531 to 25543.4	The California Accidental Release Program (CalARP) requires the preparation of a Risk Management Plan (RMP) and off-site consequence analysis (OCA) and submittal to the local Certified Unified Program Agency for approval.
California Health and Safety Code, section 41700	Requires that "No person shall discharge from any source whatsoever such quantities of air contaminants or other material which causes 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."
Title 19 California Code of Regulations, Division 2, Chapter 4.5, Articles 1-11	Sets forth the list of regulated substances and thresholds, the requirements for owners and operators of stationary sources concerning the prevention of accidental releases, the accidental release prevention programs approved under Section 112 of the federal Clean Air Act (CAA) Amendments of 1990 and mandated under the CalARP Program, and how the CalARP Program relates to the state's Unified Program.
Title 22 California Code of Regulations, Chapter 14, Article 10	The design requirements set forth for new tank construction and secondary containment requirements for hazardous chemicals and waste.
California Safe Drinking Water and Toxic Enforcement Act (Proposition 65)	Prevents certain chemicals that cause cancer and reproductive toxicity from being discharged into sources of drinking water.
California Public Utilities Commission General Order 112-E and 58-A	Contains standards for gas piping construction and service.

Applicable LORS	Description
Local (or locally enforced)	
Redondo Beach Municipal Code Title 3, Chapter 7, Article 9	Contains standards for commercial trucks and designated commercial truck routes within city limits.
Redondo Beach Municipal Code Title 3, Chapter 4, Article 1, 3-104.1	The city has adopted the 2013 California Fire Code.
NFPA 56 (adopted 2012)	NFPA 56 is the Standard for Fire and Explosion Prevention During Cleaning and Purging of Flammable Gas Piping Systems.

The Redondo Beach Fire Department (RBFD) and Los Angeles Fire Department – Health Hazardous Materials Division (LAFD-HHMD) share responsibility for the Certified Unified Program Agency (CUPA) programs. The RBFD is responsible for administering Hazardous Materials Business Plans (HMBP), Risk Management Plan (RMP), and Spill Prevention Control and Countermeasure (SPCC) filed by businesses located within the city. In addition, the RBFD and LA-FD HHMD share responsibility for ensuring that businesses and industry store and use hazardous materials safely and in conformance with various regulatory codes. The LAFD-HHMD is responsible for all other CUPA programs including underground storage compliance. The RBFD performs 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(RBEP 2012a, Sections 5.5.6.3). With regard to seismic safety issues, construction and design of buildings and vessels storing hazardous materials would meet the seismic requirements of California Code of Regulations Title 24 and the California Building Code (RBEP 2012a, Section 5.5.6.4).

SETTING

Several factors associated with the area in which a project is to be located affect the potential for an accidental release of a hazardous material that could cause public health impacts. These include:

- local meteorology;
- terrain characteristics; and,
- location of population centers and sensitive receptors relative to the project.

METEOROLOGICAL CONDITIONS

Meteorological conditions, including wind speed, wind direction, and air temperature, affect both the extent to which accidentally released hazardous materials would be dispersed into the air and the direction in which they would be transported. This affects the potential magnitude and extent of public exposure to such materials, as well as their associated health risks. When wind speeds are low and the atmosphere stable, dispersion is severely reduced but can lead to increased localized public exposure.

Recorded wind speeds and directions are described in the **AIR QUALITY** section (5.1) of the Application for Certification (**AFC**) (RBEP 2012a). Staff agrees with the applicant's proposed meteorological input assumptions for modeling of potential accidental hazardous material releases that would use the U.S. Environmental Protection Agency's *RMP Offsite Consequence Analysis Guidance* document which assumes environmental conditions of F stability (stagnated air, very little mixing), wind speed of 1.5 meters per second, and the maximum temperature recorded in the area in the last three years is appropriate for conducting the off-site consequence analysis (RBEP 2012a, Appendix 5.5A).

TERRAIN CHARACTERISTICS

The location of elevated terrain is often an important factor in assessing potential exposure. An emission plume resulting from an accidental release may impact high elevations before impacting lower elevations. The existing RBEP site is located on a gently sloping coastal terrace above King Harbor marina, and the topography of the site is approximately 17 feet above mean sea level. The RBEP site is bordered by North Harbor Drive and King Harbor marina to the west, Herondo Street to the north, and commercial properties to the east and south.

LOCATION OF EXPOSED POPULATIONS AND SENSITIVE RECEPTORS

The general population includes many sensitive subgroups that may be at greater risk from exposure to emitted pollutants. These sensitive subgroups include the very young, the elderly, and those with existing illnesses. In addition, the location of the population in the area surrounding a project site may have a major bearing on health risk. Sensitive receptors in the project vicinity are listed and shown in APPENDIX 5.9A (RBEP 2012a). The nearest sensitive receptor would be the Salvation Army Senior Residence, a long-term health care facility/senior facility, located adjacent to the southern fence line of the project site. The nearest school is the Yak Academy Learning Center and Preschool, located approximately 0.15 mile to the east of the project site (RBEP 2012a, section 5.9.2). All sensitive receptors within six miles of the project site are depicted in figure 5.9A-RECEPTOR MAP (RBEP 2012a, Appendix 5.9A). The nearest residents would be approximately 650 feet southeast of the facility near the intersection of Francisca and North Catalina Avenues, and additional residences would be located approximately 980 feet from the site to the north along Herondo Street and 1,050 feet from the site to the west, respectively (RBEP 2012a, Section 5.9.2 and Figure 5.9-1a).

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

Staff reviewed and assessed the potential for the transportation, handling, and use of hazardous materials to impact the surrounding community. All chemicals and natural gas were evaluated. Staff's analysis addresses the potential impacts on all members of the population including the young, the elderly, and people with existing medical conditions that may make them more sensitive to the adverse effects of hazardous materials. In order to accomplish this goal, staff utilized the most current public health exposure levels (both acute and chronic) that are established to protect the public from the effects of an accidental chemical release.

In order to assess the potential for released hazardous materials to travel off site and affect the public, staff analyzed several aspects of the proposed use of these materials at the facility. Staff recognizes that some hazardous materials must be used at power plants. Therefore, staff conducted its analysis by examining the choice and amount of chemicals to be used, the manner in which the applicant will use the chemicals, the manner by which they will be transported to the facility and transferred to facility storage tanks, and the way the applicant plans to store the materials on site.

Staff reviewed the applicant's proposed engineering and administrative controls concerning hazardous materials usage. Engineering controls are the physical or mechanical systems, such as storage tanks or automatic shut-off valves, that can prevent the spill of hazardous material from occurring, or which can either limit the spill to a small amount or confine it to a small area. Administrative controls are the rules and procedures that workers at the facility must follow that will help to prevent accidents or to keep them small if they do occur. Both engineering and administrative controls can act as methods of prevention or as methods of response and minimization. In both cases, the goal is to prevent a spill from moving off site and causing harm to the public.

Staff reviewed and evaluated the applicant's proposed use of hazardous materials as described by the applicant (RBEP 2012a, Section 5.5). Staff's assessment followed the five steps listed below.

- Step 1: Staff reviewed the chemicals and the amounts proposed for on-site use as listed in Tables 5.5-1 through 5.5-3 of the AFC and determined the need and appropriateness of their use.
- Step 2: Those chemicals proposed for use in small amounts or whose physical state is such that there is virtually no chance that a spill would migrate off site and impact the public were removed from further assessment.
- Step 3: Measures proposed by the applicant to prevent spills were reviewed and evaluated. These included engineering controls such as automatic shut-off valves and different-sized transfer-hose couplings and administrative controls such as worker training and safety management programs.
- Step 4: Measures proposed by the applicant to respond to accidents were reviewed and evaluated. These measures also included engineering controls such as catchment basins and methods to keep vapors from spreading and administrative controls such as training emergency response crews.
- Step 5: Staff analyzed the theoretical impacts on the public of a worst-case spill of hazardous materials, as reduced by the mitigation measures proposed by the applicant. When mitigation methods proposed by the applicant are sufficient, no further mitigation is recommended. If the proposed mitigation is not sufficient to reduce the potential for adverse impacts to an insignificant level, staff will propose additional prevention and response controls until the potential for causing harm to the public is reduced to an insignificant level. It is only at this point that staff can recommend that the facility be allowed to use hazardous materials.

DIRECT/INDIRECT IMPACTS AND MITIGATION

Small Quantity Hazardous Materials

In conducting the analysis, staff determined in Steps 1 and 2 that some hazardous materials, although present at the proposed facility, pose a minimal potential for off-site impacts since they would be stored in a solid form or in smaller quantities, have low mobility, or have low levels of toxicity. These hazardous materials, which were eliminated from further consideration, are briefly discussed below.

During the construction phase of the project, the only hazardous materials proposed for use are paints, paint thinners, cleaners, solvents, sealants, gasoline, diesel fuel, motor oil, hydraulic fluid, lubricants, and welding flux. Any impact of spills or other releases of these materials will be limited to the site because of the small quantities involved, their infrequent use (and therefore reduced chances of release), and/or the temporary containment berms used by contractors. Petroleum hydrocarbon-based motor fuels, mineral oil, lube oil, and diesel fuel are all very low volatility and represent limited off-site hazards even in larger quantities.

During operations, hazardous chemicals such as cleaning agents, lube oil, mineral insulating oil, and other various chemicals (see **APPENDIX B** for a list of all chemicals proposed to be used and stored at RBEP) would be used and stored in relatively small amounts and represent limited off-site hazards because of their small quantities, low volatility, and/or low toxicity.

After removing from consideration those chemicals that pose no risk of off-site impact in Steps 1 and 2, staff continued with Steps 3, 4, and 5 to review the remaining hazardous materials, natural gas and aqueous ammonia. However, the project will be limited to using, storing, and transporting only those hazardous materials listed in **APPENDIX B** of the PSA as per staff's proposed condition **HAZ-1**.

Large Quantity Hazardous Materials

Natural Gas

Natural gas poses a fire and/or possible explosion risk because of its flammability. Natural gas is composed of mostly methane, but also contains ethane, propane, nitrogen, butane, isobutene, and isopentane. It is colorless, odorless, tasteless, and lighter than air. Natural gas can cause asphyxiation when methane is 90 percent in concentration. Methane is flammable when mixed in air at concentrations of 5-14 percent, which is also the detonation range. Natural gas, therefore, poses a risk of fire and/or possible explosion if a release occurs under certain specific conditions. However, it should be noted that, due to its tendency to disperse rapidly (Lees 2012), natural gas is less likely to cause explosions than many other fuel gases such as propane or liquefied petroleum gas, but can explode under certain confined conditions as demonstrated by the natural gas explosion at the Kleen Energy power plant in Middletown, Connecticut in February 2010 (Chemical Safety Board (US CSB 2010).

While natural gas would be used in significant quantities, it would not be stored on site. It would be delivered by SoCalGas via the existing onsite gas pipeline that serves the currently operating Redondo Beach Generating Station (RBEP 2012a, Section 4.0). The pipeline and onsite metering station are, and would continue to be, owned and operated by SoCalGas.

The existing SoCalGas metering station would remain in service during RBEP construction for continued operation of existing Redondo Beach Generating Station Units 5 and 8 until they are decommissioned. The existing metering station would be reused for the new plant.

The risk of a fire and/or explosion on site can be reduced to insignificant levels through adherence to applicable codes and the development and implementation of effective safety management practices. The National Fire Protection Association (NFPA) code 85A requires both the use of double-block and bleed valves for gas shut off and automated combustion controls. These measures will significantly reduce the likelihood of an explosion in gas-fired equipment. Additionally, start-up procedures would require air purging of the gas turbines prior to start up, thereby precluding the presence of an explosive mixture. The safety management plan proposed by the applicant would address the handling and use of natural gas, and would significantly reduce the potential for equipment failure because of either improper maintenance or human error.

Staff concludes that existing LORS are sufficient to ensure minimal risks of pipeline failure. Additionally, the existing gas metering station is located entirely on-site, which greatly reduces the risks of impacts to the public from a rupture or failure.

On June 28, 2010, the United States Chemical Safety and Hazard Board (US CSB) issued Urgent Recommendations to the United States Occupational Safety and Health Administration (OSHA), the NFPA, the American Society of Mechanical Engineers (ASME), and major gas turbine manufacturers to make changes to their respective regulations, codes, and guidance to require the use of inherently safer alternatives to natural gas blows for the purposes of pipe cleaning (US Chemical Safety Board 2010). Recommendations were also made to the 50 states to enact legislation applicable to power plants that prohibits flammable gas blows for the purposes of pipe cleaning. In accordance with those recommendations, staff proposes Condition of Certification **HAZ-9** which prohibits the use of flammable gas blows for pipe cleaning at the facility, including during construction and after the start of operations. All fuel gas pipe purging activities would vent any gases to a safe location outdoors, away from workers and sources of ignition. Fuel gas pipe cleaning and purging shall adhere to the provisions of NFPA 56, the Standard for Fire and Explosion Prevention During Cleaning and Purging of Flammable Gas Piping Systems, with special emphasis on sections 4.3.1 (written procedures for pipe cleaning and purging) and 6.111 (prohibition on the use of flammable gas for cleaning or purging at any time).

Aqueous Ammonia

Aqueous ammonia would be used to control the emission of oxides of nitrogen (NO_x) from the combustion of natural gas at the RBEP. The accidental release of aqueous ammonia without proper mitigation can result in significant down-wind concentrations of ammonia gas. RBEP would have 19-percent aqueous ammonia solution in a 24,000-gallon horizontal above ground storage tank (RBEP 2012a, Section 5.5.3 Table 5-5.1). Actual storage contents would be limited to 20,400 gallons or 85 percent of tank capacity. Based on staff's analysis described above, aqueous ammonia is the only hazardous material that may pose the risk of off-site impact. The use of aqueous ammonia can result in the formation and release of toxic gases (Lees 2012) in the event of a spill even without interaction with other chemicals. This is a result of its moderate vapor pressure and the large amounts of aqueous ammonia that will be used and stored on site. However, the use of aqueous ammonia poses far less risk than the use of the far more hazardous anhydrous ammonia (ammonia that is not diluted with water).

To assess the potential impacts associated with an accidental release of aqueous ammonia, staff uses four bench mark exposure levels of ammonia gas occurring offsite. These include:

1. the lowest concentration posing a risk of lethality, 2,000 parts per million (ppm);

2. the immediately dangerous to life and health level of 300 ppm;

3. the emergency response planning guideline level 2 of 150 ppm, which is also the RMP level 1 criterion used by US EPA and California; and,

4. the level considered by the Energy Commission staff to be without serious adverse effects on the public for a one-time exposure of 75 ppm (considered by staff to be a level of significance).

If the potential exposure associated with a potential release exceeds 75 ppm at any public receptor, staff would assume that the potential release poses a risk of significant impact. However, staff will also assess the probability of occurrence of the release and/or the nature of the potentially exposed population in determining whether the likelihood and extent of potential exposure are sufficient to support a finding of potentially significant impact. A detailed discussion of the exposure criteria considered by staff, as well as their applicability to different populations and exposure-specific conditions, is provided in **APPENDIX A**.

Section 5.5.3.4.1 and APPENDIX 5.5A of the AFC (RBEP 2012a) described the modeling parameters that would be used for the worst-case accidental releases of aqueous ammonia in the applicant's off-site consequence analysis (OCA). Pursuant to the California Accidental Release Program (CalARP) regulations (federal risk management plan regulations do not apply to sources that store or use aqueous ammonia solutions below 20 percent), the OCA would be performed for the worst-case release scenario, which would involve the failure and complete discharge of the storage tank. Ammonia emissions from the potential release scenario would be calculated following methods provided in the RMP off-site consequence analysis guidance (US EPA, April 1999). Potential off-site ammonia concentrations would be estimated indicating the distance from the source release point to the benchmarks of ammonia concentration.

Staff received applicant's offsite consequence analysis indicating that potential worst-case plume concentrations of more than 75 ppm would not move beyond the site boundaries. Applicant's modeling was performed with the commonly-used SLAB plume modeling program (RBEP 2013ff).

Staff verified applicant's results using a different and more conservative EPA-approved plume modeling program, ALOHA in conjunction with MARPLOT, a mapping program that showed the distance of the plume from a specific reference point. Staff located the ammonia storage tank (the source point of the plume) based on the scaled Plot Layout provided in the AFC (RBEP 2012a, Chapter 2.0, Figure 2.1-2). The applicant proposes placement of a partial cover over the secondary containment structure to limit the exposed surface area of any captured spill to 41 square feet (RPEP 2012a, Appendix 5.5A). Staff's modeling using ALOHA indicated that there was a very small potential of ammonia concentrations of 75 ppm to reach just off-site to the north and east of the project site. Staff therefore proposes that the secondary containment exposure area be limited to 25 square feet to ensure that plume concentrations of 75 ppm do not migrate off-site and will not pose a significant risk to any off-site members of public.

Staff's proposed Condition of Certification **HAZ-4** ensures that the aqueous ammonia secondary containment structure would include essential design elements to prevent a worst-case spill from producing significant off-site impacts.

Furthermore, the potential for accidents resulting in the release of hazardous materials is greatly reduced through implementation of a safety management program that would include the use of both engineering and administrative controls. Elements of both facility controls and the safety management plan are summarized below.

Engineering Controls

Engineering controls help to prevent accidents and releases (spills) from moving off site and affecting communities by incorporating engineering safety design criteria in the design of the project. The engineered safety features proposed by the applicant for use at the RBEP project include:

- construction of secondary containment areas surrounding each of the hazardous materials storage areas designed to contain accidental releases that might happen during storage or delivery;
- physical separation of stored chemicals in isolated containment areas with a non-combustible partition in order to prevent accidental mixing of incompatible materials, which could result in the evolution and release of toxic gases or fumes;
- installation of a fire protection system for hazardous materials storage areas;
- construction of bermed containment areas surrounding the aqueous ammonia storage tank capable of holding the entire tank volume plus the water associated with a 24-hour period of a 25-year storm;

- construction of a sloped ammonia unloading pad that drains into the storage tank's secondary containment structure; and
- process protective systems including continuous tank level monitors, automated leak detectors, temperature and pressure monitors, alarms, and emergency block valves.

Administrative Controls

Administrative controls also help prevent accidents and releases (spills) from moving off site and affecting neighboring communities by establishing worker training programs, process safety management programs, and complying with all applicable health and safety laws, ordinances, and standards.

A worker health and safety program will be prepared by the applicant and include (but not be limited to) the following elements (see the **WORKER SAFETY AND FIRE PROTECTION** section for specific regulatory requirements):

- worker training regarding chemical hazards, health and safety issues, and hazard communication;
- procedures to ensure the proper use of personal protective equipment;
- safety operating procedures for the operation and maintenance of systems utilizing hazardous materials;
- fire safety and prevention; and,
- emergency response actions including facility evacuation, hazardous material spill clean-up, and fire prevention.

At the facility, the project owner would be required to designate an individual with the responsibility and authority to ensure a safe and healthful work place. The project health and safety official will oversee the health and safety program and have the authority to halt any action or modify any work practice to protect the workers, facility, and the surrounding community in the event of a violation of the health and safety program.

The applicant will also prepare a risk management plan for aqueous ammonia, as required by both CalARP regulations and Condition of Certification **HAZ-2**. This condition also includes the requirement for a program for the prevention of accidental releases and responses to an accidental release of aqueous ammonia. A hazardous materials business plan will also be prepared by the applicant that would incorporate California requirements for the handling of hazardous materials (RBEP 2012a, Section 5.5.3.2.2). Other administrative controls would be required in proposed Conditions of Certification **HAZ-1** (limitations on the use and storage of hazardous materials and their strength and volume) and **HAZ-3** (development of a safety management plan). Condition of Certification **HAZ-4** would require that the final design drawings for the aqueous ammonia storage (and secondary containment) facility be submitted to the CPM for review and approval.

On-Site Spill Response

In order to address the issue of spill response, the facility would prepare and implement an emergency response plan that includes information on hazardous materials contingency and emergency response procedures, spill containment and prevention systems, personnel training, spill notification, on-site spill containment, and prevention equipment and capabilities, as well as other elements. Emergency procedures would be established which include evacuation, spill cleanup, hazard prevention, and emergency response.

The first responders to a hazardous materials incident at RBEP would be from Station No. 3 of the RBFD. If needed, full hazardous materials response would be provided by the RBFD Hazardous Materials Response Team (RBFD-HMRT) located at RBFD Station No. 1, 401 South Broadway, Redondo Beach, CA approximately one mile away. The RBFD-HMRT is capable of handling any hazardous materials-related incident at the proposed facility and would have a response time of approximately three minutes (RBFD 2014). Staff finds that the RBFD and RBFD-HMRT teams would be capable of responding to a hazardous materials emergency call from RBEP.

Transportation of Hazardous Materials

Hazardous materials, including aqueous ammonia, would be transported to the facility by tanker truck. While many types of hazardous materials would be transported to the site, staff believes that transport of aqueous ammonia poses the predominant risk associated with hazardous materials transport.

Staff reviewed the applicant's proposed transportation route for hazardous materials delivery. Trucks would travel on I-405 to South Western Avenue (State Highway 213), west onto West 190th Street and continuing onto Anita Street and then Herondo Street, left onto North Harbor Drive, then left onto the RBEP site (RBEP 2012a, Section 5.5.3.3).

Ammonia can be released during a transportation accident and the extent of impact in the event of such a release would depend upon the location of the accident and the rate of dispersion of ammonia vapor from the surface of the aqueous ammonia pool. The likelihood of an accidental release during transport is dependent upon three factors:

- the skill of the tanker truck driver;
- the type of vehicle used for transport; and,
- accident rates.

To address this concern, staff evaluated the risk of an accidental transportation release in the project area. Staff's analysis focused on the project area after the delivery vehicle leaves the main highway (I-405). Staff believes it is appropriate to rely upon the extensive regulatory program that applies to the shipment of hazardous materials on California highways to ensure safe handling in general transportation (see Federal Hazardous Materials Transportation Law 49 USC §5101 et seq, DOT regulations 49 CFR subpart H, §172–700, and California Department of Motor Vehicles (DMV) regulations on hazardous cargo). These regulations also address the issue of driver competence. See AFC section 5.5.3.3 for additional information on regulations governing the transport of hazardous materials.

To address the issue of tanker truck safety, aqueous ammonia will be delivered to the proposed facility in DOT-certified vehicles with design capacities of 7,000 gallons. These vehicles will be designed to specifications MC307/DOT 407. These are high-integrity vehicles designed to haul caustic materials such as ammonia. Staff has, therefore, proposed Condition of Certification **HAZ-5** to ensure that, regardless of which vendor supplies the aqueous ammonia, delivery would be made in a tanker that meets or exceeds the specifications prescribed by these regulations.

To address the issue of accident rates, staff reviewed the technical and scientific literature on hazardous materials transportation (including tanker trucks) accident rates in the United States and California. Staff relied on six references and three federal government databases to assess the risk of a hazardous materials transportation accident.

Staff used the data from the 1990 Harwood and 1993 Harwood studies, to determine that the truck accident rate for the transportation of materials in the U.S. is between 0.64 and 13.92 per 1,000,000 miles traveled on well-designed roads and highways. The applicant estimated that routine operation of the proposed RBEP would require four to five ammonia deliveries per month, each delivering about 7,000 gallons (RBEP 2012a, Section 5.5.3.2.2). Each delivery would travel approximately 6.0 miles from I-405 along West 190th Street to the facility.

This would result in a maximum of 30 miles of delivery tanker truck travel in the project area per month during peak operation (with a full load) and an average of approximately 360 miles of delivery tanker truck travel per year (assuming five deliveries per month). Staff believes that the risk over this distance is insignificant.

In addition, staff used a transportation risk assessment model (Harwood 1993, Brown 2000 & Guidelines for Chemical Transportation Risk Analysis 1995) in order to calculate the probability of an accident resulting in a release of a hazardous material due to delivery from the freeway to the facility via West 190th to North Harbor Boulevard. Results show a risk of about one in 340,000 for one trip from I-405 and a total annual risk of about one in 5,600 for 60 deliveries over a year. This risk was calculated using accident rates on various types of roads (in this case, urban multilane undivided and multilane divided) with distances traveled on each type of road computed separately. Although it is an extremely conservative model in that it includes accident rates per million mile of highway trucking as a mode of transportation and does not distinguish between a high-integrity steel tanker truck and other less secure modes, the results still show that the risk of a transportation accident is insignificant.

Staff therefore believes that the risk of exposure to significant concentrations of aqueous ammonia during transportation to the facility is insignificant because of the remote possibility that an accidental release of a sufficient quantity could be dangerous to the public. The transportation of similar volumes of hazardous materials on the nation's highways is neither unique nor infrequent. Staff's analysis of the transportation of aqueous ammonia to the proposed facility (along with data from the U.S. DOT and studies) demonstrates that the risk of accident and exposure is less than significant.

In order to further ensure that the risk of an accident involving the transport of aqueous ammonia to the power plant is insignificant, staff proposed Condition of Certification **HAZ-6** would require the use of only the specified and California Highway Patrol-approved route to the site.

Based on the environmental mobility, toxicity, the quantities at the site, and frequency of delivery, it is staff's opinion that aqueous ammonia poses the predominate risk associated with both use and hazardous materials transportation. Staff concludes that the risk associated with the transportation of other hazardous materials to the proposed project does not significantly increase the risk over that of ammonia transportation.

Seismic Issues

It is possible that an earthquake could cause the failure of a hazardous materials storage tank. An earthquake could also cause failure of the secondary containment system (berms and dikes), as well as the failure of electrically controlled valves and pumps. The failure of all of these preventive control measures might then result in a vapor cloud of hazardous materials that could move off site and affect residents and workers in the surrounding community. The effects of the Loma Prieta earthquake of 1989, the Northridge earthquake of 1994, and the earthquake in Kobe, Japan, in January 1995, have all heightened concerns about earthquake safety.

Information obtained after the January 1994 Northridge earthquake showed that some damage was caused both to several large storage tanks and to smaller tanks associated with the water treatment system of a cogeneration facility. The tanks with the greatest damage, including seam leakage, were older tanks, while the newer tanks sustained displacements and failures of attached lines. Staff reviewed the impacts of the February 2001 Nisqually earthquake near Olympia, Washington, a state with similar seismic design codes as California. No hazardous materials storage tanks failed as a result of that earthquake. Staff also conducted an analysis of the codes and standards which should be followed when designing and building storage tanks and containment areas to withstand a large earthquake. Referring to the sections on **GEOLOGIC HAZARDS AND RESOURCES** and **FACILITY DESIGN** in the **AFC**, staff notes that the proposed facility would be designed and constructed to the standards (including seismic) of the 2013 California Building Code. Therefore, on the basis of what occurred in Northridge with older tanks and the lack of failures during the Nisqually earthquake (with newer tanks), staff determined that tank failures during seismic events are not probable and do not represent a significant risk to the public.

Site Security

The applicant proposes to use hazardous materials identified by the U.S. EPA as requiring the development and implementation of special site security measures to prevent unauthorized access. The U.S. EPA published a Chemical Accident Prevention Alert regarding site security (EPA 2000a), the U.S. Department of Justice published a special report entitled *Chemical Facility Vulnerability Assessment Methodology* (US DOJ 2002), the North American Electric Reliability Council published *Security Guidelines for the Electricity Sector* in 2002 (NERC 2002), and the U.S. Department of Energy (U.S.DOE) published the draft *Vulnerability Assessment Methodology for Electric Power Infrastructure* in 2002 (DOE 2002). The energy generation sector is one of 14 areas of critical infrastructure listed by the U.S. Department of Homeland Security. On April 9, 2007, the U.S Department of Homeland Security published in the Federal Register (6 CFR Part 27) an interim final rule requiring that facilities that use or store certain hazardous materials conduct vulnerability assessments and implement certain specified security measures. This rule was implemented with the publication of Appendix A, the list of chemicals, on November 2, 2007. While the rule applies to aqueous ammonia solutions of 20 percent or greater and this proposed facility plans to utilize a 19 percent aqueous ammonia solution, staff still believes that all power plants under the jurisdiction of the Energy Commission should implement a minimum level of security consistent with the guidelines listed here.

The applicant has stated that a security plan will be prepared for the proposed facility and will include a description of perimeter security measures and procedures for evacuating, notifying authorities of a security breach, monitoring fire alarms, conducting site personnel background checks, site access, and a security plan and background checks for hazardous materials drivers. Perimeter security measures utilized for this facility may include security guards, security alarms, breach detectors, motion detectors, and video or camera systems (RBEP 2012a, Section 5.5.5.2.5).

In order to ensure that neither this project nor a shipment of hazardous material is the target of unauthorized access, staff's proposed Conditions of Certification **HAZ-7** and **HAZ-8** address both construction security and operation security plans. These plans would require implementation of site security measures consistent with the above-referenced documents.

The goal of these conditions of certification is to provide for the minimum level of security for power plants necessary for the protection of California's electrical infrastructure from malicious mischief, vandalism, or domestic/foreign terrorist attacks. The level of security needed for the RBEP project is dependent upon the threat imposed, the likelihood of an adversarial attack, the likelihood of success in causing a catastrophic event, and the severity of the consequences of that event. The results of the off-site consequence analysis prepared as part of the RMP will be used, in part, to determine the severity of consequences of a catastrophic event.

In order to determine the level of security, the Energy Commission staff used an internal vulnerability assessment decision matrix modeled after the U.S. Department of Justice Chemical Vulnerability Assessment Methodology (July 2002), the North American Electric Reliability Council's (NERC) 2002 guidelines, the U.S. DOE VAM-CF model, and the U.S. Department of Homeland Security regulations published in the Federal

Register (Interim Final Rule 6 CFR Part 27). Staff determined that this project would fall into the category of medium vulnerability due to the urban setting and close proximity to sensitive receptors. Staff therefore proposes that certain security measures be implemented but does not propose that the project owner conduct its own vulnerability assessment.

These security measures include perimeter fencing and breach detectors, alarms, site access procedures for employees and vendors, site personnel background checks, and law enforcement contacts in the event of a security breach. The perimeter fencing should include slats or other methods to reduce and restrict the visibility of the site from off-site locations. Site access for vendors shall be strictly controlled. Consistent with current state and federal regulations governing the transport of hazardous materials, hazardous materials vendors will have to maintain their transport vehicle fleet and employ only properly licensed and trained drivers. The project owner will be required, through the use of contractual language with vendors, to ensure that vendors supplying hazardous materials strictly adhere to the U.S. DOT requirements for hazardous materials vendors to prepare and implement security plans (as per 49 CFR 172.800) and to ensure that all hazardous materials drivers are in compliance through personnel background security checks (as per 49 CFR Part 1572, Subparts A and B). The compliance project manager (CPM) may authorize modifications to these measures or may require additional measures in response to additional guidance provided by the U.S. Department of Homeland Security, the U.S. DOE, or the NERC, after consultation with both appropriate law enforcement agencies and the applicant.

CUMULATIVE IMPACTS AND MITIGATION

Staff analyzed the potential for the existence of cumulative impacts. A significant cumulative hazardous materials impact is defined as the simultaneous uncontrolled release of hazardous materials from multiple locations in a form (gas or liquid) that could cause a significant impact where the release of one hazardous material alone would not cause a significant impact. Existing locations that use or store gaseous or liquid hazardous materials, or locations where such facilities might likely be built, were both considered. Staff believes that while cumulative impacts are theoretically possible, they are not probable because of the many safeguards implemented to both prevent and control an uncontrolled release. The chances of one uncontrolled release occurring are remote. The chance of two or more occurring simultaneously, with resulting airborne plumes mingling to create a significant impact, are even more remote. Staff believes the risk to the public is insignificant.

The applicant would develop and implement a hazardous materials handling program for RBEP independent of any other projects considered for potential cumulative impacts. Staff believes that the facility, as proposed by the applicant and with the additional mitigation measures proposed by staff, poses a minimal risk of accidental release that could result in off-site impacts. It is unlikely that an accidental release that has very low probability of occurrence (about one in one-million per year) would independently occur at the RBEP site and another facility at the same time. Therefore, staff concludes that the facility would not contribute to a significant hazardous materials-related cumulative impact.

COMPLIANCE WITH LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

Staff concludes that construction and operation of the RBEP project would be in compliance with all applicable laws, ordinances, regulations, and standards (LORS) regarding long-term and short-term project impacts in the area of hazardous materials management.

CONCLUSIONS

Staff's evaluation of the proposed project (with proposed mitigation measures) indicates that hazardous material use would pose no significant impact to the public. Staff's analysis also shows that there will be no significant cumulative impact. With adoption of the proposed conditions of certification, the proposed project will comply with all applicable LORS. In response to California Health and Safety Code, section 25531 et seq., the applicant would be required to develop a Risk Management Plan (RMP). To ensure the adequacy of the RMP, staff's proposed conditions of certification require that the RMP be submitted for concurrent review by the Redondo Beach Fire Department and by Energy Commission staff. In addition, staff's proposed Condition of Certification **HAZ-2** requires the review and approval of the RMP by staff prior to the delivery of any hazardous materials to the facility. Other proposed conditions of certification address the issue of the transportation, storage, and use of aqueous ammonia, in addition to site security matters.

Staff recommends that the Energy Commission impose the proposed conditions of certification, presented herein, to ensure that the project would be designed, constructed, and operated to comply with all applicable LORS and to protect the public from significant risk of exposure to an accidental ammonia release. If all mitigation measures proposed by the applicant and staff are required and implemented, the use, storage, and transportation of hazardous materials would not present a significant risk to the public.

Staff proposes nine conditions of certification mentioned throughout the text (above), and listed below. Condition of Certification **HAZ-1** ensures that no hazardous material would be used at the facility except as listed in **APPENDIX B** of the staff assessment, unless there is prior approval by the Energy Commission compliance project manager. Condition of Certification **HAZ-2** requires that an RMP be submitted and approved prior to the delivery of aqueous ammonia.

Staff believes that an accidental release of aqueous ammonia during transfer from the delivery tanker to the storage tank is the most probable accident scenario and therefore proposes Condition of Certification **HAZ-3** requiring the development of a safety management plan for the delivery of all liquid hazardous materials, including aqueous ammonia. The development of a safety management plan addressing the delivery of all liquid hazardous materials during construction, commissioning, and operations will further reduce the risk of any accidental release not addressed by the proposed spill-prevention mitigation measures and the required RMP. This plan would additionally prevent the mixing of incompatible materials that could result in toxic vapors. Condition of Certification **HAZ-4** requires that the aqueous ammonia storage tank be designed to appropriate specifications. The transportation of hazardous materials is addressed in Conditions of Certification **HAZ-5** and **HAZ-6**. Site security during both the construction and operations phases is addressed in Conditions of Certification **HAZ-7** and **HAZ-8.** Condition of Certification **HAZ-9** addresses the use of natural gas and prohibits its use to clear pipes.

PROPOSED CONDITIONS OF CERTIFICATION

HAZ-1 The project owner shall not use any hazardous materials not listed in Appendix B, below, or in greater quantities or strengths than those identified by chemical name in Appendix B, below, unless approved in advance by the Compliance Project Manager (CPM).

Verification: The project owner shall provide to the CPM, in the Annual Compliance Report, the Hazardous Materials Business Plan's list of hazardous materials contained at the facility.

HAZ-2 The project owner shall concurrently provide a Business Plan and a Risk Management Plan (RMP) prepared pursuant to the California Accidental Release Program (CalARP) to the Redondo Beach Fire Department and the CPM for review. After receiving comments from the Redondo Beach Fire Department and the CPM, the project owner shall reflect all recommendations in the final documents. Copies of the final Hazardous Materials Business Plan and RMP shall then be provided to the Redondo Beach Fire Department for information and to the CPM for approval.

Verification: At least 30 days prior to receiving any hazardous material on the site for commissioning or operations, the project owner shall provide a copy of a final Hazardous Materials Business Plan to the CPM for approval.

At least 30 days prior to delivery of aqueous ammonia to the site, the project owner shall provide the final RMP to the Certified Unified Program Agency (the Redondo Beach Fire Department) for information and to the CPM for approval.

HAZ-3 The project owner shall develop and implement a Safety Management Plan for delivery of aqueous ammonia and other liquid hazardous materials by tanker truck. The plan shall include procedures, protective equipment requirements, training, and a checklist. It shall also include a section describing all measures to be implemented to prevent mixing of incompatible hazardous materials including provisions to maintain lockout control by a power plant employee not involved in the delivery or transfer operation. This plan shall be applicable during construction, commissioning, and operation of the power plant.

Verification: At least 30 days prior to the delivery of any liquid hazardous material to the facility, the project owner shall provide a Safety Management Plan as described above to the CPM for review and approval.

HAZ-4 The aqueous ammonia storage facility shall be designed to API 620. The storage tank shall be protected by a secondary containment vault capable of holding precipitation from a 24-hour, 25-year storm event plus 100 percent of the capacity of the largest tank within its boundary. The containment vault shall incorporate a vented cover that allows free flow of any aqueous ammonia release into the containment, yet limits the total vent area to not more than 25 square feet. The final design drawings and specifications for the ammonia storage tank and secondary containment basin shall be submitted to the CPM.

Verification: At least 60 days prior to delivery of aqueous ammonia to the facility, the project owner shall submit final design drawings and specifications for the ammonia storage tank and secondary containment basin to the CPM for review and approval.

HAZ-5 The project owner shall direct all vendors delivering aqueous ammonia to the site to use only tanker truck transport vehicles which meet or exceed the specifications of MC-307/DOT 407.

Verification: At least 30 days prior to receipt of aqueous ammonia on site, the project owner shall submit copies of the notification letter to supply vendors indicating the transport vehicle specifications to the CPM for review and approval.

HAZ-6 The project owner shall direct all vendors delivering any hazardous material to the site to use only the route approved by the CPM. The project owner shall obtain approval of the CPM if an alternate route is desired.

Verification: At least 60 days prior to receipt of any hazardous materials on site, the project owner shall submit copies of the required transportation route limitation direction to the CPM for review and approval.

HAZ-7 Prior to commencing construction, a site-specific Construction Site Security Plan for the construction phase shall be prepared and made available to the CPM for review and approval. The Construction Security Plan shall include the following:

1. perimeter security consisting of fencing enclosing the construction area;
2. security guards;
3. site access control consisting of a check-in procedure or tag system for construction personnel and visitors;
4. written standard procedures for employees, contractors and vendors when encountering suspicious objects or packages on site or off site;
5. protocol for contacting law enforcement and the CPM in the event of suspicious activity or emergency; and,
6. evacuation procedures.

Verification: At least 30 days prior to commencing construction, the project owner shall notify the CPM that a site-specific Construction Security Plan is available for review and approval.

HAZ-8 The project owner shall also prepare a site-specific security plan for the commissioning and operational phases that will be available to the CPM for review and approval. The project owner shall implement site security measures that address physical site security and hazardous materials storage. The level of security to be implemented shall not be less than that described below (as per NERC 2002).

The Operation Security Plan shall include the following:

1. permanent full perimeter fence or wall, at least eight feet high and topped with barbed wire or the equivalent (and with slats or other methods to restrict visibility if a fence is selected);

2. main entrance security gate, either hand operated or motorized;

3. evacuation procedures;

4. protocol for contacting law enforcement and the CPM in the event of suspicious activity or emergency;

5. written standard procedures for employees, contractors, and vendors when encountering suspicious objects or packages on site or off site;

   A. a statement (refer to sample, **ATTACHMENT A**), signed by the project owner certifying that background investigations have been conducted on all project personnel. Background investigations shall be restricted to determine the accuracy of employee identity and employment history and shall be conducted in accordance with state and federal laws regarding security and privacy;

   B. a statement(s) (refer to sample, **ATTACHMENT B**), signed by the contractor or authorized representative(s) for any permanent contractors or other technical contractors (as determined by the CPM after consultation with the project owner), that are present at any time on the site to repair, maintain, investigate, or conduct any other technical duties involving critical components (as determined by the CPM after consultation with the project owner) certifying that background investigations have been conducted on contractors who visit the project site;

6. site access controls for employees, contractors, vendors, and visitors;

7. a statement(s) (refer to sample, **ATTACHMENT C**), signed by the owners or authorized representative of hazardous materials transport vendors, certifying that they have prepared and implemented security plans in compliance with 49 CFR 172.880, and that they have conducted employee background investigations in accordance with 49 CFR Part 1572, subparts A and B;

8. closed circuit TV (CCTV) monitoring system, recordable, and viewable in the power plant control room and security station (if separate from the control room) with cameras able to pan, tilt, and zoom, have low-light capability, and are able to view 100 percent of the perimeter fence, the ammonia storage tank, the outside entrance to the control room, and the front gate; and,

9. additional measures to ensure adequate perimeter security consisting of either:

   A. security guard(s) present 24 hours per day, seven days per week; **<u>or</u>**

   B. power plant personnel on site 24 hours per day, seven days per week, and perimeter breach detectors **<u>or</u>** on-site motion detectors.

The project owner shall fully implement the security plans and obtain CPM approval of any substantive modifications to those security plans. The CPM may authorize modifications to these measures, or may require additional measures such as protective barriers for critical power plant components—transformers, gas lines, and compressors—depending upon circumstances unique to the facility or in response to industry-related standards, security concerns, or additional guidance provided by the U.S. Department of Homeland Security, the U.S. Department of Energy, or the North American Electrical Reliability Council, after consultation with both appropriate law enforcement agencies and the applicant.

<u>Verification:</u> At least 30 days prior to the initial receipt of hazardous materials on site, the project owner shall notify the CPM that a site-specific operations site security plan is available for review and approval. In the annual compliance report, the project owner shall include a statement that all current project employee and appropriate contractor background investigations have been performed, and that updated certification statements have been appended to the operations security plan. In the annual compliance report, the project owner shall include a statement that the operations security plan includes all current hazardous materials transport vendor certifications for security plans and employee background investigations.

HAZ-9: The project owner shall not allow any fuel gas pipe cleaning activities on site, either before placing the pipe into service or at any time during the lifetime of the facility, that involve “flammable gas blows” where natural (or flammable) gas is used to blow out debris from piping and then vented to atmosphere. Instead, an inherently safer method involving a non-flammable gas (e.g. air, nitrogen, steam) or mechanical pigging shall be used as per NFPA 56. A written procedure shall be developed and implemented as per NFPA 56, section 4.3.1.

Verification: At least 30 days before any fuel gas pipe cleaning activities begin, the project owner shall submit a copy of the Fuel Gas Pipe Cleaning Work Plan (as described in NFPA 56, section 4.3.1) which shall indicate the method of cleaning to be used, what gas will be used, the source of pressurization, and whether a mechanical PIG will be used, to the CBO for information and to the CPM for review and approval.

SAMPLE CERTIFICATION (Attachment A)

Affidavit of Compliance for Project Owners

I,

____

(Name of person signing affidavit)(Title)

do hereby certify that background investigations to ascertain the accuracy of the identity and employment history of all employees of

____

(Company name)

for employment at

____

(Project name and location)

have been conducted as required by the California Energy Commission Decision for the above-named project.

____

(Signature of officer or agent)

Dated this ____________________ day of ____________________, 20 ________.

THIS AFFIDAVIT OF COMPLIANCE SHALL BE APPENDED TO THE PROJECT SECURITY PLAN AND SHALL BE RETAINED AT ALL TIMES AT THE PROJECT SITE FOR REVIEW BY THE CALIFORNIA ENERGY COMMISSION COMPLIANCE PROJECT MANAGER.

SAMPLE CERTIFICATION (Attachment B)

Affidavit of Compliance for Contractors

I,

____

(Name of person signing affidavit)(Title)

do hereby certify that background investigations to ascertain the accuracy of the identity and employment history of all employees of

____

(Company name)

for contract work at

____

(Project name and location)

have been conducted as required by the California Energy Commission Decision for the above-named project.

____

(Signature of officer or agent)

Dated this ____________________ day of ____________________, 20 _______.

THIS AFFIDAVIT OF COMPLIANCE SHALL BE APPENDED TO THE PROJECT SECURITY PLAN AND SHALL BE RETAINED AT ALL TIMES AT THE PROJECT SITE FOR REVIEW BY THE CALIFORNIA ENERGY COMMISSION COMPLIANCE PROJECT MANAGER.

SAMPLE CERTIFICATION (Attachment C)

Affidavit of Compliance for Hazardous Materials Transport Vendors

I,

____

(Name of person signing affidavit)(Title)

do hereby certify that the below-named company has prepared and implemented security plans in conformity with 49 CFR 172.880 and has conducted employee background investigations in conformity with 49 CFR 172, subparts A and B,

____

(Company name)

for hazardous materials delivery to

____

(Project name and location)

as required by the California Energy Commission Decision for the above-named project.

____

(Signature of officer or agent)

Dated this ____________________ day of ___________________, 20 _______.

THIS AFFIDAVIT OF COMPLIANCE SHALL BE APPENDED TO THE PROJECT SECURITY PLAN AND SHALL BE RETAINED AT ALL TIMES AT THE PROJECT SITE FOR REVIEW BY THE CALIFORNIA ENERGY COMMISSION COMPLIANCE PROJECT MANAGER.

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U.S. Department of Energy (US DOE). 2002. Draft Vulnerability Assessment Methodology, Electric Power Infrastructure. Office of Energy Assurance, September 30, 2002.

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HAZARDOUS MATERIALS
APPENDIX A

Basis for Staff's Use of 75 Parts Per Million Ammonia Exposure Criteria

BASIS FOR STAFF'S USE OF 75 PARTS PER MILLION AMMONIA EXPOSURE CRITERIA

Staff uses a health-based airborne concentration of 75 parts per million (PPM) to evaluate the significance of impacts associated with potential accidental releases of ammonia. While this level is not consistent with the 200-ppm level used by the U.S. Environmental Protection Agency and the California Environmental Protection Agency in evaluating such releases pursuant to the Federal Risk Management Program and State Accidental Release Program, it is appropriate for use in staff's analysis of the proposed project. The Federal Risk Management Program and the State Accidental Release Program are administrative programs designed to address emergency planning and ensure that appropriate safety management practices and actions are implemented in response to accidental releases. However, the regulations implementing these programs do not provide clear authority to require design changes or other major changes to a proposed facility. The preface to the Emergency Response Planning Guidelines states that "these values have been derived as planning and emergency response guidelines, **not** exposure guidelines, they do not contain the safety factors normally incorporated into exposure guidelines. Instead they are estimates, by the committee, of the thresholds above which there would be an unacceptable likelihood of observing the defined effects." It is staff's contention that these values apply to healthy adult individuals and are levels that should not be used to evaluate the acceptability of avoidable exposures for the entire population. While these guidelines are useful in decision making in the event that a release has already occurred (for example, prioritizing evacuations), they are not appropriate for and are not binding on discretionary decisions involving proposed facilities where many options for mitigation are feasible. The California Environmental Quality Act requires permitting agencies making discretionary decisions to identify and mitigate potentially significant impacts through feasible changes or alternatives to the proposed project.

Staff has chosen to use the National Research Council's 30-minute Short Term Public Emergency Limit (STPEL) for ammonia to determine the potential for significant impact. This limit is designed to apply to accidental unanticipated releases and subsequent public exposure. Exposure at this level should not result in serious effects but would result in "strong odor, lacrimation, and irritation of the upper respiratory tract (nose and throat), but no incapacitation or prevention of self-rescue." It is staff's opinion that exposures to concentrations above these levels pose significant risk of adverse health impacts on sensitive members of the general public. It is also staff's position that these exposure limits are the best available criteria to use in gauging the significance of public exposures associated with potential accidental releases. It is, further, staff's opinion that these limits constitute an appropriate balance between public protection and mitigation of unlikely events and are useful in focusing mitigation efforts on those release scenarios that pose real potential for serious impacts on the public. Table 1 provides a comparison of the intended use and limitations associated with each of the various criteria that staff considered in arriving at the decision to use the 75-ppm STPEL.

Hazardous Materials Appendix A Table-1
Acute Ammonia Exposure Guidelines

Guideline	Responsible Authority	Applicable Exposed Group	Allowable Exposure Level	Allowable* Duration of Exposures	Potential Toxicity at Guideline Level/Intended Purpose of Guideline
IDLH[2]	NIOSH	Workplace standard used to identify appropriate respiratory protection.	300 ppm	30 minutes	Exposure above this level requires the use of “highly reliable” respiratory protection and poses the risk of death, serious irreversible Injury, or impairment of the ability to escape.
IDLH/10[1]	EPA, NIOSH	Work place standard adjusted for general population factor of ten for variation in sensitivity	30 ppm	30 minutes	Protects nearly all segments of general population from irreversible effects.
STEL[2]	NIOSH	Adult healthy male workers	35 ppm	15 minutes, 4 times per 8-hour day	No toxicity, including avoidance of irritation.
EEGL[3]	NRC	Adult healthy workers, military personnel	100 ppm	Generally less than 60 minutes	Significant irritation, but no impact on personnel in performance of emergency work; no irreversible health effects in healthy adults. Emergency conditions one-time exposure.
STPEL[4]	NRC	Most members of general population	50 ppm 75 ppm 100 ppm	60 minutes 30 minutes 10 minutes	Significant irritation, but protects nearly all segments of general population from irreversible acute or late effects. One-time accidental exposure.
TWA[2]	NIOSH	Adult healthy male workers	25 ppm	8 hours	No toxicity or irritation on continuous exposure for repeated eight-hour work shifts.
ERPG-2[5]	AIHA	Applicable only to emergency response planning for the general population (evacuation) (not intended as exposure criteria) (see preface attached)	200 ppm	60 minutes	Exposures above this level entail** unacceptable risk of irreversible effects in healthy adult members of the general population (no safety margin).

1) (EPA 1987) 2) (NIOSH 1994) 3) (NRC 1985) 4) (NRC 1972) 5) (AIHA 1989)
* The (NRC 1979), (WHO 1986), and (Henderson and Haggard 1943) all conclude that available data confirm the direct relationship to increases in effect with both increased exposure and increased exposure duration.
** The (NRC 1979) describes a study involving young animals, which suggests greater sensitivity to acute exposure in young animals. The WHO (1986) warned that the young, elderly, asthmatics, those with bronchitis, and those that exercise should also be considered at increased risk based on their demonstrated greater susceptibility to other non-specific irritants.

REFERENCES FOR HAZARDOUS MATERIALS APPENDIX A, TABLE 1

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NIOSH. 1994. National Institute of Occupational Safety and Health, Pocket Guide to Chemical Hazards, U.S. Department of Health and Human Services, Washington D.C., Publication numbers 94-116.

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ABBREVIATIONS - HAZARDOUS MATERIALS APPENDIX A, TABLE 1

ACGIH	American Conference of Governmental and Industrial Hygienists
AIHA	American Industrial Hygienists Association
EEGL	Emergency Exposure Guidance Level
EPA	Environmental Protection Agency
ERPG	Emergency Response Planning Guidelines
IDLH	Immediately Dangerous to Life and Health Level
NIOSH	National Institute of Occupational Safety and Health
NRC	National Research Council
STEL	Short Term Exposure Limit
STPEL	Short Term Public Emergency Limit
TLV	Threshold Limit Value
WHO	World Health Organization

HAZARDOUS MATERIALS
APPENDIX B

Hazardous Materials Proposed for Use at the RBEP
Hazardous Materials Appendix B

Table 5.5-2 (from AFC)
Chemical Inventory, Description of Hazardous Materials Stored Onsite, and Reportable Quantities

Trade Name	Chemical Name	CAS Number	Maximum Quantity Onsite	CERCLA SARA RQa	RQ of Material as Used On-site	EHS TPQc	Regulated Substance TQd	Prop 65
Aqueous ammonia (19% NH3 by weight)	Aqueous ammonia	7664-41-7	24,000 gallons	100 pounds	526 pounds	500 pounds	500 pounds	No
Aqueous ammonia (19% NH3 by weight)	Aqueous ammonia	7664-41-7	400 gallons	100 pounds	340 pounds	500 pounds	500 pounds	No
Anti-scalant (e.g., NALCO PermaTreat PC-191T)	Anti-scalant	Various	400 gallons	e	e	e	e	No
Battery Electrolyte	Sulfuric Acid	7664-93-9	1,000 gallons	1,000 pounds	2,632 pounds	1,000 pounds	1,000 pounds	Yes
Citric acid	Citric Acid	77-92-9	500 pounds	e	e	e	e	No
Cleaning chemicals/detergents	Various	None	55 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, NALCO PermaClean PC-98)	Various	None	25 gallons	e	e	e	e	No 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	400 gallons	e	e	e	e	No
Hydraulic oil	Phosphate ester	None	300 gallons	42 gallons	42 gallons	e	e	No
Laboratory reagents	Various	Various	10 gallons	e	e	e	e	No
Lubrication oil	Oil	None	10,000 gallons	42 gallons	42 gallons			No
Mineral insulating oil	Oil	8012-95-1	41,000 gallons	42 gallons	42 gallons			No
Amine solution	Amine	2008-39-1	400 gallons	e	e	e	e	No
Sodium bisulfite (NaHSO3)	Sodium bisulfite	7631-90-5	500 gallons	5,000 pounds	5,000 pounds	e	e	No
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	600 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	500 pounds	100 pounds	100 pounds	e	e	No
Proprietary corrosion/scale inhibitor (e.g., NALCO TRAC107)	Inorganic Salt Sodium Hydroxide	Proprietary 1310-73-2	25 gallons	e	e	e	e	No No

Trade Name	Chemical Name	CAS Number	Maximum Quantity Onsite	CERCLA SARA RQa	RQ of Material as Used On-site	EHS TPQc	Regulated Substance TQd	Prop 65
Proprietary non-oxidizing biocide (e.g., NALCO 7330)	5-Chloro-2-Methyl-4-Isothiazolin-3-one (1.1%) 2-Methyl-4-Isothiazolin-3-one (0.3%)	26172-55-4 2682-20-4	400 gallons	e	e	e	e	No No
Propylene Glycol	Propylene Glycol	57-55-6	1,500 gallons	e	e	e	e	Yes
Trisodium phosphate (Na3PO4) 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	200 pounds	e	e	e	e	No
Acetylene	Acetylene	47-86-2	540 cubic feet	e	e	e	e	No
Oxygen	Oxygen	7782-44-7	540 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	1,500 cubic feet	e	e	e	e	No
Cleaning chemicals	Various	Various	Varies (less than 25 gallons of liquids or 100 pounds of solids for each chemical)					
Paint	Various	Various	Varies (less than 25 gallons of liquids or 100 pounds of 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 CFR 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 lb., the RQ for that material would be (100 lb)/(10%) = 1,000 lb.
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 19 California Code of Regulations (CCR) 2770.5 (state) or 40 CFR 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 ammonia tank capacity is 24,000 gallons; however, the tank is only filled to 85 percent of its capacity, or 20,400 gallons

LAND USE

Steven Kerr

SUMMARY OF CONCLUSIONS

The proposed Redondo Beach Energy Project (RBEP) would be consistent with the applicable laws, ordinances, regulations, and standards (LORS) pertaining to land use planning and would not generate a significant impact under the California Environmental Quality Act (CEQA) guidelines. The proposed project is consistent with the current development patterns for the area established by the city of Redondo Beach Land Use Element and Zoning Ordinance.

The proposed project would not result in conversion of any farmland (as classified by the Farmland Mapping and Monitoring Program) to non-agricultural use, conflict with existing agricultural zoning or Williamson Act contracts or result in conversion of forest land to non-forest use. In addition, the proposed project would be compatible with existing on-site and nearby land uses, consistent with the planned public development for the city of Redondo Beach, and would not divide an established community.

The project would be consistent with development standards of the Public-Generating Plant (P-GP) zoning district, as well as other applicable provisions of the Redondo Beach Municipal Code. Following the commencement of staff's environmental review of the RBEP, the city council of Redondo Beach adopted urgency ordinances imposing a two-year moratorium on the permitting of electrical generating facilities within the coastal zone. The urgency ordinances were not approved until after the review of the project commenced, and the Coastal Commission has not approved the ordinances; therefore, it is staff's position that the urgency ordinances are not applicable LORS for the purpose of this analysis.

While staff believes that the project would likely conform to the California Coastal Act and city of Redondo Beach LCP, staff has not yet received the review and proposed findings of the Coastal Commission. Staff cannot make a recommendation whether the project meets the findings for a coastal development permit at this time. The California Coastal Commission is currently reviewing the project's conformity to relevant provisions of the California Coastal Act and the certified Local Coastal Program (LCP). California Coastal Commission staff anticipates providing a more thorough project evaluation as part of their review of this PSA.

Staff has not identified any significant adverse direct or cumulative Land Use impacts resulting from the construction or operation of the proposed project, including impacts to the environmental justice population. Therefore, there are no Land Use environmental justice issues related to this project and no minority or low-income populations would be significantly or adversely impacted.

INTRODUCTION

This land use analysis addresses project compatibility with existing or reasonably foreseeable[1] land uses; consistency with applicable city of Redondo Beach and state laws, ordinances, regulations, and standards (LORS); and potential project related direct, indirect, and cumulative environmental effects. In addition to the effects associated with land use, a power plant and its related facilities have the potential to create environmental impacts in areas that include air quality, biological and cultural resources, noise and vibration, hazardous materials management, public health, traffic and transportation, and visual resources. These individual resource areas are discussed in detail in separate sections of this document.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS (LORS)

Land Use Table 1 lists the state and local land use LORS applicable to the proposed project. The proposed project's consistency with these LORS is analyzed under the "Assessment of Impacts and Discussion of Mitigation" subsection and in **Land Use Table 2**. The project site does not involve federally managed lands, therefore, there are no identified applicable federal land use related LORS.

Land Use Table 1
Applicable Laws, Ordinances, Regulations, and Standards (LORS)

Applicable LORS	Description
State	
Public Resources Code, section 25529	When a facility is proposed to be located in the coastal zone or any other area with recreational, scenic, or historic value, the commission shall require that an area be established for public use. Lands within such area shall be acquired and maintained by the applicant and shall be available for public access and use.
California Coastal Act Public Resources Code, section 30000 et seq.	The California Coastal Act establishes a comprehensive scheme to govern land use planning along the entire California coast (Pub. Resources Code, §30000 et seq.). The Coastal Act sets forth general policies that govern the California Coastal Commission's review of permit applications and local plans (Pub. Resources Code, §30200).
Public Resources Code, section 30101	Section 30101 defines a "Coastal-dependent development or use" as the following: "Coastal-dependent development or use" means any development or use which requires a site on, or adjacent to, the sea to be able to function at all."
Public Resources Code, section 30211	Section 30211 of the Coastal Act requires that new development not interfere with the public's right of access to the shoreline, where the access has been previously acquired by a federal, state, or local government authorization.
Public Resources Code, section 30260	Section of 30260 encourages the use of existing coastal-dependent industrial sites within the Coastal Zone instead of using undeveloped areas of the Coastal Zone.

[1] Whether a project is reasonably foreseeable (i.e., a "probable future project") for purposes of cumulative impact analysis depends on the nature of the resource in question, the location of the project, and the type of project. (Cal. Code Regs.,tit.14, section 15130(b)(2)).

Applicable LORS	Description
Local	
City of Redondo Beach Land Use Element of the General Plan	The City of Redondo Beach Land Use Element of the General Plan, adopted May 26, 1992, establishes goals, objectives, policies, and implementation programs to guide the manner in which new development will occur and existing uses will be conserved in the city of Redondo Beach.
City of Redondo Beach Harbor/Civic Center Specific Plan	The City of Redondo Beach Harbor/Civic Center Specific Plan is the supplemental development policy document to the General Plan. Together, these two documents govern future development and character of the Harbor/Pier and Civic Center areas of the city of Redondo Beach.
Redondo Beach Municipal Code Zoning Ordinance, Title 10, Ch. 2 and Zoning Ordinance for the Coastal Zone, Title 10, Ch. 5	The Municipal Code establishes all of the regulatory, penal and administrative laws of general application within the city. The broad purposes of the Zoning Ordinance for the Coastal Zone are to protect and promote the public health, safety, and general welfare, and to implement the policies and the land use plan map of the city of Redondo Beach General Plan and the Coastal Land Use Plan.

SETTING

PROJECT SITE

The proposed RBEP site is located at 1100 North Harbor Drive in the city of Redondo Beach. The project would be located entirely within the existing Redondo Beach Generation Station (RBGS), an operating power plant site.

RBEP would be a natural gas-fired, combined-cycle, air-cooled, 496 megawatt (MW) (net) electrical generating facility consisting of two independently operating, three-on-one, combined-cycle gas turbine power blocks. Other equipment and facilities to be constructed and shared by both power blocks include natural gas compressors, water treatment facilities, emergency services, and administration and maintenance buildings.

The Los Angeles County Assessor's Identification Numbers (AIN) for the RBEP site is 7503-013-015 and 7503-013-819 (LAC 2014). If the proposed project is approved by the Energy Commission, following approval and prior to commencing construction of the power block, the project owner shall obtain a lot line adjustment to establish a single parcel for the RBEP site. This is included as staff's proposed Condition of Certification **LAND-1**. Primary access to the RBEP site would be from the existing RBGS entrance off of North Harbor Drive, south of the intersection of Herondo Street and North Harbor Drive.

Construction Laydown and Parking Areas

All laydown and construction parking areas would be located within the existing RBGS site. According to the Application for Certification (AFC), approximately 17 acres would be used for construction laydown and parking. During RBEP construction, all construction equipment and supplies would be trucked directly to the site. (RBEP 2012, Section 5.6-2)

Construction worker parking for RBEP and the demolition of the existing units at the RBGS would be provided by onsite parking. Construction workers would park at the project laydown area within the project site's boundaries. No on-street parking is anticipated. Therefore, staff has determined that construction workforce parking impacts would be less than significant.

Transmission Lines and Infrastructure

The RBEP would utilize existing potable water, natural gas, storm-water, process wastewater, sanitary pipelines, and electrical transmission facilities. No off-site linear developments are proposed as part of the project. However, the project proposes the construction of a new onsite 230-kilovolt (kV) transmission interconnection, which would connect to the existing Southern California Edison (SCE) 230-kV switchyard.

GENERAL PLAN LAND USE AND ZONING DESIGNATIONS

Land Use Figure 1 (General Plan Land Use Designations Map) and **Land Use Figure 2** (Zoning and Subdivision Ordinance Map) illustrate the land use and zoning designations of the proposed power plant site. In addition, these figures illustrate the land use and zoning designations of lands within the one-mile buffer of the proposed power plant site. The land use and zoning designations of the areas surrounding the proposed project are presented to help illustrate the affected local agencies' existing and planned pattern of land use development in the project area.

SURROUNDING AREA

General Plan land use designations immediately adjacent to and nearby the proposed RBEP site include:

- North: High density residential, neighborhood commercial, medium density residential, open space, and low density residential within the city of Hermosa Beach.
- East: Commercial, public or institutional, industrial, medium density multi-family residential and low density multi-family residential.
- South: Commercial, mixed use, and low density multi-family residential.
- West: Coastal commercial and the Pacific Ocean.

PROJECT SITE

The RBEP site is designated by the Redondo Beach General Plan as Public or Institutional (P). The Redondo Beach General Plan states that typical permitted uses include governmental administrative and capital facilities, parks, schools, libraries, hospitals and associated medical offices, public cultural facilities, public open space, utility easements, and other public uses (CRB 1992, p. 2-11). The goal of this land use designation is to provide for public uses which support the needs and functions of the residents and businesses of the city (CRB 1992, p. 2-88).

The RBEP site is in the Generating Plant (P-GP) zone, which is one of seven Public and Institutional zones within the city of Redondo Beach. Use classifications permitted in the P-GP zone are: parks, parkettes, open space, recreational facilities, beaches, and coastal bluffs. Public buildings in parks, recreation areas, open space areas, and beaches are permitted subject to the approval of a conditional use permit. Public utility facilities are also permitted subject to the approval of a conditional use permit. Public utility facilities are defined as: "…a building or structure used or intended to be used by any public utility including, but not limited to…electric generating plant, distribution or transmission sub-station…transmission facility, any storage yard for public utility equipment or vehicles and any parking lot for parking vehicles or automobiles to serve a public utility." The term "public utility" would include every gas, electrical, telephone and water corporation serving the public or any portion thereof for which a certificate of public convenience and necessity has been issued by the State Public Utility Commission." (CRB 2014) The project site is also located within the Redondo Beach Coastal Zone and the Catalina Avenue Sub-Area of the Harbor/Civic Center Specific Plan.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

Energy Commission staff has analyzed the information provided in the AFC and has acquired information from other sources to determine consistency of the proposed RBEP with applicable land use LORS and the proposed project's potential to have significant adverse land use-related impacts.

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

Significance criteria used in this document are based on Appendix G of the CEQA Guidelines and performance standards or thresholds identified by Energy Commission staff, as well as applicable LORS utilized by other governmental regulatory agencies.

An impact may be considered significant if the proposed project results in:

- Conversion of Farmland or Forest Land.
  - Conversion of Prime Farmland, Unique Farmland, or Farmland of Statewide or Local 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.[2]
  - Conflict with existing zoning for agricultural use, or a Williamson Act contract.
  - Conflict with existing zoning for, or cause rezoning of, forest land [as defined in Pub. Resources Code §12220 (g)), timberland (as defined by Pub. Resources Code §4526), or timberland zoned Timberland Production (as defined by Gov. Code §51104(g)).
  - Loss of forest land or conversion of forest land to non-forest use.

[2] FMMP defines "land committed to non-agricultural use" as land that is permanently committed by local elected officials to non-agricultural development by virtue of decisions which cannot be reversed simply by a majority vote of a city council or county board of supervisors.

- Changes in the existing environment which, due to their location or nature, could result in conversion of Farmland to non-agricultural use[3] or conversion of forest land to non-forest use.

- Physical disruption or division of an established community.
- Conflict with any applicable habitat conservation plan, natural community conservation plan, or biological opinion.
- Conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction, or that would normally have jurisdiction, over the project adopted for the purpose of avoiding or mitigating environmental effects. This includes, but is not limited to, a General Plan, redevelopment plan, or zoning ordinance.
- Incremental impacts that, although individually limited, are cumulatively considerable when viewed in connection with other project-related effects or the effects of past projects, other current projects, and probable future projects.[4] An unmitigated noise, odor, public health or safety hazards, visual, or adverse traffic affect on surrounding properties.

DIRECT/INDIRECT IMPACTS AND MITIGATION

This section discusses the applicable potential project impacts and associated methods and thresholds of significance referenced above.

AGRICULTURE AND FOREST

Would the project convert Farmland to non-agricultural use?

The proposed RBEP site does not contain, and would therefore not convert any farmland with FMMP designations of Prime Farmland, Farmland of Statewide Importance, Unique Farmland, or Farmland of Local Importance to non-agricultural use. The proposed RBEP would have no impact with respect to farmland conversion.

Would the project conflict with existing zoning for agricultural use or a Williamson Act contract?

The California Land Conservation Act, commonly referred to as the Williamson Act, enables local governments to enter into contracts with private landowners for the purpose of restricting specific parcels of land to agricultural or related open space uses. (Chapter 7, Agricultural Land, Gov. Code, §§ 51200-51297.4) There are no existing agricultural uses present on the proposed project site. The proposed RBEP is not located on land that is under a Williamson Act contract and as a result would not conflict with any Williamson Act contracts.

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[3] A non-agricultural use in this context refers to land where agriculture (the production of food and fiber) does not constitute a substantial commercial use.

[4] Cumulative impacts refer to two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts. The individual effects may be changes resulting from a single project or a number of separate projects and can result from individually minor, but collectively significant actions taking place over a period of time (CEQA Guidelines §15355; 40 CFR 1508.7).

Would the project conflict with existing zoning for, or cause rezoning of, forest land (as defined in Pub. Resources Code, §12220(g)), timberland (as defined by Pub. Resources Code, §4526), or timberland zoned Timberland Production (as defined by Gov. Code, §51104(g))?

The proposed project site is not zoned for forest land, timberland, or for timberland production. In addition, there is no land zoned for such purposes within one mile of the project site. Therefore, there would be no conflict with, or cause for, rezoning of forest land or timberland and as a result there would be no impact to forest land or timberland.

Physical Disruption or Division of an Established Community

The proposed RBEP would be located within the boundaries of an existing power plant that has been in its current location since the late 1940s. Access to the proposed project would be through an existing entrance off of North Harbor Drive, just south of the intersection of Herondo Street and North Harbor Drive. The project site is also located approximately 1,000 feet west of the Pacific Coast Highway (Hwy 1), which is a major transportation corridor. In addition, the proposed project is located on lands designated and zoned for public and energy-related uses, including electrical generating plants, subject to approval of a conditional use permit and coastal development permit. There would not be a need to relocate any residences as a result of the RBEP. Therefore, the RBEP would not physically divide or disrupt any community within the city of Redondo Beach. In addition, the proposed project would not involve the displacement of any existing development or result in new development that would physically divide an existing community.

Conflict with Any Applicable Habitat or Natural Community Conservation Plan

The RBEP is not located within any Habitat Conservation Plan or Natural Community Conservation Plan and there will be no conflicts as a result of the proposed project.

Conflict with Any Applicable Land Use Plan, Policy or Regulation

Energy Commission staff evaluates (Cal. Code Regs., tit. 20, § 1744) the information provided by the applicant in the AFC (and any supplemental information), project design, site location, and operational components to determine if elements of the proposed project would conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction over the project, or that would normally have jurisdiction over the project except for the Energy Commission's exclusive authority. As part of the licensing process, the Energy Commission must determine whether a proposed facility complies with all applicable state, regional, and local LORS (Pub. Resources Code § 25523[d][1]). The Energy Commission must either find that a project conforms to all applicable LORS or make specific findings that a project's approval is justified even where the project is not in conformity with all applicable LORS (Pub. Resources Code, § 25525). When determining LORS compliance, staff is required to give "due deference" to an agency's assessment of whether a proposed project is consistent with LORS under the agency's jurisdiction (Cal. Code Regs., tit. 20, § 1714.5). On past projects, staff has requested that an agency provide a discussion of the findings and conditions that the agency would make when determining whether a proposed project would comply with the agency's LORS, were they the permitting authority. Any conditions recommended by an agency are considered by Energy Commission staff for inclusion in the proposed conditions of certification for the project.

Warren-Alquist Act

The Warren-Alquist Act (Pub. Resources Code, § 25500 et seq.), discusses the Energy Commission's statutory requirement for a public use area for facilities proposed in the Coastal Zone.

Section 25529 of the Warren-Alquist Act requires the establishment of an area for public use as a condition of certification of a facility proposed in the Coastal Zone as follows:

> "When a facility is proposed to be located in the Coastal Zone or any other area with recreational, scenic, or historic value, the [Energy] Commission shall require, as a condition of certification of any facility contained in the application, that an area be established for public use, as determined by the Commission. Lands within such area shall be acquired and maintained by the applicant and shall be available for public access and use, subject to restrictions required for security and public safety. The applicant may dedicate such public use zone to any local agency agreeing to operate or maintain it for the benefit of the public. If no local agency agrees to operate or maintain the public use zone for the benefit of the public, the applicant may dedicate such zone to the state. The [Energy] Commission shall also require that any facility to be located along the coast or shoreline of any major body of water be set back from the shoreline to permit reasonable public use and to protect scenic and aesthetic values."

The proposed RBEP facilities and the existing SCE high-voltage switchyard, which would remain, would take up approximately 13 acres of the existing approximately 50 acre RBGS site. The RBGS aboveground facilities on the remainder of the site would be demolished and removed, leaving approximately 37 acres of open space across from the Redondo Beach waterfront. At this time, the applicant has simply identified these 37 acres as open space within the fenced perimeter of the larger 50 acre site. As stated above, open space is identified in the city of Redondo Beach Municipal Code as a permitted use in the P-GP zone; however, a definition for "open space" is not provided. Since the project as proposed would result in such a large open area, opportunities may exist to utilize a portion of the site, which is already under the control of the applicant, rather than acquiring additional lands to meet the public use area requirement. Staff will continue to work with the applicant, the city of Redondo Beach, and the California Coastal Commission to determine how the project would comply with the Warren-Alquist Act requirement to establish an area for public use.

California Coastal Act

The project site is located within the Coastal Zone in the city of Redondo Beach. The California Coastal Act (Coastal Act) requires each local government with land area located within the Coastal Zone to prepare a local coastal program (LCP) for management of such land areas. Once the California Coastal Commission (Coastal Commission) certifies an LCP, the authority to issue coastal development permits for development within the coastal zone is delegated to the local jurisdiction. (Public Resources Code, § 30519(a)).

Notwithstanding the provisions of section 30519, the Coastal Act, in section 30600(a), provides that a coastal development permit is not required for a facility subject to the provisions of Public Resources Code section 25500 (i.e., a thermal power plant or related facility subject to the Warren-Alquist Act).

While RBEP is under the exclusive jurisdiction of the Energy Commission, sections 30413(d) and (e) of the Coastal Act expressly authorize the Coastal Commission to participate in Energy Commission siting proceedings for any thermal power plant to be located within the coastal zone and provide findings with respect to specific measures needed to bring a project into conformity with Coastal Act and LCP policies.

Coastal Commission staff submitted a letter to the Energy Commission on February 5, 2014, which was limited to initial comments on specific issues surrounding the project site's wetland characteristics and the city of Redondo Beach urgency ordinances. The letter also stated that Coastal Commission staff would provide a more thorough project review later in the AFC process and provide a report from the Coastal Commission after the publication of this PSA. Therefore, Energy Commission staff cannot make a conclusion that the project is consistent with the California Coastal Act at this time.

City of Redondo Beach General Plan

State law requires each county and city to prepare and adopt a comprehensive and long-range general plan for its physical development (Government Code section 65300). The general plan must include elements such as land use, circulation, housing, open-space, conservation, safety, and noise as identified in state law (Government Code section 65302), to the extent that the topics are locally relevant. Once a general plan is adopted, its maps, diagrams, and development policies form the basis for a jurisdiction's zoning, subdivision, and public works actions. Under California law, no specific plan, area plan/community plan, zoning, subdivision map, nor public works project may be approved unless the jurisdiction finds that it is consistent with the adopted general plan.

The General Plan, as mandated by state law, sets forth the comprehensive, long-range plan to serve as a guide for the physical development of the city. Each of the elements of the General Plan is organized into statements of Goals, Objectives, Policies, and Implementation Programs.

Land Use Element

The project site is designated as Public or Institutional (P), which includes governmental administrative and capital facilities, parks, schools, libraries, hospitals and associated medical offices, public cultural facilities, public open space, utility easements, and other public uses (CRB 1992). The RBGS is generally referenced in General Plan documents as the AES Redondo Beach plant.

The following provisions of the Land Use Element are relevant to the project:

Goal 1D seeks to provide for the development of public infrastructure to support existing and future residents, businesses, recreation, and other uses. Policy 1.8.2 seeks to allow utility corridors, easements, and facilities (sewer, water, energy, storm drainage, telecommunications, and other) to provide for existing and future land use development in areas classified as Public (P) on the Land Use Plan map. Policy 1.8.4 seeks to develop plans and programs for the reuse of infrastructure and utility properties and easements should they no longer be required for their intended operations. The RBEP allows for the continuation of an energy facility to support existing and future residents, businesses, recreation, etc by providing electricity to those uses. The RBEP would also reuse the existing project site for energy production. Therefore, it is staff's position that the project would be consistent with these provisions.

Goal 1K seeks to provide for public uses which support the needs and functions of the residents and businesses. The RBEP would accommodate public utility uses as the project site area is designated Public or Institutional. Therefore, it is staff's position that the project would be consistent with this provision.

Policy 1.46.1 seeks to accommodate governmental administrative and maintenance facilities, parks and recreation, public open space, police, fire, educations (schools), cultural (libraries, museums, performing and visual arts, etc.), human health, human services, public utility and infrastructure (transmission corridors, etc.), public and private secondary uses, and other public uses in areas designates as "P". As the RBEP is zoned Public-Generating Plant (P-GP), would reuse an existing industrial property at a smaller physical scale than the current facility, and conform to the Harbor/Civic Center Specific Plan, it is staff's position that the project would be consistent with this provision.

City of Redondo Beach Municipal Code

Zoning Ordinance

The RBEP site is in the P-GP zone, which is also within the city of Redondo Beach Coastal Zone. But for the Energy Commission's exclusive authority to license the project, siting the RBEP at the proposed location would require the following land use actions by the city of Redondo Beach:

- A Conditional Use Permit to allow development of a public utility facility within the P-GP zone.
- A Coastal Development Permit to allow development within the Coastal Zone.

The P-GP zone is one of seven Public and Institutional zones within the city of Redondo Beach. One of the specific purposes of the Public and Institutional zone regulations is to establish appropriate and flexible development standards for the development of necessary public uses and facilities (CRB 2014). Therefore, several of the typical development standards that would be specified for other zones within the zoning ordinance are left to be determined subject to planning commission review, such as floor area ratio, building height, stories, and setbacks.

As local review is subsumed by Energy Commission jurisdiction over the RBEP project, final RBEP design plans would be submitted to the Energy Commission Compliance Project Manager (CPM) for review and approval. Staff proposes Conditions of Certification **LAND-2, LAND-3, and LAND-4** to ensure the RBEP conforms to all applicable development standards.

The RBEP would be significantly smaller in bulk, height, and area than the existing RBGS. The major generating components would be housed in fully or partially enclosed buildings for safety purposes, the attenuation of noise, and to improve the aesthetic features of the project. It would also be sited within the eastern portion of the RBEP site, away from public streets with walls and landscaping to further mask views of the facility. Therefore, based on the conceptual drawing and plot layout provided in the AFC (see **Project Description Figures 1-4**), it is reasonable that the RBEP would comply with all applicable development standards of the P-GP zone. Additional analysis of the project's conformance with applicable landscaping and lighting regulations is provided in the **VISUAL RESOURCES** section.

But for the exclusive jurisdiction of the Energy Commission to license the RBEP, the city of Redondo Beach would need to make the following findings to approve the conditional use permit and coastal development permit. Additional discussion is provided in italics below each required finding.

<u>Conditional Use Permit Findings (CRB 2014):</u>

1. The site for the proposed use shall be in conformity with the General Plan and the Coastal Land Use Plan and shall be adequate in size and shape to accommodate such use and all setbacks, spaces, walls and fences, parking, loading, landscaping, and other features required by this chapter to adjust such use with the land and uses in the neighborhood.

    The RBEP project site is designated "Public or Institutional" under the city of Redondo Beach General Plan. A public utility facility, such as the RBEP is an allowed use in the "Public or Institutional" general plan designation. The Coastal Land Use Plan "[a]llow the reduction in size and modernizing of the AES Redondo Beach Generating Plant on a portion of the existing plant site..." (CRB 2010, Section 7). The RBEP seeks to modernize the AES Redondo Beach Generating Station by proposing a project that significantly reduces the footprint and structure height of the existing AES Redondo Beach Generating Plant.

2. The site for the proposed use shall have adequate access to a public street or highway of adequate width and pavement to carry the quantity and kind of traffic generated by the proposed use.

    *Primary access to the RBEP site would be provided via an existing entrance off of North Harbor Drive, just south of the intersection of Herondo Street and North Harbor Drive. Please see the **TRAFFIC AND TRANSPORTATION** section for a detailed analysis of construction and operation access*.

3. The proposed use shall have no adverse effect on abutting property or the permitted use thereof.

   The siting of the proposed project at the existing location would not create unmitigated significant adverse impacts on abutting property or the permitted use thereof in the following areas: ***AIR QUALITY, HAZARDOUS MATERIALS MANAGEMENT, NOISE AND VIBRATION, PUBLIC HEALTH, TRANSMISSION LINE SAFETY AND NUISANCE, AND VISUAL RESOURCES****. Please refer to those sections in this assessment for the detailed analyses of the air quality, dust, hazardous materials, noise, visual, and public health hazards or nuisance impacts on surrounding occupants.*

4. The conditions stated in the resolution or design considerations integrated into the project shall be deemed necessary to protect the public health, safety, and general welfare. Such conditions may include but shall not be limited to:

   a. Additional setbacks, open spaces, and buffers;

   b. Provision of fences and walls;

   c. Street dedications and improvements, including service roads and alleys;

   d. The control of vehicular ingress, egress, and circulation;

   e. Sign requirements or a sign program, consistent with the Sign Regulations Criteria in Section 10-5.1802;

   f. Provision of landscaping and the maintenance thereof;

   g. The regulation of noise, vibration, odor and the like;

   h. Requirements for off-street loading facilities;

   i. A time period within which the proposed use shall be developed;

   j. Hours of permitted operation and similar restrictions;

   k. Removal of existing billboards on the site, subject to the findings required by Section 10-5.2006(b)(7); and

   l. Such other conditions as will make possible the development of the city in an orderly and efficient manner and in conformity with the intent and purposes set forth in this chapter and the Coastal Land Use Plan.

      The proposed RBEP project would not be detrimental to the public health, safety, and general welfare of persons working or residing in the vicinity nor detrimental to the value of the property and improvements in the neighborhood because, with mitigation, the establishment, maintenance and operation of the project would not cause any significant noise, dust, public health, or traffic impacts, to nearby land uses, nor would the project contribute substantially to any cumulative land use impacts.

Coastal Development Permit Findings (CRB 2014):

1. The proposed development must be in conformity with the Certified Local Coastal Program.

   The project site is designated within the Land Use Element of the General Plan as Public or Institutional (P). The Land Use Element identifies the existing land use of the site as a regionally serving electrical generating facility. Coastal Commission staff anticipates providing a more thorough project evaluation as part of their review of this Preliminary Staff Assessment prior to completing their report on the project's consistency with the Coastal Act and the Local Coastal Plan.

2. The proposed development, if located between the sea (or the shoreline of any body of water located within the coastal zone) and the first public road paralleling the sea, must be in conformity with the public access and public recreation policies of Chapter 3 of Division 20 of the Public Resources Code (commencing with section 30200).

   The RBEP is located adjacent to but east of the first public road paralleling the sea (North Harbor Drive). Therefore, the RBEP project does not have to be in conformity with the public access and public recreation policies of Chapter 3 of Division 20 of the Public Resources Code (commencing with section 30200).

3. The decision-making body must comply with any CEQA responsibilities it may have in connection with the project, and that, in approving the proposed development, the decision-making body cannot violate any CEQA prohibition that may exist on approval of projects for which there is a less environmentally damaging alternative or a feasible mitigation measure available.

   Within the PSA, the Energy Commission staff will review and analyze significance criteria for all environmental impacts based on Appendix G of the CEQA Guidelines, as well as applicable LORS utilized by other governmental regulatory agencies.

City of Redondo Beach Urgency Ordinances

The AFC for the RBEP was filed with the Energy Commission on November 20, 2012 (RBEP 2012a) and the application was deemed data adequate on August 27, 2013.

An initiative measure, designated Measure A, failed to pass in the city of Redondo Beach general municipal election on March 5, 2013. Measure A, if enacted, would have required termination of all electrical power generating on the project site by December 31, 2020, and removal of all electrical generating facilities by December 31, 2022. Measure A, if passed, would have substantially limited future redevelopment of the AES property for other economically beneficial uses and would have required 60 to 70 percent of the property be reserved for open space and public recreational uses.

On December 3, 2013, the Redondo Beach city council adopted Urgency Interim Ordinance No. 3116-13 imposing a 45-day moratorium on the approval of any conditional use permit, coastal development permit, or any discretionary city permit or approval of construction, expansion, replacement, modification or alteration of any facilities for the on-site generation of electricity on any property located within the coastal zone.

On January 14, 2014, the city council adopted Urgency Ordinance No. 3120-14, which extended the moratorium for 22-months and 15-days from the date of adoption of this ordinance to December 2015. (CRB 2014c).

Coastal Commission staff submitted a letter dated February 5, 2014, regarding the status and applicability of the city's urgency ordinance. Coastal Commission staff determined that the city's ordinance is not effective unless approved by the Coastal Commission. They further explained that, Coastal Act (Pub. Resources Code § 30514(a)) requires that all local implementing ordinances that would amend provisions of a certified Local Coastal Plan (LCP) are to take effect only after approval by the Coastal Commission. The urgency ordinance would amend the city's certified LCP; therefore it is subject to Coastal Commission approval. Specifically, the city's ordinance selectively prohibits a type of use that is currently allowed under the LCP, creating a conflict with the LCP. This conflict represents a proposed amendment to the LCP that is subject to review and approval by the Coastal Commission before it can become effective. (CCC 2014a).

Following the submittal of Coastal Commission staff's February 5, 2014 letter of determination, intervenors Building a Better Redondo and the city of Redondo Beach submitted letters stating their disagreement with Coastal Commission staff's determination (BBR 2014c, BBR 2014d, CRB 2014b).

The urgency ordinances were not approved until after the review of the project commenced, and the Coastal Commission has not approved the ordinances; therefore, it is staff's position that the urgency ordinances are not applicable LORS for the purpose of this analysis.

City of Redondo Beach Harbor/Civic Center Specific Plan

The city of Redondo Beach Harbor/Civic Center Specific Plan (Specific Plan) was adopted on May 6, 2008 by the city of Redondo Beach. The Specific Plan is the fundamental community development policy document that governs and determines the future development and character of the Harbor/Pier and Civic Center areas of the city of Redondo Beach. The Specific Plan serves to clarify the city's goals, objectives, and expectations for the future of the area with respect to and in the context of the rights and overall expectations of the local resident and business community, local private property owners, and general public. (CRB 2008).

The Specific Plan encompasses approximately 355 acres of land and includes all of the harbor and pier land area of the city of Redondo Beach. The proposed RBEP is located in the Catalina Avenue Corridor (between Pacific Coast Highway to the north and Pearl Street to the south), one of the five individual geographical sub-areas in the Specific Plan area. More specifically, the RBEP would be located in the Catalina Avenue Sub-Area – Zone 2. The Specific Plan designates the RBEP site for Public Utility Land Uses, Parks, Recreation, and Open Space.

The following provisions of the Specific Plan are relevant to the project:

> Goal and Objective 5.2.1 seeks to retain the existing, compatible, and attractive low scale and limited building density of the area. As the RBEP proposes a project that significantly reduces the footprint and structure height of the existing RBGS, the project would be consistent with this provision.

Goals and Objectives 5.6.1 seek the following:

1. To undertake and pursue (as appropriate and environmentally viable) planning and feasibility studies leading to the ultimate future recycling of the Southern California Edison Company (SCE) site into a more attractive, modern, and compatible alternative land use.

2. To work with the SCE during the remainder of the electricity plant's useful economic and physical life, in order to pursue specific, implementable, and enforceable means of mitigating entirely or reducing, as much as possible, the range of significant environmental impacts that are created and generated upon the community by the day-to-day operation of the facility.

As local review is subsumed by Energy Commission jurisdiction over the RBEP project, RBEP design plans would be submitted to the Compliance Project Manager (CPM) for final review and approval, which would determine whether the RBEP conforms to Goals and Objectives 5.6.1. Additionally, if the RBEP is approved, the applicant would be required to submit regular reports which ensure that environmental impact levels (air quality, public health, hazardous materials, noise, etc.) are below significant levels for the life of the project.

COMPLIANCE WITH LORS

Staff's independent analysis of the RBEP concludes that the project would likely comply with all applicable LORS. While staff believes that the project would likely conform to the California Coastal Act and city of Redondo Beach LCP, staff has not yet received the review and proposed findings of the Coastal Commission. **Land Use Table 3** summarizes the RBEP project conformance with applicable LORS.

Land Use Table 3
LORS Applicable to the Land Use Analysis

Applicable LORS	Description	Consistency Determination	Basis for Consistency
State			
California Coastal Act	Establishes a comprehensive approach to govern land use planning along the entire California coast.	Pending	Coastal Commission staff plans to provide a report from the Coastal Commission following issuance of the PSA.
Local			
City of Redondo Beach General Plan	Provides comprehensive, long-range plans, policies, and goals to guide the physical development of the city.	Yes	The project site is designated Public or Institutional (P). Public utilities are an allowed use.
Land Use Element Goal 1D Policy 1.8.2 Policy 1.8.4	Seeks to provide for the development of public infrastructure to support existing and future residents, businesses, recreation, and other uses. Seeks to allow utility corridors, easements, and facilities (sewer, water, energy, storm drainage, telecommunications, and other) to provide for existing and future land use development in areas classified as Public (P) on the Land Use Plan map. Seeks to develop plans and programs for the reuse of infrastructure and utility properties and easements should they no longer be required for their intended operations.	Yes	The RBEP project allows for the continuation of an energy facility to support existing and future residents, businesses, recreation, etc. by providing those uses electricity. The RBEP project would also reuse the existing project site for that use.
Goal 1K Policy 1.46.1	Seeks to provide for public uses which support the needs and functions of the residents and businesses. Seeks to accommodate governmental administrative and maintenance facilities, parks and recreation, public open space, police, fire, educations (schools), cultural (libraries, museums, performing and visual arts, etc.), human health, human services, public utility and infrastructure (transmission corridors, etc.), public and private secondary uses, and other public uses in areas designates as “P”.	Yes Yes	The RBEP project would accommodate public utility uses as the project site area is designated Public or Institutional The RBEP is zoned Public-Generating Plant (P-GP), would reuse an existing industrial property at a smaller physical scale than the current facility, and conform to the Harbor/Civic Center Specific Plan,.
City of Redondo Beach Zoning Ordinance 10-2.1110 P-GP District	The Public-Generating Plant District is established by this chapter.	Yes	Public utility uses are allowed in the P-GP district on approval of a conditional use permit.
10-5.1114 P-GP District Development Standards	Prescribes development standards for the P-GP district.	Yes	Staff proposes Conditions of Certification **LAND-2, LAND-3,** and **LAND-4** to ensure the RBEP conforms to all applicable development standards.

LAND USE COMPATIBILITY

The proposed RBEP would be located entirely within the site of the existing RBGS site. The property has been used since 1906 for the purpose of electrical power generation. The project represents continued use of a site committed to ensuring reliable generation is maintained in southern California. The proposed RBEP is consistent with the city of Redondo Beach and use designations and zoning and would not constitute a change in the current development pattern of the city of Redondo Beach, as established by the city of Redondo Beach adopted General Plan. Furthermore, the project is compatible with the existing ancillary facilities of the RBGS which would be reused to support RBEP, such as the Southern California Gas Company (SoCalGas) natural gas pipeline serving the site, the existing onsite SCE 230-kV switchyard, and the existing connections to the city of Redondo Beach potable water system and sanitary sewer system.

When a jurisdictional authority, such as the city of Redondo Beach, establishes zoning designations to implement its general plan, it is that agency's responsibility to ensure the compatibility of adjacent zoning and permitted uses and incorporate conditions and restrictions that ensure those uses will not result in a significant adverse impact to surrounding properties. As noted in the discussion above under the section titled Physical Disruption or Division of an Established Community and in **Land Use Table 3,** development of the proposed project and its associated facilities would not divide an established community.

A project may generate a potential significant environmental impact related to land use if it would introduce an unmitigated noise, odor, public health or safety hazard, or a visual or adverse traffic affect on surrounding properties.

The siting of the proposed project at the existing location would not create unmitigated significant adverse impacts in the following areas: **AIR QUALITY, HAZARDOUS MATERIALS MANAGEMENT, NOISE AND VIBRATION, PUBLIC HEALTH, TRANSMISSION LINE SAFETY AND NUISANCE, AND VISUAL RESOURCES**. Please refer to those sections in this assessment for the detailed analyses of the air quality, dust, hazardous materials, noise, and public health hazards or nuisance impacts on surrounding occupants. Therefore, the proposed project would not result in any physical land use incompatibilities with the existing surrounding land uses.

CUMMULATIVE IMPACTS

A project may result in a significant adverse cumulative impact where its effects are cumulatively considerable. "Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects (Cal. Code Regs.§15065(a)(3).

The cumulative land use and planning analysis considers past, current and probable future projects that are relatively near the proposed project that would contribute to cumulative impacts by impacting agricultural or forest lands, disrupt or divide an established community, conflict with applicable land use plans, policy or regulation, or conflict with an applicable habitat conservation plan or natural community conservation plan.

Land Use Table 4 (below) displays the reasonably foreseeable significant sized development projects within approximately one mile of the project site in the city of Redondo Beach.

Land Use Table 4
Cumulative Projects

Project Title	Location	Project Description	Status of Project
Demolition of retired RBEP generating units	RBEP facility, 1100 North Harbor Drive, Redondo Beach	Units 1 – 4 and 5 – 8 (and auxiliary boiler no. 17) of existing RBEP are slated for demolition in 2016 and 2019, respectively.	Pending current project approval.
Greenstreet Project	901 N. Catalina Ave., Redondo Beach	20,000-sq. ft. commercial development.	On-going project
Shade Hotel	655 N. Harbor Drive, Redondo Beach	Hotel, restaurants, event space, and parking.	Completed
E&B Oil Development Project	555 6th Street, Hermosa Beach	Proposed onshore drilling and production site using directional drilling of 30 wells to access the oil and gas reserves in the tidelands (granted by the State of California to the city) and in an onshore area known as the uplands.	On-going project

Source: EXECUTIVE SUMMARY Table-1 RBEP Master List of Cumulative Projects

CUMULATIVE IMPACTS ANALYSIS

The following land use areas have been analyzed with regard to cumulative land use impacts.

Agriculture and Forest

The project as proposed does not have any impacts to agricultural or forest lands or conflict with any land that is zoned for agricultural purposes and therefore, does not contribute to cumulative impacts related to this land use area.

Physical Disruption or Division of an Established Community

Because the RBEP would be located entirely within the existing RBGS site and would not physically disrupt or divide an established community, it would not contribute to a cumulative impact in this land use area.

Conflict with Any Applicable Habitat or Natural Community Conservation Plan

The RBEP would not conflict with any habitat or natural community conservation plans and would not contribute to any cumulative impacts in this land use area.

Conflict with Any Applicable Land Use Plan, Policy or Regulation

Staff's analysis of the information available shows that the project would not conflict with any applicable land use plan, policy, or regulation of an agency with jurisdiction, with the inclusion of the proposed conditions of certification.

The Coastal Commission is currently reviewing the project's conformity to relevant provisions of the California Coastal Act and the certified LCP. Coastal Commission staff anticipates providing a more thorough project evaluation as part of their review of this PSA. Staff will continue to work with the Coastal Commission on RBEP conformity with the California Coastal Act and LCP.

With the exception of the pending determination of the RBEP's conformity with the California Coastal Act and LCP, staff concludes that the RBEP would not result in cumulative impacts in this land use area.

NOTEWORTHY PUBLIC BENEFITS

There are no land use-related benefits associated with the RBEP.

CONCLUSIONS AND RECOMMENDATIONS

The proposed RBEP would be located entirely within the existing RBGS, an operating power plant site, in the city of Redondo Beach.

Staff concludes the RBEP:

- Would not convert any farmland (as classified by the Farmland Mapping and Monitoring Program) to non-agricultural use, conflict with existing agricultural zoning or Williamson Act contracts or convert forest land to non-forest use.
- Would not conflict with existing zoning for agricultural use or a Williamson Act contract.
- Would not conflict with existing zoning for, or cause rezoning of, forest land, timberland, or timberland zoned Timberland Production.
- Would not result in the loss of forest land or conversion of forest land to non-forest use.
- Would not directly or indirectly divide an established community or disrupt an existing or recently approved land use.
- Would be consistent with development standards of the Public-Generating Plant (P-GP) zoning district.

- Conformity with the California Coastal Act and city of Redondo Beach Local Coastal Program (LCP) has not been established. Staff will continue to work with the California Coastal Commission on conformity issues.
- With the exception of pending determinations regarding the California Coastal Act and city of Redondo Beach LCP, would not conflict with an applicable land use plan, policy, or regulation of an agency with jurisdiction, or that would normally have jurisdiction over the project adopted for the purpose of avoiding or mitigating environmental effects.
- Would not conflict with any applicable habitat conservation plan or natural community conservation plan.
- Would not result in incremental impacts that, although individually limited, are cumulatively considerable when viewed in connection with other project-related effects or the effects of past projects, other current projects, and probable future projects.

PROPOSED CONDITION OF CERTIFICATION

LAND-1 The project owner shall comply with Title 20, California Code of Regulations, Appendix B(g)(3)(c) of the Siting Regulations by ensuring the Project, excluding linears and temporary laydown or staging area, will be located on a single legal parcel.

Verification: Prior to construction of the power block, the project owner shall submit evidence to the Compliance Project Manager (CPM), indicating approval of a Lot Line Adjustment by city of Redondo Beach, establishing a single parcel for the RBEP site. The submittal to the CPM shall include evidence of compliance with all conditions and requirements associated with the approval of the Lot Line Adjustment by the city.

LAND-2 The project owner shall comply with the minimum design and performance standards for the Public-Generating Plant (P-GP) District set forth in the city of Redondo Beach Zoning Ordinance.

Verification: At least 30 days prior to the start of construction, the project owner shall submit written documentation, including evidence of review by the city of Redondo Beach that the project meets the above referenced requirements.

LAND-3 The project owner shall comply with the parking standards established by the city of Redondo Beach Zoning Ordinance (Title 10, Chapter 2, Article 5).

Verification: At least 30 days prior to start of construction, the project owner shall submit to the CPM, written documentation, including evidence of review by the city that the project conforms to all applicable parking standards.

LAND-4 The project owner shall ensure that any signs erected (either permanent or for construction only) comply with the outdoor advertising regulations established by the city of Redondo Beach Zoning Ordinance (Title 10, Chapter 2, Article 6).

Verification: At least 30 days prior to start of construction, the project owner shall submit to the CPM, written documentation, including evidence of review by the city, that all erected signs will conform to the zoning ordinance.

REFERENCES

BBR 2014c – Building a Better Redondo, James A. Light (TN 201675). Additional Case Law Pertaining to Coastal Commission Memo, dated February 10, 2014. Submitted to CEC/Docket Unit on February 10, 2014.

BBR 2014d – Building a Better Redondo, James A. Light (TN 201676). Comment to California Coastal Commission Memo, dated February 6, 2014. Submitted to CEC/Docket Unit on February 7, 2014.

CCC 2014a – California Coastal Commission, Tom Luster (TN 201639). Comments on California Energy Commission AFC Review of AES Southland LLC's Proposed Redondo Beach Energy Project, dated February 5, 2014. Submitted to CEC/Pat Kelly/Docket Unit on February 5, 2014.

CDOC 2010 – California Department of Conservation, Farmland Mapping and Monitoring Program, website accessed on January 15, 2014: http://www.conservation.ca.gov/dlrp/FMMP/Pages/Index.aspx.

CRB 1992 – City of Redondo Beach General Plan, Land Use Element, Updated 1992, Last amended 2005, http://www.redondo.org/civica/filebank/blobdload.asp?BlobID=2866.

CRB 2008 – City of Redondo Beach Harbor/Civic Center Specific Plan, Revised 2008, http://www.redondo.org/depts/planning/harbor_civic_center_specific_plan.asp.

CRB 2010 – City of Redondo Beach Measure G Ballot Text & Supplemental Ballot Pamphlet, dated November 2, 2010, http://www.redondo.org/civica/filebank/blobdload.asp?BlobID=21009.

CRB 2012a – Jeffer Mangels Butler & Mitchell, LLP (JMBM)/city of Redondo Beach (TN 68920). Comments on "Data Adequacy" of Application for Certification, dated December 18, 2012. Submitted to CEC/Roger Johnson on December 19, 2012.

CRB 2014 – City of Redondo Beach Municipal Code, Title 10 Planning and Zoning, http://www.qcode.us/codes/redondobeach/.

CRB 2014a – Jeffer Mangel Butler & Mitchell, LLP/city of Redondo Beach (TN 201797). Intervenor city of Redondo Beach's First Set of Data Requests to Applicant AES Southland Development, LLC, dated February 24, 2014. Submitted to CEC/Docket Unit on February 24, 2014.

CRB 2014b – Michael W. Webb, City Attorney/City of Redondo Beach (Outside Counsel) (TN 201825). Letter from City Attorney Michael Webb re: Response to Coastal Commission of February 5, 2014, dated March 3, 2014. Submitted to CEC/Docket Unit/Patricia Kelly on March 3, 2014.

CRB 2014c – City of Redondo Beach, Mayor Steve Aspel (TN 201869). Urgency Ordinance No. 3120-14 re: An Extension of an Urgency Interim Ordinance of the City Council of the City of Redondo Beach, California, Imposing a Moratorium on Development of Electrical Generating Facilities in the Coastal Zone, dated January 14, 2014. Submitted to CEC/Docket Unit on March 13, 2014.

LAC 2014 – Los Angeles County Office of the Assessor, Property Assessment Information System, accessed March 20, 2014, http://maps.assessor.lacounty.gov/mapping/viewer.asp

RBEP 2012a – Applicant/AES Southland Development (TN 68597). Application for Certification for the Redondo Beach Energy Project Volumes 1 and 2, dated November 20, 2012. Submitted to CEC/Robert Oglesby on November 21, 2012.

LAND USE - FIGURE 1

Redondo Beach Energy Project - Land Use Designations

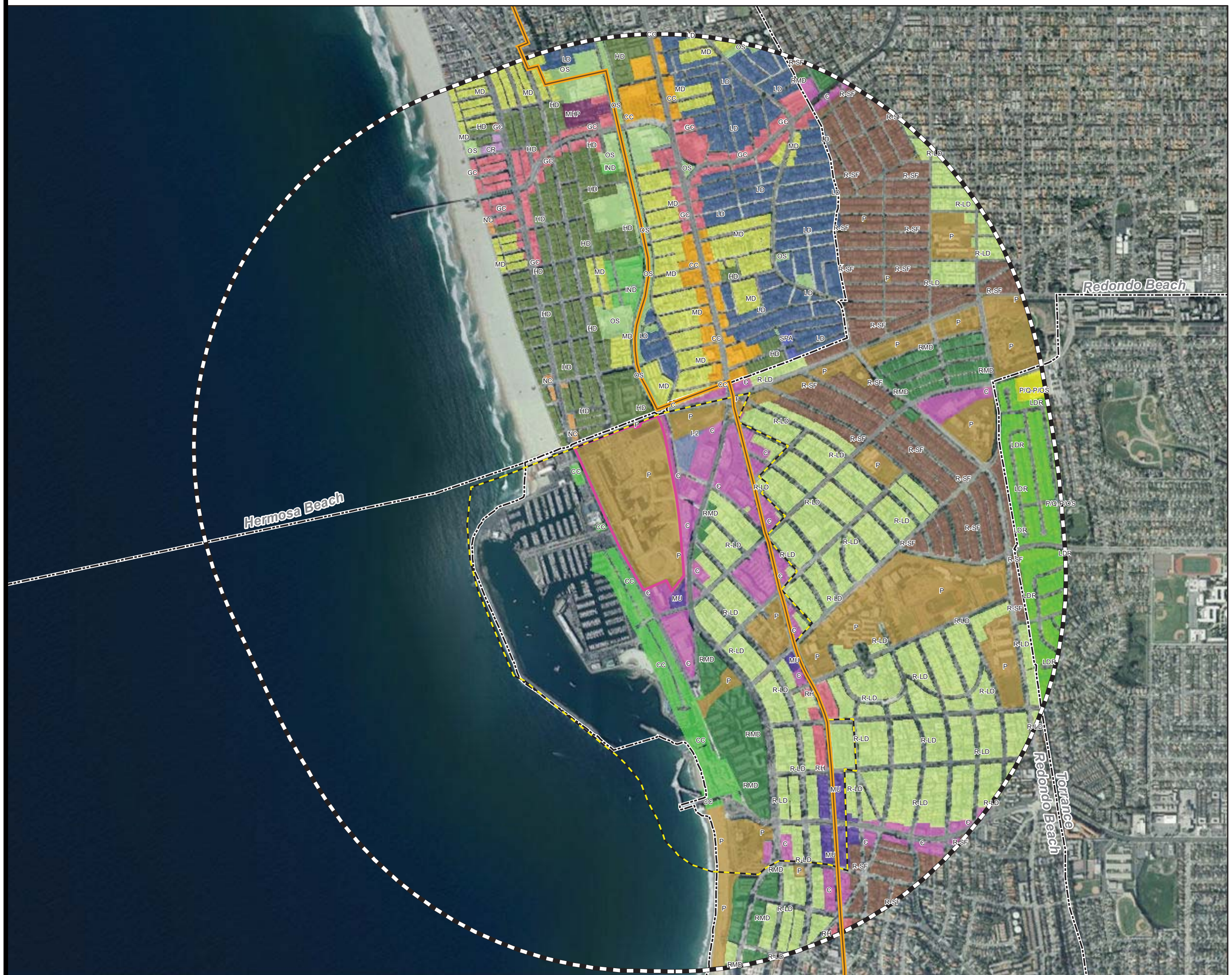

FIGURE 5.6-2
General Plan
Land Use Designations
AES Redondo Beach Energy Project
Redondo Beach, California

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CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION
SOURCE: AFC, Figure 5.6 - 2

LAND USE - FIGURE 2

Redondo Beach Energy Project - Zoning and Subdivision Ordinance

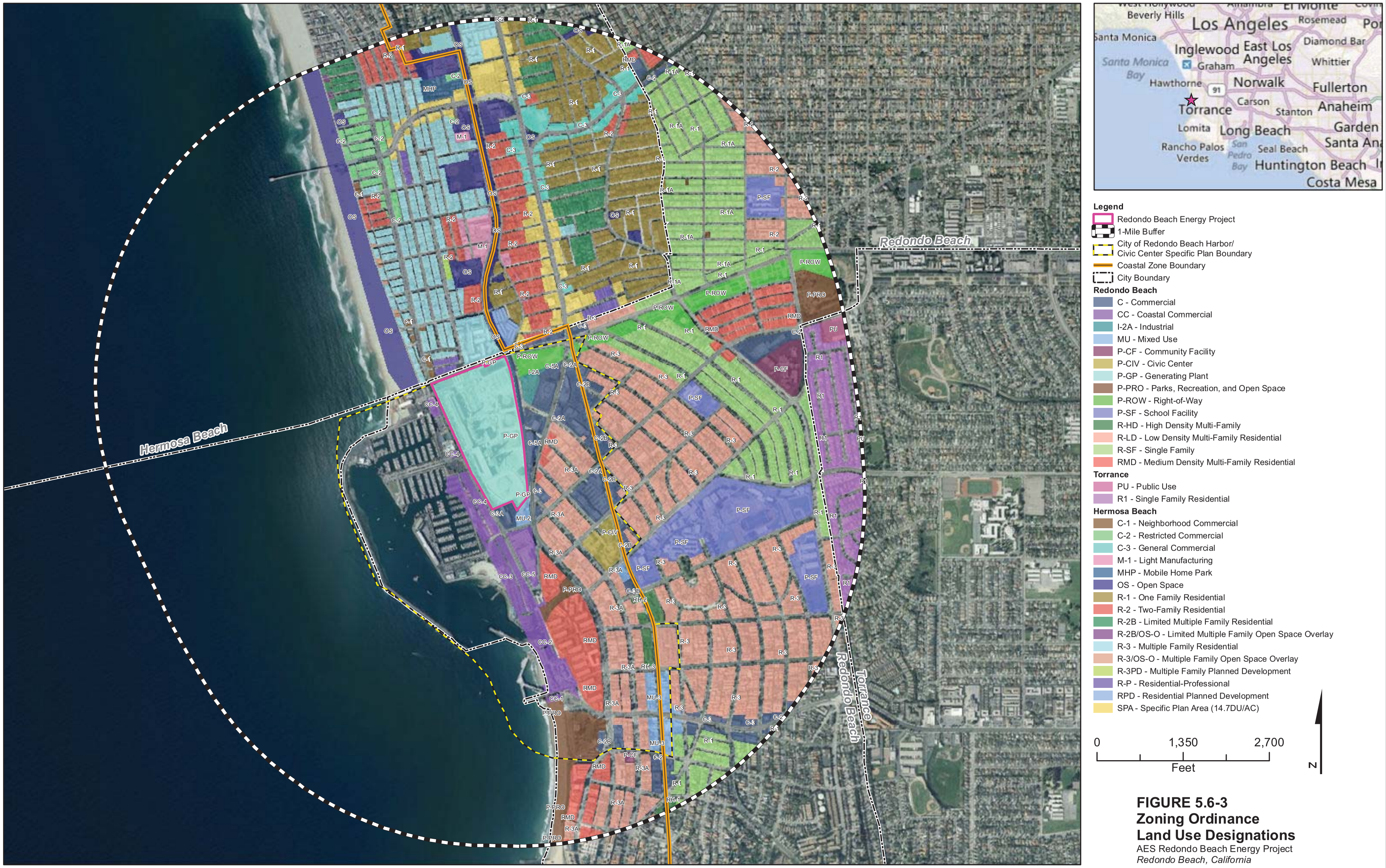

FIGURE 5.6-3
Zoning Ordinance
Land Use Designations
AES Redondo Beach Energy Project
Redondo Beach, California

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CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: AFC, Figure 5.6 - 3

NOISE AND VIBRATION

Edward Brady and Shahab Khoshmashrab

SUMMARY OF CONCLUSIONS

If built and operated in conformance with the proposed conditions of certification, it is the Energy Commission staff's (staff) opinion that the Redondo Beach Energy Project (RBEP) would comply with all applicable noise and vibration LORS. Staff concludes that the project would produce no significant adverse noise impacts under CEQA guidelines on people within the project area, including the minority populations, directly, indirectly, or cumulatively.

Staff recommends conditions of certification addressing worker and employee protection (**NOISE-3**, Employee Noise Control Program, and **NOISE-5**, Occupational Noise Survey), measurement and verification that noise performance criteria are met at project's noise-sensitive residential receptors (**NOISE-4**, Operational Noise Restrictions), restrictions on construction activities (**NOISE- 6**, Construction Noise Restrictions, **NOISE-7**, Steam Blow Restrictions**,** and **NOISE-8**, Pile Drive Management). Also, **NOISE-9** (Concrete Pour Noise Control) requires that nighttime concrete pouring activities remain within the required noise limits. Finally, **NOISE-1** (Public Notification Process) and **NOISE-2** (Noise Complaint Process) describe the process of complaint investigation and resolution.

Regarding staff's retention of responsibility to monitor the enforcement of these conditions of certification, staff works under the authority of the Energy Commission's compliance project manager (CPM) to monitor and review the reporting of plant performance during construction and the full term of operation, including facility closure.

INTRODUCTION

The construction and operation of any power plant creates noise, or unwanted sound. The character and loudness of this noise, the times of day or night that it is produced, and the proximity of the facility to sensitive receptors all combine to determine whether the facility would meet applicable noise control laws and ordinances and whether it would cause significant adverse environmental impacts. In some cases, vibration may be produced as a result of power plant construction practices such as blasting or pile driving. The ground-borne energy of vibration has the potential to cause structural damage and annoyance.

This analysis identifies and examines the noise and vibration impacts from the construction and operation of the RBEP project. Staff recommends procedures to ensure that the resulting noise and vibration impacts would be adequately mitigated to comply with applicable laws, ordinances, regulations and standards (LORS) and to lessen the impacts to less than significant. For an explanation of technical terms used in this section, please refer to **Noise Appendix A** immediately following.

Noise Table 1
Laws, Ordinances, Regulations and Standards (LORS)

<table>
<tr><th>Applicable LORS</th><th>Description</th></tr>
<tr><td><u>Federal</u>:
Occupational Safety & Health Act (OSHA), Title 29, § 1910.95

U.S. Environmental Protection Agency (USEPA) Guidelines</td><td>Protects workers from the effects of occupational noise exposure.

Assists state and local government entities in development of state and local LORS for noise.</td></tr>
<tr><td><u>State:</u>
California Occupational Safety & Health Act (Cal-OSHA): California Code of Regulations, Title 8, §§ 5095-5099</td><td>Protects workers from the effects of occupational noise exposure.</td></tr>
<tr><td><u>Local:</u>
City of Redondo Beach Municipal Code – Noise Ordinance, Title 4: Public Welfare, Morals and Conduct Noise Ordinance, Chapter 24: Noise Regulation; § 4-24.301</td><td>
<table>
<tr><th colspan="3">Exterior Noise Standards (dBA)</th></tr>
<tr><th></th><th>Noise Level (dBA)[(a)]</th><th>Time Period</th></tr>
<tr><td>1. Residential - Low Density</td><td>45
50</td><td>10 p.m. – 7 a.m.
7 a.m. – 10 p.m.</td></tr>
<tr><td>2. Residential – Medium Density</td><td>50
50</td><td>10 p.m. – 7 a.m.
7 a.m. – 10 p.m.</td></tr>
<tr><td>3. Residential – High Density</td><td>55
60</td><td>10 p.m. – 7 a.m.
7 a.m. – 10 p.m.</td></tr>
<tr><td>4. Commercial</td><td>60
65</td><td>10 p.m. – 7 a.m.
7 a.m. – 10 p.m.</td></tr>
<tr><td>5. Industrial (P-D-I)</td><td>60
65</td><td>10 a.m. – 7 p.m.
7 a.m.- 10 p.m.</td></tr>
<tr><td>6. Industrial (P-I)</td><td>70
70</td><td>10 p.m. – 7 a.m.
7 a.m. – 10 p.m.</td></tr>
</table>
(a) Correction for time characteristics
<table>
<tr><th colspan="4">Exterior Noise Excursions</th></tr>
<tr><th>Case</th><th>Min/hr</th><th colspan="2">dBA</th></tr>
<tr><td>(1)</td><td>30</td><td>L_{50}</td><td>dBA+0</td></tr>
<tr><td>(2)</td><td>15</td><td>L_{25}</td><td>dBA+5</td></tr>
<tr><td>(3)</td><td>5</td><td>$L_{8.5}$</td><td>dBA+10</td></tr>
<tr><td>(4)</td><td>1</td><td>$L_{1.7}$</td><td>dBA+15</td></tr>
<tr><td>(5)</td><td>-</td><td>--</td><td>dBA+20</td></tr>
</table>
The noise ordinance includes a guideline for the maximum period that the level of noise could exceed the reference decibel noise level. Using the reference noise levels prescribed in § 4-24.301 “Exterior Noise Standards”, the table in § 4-24.401 specifies that the allowable accumulation of time that measured noise levels could exceed the standard would be 30 minutes. The total time that noise could exceed the reference noise level plus 5 BA is 15 minutes. For example, if the nighttime standard for low density housing is 45 dBA, the cumulative time noise could exceed 45 dBA is 30 minutes. And within that time, the maximum time noise could exceed 50 dbA (45+5) is 15 minutes. The 5 minute maximum is 55 dBA, capped with the 1 minute limit of 60 dBA (45+15). At no time can the noise exceed 65 dBA (45+20).
</td></tr>
</table>

FEDERAL

Under the Occupational Safety and Health Act of 1970 (OSHA) (Cal. Code of Regs., tit. 29, § 651 et seq.), the Department of Labor, Occupational Safety and Health Administration, (OSHA) adopted regulations (29, California Code of Regulations, § 1910.95) designed to protect workers against the effects of occupational noise exposure. These regulations list permissible noise exposure levels as a function of the amount of time during which the worker is exposed (see **Noise Appendix A, Table A4** immediately following this section). The regulations further specify a hearing protection program that involves monitoring the noise to which workers are exposed, assuring that workers are made aware of overexposure to noise, and periodically testing the workers' hearing to detect any degradation.

Guidelines are available from the U.S. Environmental Protection Agency (USEPA) to assist state and local government entities in developing state and local LORS for noise. Because there are existing local LORS that apply to this project, the USEPA guidelines are not applicable.

There are no federal laws governing off-site (community) noise.

The Federal Transit Administration (FTA) has published guidelines for assessing the impacts of ground-borne vibration associated with construction of rail projects, which have been applied by other jurisdictions to other types of projects. The FTA-recommended vibration standards are expressed in terms of the "vibration level," which is calculated from the peak particle velocity measured from ground-borne vibration. The FTA measure of the threshold of perception is 65 vibrational decibels, which correlates to a peak particle velocity of about 0.2 inches per second (in/sec).

STATE

California Government Code section 65302(f) encourages each local governmental entity to perform noise studies and implement a noise element as part of its general plan. In addition, the California Office of Planning and Research has published guidelines for preparing noise elements, which include recommendations for evaluating the compatibility of various land uses as a function of community noise exposure. The city of Redondo Beach created a Noise Element that was updated in 1993 (city of Redondo Beach 1996). Because of the proximity of the project to the municipal boundary, the original city of Hermosa Beach 1971 Noise Element is considered in this noise analysis.

The State of California, Office of Noise Control, prepared the Model Community Noise Control Ordinance, which provides guidance for acceptable noise levels in the absence of local noise standards. This model also defines a simple tone, or "pure tone," as one-third octave band sound pressure levels that can be used to determine whether a noise source contains annoying tonal characteristics.

The California Occupational Safety and Health Administration (Cal-OSHA) has promulgated occupational noise exposure regulations (Cal. Code of Regs., tit. 8, §§ 5095-5099) that set employee noise exposure limits. These standards are equivalent to federal OSHA standards (see **Noise Appendix A, Table A4**).

LOCAL

City of Redondo Beach LORS

The project is located within the city limits of Redondo Beach, an incorporated city within Los Angeles County. The city of Redondo Beach Title 4, Chapter 24 Noise Regulation applies to this project. These municipal code references are listed above in **Noise Table 1**.

The criteria for operating conditions are defined in the following sections of the city's noise regulation:

§ 4-24.301 provides noise limits for exterior locations. § 4-24.301 limits exterior noise levels in medium density residential neighborhoods, similar to those surrounding the project site, to a nighttime level of 50 dBA L_{50} and a daytime level of 55 dBA. This requirement applies to RBEP.

For construction activities, the noise regulation specifies the following:

§ 4-24.503 Construction Noise:

(a) Prohibits construction between 6 p.m. and 7 a.m. on Mondays through Fridays. Prohibits construction between 5 p.m. and 9 a.m. on Saturdays. Prohibits construction on Sundays and designated holidays.

(b) Building Official delegated to issue after hour construction permit in the case of emergency; notification of residential occupants within 300 feet when feasible;

(c) Building Official may determine residential occupants' well-being is not impaired and allow construction in prohibited periods in (a) above;

(d) "Construction activity" means erection, excavation, demolition, alteration, or repair of any building.

City of Hermosa Beach LORS

Although the RBEP is located within the city of Redondo Beach, there are noise receptors in the adjoining city of Hermosa Beach that are located in the vicinity of the project site. For this reason, this noise analysis considers noise regulations adopted by the city of Hermosa Beach, including Chapter 8.24, Noise Control, and the General Plan, Noise Element.

Similar to Redondo Beach's noise LORS, the Noise Element of Hermosa Beach General Plan limits exterior noise levels in medium density residential receptors, similar to those immediately north of RBEP site, to 55 dBA (day and night).

For construction activities, Hermosa Beach Municipal Code provides the following guidance:

§ 8.24.050 Construction

A. Permissible hours of construction: 8 am – 6 p.m. Monday through Friday, 9 a.m. through 5 p.m. Saturday, all hours on Sunday and designated holidays are prohibited;

B. Special circumstances. Upon written application, Building Official may grant permission if

   1. Work performed in public interest;

   2. Unusual, unjust or unreasonable delay would result;

C. Utilities exemption, Public Utilities Commission jurisdiction;

D. City exemption, City public works;

E. Owner exemption, 10 a.m. through 2 p.m. on Sundays and designated holidays.

Because RBEP would be located within the boundaries of the city of Redondo Beach, project construction and demolition must comply with the Redondo Beach LORS; that is, construction would be allowed between 7 a.m. and 6 p.m. on Mondays through Fridays, between 9 a.m. and 5 p.m. on Saturdays, and prohibited on Sundays and designated holidays.

SETTING

The proposed RBEP project site is located on a 50-acre site in a general use industrial area within Redondo Beach city limits and within the existing AES Redondo Beach Generation Station. Within the 50 acre site, the 2.2 acre switchyard would remain unchanged and 16.8 acres would be set aside for construction laydown and parking. The new power block would take up 10.5 acres, reducing the 20 acre footprint of the existing plant by 9.5 acres.

The RBEP site would be bounded by Harbor Boulevard on the west and by residential neighborhoods along Herondo Street on the north. Herondo Street forms the city limits between Redondo Beach and Hermosa Beach. Mixed use occupancies on North Francesca Avenue extend easterly, moving toward predominantly residential areas beyond North Catalina Avenue on the southeast boundary (RBEP 2012a, AFC §§ 2.0, 5.7)

RBEP would demolish the remnants of existing Units 1 through 4, the decommissioning and demolition of Units 5 through 8 and auxiliary boiler No. 17, replacing them with a three-on-one combined cycle power block. The new facility comprises three natural gas turbines, three steam turbine generators, three supplemental-fired heat recovery steam generators (HRSGs), and associated air cooled condenser (ACC). The new power block would have a gross generating capacity of 511 MW. The combined demolition and construction work would last five years (RBEP 2012a, AFC §§ 1.0, 2.1, 5.7.3.2.1).

Placement of the new power block is critical to the integration of the project within the 50-acre site (RBEP 2012a, AFC §§ 2.1, 2.1.1, Figure 2.1-1). The existing switchyard provides a buffer for the new plant from residential areas along Herondo Street.

Placement of the power block immediately west of North Francesca commercial and mixed use spaces, as proposed in the Application for Certification (AFC), provides a buffer from the residential areas within the N. Catalina and Pacific Coast Highway triangle. Maximizing the setback from the harbor reduces the vertical impact of the new power block to the receptors at the harbor. Placing the power block in the center or center-western portion of the site, as an alternative to its proposed location, may help to slightly reduce the noise impacts at the residential receptors across the street on Herondo Street. But, as currently configured, the power block would be partially blocked by the adjacent three-story commercial/office building on N. Catalina Ave. This building would provide this partial blockage from project noise for some of the residential receptors east of N. Catalina. If the power block is moved to the center or center-western of the site, this effect would also move in the same direction; it may provide some blockage for other residential receptors across N. Catalina, but it would take away the benefit for the others.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHODS AND THRESHOLDS FOR DETERMINING SIGNIFICANCE

California Environmental Quality Act

The California Environmental Quality Act (CEQA) requires that significant environmental impacts be identified and either eliminated or mitigated to the extent feasible. Section XI of Appendix G of CEQA’s guidelines (Cal. Code of Regs., tit.14, Appendix G) describes some characteristics that could signify a potentially significant impact. Specifically, a significant effect from noise may exist if a project would result in:

1. exposure of persons to, or generation of, noise levels in excess of standards established in the local general plan or noise ordinance, or applicable standards of other agencies;

2. exposure of persons to or generation of excessive ground borne vibration or ground borne noise levels;

3. substantial permanent increase in ambient noise levels in the project vicinity above levels existing without the project; or

4. substantial temporary or periodic increase in ambient noise levels in the project vicinity above levels existing without the project.

Staff, in applying Item 3 above to the analysis of this and other projects, has concluded that a potential for a significant noise impact exists where the noise of the project plus the background exceeds the background by more than 5 dBA at the nearest sensitive receptor, including those receptors that represent the area’s minority population.

Staff has concluded that an increase in background noise levels up to and including 5 dBA in a residential setting is insignificant. An increase of more than 10 dBA, however, is clearly significant. An increase of between 5 and 10 dBA should be considered adverse, but could be either significant or insignificant, depending upon the circumstances of a particular case.

Factors to be considered in determining the CEQA significance of an adverse impact as defined above include:

1. the resulting noise level[1];
2. the duration and frequency of the noise;
3. the number of people affected; and
4. the land use designation of the affected receptor sites.

Noise due to construction activities is usually considered to be less than significant in terms of CEQA compliance if:

- the construction activity is temporary; and
- the use of heavy equipment and noisy[2] activities is limited to daytime hours.

Staff uses the above method and threshold to protect the most sensitive populations, including the area's minority population. For purposes of evaluating impacts on residential uses, the project noise is compared with measured nighttime ambient noise levels, when residents are trying to sleep.

Ambient Noise Monitoring

In order to establish a baseline for the comparison of predicted project noise with existing ambient noise, the applicant has presented the results of an ambient noise survey, a long-term survey taken on August 23-31, 2011 (RBEP 2012a, AFC § 5.7.3.2, Appendix 5.7A, Table 5.7A-1 for M1 and Table 5.7A-2 for M2). This noise survey monitored existing noise levels at two locations, labeled M1 and M2, shown below in **Noise Figure 1**.

Although measurement methods were deemed appropriate and complete, it was staff's position that the placement of receptors M1 and M2 did not provide a clearly assignable representation of the noise sensitive areas that predominated the northerly and easterly sides of the new plant, i.e., along Herondo Street, North Catalina and Beryl. Therefore, staff requested, and the applicant agreed to take, additional baseline noise measurements at the locations designated M3 and M4 shown in **Noise Figure 1**, and **Noise Table 2** (Responses to Data Requests 26-28 Revision 2, Set 1R, Tables DR26-2 through DR26-4, TN 202364). This ambient noise survey was conducted in the period between April 7 and April 8, 2014.

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[1] For example, a noise level of 40 dBA would be considered quiet in many locations. A noise limit of 40 dBA would be consistent with the recommendations of the California Model Community Noise Control Ordinance for rural environments and with industrial noise regulations adopted by European jurisdictions. If the project would create an increase in ambient noise no greater than 10 dBA, the project noise level would not be significant if the resulting noise level does not exceed 40 dBA.
[2] Noise that draws legitimate complaint. For definition of "legitimate complaint", see the footnote in Condition of Certification **NOISE-4**.

These surveys were performed using industry accepted equipment and techniques. During these surveys, the existing Redondo Beach Generating Station (RBGS) operated for a substantial period of time during the surveys, but at various power ratings. Based on staff's examination of these surveys, RBGS did not appear to substantially elevate the average ambient baseline levels at the project's sensitive noise receptors during the critical times, the quietest nighttime hours.[3] Staff derived the average L_{eq} values for use as the reference metric for daytime baseline noise and quietest four-hour consecutive average L_{eq} and L_{90} for nighttime comparison. The derived values are outlined in **Noise Table 2** below:

Noise Table 2
Sensitive Receptor Summary[4]

1	2	3	4	5	6	7
Receptor	**Description**	**L_{eq} Daytime Average dBA**	**L_{eq} Nighttime Average dBA**	**L_{90} Nighttime Lowest 4-hr Avg. dBA**	**Construction Distances To Power Block (feet)**	**Demolition Distances Units 5-8 (feet)[5]**
M1	Best Western Motel W. Beryl & Harbor Dr.	58	57	56	1,500	1,200
M2	3-Story Residential Harbor Drive & Herondo Street	60	57	55	1,200	600
M3	201 Herondo Street. Residence	64	57	49	1,200	1,600
M3a	*Proxy Receptor: Herondo Street Closest to Power Block. Use M3 Data.*	*64*	*57*	*49*	*850*	*1,100*
M4	504 N. Broadway Beryl and Broadway Streets	59	51	42	1,400	1,800

A proxy receptor designated M3a has been added to account for the residential housing located closer to the proposed project site than the measuring receptor M3 but would have similar ambient noise characteristics. The proxy receptor point would reflect the more stringent construction and operational conditions because of its proximity to the power block.

[3] Not all elevated ambient noise levels were due to RBGS' operation. Staff has used an average of the lowest ambient noise levels at the noise-sensitive receptors for nighttime comparison. During the nighttime hours, RBGS was either shut down, or operated at relatively low power ratings that resulted in only small increases in the average ambient levels. In general, there are various other noise sources in the area that influence the baseline levels, such as office/commercial facilities, traffic on roadways, and other human activities.
[4] Sources: RBEP 2012a, AFC § 5.7.3.2, Appendix 5.7A; and Responses to Data Requests 26-28 Revision 2, Set 1R
Readings for M1 and M2 were based on multi-day, long term measurements. Readings for M3 and M4 were based on long term measurements during the night and 15-minute short term measurements during the day.
[5] Sources: AFC Figure 2.1-2 & **Noise Figure** 1 below

DIRECT IMPACTS AND MITIGATION

Noise impacts associated with the project can be created by construction activities and normal operation of the project.

Construction Impacts and Mitigation

Construction noise is usually a temporary phenomenon where construction extends one to two years. The combined demolition of the existing units and construction of the RBEP project is expected to be typical of similar projects in terms of equipment used and types of activities, but would have a longer than normal schedule of approximately five years (RBEP 2012a, AFC § 5.7.3.2.1). The five-year schedule goes beyond what is normally considered temporary. Over the course of this period, various discrete activities would occur concurrently, creating a cumulative noise effect. Staff has identified that the phase when the demolition of existing Units 5 through 8 and construction of the power block would occur in the 1st and 2nd quarters of 2019 (see **Noise Table 3** below) is when noise levels are most likely to peak.[6] See **Noise Table 3** for project activities schedule.

Noise Table 3
Project Activities Schedule

Years	**2016**				**2017**				**2018**				**2019**				**2020**			
Quarters	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**	**Q1**	**Q2**	**Q3**	**Q4**
Demolition Units 1-4 (major equipment)																				
Demolition Units 5-8																				
Construction Power Block																				
Relocate Whaling Wall																				

Source: Staff derived this table from AFC § 1.4, Table 1.4-1

Compliance with LORS

Construction of an industrial facility such as a power plant is typically noisier than permissible under standard noise ordinances that apply to plant operations. In order to allow the construction of new facilities, construction noise during certain hours of the day is commonly exempt from enforcement by local ordinances. The applicable local noise LORS do not limit the loudness of construction noise, but staff compares the projected noise levels with ambient levels (please see the following discussion under CEQA Impacts).

Where circumstances require construction activity to proceed outside the allowable hours, city of Redondo Beach noise regulation § 4-24.503(b) & (c) gives the building

[6] Due to the expected volumes of heavy equipment and activities, the combined noise levels form demolition of Units 5-8 and construction of power block occurring concurrently would be higher than or equal to the combined levels from concurrent occurrences of demolition of Units 5-8 and relocation of the Whaling Wall.

official or officer the authority to issue a permit for construction outside the approved hours, where conditions warrant. Because the Energy Commission has permitting jurisdiction over this project, it must take the responsibility of fulfilling the building officials rule in ensuring that such an activity is managed in a manner to ensure any significant noise impacts at the surrounding communities are mitigated to below a significance level, in compliance with CEQA. This has been done in this analysis; please see the following discussion under CEQA Impacts.

The applicant commits to performing noisy construction work during the times specified in the city of Redondo Beach noise regulation; that is: 7 a.m. to 6 p.m. on Mondays through Fridays and 9 a.m. to 5 p.m. on Saturdays. To ensure this requirement is met, staff proposes Condition of Certification **NOISE-6**, Construction Noise Restrictions, which restricts construction to those times. Therefore, the noise impacts of the RBEP project construction activities would comply with the noise LORS.

CEQA Impacts

Since construction noise typically varies with time, it is most appropriately measured by and compared with the L_{eq} metric.

Staff has calculated the worst-case construction noise levels at the nearest residential receptors. They range between 63 and 68 dBA and are summarized below in **Noise Table 4A**. These levels are from the loudest construction phase expected, when the schedules for the demolition of the existing Units 5 through 8 and the construction of the power block occur concurrently in the 1st and 2nd quarters of 2019 as shown in **Noise Table 3**. Staff has used this worst-case scenario to evaluate the construction impacts at the noise-sensitive receptors.

Noise Table 4A
Predicted Daytime Construction Noise Levels
Worst Case: 1st and 2nd Quarters of 2019

	Daytime (L_{eq})						
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
Receptor	**Daytime Ambient Noise L_{eq} (dBA)**	**Daytime Construction Distance Power Block (feet)[7]**	**Daytime Construction Noise[8] (dBA)**	**Daytime Demolition Distance (feet)[7]**	**Daytime Demolition Noise[9] (dBA)**	**Daytime Cumulative Noise (Col. 4+6+2) (dBA)**	**Daytime Change (Col. 7-2) (dBA)**
M1	**58**	**1,500**	**59**	**1,200**	**61**	**64**	**+6**
M2	**60**	**1,200**	**61**	**600**	**66**	**68**	**+8**
M3a	**64**	**850**	**63**	**1,100**	**61**	**68**	**+4**
M4	**59**	**1,400**	**59**	**1,800**	**57**	**63**	**+4**

Staff typically performs further examination to determine if a “temporary” increase of above 10 dBA in existing “daytime” ambient noise levels would create a significant impact. Considering the five-year period of construction for RBEP, as opposed to the

[7] Sources: AFC Figure 2.1-2 & **Noise Figure 1** below
[8] RBEP 2012a AFC Table 5.7-7. Noise levels for construction activity: 71 dBA at 375 feet.
[9] ibid. Nose levels for demolition activities: 71 dBA at 375 feet.

short-term nature (usually less than two years) of a typical power plant construction, staff considers an increase of above 10 dBA at the RBEP's noise-sensitive receptors to be significant during the day, when construction would occur.

The average L_{eq} values for M1 and M2 were derived from the noise measurements taken in August, 2011 and based on values of L_{eq} for the periods of 7 a.m. to 10 p.m. Locations M3a and M4 are short term measurements, taken over a single 24-hour period.

As shown in **Noise Table 4A** above, the coincident demolition and construction noise in the first two quarters of 2019 would increase daytime noise levels at receptor M1 from the current baseline of 58 dBA by 6 dBA to 64 dBA. M2 would increase from 60 to 68 dBA; an 8 dBA increase. M3a would increase from 64 to 68 dBA; a 4 dBA increase. M4 would increase from 59 to 63 dBA; a 4 dBA increase. These daytime increases fall in 4-8 dBA where the characteristic construction activities are variable and intermittent. Both noise regulations (Redondo Beach and Hermosa Beach) recognize the tolerance for intermittent daytime construction noise. Although adverse, these increases would not be considered significant, because they would be below 10 dBA. Please note that the above increases of up to 8 dBA are expected to occur in 2019. During the rest of the construction schedule, the range of increases would be less, by approximately 1-3 dBA.

Staff proposes Condition of Certification **NOISE-6** (Construction Noise Restrictions), which restricts construction (except concrete pour) to daytime and would require construction equipment and trucks to avoid generating excessive and unnecessary noise.

Nighttime Concrete Pouring Activities

For RBEP, it is inevitable that concrete pour would take place during nighttime (10 p.m. – 7 a.m.). For example, a monolithic pour of equipment foundations at the power block may require a full 24 hour cycle to complete. Ambient temperatures at night improve the curing and improve strength. When the noise generated by these kinds of activities technically exceed: 1) LORS limits specified in the Redondo Beach noise ordinance or the measured ambient limit already measured to exceed the stipulated ordinance limit and 2) CEQA limit of significance of 5 dBA, mitigation measures must be implemented.

For nighttime conditions at RBEP, an exception must be requested by the project owner to the CPM to handle a monolithic concrete pour at the power block that would require continuous 24-hour operation. As shown in **Noise Table 4B** below, ambient L_{eq} measurements are used to evaluate the impact of nighttime construction activities, instead of ambient L_{90} measurements used for steady-state operational noise, because the L_{eq} metric correlates to the variable nature of construction-related noise.

Noise Table 4B
Predicted Nighttime Concrete Pour Noise Levels

	Nighttime (L_{eq})				
1	2	3	4	5	6
Receptor	Nighttime Ambient Noise L_{eq} (dBA)	Nighttime Concrete Distance Power Block (feet)[10]	Nighttime Concrete Noise[11] L_{eq} (feet)	Nighttime Cumulative Noise (2+4) (dBA)	Nighttime Change (6-2) (dBA)
M1	**57**	**1500**	**48**	**58**	**+1**
M2	**57**	**1200**	**50**	**58**	**+1**
M3a	**57**	**850**	**53**	**58**	**+1**
M4	**51**	**1400**	**49**	**53**	**+2**

As seen in **Noise Table 4B** above, concrete pouring would result in increases of 1-2 dBA in nighttime ambient levels at M1, M2, M3a, and M4. Because, staff regards an increase of up to 5 dBA as a less-than-significant impact, this nighttime activity would be less than significant. Also, concrete pour would be required for only some of the major equipment (mainly, the gas turbines, HRSGs, and steam turbines), and the entire pour would be expected to last no more than two weeks. Nevertheless, the sensitivity to nighttime construction activities in the surrounding residential areas should not be undermined. Therefore, the applicant should be prepared to take mitigation measures quickly. So, the potentially excessive noise levels caused by nighttime concrete pour need to be mitigated by anticipating and controlling noise. To ensure nighttime noise from concrete pour would be effectively managed to reduce the impacts to less than significant, staff proposes Condition of Certification **NOISE-9** (Concrete Pour Noise Control), which would require this noise not to exceed the nighttime ambient levels by more than 5 dBA at M1, M2, M3a, and M4.

A host of appropriate mitigation measures are available to accomplish this. Examples include:

- Portable partitions that can be placed so that noise receptors are protected
- Encasing the transfer (concrete) pump boom arm to reduce effect of pump pulsing
- Repair of defective mufflers and tightening of rattling components
- Arranging work sites to avoid or minimize concrete truck reversing movements (the use of backup alarms), ensuring vehicles enter and exit work sites in a forward direction when possible, and installation of non-tonal and automatically adjusting reversing alarms
- Reorienting noisy equipment to minimize impact to residential receptors
- Using silenced powered equipment and silencing unsilenced powered equipment
- Assuring that vibration is sufficiently isolated, i.e., less than 0.2 in/sec at nearest sensitive receptor.

[10] Sources: AFC Figure 2.1-2 & **Noise Figure 1** below
[11] Ibid. Noise levels for concrete activities: 60 dBA at 375 feet.

NOISE-9 also requires the following:

- Written notification of the initiation and duration of nighttime concrete pouring activities to the CPM and all the residents that could potentially be affected by this work.
- Written notification to the CPM when and if nighttime concrete pour activities could potentially exceed a threshold of ambient noise baseline plus 5 dBA.

Initiating measurements to address complaints, mitigation steps, and resolution would be performed using procedures specified in **NOISE-2** (Noise Complaint Process).

In light of the requirements contained in Conditions of Certification **NOISE-2** and **NOISE-9**, nighttime construction would create a less-than significant impact and satisfy the requirements of the local LORS in ensuring that the peace, comfort, and tranquility of residents would not be impaired (Redondo Beach Municipal Code, § 4-24.503 [c]).

Linear Facilities

Linear facilities proposed by the applicant include the existing 20-inch-diameter natural gas pipeline, an existing water supply pipeline, and existing sewer and storm water pipelines. No new gas, water, or sewer lines would be constructed, unless, as proposed by staff, in lieu of the existing water supply pipeline, a new recycled water supply connecting to the West Basin Municipal Water District is approved by the Energy Commission (see the **SOIL AND WATER RESOURCES** section of this document). Also, a new onsite electric transmission line would be constructed (RBEP 2012a, AFC §§ 1.2, 2.0, 2.1).

Construction of linear facilities typically moves along at a rapid pace, thus not subjecting any one receptor to noise impacts for more than two or three days. Further, construction activities would be limited to daytime hours. To ensure that these hours are, in fact, adhered to, in compliance with the LORS, staff proposes Condition of Certification **NOISE-6** (Construction Noise Restrictions).

Vibration

The only construction operation likely to produce vibration that could be perceived off site would be pile driving. The applicant anticipates that pile driving would be required for construction of the RBEP project (RBEP 2012a, AFC §§ 5.7.3.2.1, 5.7.3.2.2, 5.7.3.2.3, Tables 5.7-8 and 5.7-0). The FTA measure of the threshold of perception is 65 vibrational decibels, which correlates to a peak particle velocity of about 0.2 in/sec (inches per second). Condition of Certification **NOISE-8** (Pile Driving Management) would ensure potential vibrations from pile driving are limited to a peak particle velocity of 0.2 in/sec at the nearest sensitive receptors.

Pile driving could be expected to reach 104 dBA at a distance of 50 feet. The noise level from pile driving at RBEP would thus be approximately 75 dBA at receptor M1, approximately 76 dBA at M2, approximately 79 dBA at M3a, and approximately 75 dBA at M4 (see **Noise Table 5** below).

Noise Table 5
Predicted Pile Driving Noise Levels[12]

1	2	3	4	5	6
Receptor	**Daytime Ambient Noise L_{eq} (dBA)**	**Distance Power Block (feet)**	**Pile Driving Noise Unsilenced (dBA)**	**Daytime Cumulative Unsilenced Pile Drive (Col. 2+4) (dBA)**	**Daytime Change In Noise (Col. 5-2) (dBA)**
M1	**58**	**1,500**	**75**	**75**	**+17**
M2	**60**	**1,200**	**76**	**76**	**+16**
M3a	**64**	**850**	**79**	**79**	**+15**
M4	**59**	**1,400**	**75**	**75**	**+16**

As seen in **Noise Table 5**, the increases in the existing ambient levels at these locations would range 15-17 dBA. These increases confirm that unsilenced pile drivers can cause a significant noise impact at the nearest noise-sensitive receptors. However, several methods are available for reducing noise generated by pile driving. These methods are: (1) the use of pads or impact cushions of plywood; (2) dampened driving, which involves some form of blanket or enclosure around the hammer; and (3) the use of vibratory drivers. These methods can be effective in reducing the noise by 8-15 dBA compared to unsilenced impact drivers.

To ensure that pile driving would be performed in a manner to reduce the potential for any noise complaints, staff proposes Condition of Certification **NOISE-8** (Pile Driving Management), below. **NOISE-8** also requires the project owner to submit to the CPM a description of the pile driving technique to be employed, including calculations showing its projected noise impacts at monitoring locations M1, M2, M3a, and M4. Also to ensure that pile driving would be limited to daytime hours, staff proposes Condition of Certification **NOISE-6** (Construction Noise Restrictions), below.

Worker Effects

The applicant has acknowledged the need to protect construction workers from noise hazards and has recognized applicable LORS that would protect construction workers (RBEP 2012a, AFC §§ 5.7.3.2.3, 5.7.3.3.1, 5.7.6.1.2, 5.7.6.2.1). To ensure construction workers are, in fact, adequately protected, staff proposes Condition of Certification **NOISE-3** (Employee Noise Control Program).

Steam Blows

Typically, the loudest noise encountered during construction, inherent in building any project incorporating a steam turbine, is created by the steam blows. After erection and assembly of the feedwater and steam systems, the piping and tubing that comprise the steam path have accumulated dirt, rust, scale, and construction debris such as slag, weld spatter, dropped welding rods, and the like. If the plant were started up without

[12] Range for noise levels at pile-driving locales calculated by staff, based on a sound power level 104 dBA at 50 feet.

thoroughly cleaning out these systems, all this debris would find its way into the steam turbine, quickly destroying the machine.

In order to prevent this from happening and before the steam system is connected to the turbine, the steam line is temporarily routed to the atmosphere. Traditionally, high pressure steam is then raised in the HRSG or a temporary boiler and allowed to escape to the atmosphere through the steam piping. This flushing action, referred to as a "high pressure steam blow", is quite effective at cleaning out the steam system. A series of short steam blows, lasting two or three minutes each, are performed several times daily over a period of two or three weeks. At the end of this procedure, the steam lines are connected to the steam turbine, which is then ready for operation. Alternatively, high pressure compressed air can be substituted for steam.

High pressure steam or air blows, if unsilenced, can typically produce noise levels as high as 129 dBA at a distance of 50 feet; this would amount to a range of 101-102 dBA at M1 through M4.

Steam blows could be very disturbing at the nearest noise-sensitive receptors, depending on the frequency, duration, and noise intensity of venting. With a silencer installed on the steam blow piping, noise levels are commonly attenuated to 89 dBA at 50 feet. As shown in **Noise Table 6** below, this silenced steam blow would amount to a range of 62-67 dBA at M1 through M4 with a 3-4 dBA increase over the existing ambient levels at these locations; less than significant.

Noise Table 6
Predicted Steam Blows Noise Levels[13]

1	2	3	4	5	6
Receptor	**Daytime Ambient Noise L_{eq} (dBA)**	**Daytime Distance PB-1 (feet)**	**Daytime Steam Blow Noise Unsilenced/ Silenced (dBA)**	**Daytime Cumulative Unsilenced/ Silenced Steam Blow (Col. 2+7) (dBA)**	**Daytime Change In Noise Silenced/Unsilenced (Col. 5-2) (dBA)**
M1	**58**	**1,500**	**100/60**	**62**	**+4**
M2	**60**	**1,200**	**101/61**	**64**	**+4**
M3a	**64**	**850**	**104/64**	**67**	**+3**
M4	**59**	**1,400**	**100/60**	**63**	**+4**

Staff proposes Condition of Certification **NOISE-7** (**Steam Blow Restrictions**) in order to limit steam blow noise to 89 dBA at 50 feet, and to limit this activity to daytime hours.

Traffic Noise during Construction

The number of vehicles required for material delivery and worker commute would increase the traffic on the roadway network around the project. The roadway network around the RBEP project site (Harbor-Herondo-North Catalina-Beryl) is comprised of primary arteries with four-lanes and two directions. These radial arteries are fed and

[13] Range for noise levels at steam blow locales calculated by staff, based on 129 dBA at 50 feet. Muffled steam blow based 89 dBA at 50 feet.

discharged from traffic on the Pacific Coast Highway (PCH). The street volume of these traffic elements has an average daily traffic (ADT) of 10,000 to 20,000.

The increased traffic is summarized in Table 5.12-7 of the AFC (RBEP 2012a, AFC § 5.12). With one exception, the ADT in the roadway network contiguous to the project site (Harbor, Herondo, and North Catalina) would increase by approximately three percent or 342 vehicles for each peak hour period (a.m. inbound and p.m. outbound).

The exception is the increase in traffic along the PCH as the result of the RBEP construction-related traffic, which would be approximately 1 percent.

Along the western RBEP boundary, Harbor Way provides a demarcation from the harbor area, and enables community access along the waterfront. At the south and southeast boundaries are mixed-use residential, single family residential and commercial areas in the city of Redondo Beach which appear to have developed organically over the lifetime of the city. At the northern boundary, single family and planned residential buildings form a boundary with the city of Hermosa Beach.

As explained above, the expected increases in the current ADT on the roadways leading to the project site are in the range of 1 to 3 percent, which would not measurably increase the existing ambient noise levels in the neighboring communities. Therefore, this noise impact would not be significant.

As discussed in the **TRAFFIC AND TRANSPORTATION** section of this document, the project would include a traffic control plan (TCP) as required by Condition of Certification **TRANS-3**. The TCP would restrict the arrival and departure schedules and the designated workforce and delivery routes used for the movement of workers, vehicles, and materials. Specifically, it would require any delivery truck(s) that arrive at the site prior to allowable construction start time (7 a.m. on weekdays and 9 a.m. on Saturdays) to be parked on the project site, and would require a parking/staging plan for all phases of project construction that would prohibit all project-related offsite parking, including delivery trucks.

The applicant has stated that as a part of its TCP, it would prohibit truck idling in the early morning hours prior to the start of construction activities (CEC 2014r). In addition, California Air Resources Board prohibits idling diesel-fueled large trucks (similar to those used to deliver construction materials to the project site) for more than five minutes.[14] The longer a noise source is heard, the more adverse impact it would potentially have. A five-minute limit, as opposed to a longer time limit, or no time limit at all, which may potentially cause a significant effect, is one effective measure to sufficiently reduce the noise impact, while allowing timely delivery of construction material.

In addition, **NOISE-6** would require haul trucks and other engine-powered equipment to be equipped with adequate mufflers and other state-required noise attenuation devices; haul trucks to be operated in accordance with posted speed limits; and truck engine exhaust brake use (jake braking) to be limited to emergencies.

[14] http://www.arb.ca.gov/msprog/truck-idling/factsheet.pdf

Therefore, with staff's proposed conditions of certification, project's traffic-related noise impacts would be less than significant.

Operation Impacts and Mitigation

The primary noise sources of the RBEP project, when operational, would include engine generators and their exhaust stacks, combustion air inlets, gas compressor, ACC (air-cooled condenser), electric transformers, and various pumps and fans. Staff compares the projected project noise with applicable LORS. In addition, staff evaluates any increase in noise levels at sensitive receptors due to the project in order to identify any significant adverse impacts.

As the first step, the applicant has outlined design measures to control and mitigate noise generated by operational elements of the project. Using a computer-generated noise model,[15] the applicant has modeled operating conditions that include mitigation measures designed to control plant noise (RBEP 2012a, § 5.7.3.3.3). They include:

- Partially enclosed combustion turbine generators and HRSGs
- Acoustical building for steam turbine generator
- Enhanced stack silencing
- Larger and lower noise ACC fans
- Lagging or enclosing of the ACC ductwork
- Low-noise transformers and/or noise barriers around transformers
- Acoustical boiler feed pump enclosures
- Lagging of high-noise piping
- Steam vent silencers
- Low noise valves
- Large noise barriers, i.e., relocated Whaling Wall
- Acoustical gas pressure enclosures

In addition, the project would avoid the creation of annoying tonal (pure-tone) noises by balancing the noise emissions of various power plant features during plant design (RBEP 2012a, AFC § 5.7.3.3.3). Direct atmospheric steam releases have the potential to cause annoying tonal noise. Releasing steam directly into the atmosphere while stepping down electric generation would not occur in the same fashion as the existing boiler systems operating at Redondo Beach Generating Station. In modern combined cycle power plants, such as RBEP, flash tanks and direct condenser bypass are used to condense the excess steam to liquid condensate instead of direct steam release.

The applicant performed the noise modeling to determine the project's noise impacts on sensitive receptors M1 through M4 ((RBEP 2012a, AFC § 5.7.3.3.3; and RBEP 2012, Data Responses, Set 4 dated 3/26/14, Fig. DR 72-1), which illustrate the pattern of

[15] CADNA/A noise model, DataKustik GmbH, Munich 1996. Sound propagation factors adopted under ISO standard 9613-2 "Acoustics-Sound Attenuation during Propagation Outdoors"

noise emitted from the proposed project. See **Noise Figure 1** showing the operational plant noise contour relative to receptors M1 through M4. The intersection of the contour lines and measurement stations M1 through M4 is tabulated in **Noise Table 7** and **Noise Table 8**, below.

Compliance with LORS

Tabulation of modeling is in **Noise Table 7** below. The LORS' maximum exterior level that is considered acceptable for medium density residential areas, similar to those in the project area, is 55 dBA for daytime (7 a.m. – 10 p.m.) and 50 dBA for nighttime (10 p.m. – 7 a.m.). From **Noise Figure 1**, the isopleth[16] contour indicates that the plant's generated noise level is 43 dBA at M1 and 44 dBA at M2, which satisfy both the daytime and nighttime noise limits of 55 dBA and 50 dBA, respectively, as specified in the city of Redondo Beach noise regulation.

Noise Table 7
Predicted Operational Noise Levels at Sensitive Residential Receptors and LORS Limits

		Daytime (L_{eq})			Nighttime (L_{90})			
1	2	3	4	5	6	7	8	9
Receptor	Plant Noise (dBA)	Redondo Beach LORS Limit Daytime (dBA)	Hermosa Beach LORS Limit Daytime (dBA) [a]	Project in Excess of Day-time LORS (dBA)	Redondo Beach LORS Limit Nighttime (dBA)	Hermosa Beach LORS Limit Nighttime (dBA) [a]	Project in Excess of Nighttime LORS (dBA)	LORS Compliance (Yes/No)
M1	43	55	N/A	0	50	N/A	0	Yes
M2	44	55	N/A	0	50	N/A	0	Yes
M3a	50	55	55	0	50	55	0	Yes
M4	45	55	N/A	0	50	N/A	0	Yes

a. Hermosa Beach LORS are identified for comparison only.

With a modeled plant operating noise level of 50 dBA at M3a and 45 dBA at M4, these noise levels meet the 55 dBA daytime and 50 dBA nighttime limits, as specified in the city of Redondo Beach noise regulation.

Because the noise receptors represented by M3a are located in Hermosa Beach, staff considers the Hermosa Beach's noise LORS at these receptors. As seen in **Noise Table 7** (Column 2 compared to Columns 4 and 7), the project's operating noise levels at M3a would comply with the maximum allowable level of 55 dBA as set forth in the Noise Element of Hermosa Beach General Plan.

[16] Isopleth lines represent levels of noise that emanate from a noise source, reducing in intensity as the distance to the source increases. **Noise Figure 1** shows how the succeeding layers of noise are affected by terrain, topography and structures located in the noise path.

To ensure that the project would comply with the above noise level limits, staff proposes Condition of Certification **NOISE-4** (Operational Noise Restrictions). This condition of certification requires an operational noise survey to ensure project compliance. Similar to construction compliance and in addition to **NOISE-4**, staff proposes Condition of Certification **NOISE-2** (Noise Complaint Process), which would establish a noise complaint process requiring the applicant to resolve any problems that may be caused by operational noise.

With implementation of these conditions of certification, noise due to project operation would comply with the applicable LORS.

CEQA Impacts

Power plant noise is unique. A power plant under base load may operate essentially as a steady, continuous, broadband noise source. Under load following duty, the power plant noise may be intermittent and start-up at random times for a system designed as load follower. This would be more noticeable at nighttime when background noises are particularly low. Where power plant noise is audible, it tends to define the background noise level. For this reason, and because power plant operational noise is steady in nature (as opposed to the intermittent and variable nature of noise from construction), staff typically compares projected power plant noise to existing ambient background (L_{90}) noise levels at affected sensitive receptors. If this comparison identifies a significant adverse impact, then feasible mitigation must be applied to the project to either reduce or remove that impact.

In many cases, a power plant operates around the clock for much of the year. RBEP is expected to operate as an intermediate load and peaking facility and it could likely operate at night, which could affect nearby residences if the noise impacts are left unmitigated. For residential receptors, staff evaluates project noise emissions by comparing them with nighttime ambient background levels; this evaluation assumes that the potential for public annoyance from power plant noise is greatest at night when people are trying to sleep. Nighttime ambient noise levels are typically lower than daytime levels and differences in background noise levels of 5 to 10 dBA are common. Staff believes it is prudent to average the lowest nighttime hourly background noise levels in terms of the L_{90} metric, which exceeds measured noise 90 percent of the time, to arrive at a reasonable baseline for comparison with the project's predicted noise level. Using this comparison, adverse impacts on residential receptors can be identified by comparing predicted power plant noise levels with the nighttime ambient background noise levels at the nearest sensitive residential receptors.

The applicant has predicted operational noise levels by modeling the plant operation (See **Noise Fig.1**), which are summarized in **Noise Table 8** for receptors M1 through M4.

Noise Table 8
Predicted Operational Noise Levels at Sensitive Residential Receptors and CEQA Limits

1	2	6	7	8	9
Receptor	**Plant Noise (dBA)**	**Measured Ambient Nighttime Lowest 4-hr Avg. (dBA)**	**Cumulative Nighttime Noise Level (dBA)**	**Change in Nighttime Ambient (dB)**	**CEQA Compliance (Yes/No)**
M1	**43**	**56**	**56**	**0**	**Yes**
M2	**44**	**55**	**55**	**0**	**Yes**
M3a	**50**	**49**	**53**	**+4**	**Yes**
M4	**45**	**42**	**47**	**+5**	**Yes**

An increase of above 5 dBA in existing nighttime ambient levels at residential receptors is significant. Combining the plant noise levels, the four values shown in Column 2 of **Noise Table 8** are 43 dBA (M1), 44 dBA (M2), 50 dB (M3a) and 45 dBA (M4). The sound power level from the new plant is so low that the cumulative noise levels remain unchanged except for M3a and M4. M3a has a nighttime change of +4, less than significant. The increase at M4 is 5 dBA, also less than significant.

In order to verify compliance with the allowable noise limits, staff proposes Condition of Certification **NOISE-4** (Operational Noise Restrictions) to ensure that the changes in noise levels due to project operation would neither cause the cumulative effect of operational noise to exceed the LORS limits nor increase noise above the 5 dBA (nighttime) significance threshold at the nearest sensitive receptors. **NOISE-4** requires an operational noise survey to ensure this, when the plant achieves a minimum of 85 percent of its rated capacity (between 85 and 100 percent of the rated capacity, the change in the overall plant noise would not be measurable at the project's noise sensitive receptors).

Tonal Noises

One possible source of annoyance could be strong tonal noises. Tonal noises are individual sounds (such as pure tones) which, while not louder than permissible levels, stand out in sound quality. The applicant plans to address overall noise in project design, and to take appropriate measures, as needed, to eliminate tonal noises as possible sources of annoyance (RBEP 2012a, AFC § 5.7.3.3.4).

Direct atmospheric steam release has the potential to cause annoying tonal noise. Releasing steam directly into the atmosphere while stepping down electric generation would not occur in the same fashion as the existing boiler systems operating at Redondo Beach Generating Station. In modern combined cycle power plants, such as RBEP, flash tanks and direct condenser bypass are used to condense the excess steam to liquid condensate instead of direct steam release.

To ensure that tonal noises do not cause public annoyance, staff proposes Condition of Certification **NOISE-4**, which would require mitigation measures, if necessary, to ensure the project would not create tonal noises.

Effects of Topography and Weather on Noise

The impact of topography and weather on transmission of noise was discussed at the Data Request Workshop conducted on December 5, 2013. At this meeting, the applicant stated that it accounted for the effect of weather inversion in its operational noise modeling, but did not have the opportunity to discuss this issue with staff. Subsequently, staff issued data requests providing more detail including the effect of temperature inversions within 0.5-1.0 mile of the power block (RBEH 2012, Data Request 69 dated 12/20/14) and the effect of changes of elevation on noise transmission (ibid., Data Request 70).

The applicant provided responses to these two queries on January 2, 2014 (RBEP 2012 Data Responses, Set 2, Responses to Data Requests 67-70). Regarding the effects of temperature inversions within a 0.5-1.0 mile range (DR-69), the applicant stated that the operational plant modeling accounted for the impact of inversion conditions, quoting International Organization for Standardization (ISO) 9613-2 *Acoustics – Sound Attenuation During Propagation Outdoors* (ISO, 1996): "These (modeling) equations hold, equivalently, for average propagation under a well-developed moderate ground-based temperature inversion . . ."   Because the sound levels without inversion conditions would be lower than with temperature inversion conditions, the worst case temperature inversion conditions are accommodated by inclusion. Since operational plant modeling closer than the 0.5-1.0 mile range include temperature inversion conditions, modeled conditions beyond 1.0 mile would also account for a temperature inversion at the greater range.

Regarding the impact of changes in elevation within the proximity of the power block, the applicant responded to Data Request 72 (RBEB 2012, Data Responses, Set 4, Responses to Data Request 72, March 26, 2014) that the presumed worse case condition is the unobstructed conditions of low or even elevations within RBEP's acoustical area of influence. Higher elevations surrounding the project site would obstruct the radiation of noise. For this reason the noise contours shown in Figure DR 72-1 (See **Noise Figure 1**) represent the bounding conditions for modeling any elevated topography surrounding the proposed plant site.

Staff concludes that the applicant's responses to the effects of temperature inversions (DR-69), elevated topography (DR-70), and the operational plant noise modeling (DR-72) adequately include the weather and topographic conditions which might influence the noise conditions surrounding RBEP.

Linear Facilities

All water pipes and gas pipes would be underground and therefore silent during plant operation. Noise effects from electrical interconnection lines typically do not extend beyond the lines' right-of-way easements and would be inaudible to receptors.

Vibration

Vibration from an operating power plant could be transmitted through two primary means: ground (ground-borne vibration), and air (airborne vibration).

The operating components of a three-on-one combined cycle power plant, such as RBEP, consist of high-speed gas turbines and steam turbines, HRSGs, compressors, and various pumps. All of these pieces of equipment must be carefully balanced in order to operate; permanent vibration sensors are attached to the turbines and generators. Gas turbine generator facilities using the Mitsubishi MHI 501 system have not resulted in ground-borne or airborne vibration impacts. Staff agrees with the applicant that ground-borne vibration from the RBEP project would be undetectable by any likely receptor.

Airborne vibration (low frequency noise) can rattle windows and objects on shelves, and can rattle the walls of lightweight structures. The RBEP's chief source of airborne vibration would be the gas turbines' exhaust. In a modern power plant such as the RBEP, however, the exhaust must pass through the selective catalytic reduction (SCR) modules and the HRSG stack silencers before it reaches the atmosphere. The SCRs act as efficient mufflers. The combination of SCR units and stack silencers ensure that RBEP would not cause perceptible airborne vibration effects.

Worker Effects

The applicant acknowledges the need to protect plant operating and maintenance workers from noise hazards and commits to compliance with all applicable LORS (RBEP 2012a, AFC § 5.7.3.3.1). Signs would be posted in areas of the plant with noise levels exceeding 85 dBA (the level that OSHA recognizes as a threat to workers' hearing), and hearing protection would be required and provided. To ensure that plant operation and maintenance workers are adequately protected, staff proposes Condition of Certification **NOISE-5**, below. For further discussion of proposed worker safety conditions of certification, please see **WORKER SAFETY AND FIRE PROTECTION** section of this document.

CUMULATIVE IMPACTS AND MITIGATION

Section 15130 of the CEQA guidelines (Cal. Code of Regs., tit. 14) requires a discussion of cumulative environmental impacts. Cumulative impacts are two or more individual impacts (from existing and/or reasonably foreseeable projects) that, when considered together, compound or increase other environmental impacts. CEQA guidelines require that this discussion reflect the severity of the impacts and the likelihood of their occurrence, but do not need to provide as much detail as the discussion of impacts solely attributable to the project.

Staff has compiled a list of 50 projects which are, by proximity (six mile radius), size and possible construction schedule, candidates for consideration with RBEP for cumulative effect. Because of the effect of noise propagation, and population and terrain in the project area, staff believes that generated noise would only have a measureable impact within one mile of the project site. This reduces perspective projects to four:

1. Greenstreet Project: 20,000 square feet commercial office space, 901 North Catalina, Redondo Beach. 0.6 miles.

2. Shade Hotel: 54-room hotel, 655 North Harbor Drive, Redondo Beach. 0.3 miles.

3. E&B Oil Development (E&B): Petroleum well drilling and operation, 555 – 6th Street, Hermosa Beach.0.7 miles.

4. Manhattan Beach Civic Center: Relocation of 90,000 square feet municipal facility, Valley Drive/Manhattan Beach Blvd./Highland and Morningside Drive, Manhattan Beach. 1.0 miles.

Projects 1 and 2 are planned projects at the construction phase of work. Greenstreet Project is scheduled for completion by the end of 2014. Shade Hotel is scheduled to be completed by 2015. Since they are scheduled for completion prior to commencement of construction at RBEP, their cumulative impact, when combined with RBEP construction would not be measurable.

Projects 3 and 4 are in the feasibility phase, E&B development having a five year construction schedule and Manhattan Beach Civic Center in the EIR phase of review. Of the two, E&B is most similar in character and schedule. If these two projects proceeded, the impact of E&B would more likely have a noise impact that would be greater of the two. As a bounding condition, staff selected the E&B as the project with the greatest potential for having some measureable cumulative impact when combined with RBEP.

The E&B's wellhead would be located within the city of Hermosa Beach municipal corporation yard at 6th Street and Valley Drive. The E&B project would be phased into four parts: Site Preparation/Demolition; Drilling/Testing; Final Design/Construction; and Development/Operation. The entire project development would extend for 64 months followed by an operational life of 32 years.[17] Within the 32-year operational period, the well products would be transported via truck and pipeline. The truck route would extend southerly into Herondo Street and North Catalina Avenue corridor. The pipeline would extend southerly on Valley and continue northeast on Herondo Street and Anita by extension.

Both projects' construction would have the same five-year duration. At the time of publication of this Preliminary Staff Assessment, the starting date for the E&B project construction is undetermined. However, staff considers the worst potential scenario, which assumes that the cumulative noise impact would occur when the demolition of Units 5-8 and construction of the power block (see **Noise Table 3** above) would be concurrent with the E&B's Final Design/Construction phase, starting in 2019.

The analysis for cumulative effect estimates the noise generated by coincident construction and operational activities. The allowable increase in noise level when compared to baseline ambient conditions would be less than 10 dBA increase for daytime occurrence and up to 5 dBA for nighttime hours. The sound power levels for the E&B Pipeline project are available in the Public Draft EIR dated February, 2014 for the E&B Oil Drilling & Production Project (city of Hermosa Beach 2014, Tables 4.11-26 and 4.11-35).

[17] Table 1, Overall Project Schedule, in the EIR published in February, 2013 shows a 64 month construction cycle.

Construction Impact

The projected construction and demolition activities of the E&B project were compiled and adjusted for relative distances between the RBEP and E&B project sites and the benchmark residential sensitive receptors. **Noise Table 9** below provides a summary of the incremental impact of cumulative conditions.

Noise Table 9
Daytime Construction and Demolition Cumulative and CEQA Limits

1	2	3	4	5	6	7
Receptor	**Measured Ambient Daytime L_{eq} (dBA)**	**RBEP Construction & Demo Noise Daytime (dBA)**	**E&B Pipe Noise Daytime (dBA)***	**Cumulative Daytime Noise (RBEP + E&B) (dBA)**	**Increase Over Daytime Ambient (dBA)**	**Less than 10 dBA?**
M1	**58**	**64**	**38**	**64**	**6**	**Yes**
M2	**60**	**68**	**61**	**69**	**9**	**Yes**
M3a	**64**	**68**	**59**	**69**	**5**	**Yes**
M4	**59**	**63**	**49**	**63**	**4**	**Yes**

*L_{eq} for daytime (Column 4) based on E&B Public Draft EIR schedule restriction and adjusted for distances to RBEP noise receptors, Table 4-11.26

As seen in **Noise Table 9**, the daytime increase would be less than 10 dBA at the project's noise-sensitive receptors. This would not create a significant impact.

As a means of enforcement of construction-related mitigation measures, the E&B environmental impact report incorporates conditions **NV.1** through **NV.7** (City of Hermosa Beach 2014), which require sound attenuation features adequate to comply with the Hermosa Beach's noise ordinances (City of Hermosa Beach 2014). These requirements include acoustically-engineered noise barriers for all phases of construction.

At the same time, RBEP would require a number of conditions of certification, which would assure the effective control of construction noise:

- **NOISE-6**: Noise control of construction activities.
- **NOISE-7**: Steam blow control.
- **NOISE-8**: Noise control during pile driving activities.
- **NOISE-9**: Noise control during concrete pour.

Staff recognizes that various construction activities of the two projects might be concomitant, terminating in the coincident operation of RBEP and E&B Pipeline. Nevertheless, staff concludes that both projects would incorporate appropriate restrictions and controls to handle any combination of construction activities which would generate noise.

Construction of linear facilities typically moves along at a rapid pace, thus not subjecting any one receptor to noise impacts for more than two or three days. Further, construction of linear facilities would be limited to daytime hours. Offsite pipeline construction is considered to be a linear facility, where work activities move swiftly, are temporary, and would occur during the daytime. Thus, this impact is less than significant.

No nighttime construction is anticipated for E&B and thus, there would be no cumulative impact.

Operation Impact

Since the E&B project is presumed to operate at night, staff compares the cumulative noise impact to the nighttime ambient noise at the noise-sensitive receptors. **Noise Table 10** below provides this comparison.

Noise Table 10
Nighttime Plant Operations Cumulative and CEQA Limits

1	2	3	4	5	6	7
Receptor	Measured Ambient Nighttime L_{90} (dBA)	RBEP Plant Noise Daytime (dBA)	E&B Pipe Noise Nighttime Phase IV (dBA)*	Cumulative Nighttime Noise (RBEP + E&B) (dBA)	Increase Over Nighttime Ambient (dBA)	Less than or Equal to 5 dBA?
M1	56	43	15	43	0	Yes
M2	55	44	28	44	0	Yes
M3a	49	50	30	50	1	Yes
M4	42	45	21	45	3	Yes

*L_{90} for nighttime (Column 4) based on E&B Public Draft EIR, Table 4.11-35 adjusted for distances to RBEP noise receptors.

As demonstrated in this table, the cumulative effect of operational activities of the two projects is less than insignificant (not exceeding 5 dBA) (see Column 6).

As a means of enforcement of operation-related mitigation measures, the E&B environmental impact report incorporates conditions **NV.8** and **NV.10** (City of Hermosa Beach 2014), which require sound attenuation features and limit hours of certain noise-producing activities. At the same time, RBEP would require an operational noise survey, pursuant to Condition of Certification **NOISE-4** to ensure effective control of operational noise.

Staff concludes that both projects would incorporate appropriate restrictions and controls to handle any combination of operational activities which would generate noise.

FACILITY CLOSURE

All operational noise from the project would cease when the RBEP project closes, and no further adverse noise impact from its operation would be possible. The remaining potential temporary noise source would be the dismantling of the project structures and equipment, as well as any site restoration work that may be performed. Since this noise would be similar to that caused by the original demolition and construction, it could be similarly treated -- that is, noisy work could be performed during daytime hours with machinery and equipment that are properly insulated and/or equipped with mufflers. Any noise LORS in existence at that time would apply. Applicable conditions of certification included in the Energy Commission decision would also apply to facility closure, unless modified by a Petition to Amend.

CONCLUSIONS

If built and operated in conformance with the proposed conditions of certification, it is staff's position that RBEP would comply with all applicable noise and vibration LORS. Staff concludes that the project would produce no significant adverse noise impacts under CEQA guidelines on people within the project area, including the minority populations, directly, indirectly, or cumulatively.

Staff recommends conditions of certification addressing worker and employee protection (**NOISE-3**, Employee Noise Control Program, and **NOISE-5**, Occupational Noise Survey), measurement and verification that noise performance criteria are met at project's noise-sensitive residential receptors (**NOISE-4**, Operational Noise Restrictions), restrictions on construction activities (**NOISE- 6**, Construction Noise Restrictions, **NOISE-7**, Steam Blow Restrictions**,** and **NOISE-8**, Pile Drive Management). Also, **NOISE-9** (Concrete Pour Noise Control) requires that nighttime concrete pouring activities remain within the required noise limits. Finally, **NOISE-1** (Public Notification Process) and **NOISE-2** (Noise Complaint Process) describe the process of complaint investigation and resolution.

Regarding the staff's retention of responsibility to monitor the enforcement of these conditions of certification, staff works under the authority of the CPM to monitor and review the reporting of plant performance during construction and the full term of operation, including facility closure.

PROPOSED CONDITIONS OF CERTIFICATION

PUBLIC NOTIFICATION PROCESS

NOISE-1 Prior to the start of ground disturbance, the project owner shall notify all residents and business owners within one mile of the project site and one-half mile of the linear facilities, by mail, or by other effective means, as approved by the CPM, of the commencement of project construction. At the same time, the project owner shall establish a telephone number for use by the public to report any undesirable noise conditions associated with the construction and operation of the project. If the telephone is not staffed 24 hours a day, the project owner shall include an automatic answering feature, with date and time stamp recording, to answer calls when the phone is unattended. This or a similarly effective telephone number shall be posted at the project site during construction where it is visible to passersby. This telephone number shall be maintained until the project has been operational for at least one year.

Verification: At least 15 days prior to ground disturbance, the project owner shall transmit to the compliance project manager (CPM) a statement, signed by the project owner's project manager that the above notification has been performed, and describing the method of that notification. This communication shall also verify that the telephone number has been established and posted at the site, and shall provide that telephone number.

NOISE COMPLAINT PROCESS

NOISE-2 Throughout the construction and operation of the project, the project owner shall document, investigate, and evaluate all noise complaints and attempt to resolve all legitimate[18] noise complaints. The project owner or authorized agent shall:

- use the Noise Complaint Resolution Form (below), or a functionally equivalent procedure acceptable to the CPM, to document and respond to each project-related noise complaint;
- attempt to contact the person(s) making the noise complaint within 24 hours;
- conduct an investigation to determine the source of noise in the complaint;
- if the noise is project related, take all feasible measures to reduce the source of the noise; and
- submit a report documenting the complaint and actions taken. The report shall include: a complaint summary, including the final results of noise reduction efforts and, if obtainable, a signed statement by the complainant

[18] A legitimate complaint refers to a complaint about noise that is caused by the RBEP project as opposed to another source. A legitimate complaint constitutes a violation by the project of any noise condition of certification (as confirmed by the CPM).

that states that the noise problem has been resolved to the complainant's satisfaction.

Nighttime Construction

For construction noise complaints received outside construction hours allowed as described by Condition of Certification **NOISE-6**, the project owner shall ask if the complainant would like a returned phone call within one hour. If the complainant requests a returned call, the project owner shall contact the complainant within one hour, with information on the status of the complaint. The project owner shall monitor noise levels at or near the complainant's residence during the following night to determine the source and severity of the noise.

The project owner shall share a summary of its findings, as the result of this monitoring, with the complainant the following day. At the same time, the project owner shall notify the CPM of its findings, by either emailing the CPM or calling the phone number designated for the CPM. If the activity causing the noise is project-related, the project owner shall take appropriate actions to reduce the noise level of that activity, or take other appropriate action to remedy the complaint, such as offering off-site noise abatement mitigation at or near the affected residence or establishing a program for temporary lodging for the occupants of this residence. The project owner shall mutually agree with the complainant on a deadline for implementing this action(s).

Verification: Within five days of receiving a noise complaint related to construction performed within the construction hours allowed by **NOISE-6** or related to project operation, the project owner shall file a Noise Complaint Resolution Form, shown below, with the CPM, which documents the nature of the complaint and the definition of the problem after investigation by plant personnel. If mitigation is required to resolve the complaint, this form shall include a description of the corrective measure. If mitigation is required to resolve the complaint, and the complaint is not resolved within a three-day period, the project owner shall submit an updated Noise Complaint Resolution Form when the mitigation is implemented.

Within 24 hours of determining the resolution of the complaint related to nighttime construction, the project owner shall email the CPM or call the phone number designated for the CPM, with information about this resolution. Within three days of implementing this resolution, the project owner shall notify the CPM of this implementation.

EMPLOYEE NOISE CONTROL PROGRAM

NOISE-3 The project owner shall submit to the CPM for review and approval a noise control program. The noise control program shall be used to reduce employee exposure to high (above permissible) noise levels during construction in accordance with Title 8, California Code of Regulations, Sections 5095-5099, and Title 29, Code of Federal Regulations, Section 1910.95.

Verification: At least 30 days prior to the start of ground disturbance, the project owner shall submit the noise control program to the CPM. The project owner shall make the program available to OSHA and Cal-OSHA upon request.

OPERATIONAL NOISE RESTRICTIONS

NOISE-4 The project design and implementation shall include appropriate noise mitigation measures adequate to ensure that the operation of the project will not cause the noise levels due to normal steady-state plant operation alone, during the four quietest consecutive hours of the nighttime, to exceed an average of 43 dBA L_{90} measured at or near monitoring location M1, 44 dBA L_{90} measured at or near monitoring location M2, 50 dBA L_{90} measured at or near monitoring location M3a, and 45 dBA L_{90} measured at or near monitoring location M4.

No new pure-tone components (as defined in **Noise Table A1**, bottom row defining pure tone) shall be caused by the project. No single piece of equipment shall be allowed to stand out as a source of noise that draws legitimate complaints.

When the project first achieves a sustained output of 85 percent or greater of its rated capacity, the project owner shall conduct a 25-hour community noise survey at monitoring locations M1, M2, M3a, and M4, or at a closer location acceptable to the CPM. This survey shall also include measurement of one-third octave band sound pressure levels to ensure that no new pure-tone noise components have been caused by the project.

The measurement of power plant noise for the purposes of demonstrating compliance with this condition of certification may alternatively be made at a location, acceptable to the CPM, closer to the plant and this measured level then mathematically extrapolated to determine the plant noise contribution at the affected residence. The character of the plant noise shall be evaluated at the affected receptor locations to determine the presence of pure tones or other dominant sources of plant noise.

If the results from the noise survey indicate that the power plant noise at the affected receptor sites exceed the above values, mitigation measures shall be implemented to reduce noise to a level of compliance with these limits.

If the results from the noise survey indicate that pure tones are present, mitigation measures shall be implemented to reduce the pure tones to a level that complies with **Noise Table A1** (bottom row defining pure tone) below.

Verification: The above noise survey shall take place within 45 days of the power plant first achieving a sustained output of 85 percent or greater of its rated capacity.

Within 15 days after completing this survey, the project owner shall submit a summary report to the CPM. Included in the survey report shall be a description of any additional mitigation measures necessary to achieve compliance with the above listed noise limits, and a schedule, subject to CPM approval, for implementing these measures. When these measures are implemented and in place, the project owner shall repeat the noise survey.

Within 15 days of completion of the new survey, the project owner shall submit to the CPM a summary report of the new noise survey, performed as described above and showing compliance with this condition.

OCCUPATIONAL NOISE SURVEY

NOISE-5 Following project's attainment of a sustained output of 85 percent or greater of its rated capacity, the project owner shall conduct an occupational noise survey to identify any noise hazardous areas in the facility.

The survey shall be conducted by a qualified person in accordance with the provisions of Title 8, California Code of Regulations, Sections 5095-5099 (Article 105) and Title 29, Code of Federal Regulations, Section 1910.95. The survey results shall be used to determine the magnitude of employee noise exposure.

The project owner shall prepare a report of the survey results and, if necessary, identify proposed mitigation measures to be employed in order to comply with the above regulations.

Verification: Within 30 days after completing each survey, the project owner shall submit the noise survey report to the CPM. The project owner shall make the report available to OSHA and Cal-OSHA upon request from OSHA and Cal-OSHA.

CONSTRUCTION NOISE RESTRICTIONS

NOISE-6 Heavy equipment operation and noisy[19] construction and demolition work relating to any project features, including pile driving, shall be restricted to the times delineated below:

Mondays through Fridays:	7:00 a.m. to 6:00 p.m.
Saturdays:	9:00 a.m. to 5:00 p.m.
Sundays and designated Holidays:	Construction not allowed

Nighttime concrete pour shall comply with Condition of Certification **NOISE-9**.

Haul trucks and other engine-powered equipment shall be equipped with adequate mufflers and other state-required noise attenuation devices. Haul trucks shall be operated in accordance with posted speed limits. Truck engine exhaust brake use (jake braking) shall be limited to emergencies.

Verification: Prior to ground disturbance, the project owner shall transmit to the CPM a statement acknowledging that the above restrictions will be observed throughout the construction of the project.

[19] Noise that draws legitimate complaint (for the definition of "legitimate complaint", see the footnote in Condition of Certification **NOISE-4**)

Construction equipment generating excessive noise shall be updated or replaced. Temporary acoustic barriers shall be installed around stationary construction noise sources, if required to minimize construction noise. Reorient construction equipment, and relocate construction staging areas, when possible, to minimize the noise impact at nearest noise-sensitive receptors.

STEAM BLOW RESTRICTIONS

NOISE-7 When using a high-pressure steam blow process, the project owner shall equip steam blow piping with a temporary silencer that quiets the noise of steam blows to no greater than 89 dBA measured at a distance of 50 feet. The steam blows shall be conducted between 7:00 a.m. and 6:00 p.m. Mondays through Fridays, and between 9:00 a.m. and 5:00 p.m. on Saturdays. The project owner shall notify the residents and business owners in the vicinity of the project site prior to start of steam blow activities.

Verification: At least 15 days prior to the first steam blow, the project owner shall notify all residents and business owners within one mile of the power block. The notification may be in the form of letters, or other effective means as approved by the CPM. The notification shall include a description of the purpose and nature of the steam blows, the planned schedule, expected sound levels at monitoring locations M1, M2, M3a, and M4, and explanation that it is a one-time activity and not part of normal plant operation.

PILE DRIVING MANAGEMENT

NOISE-8 The project owner shall perform pile driving in a manner to reduce the potential for any legitimate noise and vibration complaints. The project owner shall notify the residents and business owners in the vicinity of pile driving prior to start of these activities. Vibrations from pile driving shall be limited to a peak particle velocity of 0.2 in/sec at the nearest noise-sensitive receptors, M2 and M3a.

Verification: At least 15 days prior to first pile driving, the project owner shall submit to the CPM a description of the pile driving technique to be employed, including calculations showing its projected noise impacts at monitoring locations M1, M2, M3a, and M4.

At least ten days prior to first production pile driving, the project owner shall notify the residents and business owners within one mile of the pile driving. The notification may be in the form of letters, or other effective means, as approved by the CPM. In this notification, the project owner shall state that it will perform this activity in a manner to reduce the potential for any legitimate noise and vibration complaints. The project owner shall submit a copy of this notification to the CPM prior to the start of pile driving.

CONCRETE POUR NOISE CONTROL

NOISE-9 When concrete work requires continuous pouring that may extend beyond the times specified in Condition of Certification **NOISE-6**, the project owner shall notify all residences in the vicinity of the project site of the commencement date and the duration of concrete pouring activities.

The average L_{eq} noise levels from these activities shall not exceed the hourly average nighttime ambient L_{eq} levels at M1, M2, M3a, and M4, by more than 5 dBA. In the event that noise complaints require resolution pursuant to Condition of Certification **NOISE-2**, the complaint will be resolved according to the procedures outlined in **NOISE-2**.

Verification: At least ten days prior to concrete pouring activities that are anticipated to extend beyond the times specified in Condition of Certification **NOISE-6**, the project owner shall submit a statement to the CPM, specifying the time of night and the number of nights for which activities will occur, the approximate distance of activities to receptor locations M1, M2, M3a, and M4, and the expected sound levels at these receptors, stating that the expected sound levels from this activity do not exceed the nighttime noise limits specified above.

At the same time, the project owner shall notify the residents within one mile of this work. The notification may be in the form of letters, or other effective means as approved by the CPM. In this notification, the project owner shall state that it will perform this activity in a manner to ensure excessive noise is prohibited, and include a telephone number that will be staffed throughout this activity for use by the public to report any undesirable noise conditions associated with this activity. The project owner shall submit a copy of this notification to the CPM prior to the start of this work.

EXHIBIT 1 - NOISE COMPLAINT RESOLUTION FORM

Redondo Beach Energy Project
(12-AFC-03)

NOISE COMPLAINT LOG NUMBER ________________________

Complainant's name and address:

Phone number: ________________________

Date complaint received: ________________________
Time complaint received: ________________________

Nature of noise complaint:

Definition of problem after investigation by plant personnel:

Date complainant first contacted: ________________________

Initial noise levels at 3 feet from noise source _________ dBA Date: _____________

Initial noise levels at complainant's property: __________ dBA Date: ____________

Final noise levels at 3 feet from noise source: ________ dBA Date: _____________

Final noise levels at complainant's property: __________ dBA Date: ____________

Description of corrective measures taken:

Complainant's signature: ________________________ Date: ____________

Approximate installed cost of corrective measures: $ ____________
Date installation completed: ____________
Date first letter sent to complainant: ____________ (copy attached)
Date final letter sent to complainant: ____________ (copy attached)

This information is certified to be correct:

Plant Manager's Signature: ________________________

(Attach additional pages and supporting documentation, as required).

REFERENCES

CEC 2014r – California Energy Commission, (TN 201843). Report of Conversation between Patricia Kelly and AES and Energy Commission staff, re: Summary of Information Presented at the 2/10/2014 Data Request Workshop. Submitted to CEC/Docket Unit on 3/10/2014

City of Redondo Beach 1996 – City of Redondo Beach General Plan, Noise Element

City of Redondo Beach 2012 – City of Redondo Beach Municipal Code, Noise Ordinance, Chapter 8.40, Noise Control

City of Hermosa Beach 2014 – City of Hermosa Beach Public Draft EIR Draft EIR “E&B Drilling & Production Project Draft Environmental Impact Report” dated February 2014 SCH# 2013071038.

RBEP 2012 – Data Request, Set 1R (Responses to Data Requests 26-28 Revision 2), CH2M Hill dated 5/22/14. TN 202364

RBEP 2012 – Data Responses, Set 4 (Responses to Data Request 72), CH2M Hill, dated 3/26/14. TN 201924

NOISE APPENDIX A
FUNDAMENTAL CONCEPTS OF COMMUNITY NOISE

To describe noise environments and to assess impacts on noise sensitive areas, a frequency weighting measure, which simulates human perception, is customarily used. It has been found that A-weighting of sound intensities best reflects the human ear's reduced sensitivity to low frequencies and correlates well with human perceptions of the annoying aspects of noise. The A-weighted decibel scale (dBA) is cited in most noise criteria. Decibels are logarithmic units that conveniently compare the wide range of sound intensities to which the human ear is sensitive. **Noise Table A1** provides a description of technical terms related to noise.

Noise environments and consequences of human activities are usually well represented by an equivalent A-weighted sound level over a given time period (L_{eq}), or by average day and night A-weighted sound levels with a nighttime weighting of 10 dBA (L_{dn}). Noise levels are generally considered low when ambient levels are below 45 dBA, moderate in the 45 to 60 dBA range, and high above 60 dBA. Outdoor day-night sound levels vary over 50 dBA depending on the specific type of land use. Typical L_{dn} values might be 35 dBA for a wilderness area, 50 dBA for a small town or wooded residential area, 65 to 75 dBA for a major metropolis downtown (e.g., San Francisco), and 80 to 85 dBA near a freeway or airport. Although people often accept the higher levels associated with very noisy urban residential and residential-commercial zones, they nevertheless are considered to be levels of noise adverse to public health.

Various environments can be characterized by noise levels that are generally considered acceptable or unacceptable. Lower levels are expected in rural or suburban areas than what would be expected for commercial or industrial zones. Nighttime ambient levels in urban environments are about seven decibels lower than the corresponding average daytime levels. The day-to-night difference in rural areas away from roads and other human activity can be considerably less. Areas with full-time human occupation that are subject to nighttime noise, which does not decrease relative to daytime levels, are often considered objectionable. Noise levels above 45 dBA at night can result in the onset of sleep interference effects. At 70 dBA, sleep interference effects become considerable (Effects of Noise on People, U.S. Environmental Protection Agency, December 31, 1971).

In order to help the reader understand the concept of noise in decibels (dBA), **Noise Table A2** has been provided to illustrate common noises and their associated sound levels, in dBA.

NOISE Table A1
Definition of Some Technical Terms Related to Noise

Terms	Definitions
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).
Frequency, Hz	The number of complete pressure fluctuations per second above and below atmospheric pressure.
A-Weighted Sound Level, dBA	The sound pressure level in decibels as measured on a Sound Level Meter using the A-weighting filter network. The A-weighting 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 and correlates well with subjective reactions to noise. All sound levels in this testimony are A-weighted.
L_{10}, L_{50}, & L_{90}	The A-weighted noise levels that are exceeded 10 percent, 50 percent, and 90 percent of the time, respectively, during the measurement period. L_{90} is generally taken as the background noise level.
Equivalent Noise Level, L_{eq}	The energy average A-weighted noise level during the Noise Level measurement period.
Community Noise Equivalent Level, CNEL	The average A-weighted noise level during a 24-hour day, obtained after addition of 4.8 decibels to levels in the evening from 7 p.m. to 10 p.m., and after addition of 10 decibels to sound levels in the night between 10 p.m. and 7 a.m.
Day-Night Level, L_{dn} or DNL	The Average A-weighted noise level during a 24-hour day, obtained after addition of 10 decibels to levels measured in the night between 10 p.m. and 7 a.m.
Ambient Noise Level	The composite of noise from all sources, near and far. The normal or existing level of environmental noise at a given location (often used for an existing or pre-project noise condition for comparison study).
Intrusive Noise	That 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, and time of occurrence and tonal or informational content as well as the prevailing ambient noise level.
Pure Tone	A pure tone is defined by the Model Community Noise Control Ordinance as existing 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.
Source: Guidelines for the Preparation and Content of Noise Elements of the General Plan, Model Community Noise Control Ordinance, California Department of Health Services 1976, 1977.	

Noise Table A2
Typical Environmental and Industry Sound Levels

Noise Source (at distance)	A-Weighted Sound Level in Decibels (dBA)	Noise Environment	Subjective Impression
Civil Defense Siren (100')	140-130		Pain Threshold
Jet Takeoff (200')	120		Very Loud
Very Loud Music	110	Rock Music Concert	
Pile Driver (50')	100		
Ambulance Siren (100')	90	Boiler Room	
Freight Cars (50')	85		
Pneumatic Drill (50')	80	Printing Press Kitchen with Garbage Disposal Running	Loud
Freeway (100')	70		Moderately Loud
Vacuum Cleaner (100')	60	Data Processing Center Department Store/Office	
Light Traffic (100')	50	Private Business Office	
Large Transformer (200')	40		Quiet
Soft Whisper (5')	30	Quiet Bedroom	
	20	Recording Studio	
	10		Threshold of Hearing
Source: Handbook of Noise Measurement, Arnold P.G. Peterson, 1980			

Subjective Response to Noise

The adverse effects of noise on people can be classified into three general categories:

- Subjective effects of annoyance, nuisance, dissatisfaction.
- Interference with activities such as speech, sleep, and learning.
- Physiological effects such as anxiety or hearing loss.

The sound levels associated with environmental noise, in almost every case, produce effects only in the first two categories. Workers in industrial plants can experience noise effects in the last category. There is no completely satisfactory way to measure the subjective effects of noise, or of the corresponding reactions of annoyance and dissatisfaction, primarily because of the wide variation in individual tolerance of noise.

One way to determine a person's subjective reaction to a new noise is to compare the level of the existing (background) noise, to which one has become accustomed, with the level of the new noise. In general, the more the level or the tonal variations of a new 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.

With regard to increases in A-weighted noise levels, knowledge of the following relationships can be helpful in understanding the significance of human exposure to noise.

1. Except under special conditions, a change in sound level of one dB cannot be perceived.
2. Outside of the laboratory, a three dB change is considered a barely noticeable difference.
3. A change in level of at least five dB is required before any noticeable change in community response would be expected.
4. A ten dB change is subjectively heard as an approximate doubling in loudness and almost always causes an adverse community response. (Kryter, Karl D., The Effects of Noise on Man, 1970).

Combination of Sound Levels

People perceive both the level and frequency of sound in a non-linear way. A doubling of sound energy (for instance, from two identical automobiles passing simultaneously) creates a three dB increase (i.e., the resultant sound level is the sound level from a single passing automobile plus three dB). The rules for decibel addition used in community noise prediction are:

Noise Table A3
Addition of Decibel Values

When two decibel values differ by:	Add the following amount to the larger value
0 to 1 dB	3 dB
2 to 3 dB	2 dB
4 to 9 dB	1 dB
10 dB or more	0
Figures in this table are accurate to ± 1 dB.	

Source: Architectural Acoustics, M. David Egan, 1988

Sound and Distance

Doubling the distance from a noise source reduces the sound pressure level by six dB.

Increasing the distance from a noise source ten times reduces the sound pressure level by 20 dB.

Worker Protection

OSHA noise regulations are designed to protect workers against the effects of noise exposure, and list permissible noise level exposure as a function of the amount of time to which the worker is exposed:

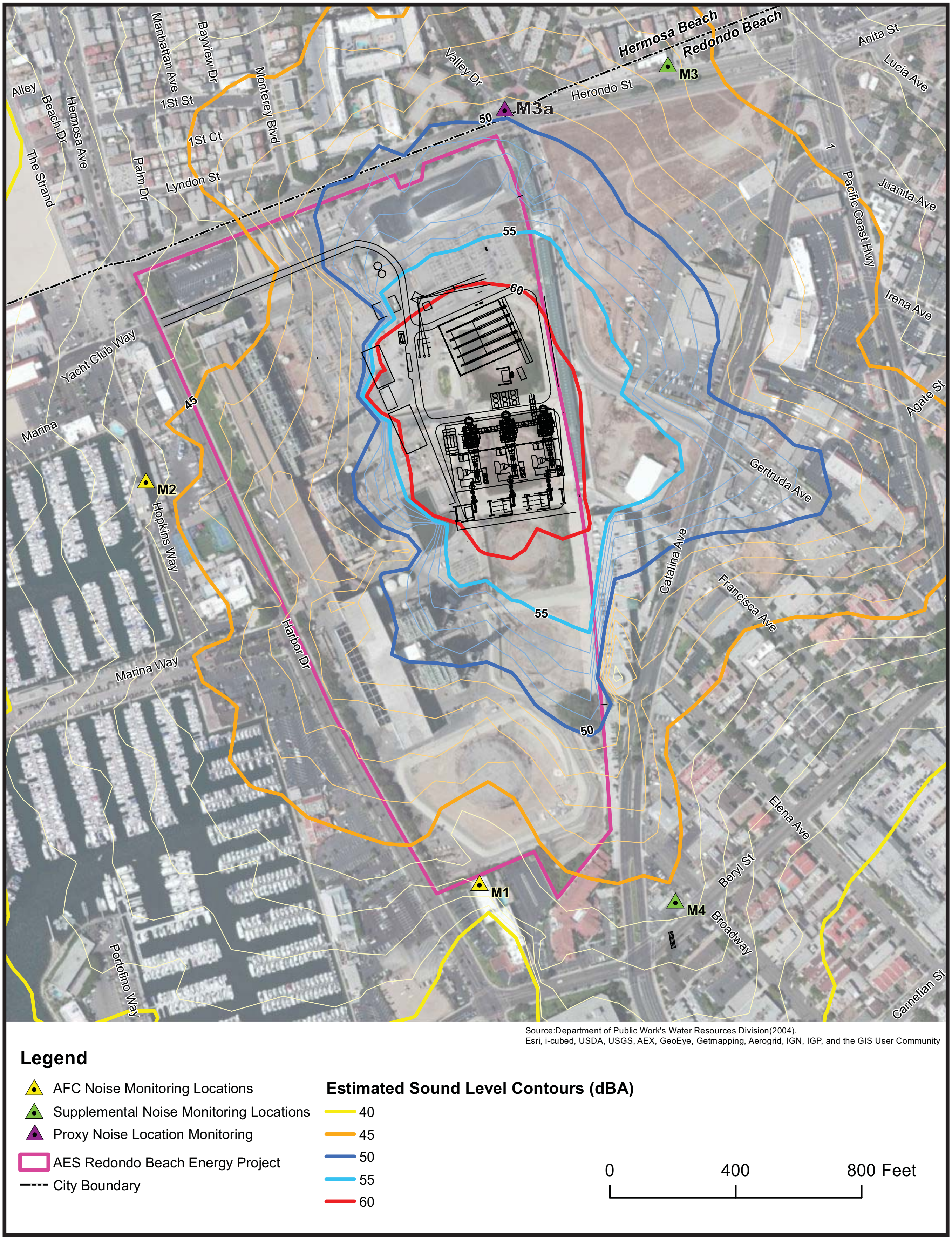
Noise Table A4
OSHA Worker Noise Exposure Standards

Duration of Noise (Hrs/day)	A-Weighted Noise Level (dBA)
8.0	90
6.0	92
4.0	95
3.0	97
2.0	100
1.5	102
1.0	105
0.5	110
0.25	115

Source: Title 29, Code of Federal Regulations, § 1910.95.

NOISE - FIGURE 1

Redondo Beach Energy Project - Noise Model Results and Monitoring Location



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: Figure DR 72-1

PUBLIC HEALTH

Huei-An (Ann) Chu, Ph.D.

SUMMARY OF CONCLUSION

California Energy Commission staff has analyzed the potential human health risks associated with construction, demolition, and operation of the proposed Redondo Beach Energy Project (RBEP). Staff's analysis of potential health impacts was based on a highly conservative health protective methodology that accounts for impacts to the most sensitive individuals in a given population. Staff concludes that there would be no significant health impacts from the project's air emissions.

INTRODUCTION

The purpose of this section of the Preliminary Staff Assessment (PSA) is to determine if emissions of toxic air contaminants (TACs) from the proposed RBEP would have the potential to cause significant adverse public health impacts or to violate standards for the protection of public health. If potentially significant health impacts are identified, staff would identify and recommend mitigation measures necessary to reduce such impacts to insignificant levels.

In addition to the analysis contained in this **PUBLIC HEALTH** section that focuses on potential effects to the public from emissions of toxic air contaminants, Energy Commission staff address the potential impacts of regulated, or criteria, air pollutants in the **AIR QUALITY** section of this PSA and assess the impacts on public and off-site worker health from accidental releases of hazardous materials in the **HAZARDOUS MATERIALS MANAGEMENT** and **WORKER SAFETY & FIRE PROTECTION** sections. The health and nuisance effects from electric and magnetic fields are discussed in the **TRANSMISSION LINE SAFETY AND NUISANCE** section. Pollutants released from the project's wastewater streams are discussed in the **SOIL AND WATER RESOURCES** sections. Releases in the form of hazardous and nonhazardous wastes are described in the **WASTE MANAGEMENT** section.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS (LORS)

Public Health Table 1 lists the federal, state, and local laws, ordinances, regulations, and standards (LORS) applicable to the control of TAC emissions and mitigation of public health impacts for RBEP. This PSA evaluates compliance with these LORS.

Public Health Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable LORS	Description
Federal	
Clean Air Act section 112 (Title 42, U.S. Code section 7412)	Section 112 of the Clean Air Act addresses emissions of hazardous air pollutants (HAPs). This act requires new sources that emit more than ten tons per year of any specified HAP or more than 25 tons per year of any combination of HAPs to apply Maximum Achievable Control Technology (MACT).
40 Code of Federal Regulations (CFR) Part 63 Subpart YYYY (National Emission Standard for Hazardous Air Pollutants for Stationary Combustion Turbines)	This regulation applies to gas turbines located at major sources of HAP emissions. A major source is defined as a facility with emissions of ten tons per year (tpy) or more of a single HAP or 25 tpy or more of a combination of HAPs based on the potential to emit.
40 Code of Federal Regulations (CFR) Part 68 (Risk Management Plan)	This regulation requires facilities storing or handling significant amounts of acutely hazardous materials to prepare and submit Risk Management Plans.
State	
California Health and Safety Code section 25249.5 et seq. (Proposition 65)	These sections establish thresholds of exposure to carcinogenic substances above which Proposition 65 exposure warnings are required.
California Health and Safety Code, Article 2, Chapter 6.95, Sections 25531 to 25541; California Code of Regulations Title 19 (Public Safety), Division 2 (Office of Emergency Services), Chapter 4.5 (California Accidental Release Prevention Program)	These sections require facilities storing or handling significant amounts of acutely hazardous materials to prepare and submit Risk Management Plans.
California Health and Safety Code section 41700	This section states that “no person shall discharge from any source whatsoever such quantities of air contaminants or other material which 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.”
California Health and Safety Code Sections 44300 et seq.	Air Toxics Hot Spots Program requires participation in the inventory and reporting program at the local air pollution control district level.
California Health and Safety Code Sections 44360 to 44366 (Air Toxics “Hot Spots” Information and Assessment Act—AB 2588)	These sections require that, based on results of a health risk assessment (HRA) conducted per ARB (California Air Resources Board) / OEHHA (Office of Environmental Health Hazard Assessment) guidelines, toxic contaminants do not exceed acceptable levels.
California Public Resource Code section 25523(a); Title 20 California Code of Regulations section 1752.5, 2300–2309 and Division 2 Chapter 5, Article 1, Appendix B, Part (1); California Clean Air Act, Health and Safety Code section 39650, et seq.	These sections require a quantitative health risk assessment for new or modified sources, including power plants that emit one or more toxic air contaminants (TACs).
Local	
SCAQMD Rule 1401 (New Source Review of Toxic Air Contaminants)	This rule specifies limits for maximum individual cancer risk (MICR), cancer burden, and noncancer acute and chronic hazard index (HI) from new permit units, relocations, or modifications to existing permit units which emit toxic air contaminants (TACs).

Applicable LORS	Description
SCAQMD Rule 1403 (Asbestos Emissions from Demolition/Renovation Activities)	This rule specifies work practice requirements to limit asbestos emissions from building demolition and renovation activities, including the removal and associated disturbance of asbestos-containing materials.
SCAQMD Rule 212(c)(3) (Permits – Public Notice)	This rule requires public notification if the maximum individual cancer risk (MICR), based on Rule 1401, exceeds one in one million (1×10^{-6}), due to a project's proposed construction, modification, or relocation for facilities with more than one permitted source, unless the applicant can show the total facility-wide MICR is below ten in one million (10×10^{-6}).

SETTING

This section describes the environment in the vicinity of the proposed project site from a public health perspective. Characteristics of the natural environment, such as meteorology and terrain, affect the project's potential for impacts on public health. An emission plume from a facility would affect elevated areas before lower terrain areas because of reduced opportunity for atmospheric mixing. Consequently, areas of elevated terrain can often be subjected to increased pollutant impacts compared to lower-level areas. Also, the land use around a project site can influence impacts due to population distribution and density, which, in turn, can affect public exposure to project emissions. Additional factors affecting potential public health impacts include existing air quality and environmental site contamination.

SITE AND VICINITY DESCRIPTION

The proposed RBEP site is located at 1100 North Harbor Drive, Redondo Beach, CA 90277, within the South Coast Air Quality Management District (SCAQMD). Redondo Beach is a seaside city in Los Angeles County in Southern California. The project is located on the site of the existing AES Redondo Beach Generating Station (RBGS), an operating power plant. The RBEP site is bounded to the north by residential areas, to the east by a storage facility and office buildings, to the south by mixed-use residential and commercial areas, and to the west by King Harbor marina and the Pacific Ocean. The site is located on a gently sloping coastal plain (RBEP 2012a, Section 2.0 and 5.9).

The RBEP is proposed as a natural gas-fired, combined-cycle, air-cooled, nominal 496-megawatt (MW) and gross 511-MW, electrical generating facility. The power block would be composed of three Mitsubishi natural gas-fired combustion turbine generators (CTG), three supplemental-fired heat recovery steam generators (HRSG), one steam turbine generator (STG), one air-cooled condenser, and related ancillary facilities. Each combustion turbine would employ supplemental natural gas firing (duct firing). The turbines would use dry low oxides of nitrogen (NOx) burners and selective catalytic reduction (SCR) to limit NOx emissions to two parts per million by volume (ppmv). Emissions of carbon monoxide (CO) would be limited to 2 ppmv and volatile organic compounds (VOCs) to 1 ppmv through the use of best combustion practices and the use of an oxidation catalyst. Best combustion practices and burning pipeline-quality natural gas would minimize emissions of the remaining pollutants. Two electric fire pumps, connected to two independent electrical power feeds from the Southern California Edison distribution system, would be used to provide onsite fire protection. Because the electric fire pumps would not be a source of air emissions, they were not included in the air quality health analysis for RBEP (RBEP 2012a, Section 5.9.1.1).

According to the Application for Certification (AFC), approximately 505,874 residents live within a six-mile radius of RBEP, and the sensitive receptors within a six-mile radius of the project site include (RBEP 2012a, Section 5.9.2):

- 641 preschool/daycare centers
- 17 nursing homes/senior care centers
- 171 schools
- 758 hospitals, clinics, and/or pharmacies
- Five colleges

Sensitive receptors, such as infants, the aged, and people with specific illnesses or diseases, are the subpopulations which are more sensitive to the effects of toxic substance exposure. The nearest sensitive receptor is the Salvation Army Senior Residence, which is located adjacent to the southern property boundary, and the Yak Academy Learning Center, which is approximately 280 meters east of the proposed stack location. The nearest schools are those within approximately 0.5 mile, including the Beryl Heights Elementary School, the Redondo Union High School, and the St. James Catholic pre-School, which are located approximately to the east, southeast, and south-southeast of the project site, respectively. The nearest residents are located north of the facility along Herondo Street, approximately 300 meters from the proposed stack locations, approximately 200 meters southeast of the proposed stack locations near the intersection of Francisca and North Catalina Avenues, and approximately 325 meters west of the proposed stack locations in the King Harbor marina. The nearest businesses are located adjacent to the eastern property boundary (RBEP 2012a, Section 5.9.2).

METEOROLOGY AND CLIMATE

Meteorological conditions, including wind speed, wind direction, and atmospheric stability, affect the extent to which pollutants are dispersed into the air and the direction of pollutant transport. This, in turn, affects the level of public exposure to emitted pollutants along with the associated health risks. When wind speeds are low and the atmosphere is stable, for example, dispersion is reduced, and localized exposures may be increased.

Atmospheric stability is one characteristic related to turbulence, or the ability of the atmosphere to disperse pollutants from convective air movement. Mixing heights (the height marking the region within which the air is well mixed below the height) are lower during mornings because of temperature inversions. These heights increase during warm afternoons. Staff’s **AIR QUALITY** section presents a more detailed description of meteorological data for the area.

The climate of the South Coast Air Basin is mild, tempered by cool sea breezes. The area's climatic conditions are strongly influenced by its terrain and geographical location. The basin 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. This usually mild climatological pattern is interrupted infrequently by periods of extremely hot weather, winter storms, or Santa Ana winds (RBEP 2012a, Section 5.1.3.2).

The annual and quarterly wind rose plots (from 2005 to 2009) for the Los Angeles International Airport (LAX) meteorological station[1] show that the prevailing winds that blow to the proposed RBEP were mostly from the southwest. Only a small percent of prevailing winds were from other directions, such as from the northeast from January to March (RBEP 2012a, Appendix 5.1C). Please refer to the **AIR QUALITY** section of this PSA for more details.

EXISTING SETTING

As previously noted, the proposed RBEP site is located in Los Angeles County, within the South Coast Air Basin (SCAB) and within the South Coast Air Quality Management District (SCAQMD). By examining average toxic concentration levels from representative air monitoring sites, together with cancer risk factors specific to each carcinogenic contaminant, a lifetime cancer risk can be calculated to provide a background risk level for inhalation of ambient air. When examining such risk estimates, staff considers it important to note that the overall lifetime risk of developing cancer for the average female in the United States is about 1 in 3, or 333,333 in 1 million and about 1 in 2, or 500,000 in 1 million for the average male (American Cancer Society, 2013). From 2005 to 2009, the cancer incidence rates in California are 51.05 in 1 million for males and 39.89 for females. Also, from 2005 to 2009, the cancer death rates for California are 19.49 in 1 million for males and 14.17 in 1 million for females (American Cancer Society, 2013).

EXISTING PUBLIC HEALTH CONCERNS

When evaluating a new project, staff usually conducts a study and analysis of existing public health issues in the project vicinity (i.e. areas within the same county). This analysis is prepared in order to identify the current status of respiratory diseases (including asthma), cancer, and childhood mortality rates in the population located within the same county or air basin of the proposed project site. Such assessment of existing health concerns provides staff with a basis on which to evaluate the significance of any additional health impacts from the proposed RBEP and assess the need for further mitigation.

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[1] A wind rose plot is a diagram that depicts the distribution of wind direction and speed at a location over a period of time.

The asthma diagnosis rates in Los Angeles County are lower than the average rates in California for both adults (age 18 and over) and children (ages 1-17). The percentage of adults diagnosed with asthma was reported as 6.6 percent in 2005- 2007, compared to 7.7 percent for the general California population. Rates for children for the same 2005-2007 period were reported as 9.3 percent compared to 10.1 percent for the state in general (Wolstein et al., 2010).

By examining the State Cancer Profiles presented by the National Cancer Institute, staff found that cancer death rates in Los Angeles County have been falling between 2006 and 2010. These rates (of 15.89 per 1,000,000, combined male/female) were somewhat lower than the statewide average of 16.03 per 1,000,000 (National Cancer Institute, 2013).

There are some ambient monitoring sites for TACs in the SCAB. Air quality and health risk data in Table C-20 of California Almanac of Emissions and Air Quality – 2009 Edition (ARB, 2009) are for SCAB for years 1990 through 2005. The data show a downward trend in TAC annual average concentrations, along with related cancer risks (ARB, 2009).

The Multiple Air Toxics Exposure Study II and III (MATES II and III) have been conducted in the SCAB by the SCAQMD Governing Board. MATES II and III 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. Both the MATES II and MATES III studies showed that mobile sources, such as cars, trucks, trains, ships, and aircraft, represent the greatest contributors to estimated health risks in Los Angeles County. About 70 percent of all carcinogenic risk is attributed to diesel particulate matter (DPM) emissions in MATES II, while about 84 percent of all carcinogenic risk is attributed to DPM emissions in MATES III. Overall, the general trend in risk exposure has been decreasing with the estimated cancer risk from exposure to airborne toxics (RBEP 2012a, Section 5.9.2). The comparison of the county-wide population-weighted risk in Table 4-5 in the final report of MATES III showed the TAC reductions that occurred in Los Angeles County, from 1,047 per million in 1998 to 951 per million in 2005. SCAB follows the same trend, showing that all year TACs reduced from 931 per million to 853 per million (MATES III, 2008).

As a follow-up to the MATES II and III studies, SCAQMD commenced a fourth MATES study (MATES IV) beginning in 2012. Although the outcome of this study is not yet available, the preliminary results of MATES IV show a downward trend in TAC[2].

[2] http://www.aqmd.gov/docs/default-source/air-quality/air-toxic-studies/mates-iv/matesiv031413.pdf?sfvrsn=0

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

This section discusses TAC emissions to which the public could be exposed during project construction/demolition and routine operation. Following the release of TACs into the air, water or soil, people would come into contact with them through inhalation, dermal contact, or ingestion via contaminated food, water or soil.

Air pollutants for which no ambient air quality standards have been established are called non-criteria pollutants. Unlike criteria pollutants such as ozone, carbon monoxide, sulfur dioxide, or nitrogen dioxide, non-criteria pollutants have no ambient (outdoor) air quality standards that specify levels considered safe for everyone[3]. Since non-criteria pollutants do not have such standards, a health risk assessment (HRA) is used to determine if people might be exposed to those types of pollutants at unhealthy levels.

The standard approach currently used for a HRA involves four steps: 1) hazard identification, 2) exposure assessment, 3) dose-response assessment and 4) risk characterization (OEHHA, 2003). These four steps are briefly discussed below:

1. **Hazard identification** is conducted to determine the potential health effects that could be associated with project emissions. For air toxics sources, the main purpose is to identify whether or not a hazard exists. Once a hazard has been identified, staff evaluates the exact toxic air contaminant(s) of concern and determines whether a TAC is a potential human carcinogen or is associated with other types of adverse health effects.

2. An **exposure assessment** is conducted to estimate the extent of public exposure to project emissions, including: (1) the worst-case concentrations of project emissions in the environment using dispersion modeling; and (2) the amount of pollutants that people could be exposed to through inhalation, ingestion, and dermal contact. Therefore, this step involves emissions quantification, modeling of environmental transport and dispersion, evaluation of environmental fate, identification of exposure routes, identification of exposed populations and sensitive subpopulations, and estimation of short-term and long-term exposure levels.

3. A **dose-response assessment** is conducted to characterize the relationship between exposure to an agent and incidence of an adverse health effect in exposed populations. The assumptions and methodologies of dose-response assessment are different between cancer and noncancer health effects. In cancer risk assessment, the dose-response relationship is expressed in terms of a potency (or slope) factor that is used to calculate the probability of getting cancer associated with an estimated exposure. In cancer risk assessment, it is assumed that risk is directly proportional to dose. It is also assumed that there is no threshold for carcinogenesis. In non-cancer risk assessment, dose-response data developed from animal or human studies are used to develop acute and chronic non-cancer Reference Exposure Levels (RELs).

[3] Carbon dioxide (CO_2) is also a non-criteria pollutant, but it is also not considered a TAC at normal concentrations and is not evaluated in this analysis.

The acute and chronic RELs are defined as the concentration at which no adverse non-cancer health effects are anticipated. Unlike cancer health effects, non-cancer acute and chronic health effects are generally assumed to have thresholds for adverse effects. In other words, acute or chronic injury from a TAC would not occur until exposure to the pollutant has reached or exceeded a certain concentration (i.e., threshold).

4. **Risk characterization** is conducted to integrate the health effects and public exposure information and to provide quantitative estimates of health risks resulting from project emissions. Staff characterizes potential health risks by comparing worst-case exposure to safe standards based on known health effects.

Staff conducts its public health analysis by evaluating the information and data provided in the AFC by the applicant. Staff also relies upon the expertise and guidelines of the California Environmental Protection Agency (Cal/EPA) Office of Environmental Health Hazard Assessment (OEHHA) in order to: identify contaminants that cause cancer or other noncancer health effects, and identify the toxicity, cancer potency factors and non-cancer RELs of these contaminants. Staff relies upon the expertise of the California Air Resources Board (ARB) and the local air districts to conduct ambient air monitoring of TACs and on the California Department of Public Health to evaluate pollutant impacts in specific communities. It is not within the purview or the expertise of the Energy Commission staff to duplicate the expertise and statutory responsibility of these agencies.

For each project, a screening-level risk assessment is initially performed using simplified assumptions that are intentionally biased toward protection of public health. That is, staff uses an analysis designed to overestimate public health impacts from exposure to project emissions. In reality, it is likely that the actual risks from the source in question would be much lower than the risks as estimated by the screening-level assessment. The risks for such screening purposes are based on examining conditions that would lead to the highest, or worst-case, risks and then using those assumptions in the assessment. Such an approach usually involves the following:

- using the highest levels of pollutants that could be emitted from the plant;
- assuming weather conditions that would lead to the maximum ambient concentration of pollutants;
- using the type of air quality computer model which predicts the greatest plausible impacts;
- calculating health risks at the location where the pollutant concentrations are estimated to be the highest;
- assuming that an individual’s exposure to carcinogenic (cancer-causing) agents would occur continuously for 70 years; and
- using health-based objectives aimed to protect the most sensitive members of the population (i.e., the young, elderly, and those with respiratory illnesses).

A screening-level risk assessment would, at a minimum, include the potential health effects from inhaling hazardous substances. Some facilities would also emit certain substances (e.g. semi-volatile organic chemicals and heavy metals) that could present a health hazard from non-inhalation pathways of exposure (OEHHA 2003, Tables 5.1, 6.3, 7.1). When these multi-pathway substances are present in facility emissions, the screening-level analysis would include the following additional exposure pathways: soil ingestion, dermal exposure, consumption of locally grown plant foods, mother's milk and water ingestion[4] (OEHHA 2003, p. 5-3).

The HRA process addresses three categories of health impacts: (1) acute (short-term) health effects, (2) chronic (long-term) noncancer effects, and (3) cancer risk (also long-term).

Acute Noncancer Health Effects

Acute health effects are those that result from short-term (one-hour) exposure to relatively high concentrations of pollutants. Such effects are temporary in nature and include symptoms such as irritation of the eyes, skin, and respiratory tract.

Chronic Noncancer Health Effects

Chronic noncancer health effects are those that result from long-term exposure to lower concentrations of pollutants. Long-term exposure has been defined as more than 12 percent of a lifetime, or about eight years (OEHHA 2003, p. 6-5). Chronic noncancer health effects include diseases such as reduced lung function and heart disease.

Reference Exposure Levels (RELs)

The analysis for both acute and chronic noncancer health effects compares the maximum project contaminant levels to safe levels known as Reference Exposure Levels, or RELs. These are amounts of toxic substances to which even sensitive individuals could be exposed without suffering any adverse health effects (OEHHA 2003, p. 6-2). These exposure levels are specifically designed to protect the most sensitive individuals in the population, such as infants, the aged, and people with specific illnesses or diseases which make them more sensitive to the effects of toxic substance exposure. The RELs are based on the most sensitive adverse health effect reported in the medical and toxicological literature and include specific margins of safety. The margins of safety account for uncertainties associated with inconclusive scientific and technical information available at the time of standard setting. They are therefore meant to provide a reasonable degree of protection against hazards that research has not yet identified.

Concurrent exposure to multiple toxic substances would result in health effects that are equal to, less than, or greater than effects resulting from exposure to the individual chemicals. Only a small fraction of the thousands of potential combinations of chemicals have been tested for the health effects of combined exposures. In conformity with California Air Pollution Control Officers Association (CAPCOA) guidelines, the HRA assumes that the effects of each substance are additive for a given organ system

[4] The HRA exposure pathways for RBEP included inhalation, home grown produce, dermal absorption, soil ingestion, and mother's milk, not including water ingestion.

(OEHHA 2003, pp. 1-5, 8-12). Other possible mechanisms due to multiple exposures include those cases where the actions would be synergistic or antagonistic (where the effects are greater or less than the sum, respectively). For these types of exposures, the health risk assessment could underestimate or overestimate the risks.

Cancer Risk and Estimation Process

For carcinogenic substances, the health assessment considers the risk of developing cancer and assumes that continuous exposure to the carcinogen would occur over a 70-year lifetime. The risk that is calculated is not meant to project the actual expected incidence of cancer, but rather a theoretical upper-bound estimate based on the worst-case assumptions.

Cancer Potency Factors

Cancer risk is expressed in terms of chances per million of developing cancer. It is a function of the maximum expected pollutant concentration, the probability that a particular pollutant would cause cancer (called potency factors), and the length of the exposure period. Cancer risks for individual carcinogens are added together to yield a total cancer risk for each potential source. The conservative nature of the screening assumptions used means that the actual cancer risks from project emissions would be considerably lower than estimated.

As previously noted, the screening analysis is performed to assess the worst-case risks to public health associated with the proposed project. If the screening analysis were to predict a risk below significance levels, no further analysis would be necessary and the source would be considered acceptable with regard to carcinogenic effects. If, however, the risk were to be above the significance level, then further analysis using more realistic site-specific assumptions would be performed to obtain a more accurate estimate.

SIGNIFICANCE CRITERIA

Energy Commission staff assesses the maximum cancer impacts from specific carcinogenic exposures by first estimating the potential impacts on the maximally exposed individual. This is a person hypothetically exposed to project emissions at a location where the highest ambient impacts were calculated using the worst-case assumptions. Since the individual’s exposure would produce the maximum impacts possible around the source, staff uses this risk estimate as a marker for acceptability of the project’s carcinogenic impacts.

Acute and Chronic Noncancer Health Risks

As described earlier, non-criteria pollutants are evaluated for short-term (acute) and long-term (chronic) noncancer health effects, and the noted cancer impacts from long-term exposures. The significance of project-related impacts is determined separately for each of the three health effects categories. Staff assesses the noncancer health effects by calculating a hazard index. A hazard index is a ratio obtained by comparing exposure from facility emissions to the safe exposure level (i.e. REL) for that pollutant. A ratio of less than 1.0 suggests that the worst-case exposure would be below the limit for safe levels and would thus be insignificant with regard to health effects. The hazard indices for all toxic substances with the same type of health effect are added together to yield a Total Hazard Index for the source. The Total Hazard Index is calculated separately for acute effects and chronic effects. A Total Hazard Index of less than 1.0 would indicate that cumulative worst-case exposures would be not lead to significant noncancer health effects. In such cases, noncancer health impacts from project emissions would be considered unlikely even for sensitive members of the population. Staff would therefore conclude that there would be no significant noncancer project-related public health impacts. This assessment approach is consistent with risk management guidelines of both California OEHHA and U.S. EPA.

Cancer Risk

Staff relies upon regulations implementing the provisions of Proposition 65, the Safe Drinking Water and Toxic Enforcement Act of 1986, (Health & Safety Code, §§25249.5 et seq.) for guidance in establishing significance levels for carcinogenic exposures. Title 22, California Code of Regulations, section 12703(b) states that “the risk level which represents no significant risk shall be one which is calculated to result in one or less excess cancer cases within an exposed population of 100,000, assuming lifetime exposure.” This risk level is equivalent to a cancer risk of 10 in 1 million, which is also written as 10×10^{-6}. In other words, under state regulations, an incremental cancer risk greater than 10 in 1 million from a project should be regarded as suggesting a potentially significant carcinogenic impact on public health. The 10 in 1 million risk level is also used by the Air Toxics “Hot Spots” (AB 2588) program as the public notification threshold for air toxic emissions from existing sources.

An important distinction between staff’s and the Proposition 65 risk characterization approach is that the Proposition 65 significance level applies separately to each cancer-causing substance, whereas staff determines significance based on the total risk from all the cancer-causing pollutants to which the individual might be exposed in the given case. Thus, the manner in which the significance level applied by staff is more conservative (health-protective) than the manner applied by Proposition 65. The significant risk level of 10 in 1 million is also consistent with the level of significance adopted by many California air districts. In general, these air districts would not approve a project with a cancer risk estimate more than 10 in 1 million.

As noted earlier, the initial risk analysis for a project is typically performed at a screening level, which is designed to overstate actual risks, so that health protection could be ensured. Staff’s analysis also addresses potential impacts on all segments of the population including the young, the elderly, people with existing medical conditions that would render them more sensitive to the adverse effects of toxic air contaminants, and any minority or low-income populations that are likely to be disproportionately affected by impacts. To accomplish this goal, staff uses the most current acceptable public health exposure levels (both acute and chronic) set to protect the public from the effects of air toxics being analyzed. When a screening analysis shows the cancer risks to be above the significance level, refined assumptions would be applied for likely a lower, more realistic risk estimate. If after refined assumptions, the project’s risk is still found to exceed the significance level of 10 in 1 million, staff would require appropriate measures to reduce the risk to less than significance levels. If, after all feasible risk reduction measures have been considered and a refined analysis still identifies a cancer risk of greater than 10 in 1 million, staff would deem such a risk to be significant and would not recommend project approval.

DIRECT/INDIRECT IMPACTS AND MITIGATION

PROPOSED PROJECT'S CONSTRUCTION/DEMOLITION IMPACTS AND MITIGATION MEASURES

The construction and demolition period for RBEP would be approximately 60 months, from January 2016 to December 2020 (RBEP 2012a). **Table 2.2-1** in **AFC** listed the details regarding the timeline of construction/demolition activities (RBEP 2012a, Section 2.2). The potential construction/demolition risks are normally associated with exposure to asbestos, fugitive dust, and combustion emissions (i.e. diesel exhaust).

Asbestos

The demolition of buildings containing asbestos would cause the emission of asbestos. Asbestos is a mineral fiber that occurs in rock and soil. Because of its fiber strength and heat resistance, it has been used in a variety of building construction materials for insulation and as a fire-retardant. Asbestos has been used in a wide range of manufactured goods, mostly in building materials (roofing shingles, ceiling and floor tiles, paper products, and asbestos cement products), friction products (automobile clutch, brake, and transmission parts), heat-resistant fabrics, packaging, gaskets, and coatings (US EPA, 2012). Structures built before 1980 are more likely to have asbestos containing materials (ACM). Thermal system insulation (formed or spray-on) is the ACM of greatest concern for response and recovery worker exposure (Occupational Safety and Health Administration [OSHA]).

Exposure to asbestos and asbestos containing materials (ACM) increases workers' and residences' risk of developing lung diseases, including asbestosis, lung cancer, and mesothelioma.

To reduce the potential risk associated with the removal of asbestos and ACM, the applicant would comply with all requirements outlined in SCAQMD Rule 1403, which requires the notification and special handling of ACM during demolition activities. The applicant would comply with SCAQMD Rule 1403 by:

- Conducting a facility survey to identify and quantify the presence of all friable and non-friable Class I and Class II ACM prior to the start of demolition activities;
- Notifying the SCAQMD and the Energy Commission compliance project manager (CPM) of the intent to conduct demolition activities in a district-approved format (e.g., submittal of a Rule 1403 Plan) prior to the start of any demolition activities;
- Employing one or more of the following methods for asbestos removal: High efficiency particulate air (HEPA) filtration, glovebag or Mini-enclosures, dray removal, or an alternative approved method;
- Collecting and storing ACM in a leak-tight or wrapped container to avoid releasing ACM to the atmosphere;

- Requiring an onsite representative to complete the Asbestos Abatement Contractor/Supervisor course pursuant to the Asbestos Hazard Emergency Response Act and Provision of Title 40, Code of Federal Regulations, Parts 61.145 to 61.147, 61.152, and Part 763, and be present during all ACM demolition or handling procedures; and
- Disposing of ACM wastes at a licensed waste disposal facility; ACM wastes will be hauled from the site by an appropriately licensed ACM waste transporter.

As a result of the activities listed above and in compliance with SCAQMD Rule 1403, the potential impacts associated with asbestos removal during demolition will be less than significant (RBEP 2012a, Section 5.9.3.3).

Small quantities of other hazardous wastes would also be generated during construction or demolition phases of the project. The mitigation measures needed to reduce the impacts of asbestos, ACM and other hazardous wastes from the construction or demolition phases of the project are covered in the **WASTE MANAGEMENT** section of this PSA. As for asbestos, Conditions of Certification **WASTE-2** requires that the project owner submit the SCAQMD Asbestos Demolition Notification Form to SCAQMD and the Energy Commission CPM for review and approval prior to removal and disposal of asbestos. After receiving approval, the project owner shall remove all ACM from the site prior to demolition. This program ensures there will be no release of asbestos that could impact public health and safety. Please refer to staff's **WASTE MANAGEMENT** section for detailed mitigation measures regarding the construction/demolition of asbestos and ACM, and information on the safe handling and disposal of these and all project-related wastes.

Fugitive Dust

Fugitive dust is defined as dust particles that are introduced into the air through certain activities such as soil cultivation, vehicles operating on open fields, or dirt roadways. Fugitive dust emissions during construction and demolition of the proposed project could occur from:

- dust entrained during site preparation and grading/excavation at the construction site;
- dust entrained during onsite movement of construction vehicles on unpaved surfaces;
- fugitive dust emitted from an onsite concrete batch plant; and
- wind erosion of areas disturbed during construction activities.

The effects of fugitive dust on public health are covered in the **AIR QUALITY** section of this PSA which includes staff's recommended mitigation measures, including **AQ-SC3** (Construction Fugitive Dust Control) and **AQ-SC4** (Dust Plume Response Requirement) to prevent fugitive dust plumes from leaving the project boundary. As long as the dust plumes are kept from leaving the project site, there would be no significant concern of fugitive dust adversely affecting public health.

Diesel Exhaust

Emissions of combustion byproducts during construction would result from:

- exhaust from diesel construction equipment used for site preparation, grading, excavation, trenching, and construction of onsite structures;
- exhaust from water trucks used to control construction dust emissions;
- exhaust from portable welding machines, small generators, and compressors;
- exhaust from diesel trucks used to transport workers and deliver concrete, fuel, and construction supplies to construction areas; and
- exhaust from vehicles used by construction workers to commute to and from the project areas.

Construction Health Risk Assessment (HRA) for Diesel Exhaust

The primary air toxic pollutant of concern from construction/demolition activities is diesel particulate matter (diesel PM or DPM). Diesel exhaust is a complex mixture of thousands of gases and fine particles and contains over 40 substances listed by the U.S. Environmental Protection Agency (EPA) as hazardous air pollutants (HAPs) and by ARB as toxic air contaminants. The diesel particulate matter (DPM) is primarily composed of aggregates of spherical carbon particles coated with organic and inorganic substances. Diesel exhaust deserves particular attention mainly because of its ability to induce serious noncancer effects and its status as a likely human carcinogen.

Diesel exhaust is also characterized by ARB as "particulate matter from diesel-fueled engines." The impacts from human exposure would include both short- and long-term health effects. Short-term effects can include increased coughing, labored breathing, chest tightness, wheezing, and eye and nasal irritation. Effects from long-term exposure can include increased coughing, chronic bronchitis, reductions in lung function, and inflammation of the lung. Epidemiological studies strongly suggest a causal relationship between occupational diesel exhaust exposure and lung cancer. Diesel exhaust is listed by the EPA as "likely to be carcinogenic to humans" (U.S. EPA 2003).

Based on a number of health effects studies, the Scientific Review Panel (SRP) on Toxic Air Contaminants in 1998 recommended a chronic REL for diesel exhaust particulate matter of five micrograms per cubic meter of air ($\mu g/m^3$) and a cancer unit risk factor of $3x10^{-4}$ $(\mu g/m^3)^{-1}$. However, SRP did not recommend a specific value for an acute REL since available data in support of a value was deemed insufficient. Therefore, there is no acute relative exposure level (REL) for diesel particulate matter, and it was not possible to conduct an assessment for its acute health effects. In 1998, ARB listed particulate emissions from diesel-fueled engines as a toxic air contaminant and approved the panel's recommendations regarding health effects (OEHHA 2009, Appendix A). In 2000, ARB developed a "Risk Reduction Plan to Reduce Particulate Matter Emissions From Diesel-Fueled Engines and Vehicles" and has been developing regulations to reduce diesel particulate matter emissions since that time.

A screening HRA for diesel particulate matter was conducted to assess the potential impacts associated with diesel emissions during the construction and demolition activities at RBEP. This HRA was based on the annual average emissions of diesel particulate matter (DPM), assumed to occur each year for nine years of continuous exposure[5]. The results are listed in the upper portion of **Public Health Table 2**.

The applicant did not run the Hotspots Analysis Reporting Program (HARP) model to evaluate construction-related public health impacts, but rather took the maximum locations from diesel PM modeling and hand calculated the results. The maximum modeled annual average concentration of diesel particulate matter at any location calculated by the project owner was 0.456 $\mu g/m^3$ (RBEP 2012a, Appendix 5.9C, Table 5.9C.2). Staff reviewed their analysis and conducted additional analyses.

The HARP model limits short-term, continuous residential exposure to nine years. OEHHA derived methodology was used to determine the residential and sensitive receptor exposure cancer risk. An adjusted nine-year, 49-week-per year, five-days-per-week, eight hours-per-day, exposure duration was used for commercial/industrial receptors[6]. Staff only evaluates the health impact of off-site workers because on-site workers are protected by Cal OSHA and are not required to be evaluated under the Hot Spots Program, unless the worker also lives on the facility site or property (OEHHA 2003, Chapter 8, pp. 8-5 and 8-6). The cancer unit risk value for an assumed nine-year exposure is 3.87×10^{-5} per $\mu g/m^3$ [7]. This is lower than the cancer unit risk of 3×10^{-4} per $\mu g/m^3$ from SRP since the results from SRP are derived for longer-term exposures (RBEP 2012a, Section 5.9.3.3 and Appendix 5.9C, Table 5.9C.2).

Based on the applicant's analysis, the predicted incremental increases in cancer risk at the Point of Maximum Impact (PMI), Maximally Exposed Individual Resident (MEIR) and Maximally Exposed Individual Worker (MEIW) associated with construction/demolition activities are 17.6 in one million[8], 8.95 in one million and 3.9 in one million, respectively. The predicted chronic health index at the PMI, MEIR and MEIW are 0.091, 0.046, and 0.091, respectively (RBEP 2012a, Section 5.9.3.3 and Appendix 5.9C, Table 5.9C.2).

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[5] Using to OEHHA's guidelines, a health risk assessment was conducted for different durations of exposure based on how long people live at a single location (Nine years for the average, 30 years for a high end estimates, and 70 years for a lifetime) (OEHHA 2012, page 1-6). The scenario of nine-year exposure is consistent with construction and demolition activities because HARP cannot be used for shorter periods of time, even though construction is expected to last only five years.

[6] Since the annual average determined by air modeling program is 24 hours per day, seven days per week , 52 weeks per year regardless of the actual operating schedule of the facility, the worker adjustment factor = $(8/24) \times (5/7) \times (49/52) = 0.224$ (OEHHA, 2003, Chapter 8, pp.8-6 and RBEP 2012a, Appendix 5.9C.2).

[7] The cancer unit risk value of 3.87×10^{-5} per $\mu g/m^3$ was calculated by assuming an exposure of nine years. By using this exposure assumption, the lifetime exposure factor could be calculated by the following formula:

The Lifetime Exposure Factor = 9/70 = 0.129.

The cancer unit risk value then could be calculated by the following formula:

The Cancer Unit Risk Value = The Cancer Unit Risk from SRP × The Lifetime Exposure Factor = 3×10^{-4} per $\mu g/m^3 \times 0.129 = 3.87 \times 10^{-5}$ per $\mu g/m^3$.

[8] The risk of 17.6 in one million was calculated using the following formula:

Cancer Risk = the maximum modeled annual average concentration of diesel particulate matter at any location × Cancer Unit Risk = $0.456\ \mu g/m^3 \times 3.87 \times 10^{-5}$ per $\mu g/m^3 = 17.6 \times 10^{-6}$.

Public Health Table 2
Construction Hazard/Risk from DPMs calculated by the Applicant

			Significance Level [b]	Significant? [c]
Derived Cancer Risk (per million)	PMI	**17.6**	10	**Yes**
	PMI [a]	9.78	10	No
	MEIR	8.95	10	No
	MEIW	3.9	10	No
Chronic HI (dimensionless)	PMI	0.091	1	No
	MEIR	0.046	1	No
	MEIW	0.091	1	No

Sources: RBEP 2012a, Section 5.9.3.3 and Appendix 5.9C, Table 5.9C.2.
[a] An adjusted five-year, five-days-per-week, 8 hours-per-day, exposure duration was used for commercial/industrial receptors.
[b] The significance level is a level that does not necessarily mean that adverse impacts are expected, but rather that further analysis and refinement of the exposure assessment is warranted.
[c] Staff conducted further analyses to investigate if the adverse impacts would be expected. Please see PSA content for details.

The calculated cancer risk at PMI is approximately 17.6 in one million, which is higher than the significance level of ten in one million. This PMI is located on the project fenceline. This screening cancer risk value at the PMI is higher than the California Environmental Quality Act (CEQA) significance threshold of ten in one million, a level that does not necessarily mean that adverse impacts are expected, but rather that further analysis and refinement of the exposure assessment is warranted.

To investigate if the adverse impacts would be expected, staff first conducted a further analysis to see if any residential or commercial/industrial receptors would be exposed to the construction risk higher than the significance level of ten in one million. Staff used AERMOD to plot the isopleths of 0.2584 $\mu g/m^3$ (i.e. the modeled annual average DPM concentration; excess cancer risk of this concentration is equal to ten in one million[9]). If there is neither a residential nor a commercial/industrial receptor within this isopleth, then the elevated risk would not occur since there is no public there. According to the plot, staff found that the construction cancer risk exceeds the threshold of ten in one million mainly within the project fence line, the adjacent open space area, parking lots, marina sailing, and oceanfront docks - none of which include residential buildings. However, two commercial/industrial buildings are within the isopleth that exceeds the threshold of ten in one million: Spectrum Athletic Clubs and Marina Sailing. However, since these two receptors are not residential but commercial/industrial, it is unlikely that a receptor would be there as long as analyzed in this assessment (i.e. 24 hours per day, seven days per week, 52 weeks per year for nine years) and it is more appropriate to use worker risks (i.e. eight hours per day, five days per week, 49 weeks per year for nine years) at these two receptors. As noted previously, risk of Maximally Exposed Individual Worker (MEIW) is 3.9 in one million, which is lower than the significance level of ten in one million. Risks of workers at these two commercial/industrial receptors are unlikely to be higher than the MEIW. Therefore, no mitigation measures would be required to decrease the risk to less than significant to protect these receptors.

[9] $0.2584\ \mu g/m^3 \times 3 \times 10^{-4}$ per $\mu g/m^3 \times 0.129 = 10 \times 10^{-6}$

Secondly, staff also recalculated the predicted incremental increases in cancer risk at the Point of Maximum Impact (PMI) by using an adjusted five-year, five-days-per-week, eight- hours-per-day, exposure duration, which is more consistent with the expected construction period of RBEP. The Point of Maximum Impact (PMI) using an adjusted five-year exposure duration, was 9.78 in one million, a little bit below the significance level of ten in one million.

Based on the results of staff's refined analysis, and considering two other facts: (1) the potential exposure of DPM would be sporadic and limited in length and (2) the predicted incremental increase in cancer risk at the MEIR and MEIW and chronic health index at the PMI, MEIR, and MEIW are less than the significance thresholds of ten in one million and 1.0, respectively, staff concludes that impacts associated with the DPM from finite construction activities would be less than significant.

Staff also regards the related conditions of certification of **AQ-SC5** (Diesel-Fueled Engine Control) and **AQ-SC6** in the **AIR QUALITY** section of this PSA as adequate to ensure that cancer-related impacts of diesel exhaust emissions for the public and off-site workers are mitigated during construction/demolition to a point where they are not considered significant. Moreover, since the screening risk value of 17.6 in one million is higher than the public notification levels of SCAQMD (i.e. ≥ 10 in one million), the applicant would be required by SCAQMD to follow the public notification procedures unless further analyses reduce the risk to less than ten in a million(SCAQMD Rule 1401 and SCAQMD Rule 212(c)(3)).

The chronic hazard indices for diesel exhaust during construction/demolition activities are lower than the significance level of 1.0. This means that there would be no chronic non-cancer impacts from construction/demolition activities.

The potential levels of criteria pollutants from operation of construction-related equipment are discussed in staff's **AIR QUALITY** section along with mitigation measures and related conditions of certification. The pollutants of most concern in this regard are particulate matter (PM), carbon monoxide (CO), sulfur dioxide (SO_2), and nitrogen dioxide (NO_2).

PROPOSED PROJECT'S OPERATIONAL IMPACTS AND MITIGATION MEASURES

Emission Sources

As previously noted, the proposed RBEP would be a natural gas-fired, combined-cycle, air-cooled, nominal 496- MW, gross 511-MW, electrical generating facility. Pollutants that could potentially be emitted are listed in **Public Health Table 3,** including both criteria and non-criteria pollutants. These pollutants include certain volatile organic compounds (VOCs) and polycyclic aromatic hydrocarbons (PAHs). Criteria pollutant emissions and impacts are examined in staff's Air Quality analysis. Since the facility would use dry cooling, there would be no emissions of toxic metals or VOCs from cooling tower mist or drift and no health risk from the potential presence of the Legionella bacterium responsible for Legionnaires' disease.

Tables 5.9-1and Table 5.9-2 of the AFC (RBEP 2012a) list the specific non-criteria pollutants that would be emitted as combustion byproducts from the RBEP natural-gas-fired turbines. The emission factors for these pollutants were obtained from the U.S. EPA AP-42 emission factors as required by the SCAQMD (SCAQMD 2014a, page 68-69).

The health risk from exposure to each project-related pollutant is assessed using the “worst case” emission rates and impacts. Maximum hourly emissions are used to calculate acute (one-hour) noncancer health effects, while estimates of maximum emissions on an annual basis are used to calculate cancer and chronic (long-term) noncancer health effects.

Public Health Table 3
The Main Pollutants Emitted from the Proposed Project

Criteria Pollutants	Non-criteria Pollutants
Carbon monoxide (CO)	Acetaldehyde
Oxides of nitrogen (NO_x)	Acrolein
Particulate matter (PM10 and PM2.5)	Ammonia
Oxides of sulfur (SO_2)	Benzene
Volatile Organic Compounds (VOCs)	1,3-Butadiene
	Ethyl Benzene
	Formaldehyde
	Hexane
	Naphthalene
	Polycyclic Aromatic Hydrocarbons (PAHs)
	Propylene
	Propylene oxide
	Toluene
	Xylene

Source: RBEP 2012a, Table 5.9-1 and Table 5.9-2

Hazard Identification

Numerous health effects have been linked to exposure to TACs, including development of asthma, heart disease, Sudden Infant Death Syndrome (SIDS), respiratory infections in children, lung cancer and breast cancer (OEHHA, 2003). According to the RBEP AFC, the toxic air contaminants emitted from the natural gas-fired CTGs/HRSGs include acetaldehyde, acrolein, ammonia, benzene, 1,3-butadiene, ethyl benzene, formaldehyde, napthalene, polycyclic aromatics, propylene oxide, toluene and xylene. **Public Health Table 3** and **Public Health Table 4** list each such pollutant.

Public Health Table 4
Types of Health Impacts and Exposure Routes Attributed to Toxic Emissions

Substance	Oral Cancer	Oral Noncancer	Inhalation Cancer	Noncancer (Chronic)	Noncancer (Acute)
Acetaldehyde			✔	✔	✔
Acrolein				✔	✔
Ammonia				✔	✔
Benzene			✔	✔	✔
1,3-Butadiene			✔	✔	
Ethyl Benzene			✔	✔	
Formaldehyde			✔	✔	✔
Napthalene		✔	✔	✔	
Polycyclic Aromatic Hydrocarbons (PAHs)	✔		✔		
Propylene Oxide			✔	✔	✔
Toluene				✔	✔
Xylene				✔	✔

Source: OEHHA / ARB 2011 and RBEP 2012a, Table 5.9-1

Exposure Assessment

Public Health Table 4 shows the exposure routes of TACs and how they would contribute to the total risk obtained from the risk analysis. The applicable exposure pathways for the toxic emissions include inhalation, home grown produce, dermal (through the skin) absorption, soil ingestion, and mother's milk. This method of assessing health effects is consistent with OEHHA's Air Toxics Hot Spots Program Risk Assessment Guidelines (OEHHA 2003) referred to earlier.

The next step in the assessment process is to estimate ambient concentrations using a screening air dispersion model and assuming conditions that would result in maximum impacts. The applicant used the EPA-recommended air dispersion model, AERMOD, along with five years (2005–2009) of compatible meteorological data from the LAX meteorological station (RBEP 2012a, Appendix 5.1C).

Dose-Response Assessment

Public Health Table 5 (modified from Table 5.9-2 in the AFC, including neither oral cancer potency factor nor chronic oral REL[10]) lists the toxicity values used to quantify the cancer and noncancer health risks from the project's combustion-related pollutants. The listed toxicity values include RELs and the cancer potency factors are published in the OEHHA's Guidelines (OEHHA 2003) and OEHHA/ARB Consolidation Table of OEHHA/ARB Approved Risk Assessment Health Values (ARB 2011). RELs are used to calculate short-term and long-term noncancer health effects, while the cancer potency factors are used to calculate the lifetime risk of developing cancer.

[10] Except for PAHs, there are neither oral cancer slope factors nor chronic oral reference exposure levels available for these toxic air contaminants. The oral cancer slope factor for PAHs is 12 $(mg/kg\text{-}d)^{-1}$.

Public Health Table 5
Toxicity Values Used to Characterize Health Risks

Toxic Air Contaminant	Inhalation Cancer Potency Factor $(mg/kg\text{-}d)^{-1}$	Chronic Inhalation REL ($\mu g/m^3$)	Acute Inhalation REL ($\mu g/m^3$)
Acetaldehyde	0.010	140	470 (1-hr) 300 (8-hr)
Acrolein	—	0.35	2.5 (1-hr) 0.7 (8-hr)
Ammonia	—	200	3,200
Benzene	0.10	60	1,300
1,3-Butadiene	0.60	20	—
Ethyl Benzene	0.0087	2,000	—
Formaldehyde	0.021	9	55 (1-hr) 9 (8-hr)
Hexane	—	7000	—
Napthalene	0.12	9.0	—
Polycyclic Aromatic Hydrocarbons (PAHs)	3.9	—	—
Propylene Oxide	0.013	3	3100
Toluene	—	300	37,000
Xylene	—	700	22,000

Sources: ARB 2011 and RBEP 2012a, Table 5.9-2

Characterization of Risks from TACs

As described above, the last step in an HRA is to integrate the health effects and public exposure information, provide quantitative estimates of health risks resulting from project emissions, and then characterize potential health risks by comparing worst-case exposure to safe standards based on known health effects.

The applicant’s HRA was prepared using the ARB’s HARP model, version 1.4f (ARB, 2011) and HARP On-ramp program (version 1.0). The HARP On-ramp tool was used to import the American Meteorological Society/EPA Regulatory Model (AERMOD) air dispersion modeling results into the HARP Risk Module. Emissions of non-criteria pollutants from the project were analyzed using emission factors, as noted previously, obtained mainly from the U.S. EPA AP-42 emission factors as required by the SCAQMD (SCAQMD 2014a, page 68-69). Air dispersion modeling combined the emissions with site-specific terrain and meteorological conditions to analyze the mean short-term and long-term concentrations in air for use in the HRA. Ambient concentrations were used in conjunction with cancer unit risk factors and RELs to estimate the cancer and noncancer risks from operations. In the following sub-sections, staff reviews and summarizes the work of the applicant, and evaluates the adequacy of the applicant’s analysis by conducting an independent HRA.

To evaluate the applicant’s analysis, staff conducted an additional analysis of cancer risks and acute and chronic hazards due to combustion-related emissions from the proposed RBEP. The analysis was conducted for the general population, sensitive receptors, nearby residences and off-site workers. The sensitive receptors, as previously noted, are subgroups that would be at greater risk from exposure to emitted air toxics, and include the very young, the elderly, and those with existing illnesses.

Effective August 2012, all air toxics HRAs should use the new OEHHA's Air Toxics Hot Spots Program Risk Assessment Guideline (OEHHA 2012) which recommends breaking down exposure/risk by age group using age-dependent adjustment factors (i.e. Age Sensitivity Factors) to calculate the cancer risk. This new methodology is used to reflect the fact that exposure varies among different age groups and exposure occurring in early life has a higher weighting factor. Since ARB is updating HARP software according to this new guideline and the updated HARP software is still unavailable, staff hand calculated the cancer risk at the Point of Maximum Impact (PMI) to check if cancer risks at this point exceed the threshold[11]. Human health risks associated with emissions from the proposed and similar projects are unlikely to be higher at any location other than the PMI. Therefore, if there is no significant impact associated with concentrations at the PMI, it can be reasonably assumed there would not be significant impacts in any other location in the project area.

Health risks potentially associated with ambient concentrations of carcinogenic pollutants were calculated in terms of excess lifetime cancer risks. The total cancer risk at any specific location is found by summing the contributions from the individual carcinogens. Health risks from non-cancer health effects were calculated in terms of hazard index as a ratio of ambient concentration of TACs to RELs for that pollutant.

The following is a summary of the most important elements of staff's heath risk assessment for the RBEP:

- the analysis was conducted using the latest version (1.4f) of ARB/OEHHA Hotspots Analysis and Reporting Program (HARP);
- emissions are based upon concurrent operation of all three natural-gas-fired turbines. The two electric fire pumps are not included in the public health analysis for RBEP because they would not be a source of air emissions;
- exposure pathways included inhalation, soil ingestion, dermal absorption, home grown produce, and mother's milk;
- the local meteorological data, local topography, grid, residence and sensitive receptors, source elevations, and site-specific and building-specific input parameters used in the HARP model were obtained from the AFC and modeling files provided by the applicant;

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[11] Staff used the simplified formula modified from the one from OEHHA by assuming that the Average Daily Doses (ADD) are all the same at different time periods. The formula for Lifetime (70 year) exposure duration - Calculation of Cancer Risk from Third Trimester to Age 70 (OEHHA 2012, page 1-7) is:
Cancer Risk = $[(ADD_{\text{third trimester}} \times CPF \times 10) \times 0.3 \text{ yrs}/70 \text{ yrs}] + [(ADD_{0 \text{ to} <2\text{yrs}} \times CPF \times 10) \times 2 \text{ yrs}/70 \text{ yrs}] + [(ADD_{2 < 16\text{yrs}} \times CPF \times 3) \times 14 \text{ yrs}/70 \text{ yrs}] + [(ADD_{16 < 70\text{yrs}} \times CPF \times 1) \times 54 \text{ yrs}/70 \text{ yrs}]$
where:
ADD = Average Daily Dose, mg/kg-d, for the specified time period
CPF = Cancer Potency Factor $(mg/kg\text{-}d)^{-1}$
Age Sensitivity Factor third trimester to less than 2 years = 10
Age Sensitivity Factor age 2 to less than 16 years = 3
Age Sensitivity Factor age 16 to less than 70 years = 1

- the emission factors and toxicity values used in staff's analysis of cancer risk and hazard were obtained from the AFC. The toxicity values are listed in **Public Health Table 5**;
- cancer risk was determined using the derived (OEHHA) risk assessment method, and staff applied the Age Sensitivity Factors recommended on OEHHA 2012 Guideline on the calculation of the cancer risk at the Point of Maximum Impact (PMI).

Cancer Risk at the Point of Maximum Impact (PMI)

The most significant result of HRA is the numerical cancer risk for the maximally exposed individual (MEI) which is the individual located at the point of maximum impact (PMI) and risks to the MEI at a residence (MEIR). As previously noted, human health risks associated with emissions from the proposed project are unlikely to be higher at any other location than at the PMI. Therefore, if there is no significant impact associated with concentrations at the PMI location, it can be reasonably assumed that there would not be significant impacts in any other location in the project area. The cancer risk to the MEI at the PMI is referred to as the Maximum Incremental Cancer Risk (MICR). However, the PMI (and thus the MICR) is not necessarily associated with actual exposure because in many cases, the PMI is in an uninhabited area. Therefore, the MICR is generally higher than the maximum residential cancer risk. MICR is based on 24 hours per day, 365 days per year, 70 year lifetime exposure. As shown in **Public Health Table 6**, total worst-case individual cancer risk was calculated by staff to be 3.49 in one million (the applicant calculated 2.05 in one million [RBEP 2013e, Table AQMD-2R] without applying the Age Sensitivity Factors) at the PMI. The PMI is approximately 0.24 miles northeast of the RBEP emission sources. As **Public Health Table 6** shows, the cancer risk value at PMI is below the significance level, ten in one million, whether the applicant's or staff's cancer risk is used, indicating that no significant adverse cancer risk is expected.

Chronic and Acute Hazard Index (HI)

The screening HRA for the project included emissions from all sources and resulted in a maximum chronic Hazard Index (HI) of 0.00626 and a maximum acute HI of 0.0423 (RBEP 2013e, Table AQMD-2R). As **Public Health Table 6** shows, both acute and chronic hazard indices are less than 1.0, indicating that no short- or long-term adverse health effects are expected.

Project-Related Impacts at Area Residences

Staff's specific interest in the risk to the maximally exposed individual in a residential setting (MEIR) is because this risk most closely represents the maximum project-related lifetime cancer risk. Residential risk is presently assumed by the regulatory agencies to result from exposure lasting 24 hours per day, 365 days per year, over a 70- year lifetime. Residential risks were presented in terms of MEIR and health hazard index (HHI) at residential receptors in **Public Health Table 6**. The cancer risk for the MEIR, is 2.03, which is below the significance level. The maximum resident chronic HI and acute HI are 0.00619 and 0.0277, respectively. They are both less than 1.0, indicating that no short- or long-term adverse health effects are expected at these residents.

Risk to Workers

The cancer risk to potentially exposed workers was presented by the applicant in terms of risk to the maximally exposed individual worker or MEIW at PMI and is summarized in **Public Health Table 6**. The applicant's assessment for potential workplace risks uses a shorter duration exposure rather than the 70-year exposure used residential risks. Workplace risk is presently calculated by regulatory agencies using exposures of eight hours per day, 245 days per year, over a 40- year period. As shown in **Public Health Table 6**, the cancer risk for workers at MEIW (i.e. 0.36 in 1 million) is below the significance level. All risks are below the significance level.

Risk to Sensitive Receptors

The highest cancer risk at a sensitive receptor is 1.32 in one million, the chronic HI is 0.00404 and the acute HI is 0.0317. All risks are below the significance level.

In **Public Health Table 6**, it is notable that the cancer and noncancer risks from RBEP operation would be below their respective significance levels. This means that no health impacts would occur within all segments of the surrounding population. Therefore, staff concludes there is no need for conditions of certification to protect public health.

The regulation applied to gas turbines located at major sources of HAP emissions is 40CFR Part 63 Subpart YYYY. A major source is defined as a facility with emissions of ten tons per year (tpy) or more of a single HAP or 25 tpy or more of a combination of HAPs based on the potential to emit. From Table 24 of SAQMD's PDOC, the single highest HAP emissions, formaldehyde, from the facility is 5.29 tpy (3 ×1.76 tpy/turbine & duct burner), which is less than 10 tpy. The total combined HAPs from all sources is 9.93 tpy (3 × 3.31 tpy/turbine & duct burner), which is less than 25 tpy. Therefore, the RBEP is, not a major source and not subject to this subpart (SCAQMD 2014a).

Public Health Table 6
Cancer Risk and Chronic Hazard from RBEP Operations

Receptor Location	Cancer Risk (per million)	Chronic HI[f]	Acute HI[f]
PMI[a]	2.05[d] **3.49**[e]	0.00626	0.0423
Residence MEIR[b]	2.03	0.00619	0.0277
Worker MEIW[c]	0.36	0.00626	0.0423
Highest Value at Sensitive Receptor	1.32	0.00404	0.0317
Significance level	10	1	1
Significant?	No	No	No

[a] PMI = Point of Maximum Impact
[b] MEIR = MEI of residential receptors. Location of the residence of the highest risk with a 70-year residential scenario.
[c] MEIW = MEI for offsite workers. Occupational exposure patterns assuming standard work schedule, i.e. exposure of eight hours/day, five days/week, 49 weeks/year for 40 years (OEHHA, 2003, Chapter 8, pp.8-5).
[d] Calculated by the applicant
[e] Calculated by staff. Cancer risk calculated by using the Age Sensitivity Factors recommended by OEHHA (OEHHA 2012). The cancer risk of PMI= ADD X CPF X [(10 X 0.3 yrs/70 yrs) + (10 X 2 yrs/70 yrs) + (3 X 14 yrs/70 yrs)+ (1 X 54 yrs/70 yrs)] = (2.05 $\times 10^{-6}$) x (10x0.3/70+10x2/70+3x14/70+1x54/70) =3.49 $\times 10^{-6}$
[f] HI = Hazard Index

CUMULATIVE IMPACTS AND MITIGATION

A project would result in a significant adverse cumulative impact if its effects are cumulatively considerable. "Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects (Cal. Code Regs., tit. 14, § 15130). As for cumulative impacts for cumulative hazards and health risks, if the implementation of the proposed project, as well as the past, present, and probable future projects, would not cumulatively contribute to regional hazards, then it could be considered a less than cumulatively considerable impact.

The geographic scope of analysis for cumulative effects to public health is a six-mile buffer zone around the project site. This is the same six-mile buffer zone for localized significant cumulative air quality impacts described and evaluated in the **AIR QUALITY** section of this PSA. While MATES II and MATES III studies were discussed, cumulative impacts of the proposed project along with other projects within a six-mile radius were not quantitatively evaluated in the AFC (RBEP 2012a, Section 5.9.4).

The SCAQMD identified four facilities within 6 miles (~10 km) of RBEP for inclusion in the cumulative impact assessment of 1-hour NO_2 (SCAQMD 2014a):

- Exxon Mobil Oil Corporation (Facility ID 800089): located in Torrance, CA, approximately four miles east of the proposed RBEP site;
- Chevron Products Corporation (Facility ID 800030): located in El Segundo, CA, approximately 4.5 miles north of the proposed RBEP site;
- LADWP's Scattergood Generating Station (Facility ID 800075): located in Playa del Rey, CA, approximately five miles north of the proposed RBEP site; and
- El Segundo Power, LLC (Facility ID 115663), located in El Segundo, CA, approximately four miles north of the proposed RBEP site.

The maximum cancer risk and non-cancer hazard index (both acute and chronic) for operations emissions from the RBEP estimated independently by the applicant, staff, and the SCAQMD are all below the level of significance. While air quality cumulative impacts could occur with sources within a six-mile radius, cumulative public health impacts are usually not significant unless the emitting sources are extremely close to each other, within a few blocks, not miles. All identified facilities are at least four miles from RBEP. Staff, therefore, concludes that the proposed RBEP project, even when combined with these projects, would not contribute to cumulative impacts in the area of public health.

Moreover, as previously noted, the maximum impact location would be the spot where pollutant concentrations for the proposed project would theoretically be highest. Even at this hypothetical location, staff does not expect any significant change in lifetime risk to any person, given the calculated incremental cancer risk of 3.49 in one million, which staff regards as not contributing significantly to the previously noted county-wide population-weighted risks of MATES III, 951 per million for Los Angeles County and 853 per million for SCAB. Modeled facility-related risks would be much lower for more distant locations. Given the previously noted conservatism in the calculation method used, the actual risks would likely be much smaller. Therefore, staff does not consider the incremental risk estimate from RBEP's operation as suggesting a potentially significant contribution to the area's overall or cumulative cancer risk that includes the respective risks from the background pollutants from all existing area sources.

COMPLIANCE WITH LORS

Staff has conducted a HRA for the proposed RBEP and found no potentially significant adverse impacts for any receptors, including sensitive receptors. In arriving at this conclusion, staff notes that its analysis complies with all directives and guidelines from the Cal/EPA Office of Environmental Health Hazard Assessment and the California Air Resources Board. Staff's assessment is biased towards protection of public health and takes into account the most sensitive individuals in the population. Using extremely conservative (health-protective) exposure and toxicity assumptions, staff's analysis demonstrates that members of the public potentially exposed to toxic air contaminant emissions of this project, including sensitive receptors such as the elderly, infants, and people with pre-existing medical conditions, would not experience any acute or chronic significant health risk or any significant cancer risk as a result of that exposure.

Staff incorporated every conservative assumption called for by state and federal agencies responsible for establishing methods for analyzing public health impacts. The results of that analysis indicate that there would be no direct or cumulative significant public health impact on any population in the area. Therefore staff concludes that construction and operation of the RBEP would comply with all applicable LORS regarding long-term and short-term project impacts in the area of public health.

Additionally, staff reviewed the **Socioeconomics Figure 1**, which shows the environmental justice population (see the **SOCIOECONOMICS** and **EXECUTIVE SUMMARY** sections of this PSA for further discussion of environmental justice) is greater than 50 percent within a six-mile buffer of the proposed RBEP site. Because no members of the public potentially exposed to toxic air contaminant emissions of this project would experience acute or chronic significant health risk or cancer risk as a result, there would not be a disproportionate Public Health impact resulting from construction and operation of the proposed project to an environmental justice population.

CONCLUSIONS

Staff has analyzed the potential public health risks associated with construction and operation of the RBEP using a highly conservative methodology that accounts for impacts to the most sensitive individuals in a given population. Staff concludes that there would be no significant health impacts from the project's air emissions. According to the results of staff's HRA, both construction/demolition and operating emissions from the RBEP would not contribute significantly or cumulatively to morbidity or mortality in any age or ethnic group residing in the project area.

PROPOSED CONDITIONS OF CERTIFICATION

No public health conditions of certification are proposed by staff.

ACRONYMS

ACM	Asbestos Containing Materials
AFC	Application for Certification
ARB	California Air Resources Board
ATC	Authority to Construct
Btu	British thermal unit
CAA	Clean Air Act (Federal)
CAL/EPA	California Environmental Protection Agency
CAPCOA	California Air Pollution Control Officers Association
CEC	California Energy Commission (or Energy Commission)
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CTGs	Combustion Turbine Generators
CO	Carbon Monoxide
CO2	Carbon Dioxide
CPM	Compliance Project Manager
DPMs	Diesel Particulate Matter
FSA	Final Staff Assessment
HAPs	Hazardous Air Pollutants
HARP	Hot Spots Reporting Program
HEPA	High Efficiency Particulate Air
HRA	Health Risk Assessment
RBEP	Redondo Beach Energy Project (proposed project)
HI	Hazard Index
HRSGs	Heat Recovery Steam Generators
lbs	Pounds

LORS	Laws, Ordinances, Regulations and Standards
MACT	Maximum Achievable Control Technology
MATES	Multiple Air Toxics Exposure Study
MEIR	Maximally Exposed Individual Resident
MEIW	Maximally Exposed Individual Worker
MICR	Maximum Individual Cancer Risk
mg/m3	Milligrams per Cubic Meter
MMBtu	Million British thermal units
MW	Megawatts (1,000,000 Watts)
NO	Nitric Oxide
NO2	Nitrogen Dioxide
NO3	Nitrates
NOx	Oxides of Nitrogen or Nitrogen Oxides
O2	Oxygen
O3	Ozone
OEHHA	Office of Environmental Health Hazard Assessment
OSHA	Occupational Safety and Health Administration
PAHs	Polycyclic Aromatic Hydrocarbons
PM	Particulate Matter
PM10	Particulate Matter less than 10 microns in diameter
PM2.5	Particulate Matter less than 2.5 microns in diameter
PMI	Point of Maximum Impact
ppm	Parts Per Million
ppmv	Parts Per Million by Volume
ppmvd	Parts Per Million by Volume, Dry
PSA	Preliminary Staff Assessment (this document)

RBEP	Redondo Beach Energy Project
RBGS	Redondo Beach Generating Station
RELs	Reference Exposure Levels
SCAB	South Coast Air Basin
SCAQMD	South Coast Air Quality Management District
SIDS	Sudden Infant Death Syndrome
SO2	Sulfur Dioxide
SO3	Sulfate
SOx	Oxides of Sulfur
SRP	Scientific Review Panel
TACs	Toxic Air Contaminants
T-BACT	Best Available Control Technology for Toxics
TDS	Total Dissolved Solids
tpy	Tons per Year
VOCs	Volatile Organic Compounds

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SOCIOECONOMICS

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SUMMARY OF CONCLUSIONS

Energy Commission staff (staff) concludes that construction and operation of the Redondo Beach Energy Project (RBEP) would not cause significant direct, indirect, or cumulative adverse socioeconomic impacts on the project area's housing, schools, law enforcement services, and parks. Staff also concludes that the project would not induce a substantial population growth or displacement of population, or induce substantial increases in demand for housing, parks, or law enforcement services. Staff-proposed Condition of Certification **SOCIO-1** would ensure project compliance with state and local laws, ordinances, regulations, and standards (LORS).

Staff concludes the population in the six-mile project buffer constitutes an environmental justice population, as defined by *Environmental Justice: Guidance Under the National Environmental Policy Act*, and further scrutiny is necessary for purposes of an environmental justice analysis. Because the project would have no significant adverse direct, indirect, or cumulative socioeconomic impacts, the project would have no socioeconomic impact on the environmental justice population as identified in **Socioeconomics Figure 1**.

INTRODUCTION

Staff's socioeconomics impact analysis evaluates the project's induced changes on existing population, employment patterns, and community services. Staff discusses the estimated impacts of the construction and operation of the RBEP on local communities, community resources, and law enforcement services, and provides a discussion of the estimated beneficial economic impacts of the construction and operation of the proposed project.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

Socioeconomics Table 1 contains socioeconomics laws, ordinances, regulations, and standards applicable to the proposed project.

Socioeconomics Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable LORS	Description
State	
California Education Code, Section 17620	The governing board of any school district is authorized to levy a fee, charge, dedication, or other requirement, for the purpose of funding the construction or reconstruction of school facilities.
California Government Code, Sections 65995-65997	Except for a fee, charge, dedication, or other requirement authorized under Section 17620 of the Education Code, state and local public agencies may not impose fees, charges, or other financial requirements to offset the cost for school facilities.

SETTING

The proposed RBEP would be located in the city of Redondo Beach, Los Angeles County, within the boundaries of the existing AES Redondo Beach Generating Station industrial site. The existing power plant is bound to the north by residential areas, to the east by a storage facility and office building, to the south by mixed use residential and commercial, and to the west by King Harbor Marina and the Pacific Ocean. Primary access to the RBEP site would be from the existing RBGS entrance off North Harbor Drive, south of the intersection of Herondo Street and North Harbor Drive (RBEP 2012a). The existing power plant has four operating steam-generating units (Units 5-8), an auxiliary boiler (no. 17), and four retired units (Units 1-4). Demolition of the eight units and auxiliary boiler would make way for the construction of the new power block and relocation of the existing Wyland Whaling Wall. Construction laydown, storage, and parking would be within the RBGS site.

For the purposes of assessing project impacts, staff defines the “local workforce” during project construction as residing within a two-hour commute of the project. This includes Los Angeles-Long Beach-Glendale Metropolitan Division (Los Angeles County), Santa Ana-Anaheim-Irvine Metropolitan Statistical Area (MSA) (Orange County), and Riverside-San Bernardino-Ontario MSA (Riverside and San Bernardino counties). The “local workforce” during project operation is defined as residing within a one-hour commute of the project.

Staff defines the study area related to project impacts on population, housing and parks, as the city of Redondo Beach and nearby cities to the project site. The study area for indirect and induced economic impacts is defined as Los Angeles County. The study area for environmental justice impacts is within a six-mile buffer of the project site.

USING THE 2010 US CENSUS AND US CENSUS BUREAU’S AMERICAN COMMUNITY SURVEY IN STAFF ASSESSMENTS

After the 2000 Census, the detailed social, economic, and housing information previously collected on the decennial census long form became the American Community Survey (ACS) (US Census 2013). The U.S. Census Bureau’s ACS is a nationwide, continuous survey that will continue to collect long-form-type information throughout the decade. Decennial census data is a 100 percent count collected once every ten years and represents information from a single reference point (April 1st). The main function of the decennial census is to provide counts of people for the purpose of congressional apportionment and legislative redistricting. ACS estimates are collected from a sample of the population based on information compiled continually and aggregated into one, three, and five-year estimates (“period estimates”) released every year. The primary purpose of the ACS is to measure the changing social and economic characteristics of the U.S. population. As a result, the ACS does not provide official counts of the population in between censuses. Instead, the Census Bureau’s Population Estimates Program will continue to be the official source for annual population totals, by age, race, Hispanic origin, and sex.

ACS collects data at every geography level from the largest level (nation) to the smallest level available (block group (BG)).[1] Census Bureau staff recommends the use of data no smaller than the Census tract level.[2,3] Data from the five-year estimates is used for the analysis as it provides the greatest detail at the smallest geographic level. Because ACS estimates come from a sample population, a certain level of variability is associated with these estimates. This variability is expressed as a margin of error (MOE). The MOE is used to calculate the coefficient of variation (CV). CVs are a standardized indicator of the reliability of an estimate. While not a set rule, the US Census Bureau considers the use of estimates with a CV more than 15 percent a cause for caution when interpreting patterns in the data (US Census 2009). In situations where CVs for estimates are high, the reliability of an estimate improves by using estimates for a larger geographic area (e.g. city or community versus census tract) or combining estimates across geographic areas.

PROJECT-SPECIFIC DEMOGRAPHIC SCREENING

Staff's demographic screening is based on information contained in two documents: *Environmental Justice: Guidance Under the National Environmental Policy* Act (CEQ 1997) and *Final Guidance for Incorporating Environmental Justice Concerns in EPA's Compliance Analyses* (US EPA 1998). The intention is to identify potentially sensitive populations, which could be disproportionately impacted by the proposed action. Due to the changes in the data collection methods used by the U.S. Census Bureau, the screening process relies on 2010 U.S. Census data to determine the number of minority populations and data from the 2008 - 2012 ACS to evaluate the presence of individuals and households living below the federal poverty level.

Staff's demographic screening is designed to identify the presence of minority or below-poverty-level populations, or both, within a six-mile area of the proposed project site. The six-mile buffer is based on air quality modeling, which shows that project-related impacts from pollutants decrease to less than significant within six miles of the emission site. Staff uses the six-mile buffer to determine the area of potential project impacts and to obtain data to gain a better understanding of the demographic makeup of the communities potentially impacted by the project. When Socioeconomics staff identifies the presence of an environmental justice population, staff from the 13 affected technical

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[1] Census Block Group - A statistical subdivision of a census tract. A BG consists of all tabulation blocks whose numbers begin with the same digit in a census tract; for example, for Census 2000, BG 3 within a census tract includes all blocks numbered between 3000 and 3999. The block group is the lowest-level geographic entity for which the Census Bureau tabulates sample data from the decennial census. **Source:** http://www.census.gov/dmd/www/glossary.html.

[2] Census Tract - A small, relatively permanent statistical subdivision of a county or statistically equivalent entity, delineated for data presentation purposes by a local group of census data users or the geographic staff of a regional census center in accordance with Census Bureau guidelines. Census tracts are designed to be relatively homogeneous units with respect to population characteristics, economic status, and living conditions at the time they are established. Census tracts generally contain between 1,000 and 8,000 people, with an optimum size of 4,000 people. Census tract boundaries are delineated with the intention of being stable over many decades, so they generally follow relatively permanent visible features. **Source:** http://www.census.gov/dmd/www/glossary.html.

[3] Census Workshop: Using the American Community Survey (ACS) and The New American Factfinder (AFF) hosted by Sacramento Area Council of Governments on May 11 & 12, 2011. Workshop presented by Barbara Ferry, U.S. Census Partnership Data Services Specialist.

areas evaluates the project for potential disproportionate impacts on, the environmental justice population.[4] When staff's screening analysis does not identify an environmental justice population in the six-mile buffer, no further scrutiny is required for purposes of an environmental justice analysis.

Minority Populations

According to *Environmental Justice: Guidance Under the National Environmental Policy Act*, minority individuals are defined as members of the following groups: American Indian or Alaskan Native; Asian or Pacific Islander; Black, not of Hispanic origin; or Hispanic. An environmental justice population is identified when the minority population of the potentially affected area is greater than 50 percent or the minority population percentage is meaningfully greater than the minority population in the general population or other appropriate unit of geographical analysis.

Socioeconomics Figure 1 shows the total population within the six-mile buffer of the project site was 534,348 persons with a minority population of 317,829 persons, or about 60 percent of the total population (US Census 2010a). The population in the six-mile buffer lives primarily within the cities of Redondo Beach, El Segundo, Lawndale, Torrance, Manhattan Beach, and Hermosa Beach, and to a much lesser extent, in the cities of Los Angeles, Hawthorne, Gardena, Lomita, Palos Verdes Estates, Rolling Hills Estates, and Rancho Palos Verdes. **Socioeconomics Figure 2** shows the jurisdictions of the cities in and around the six-mile buffer. The data presented in **Socioeconomics Table 2** shows that there is not only a large minority population in the six-mile buffer of the project site, but some of the cities in and around the six-mile buffer, as well as in the project area Census County Division (CCDs) have comparable or greater concentrations of minority populations.

[4] The 13 technical staff/areas are Air Quality, Hazardous Materials Management, Land Use, Noise and Vibration, Public Health, Socioeconomics, Soil and Water Resources, Water Supply, Traffic & Transportation, Transmission Line Safety and Nuisance, Visual Resources, Cultural Resources, and Waste Management.

Socioeconomics Table 2
Minority Populations within the Project Area

Area	Total Population	Not Hispanic or Latino: White alone	Minority	Percent Minority
Six-Mile Buffer of Project Site (**Socioeconomics Figure 1**)	534,348	216,519	317,829	**59.48**
Cities In and Around the Six-Mile Buffer				
El Segundo	16,654	11,515	5,139	30.86
Gardena	58,829	14,498	44,331	**75.36**
Hawthorne	84,293	27,678	56,615	**67.16**
Hermosa Beach	19,506	15,780	3,726	19.10
Lawndale	32,769	5,311	27,458	**83.79**
Lomita	20,256	8,797	11,459	**56.57**
Los Angeles	3,792,621	1,086,908	2,705,713	**71.34**
Manhattan Beach	35,135	27,873	7,262	20.67
Palos Verdes Estates	13,438	9,868	3,570	26.57
Rancho Palos Verdes	41,643	23,323	18,320	43.99
Redondo Beach	66,748	43,531	23,217	34.78
Rolling Hills Estates	8,067	5,134	2,933	36.36
Torrance	145,438	61,591	83,847	**57.65**
Regional Geographies				
Project Area CCDs*- Total	653,175	189,181	463,994	**71.04**
-South Bay Cities	138,043	98,699	39,344	28.50
-Torrance	145,438	61,591	83,847	**57.65**
-Inglewood	369,694	28,891	340,803	**92.19**
Los Angeles County	9,818,605	2,728,321	7,090,284	**72.21**
California	37,253,956	14,956,253	22,297,703	**59.85**

Notes: Bold text- minority population is greater than 50 percent. *CCD – Census County Division. **Source:** US Census 2010a.

Staff concludes that the minority population in the six-mile project buffer is greater than 50 percent and constitutes an environmental justice population as defined by *Environmental Justice: Guidance Under the National Environmental Policy Act*, and would trigger further scrutiny for purposes of an environmental justice analysis.

Below-Poverty-Level-Populations

The official poverty thresholds do not vary by geography (e.g. state, county, etc.), but are updated annually to allow for changes in the cost of living. The population for whom poverty status is determined does not include institutionalized people, people in military quarters, people in college dormitories, and unrelated individuals under 15 years old.

Staff identified the below-poverty-level population in the project area using CCD data from the 2008 - 2012 ACS Five-Year Estimates from the U.S. Census (US Census 2012a).[5] Within six miles of the RBEP, approximately 14 percent, or 90,402 people, live

[5] Staff determined that the data at the CCD level is the lowest level available that retains reasonable accuracy. The data represents a period estimate, meaning the numbers represent an area's characteristics for the specified time period.

below the poverty threshold.[6] **Socioeconomics Table 3** presents poverty data for the area within six miles of the project site.

The CEQ and US EPA guidance documents identify a 50 percent threshold to determine whether minority populations are considered environmental justice populations but do not provide a discrete threshold for below-poverty-level populations.

To understand the presence of poverty in the area, staff compared the below-poverty-level populations in the six-mile buffer to other appropriate geographies. As shown in **Socioeconomics Table 3**, staff used poverty data for the cities in and around the project's six-mile buffer and Los Angeles County as geographies to compare levels of poverty in populations near the project.

Socioeconomics Table 3
Poverty Data within the Project Area

Area	Total			Income in the past 12 months below poverty level			Percent below poverty level		
	Estimate*	MOE	CV (%)	Estimate	MOE	CV (%)	Estimate	MOE	CV (%)
Census County Divisions Used to Determine Poverty Status- Total	638,908	±2,251	0.21	90,402	±3,786	2.55	14.15	±0.59	2.53
-South Bay Cities	137,943	±156	0.07	6,336	±819	7.86	4.60	±0.6	7.93
-Torrance	144,206	±467	0.20	10,626	±1,173	6.71	7.40	±0.8	6.57
-Inglewood	365,759	±2,197	0.37	73,440	±3,505	2.90	20.10	±0.9	2.72
Comparison Geographies**									
Gardena	58,262	±205	0.21	8,305	±1,349	9.87	14.3	±2.3	9.78
Hawthorne	83,723	±328	0.24	15,786	±1,483	5.71	18.90	±1.8	5.79
Lawndale	32,680	±124	0.23	5,473	±922	10.24	16.70	±2.8	10.19
Los Angeles	3,735,119	±1,949	0.03	790,901	±9,302	0.71	21.2	±0.2	0.57
Redondo Beach	66,691	±94	0.09	3,942	±653	10.07	5.90	±1.0	10.30
Torrance	144,206	±467	0.20	10,626	±1,173	6.71	7.40	±0.8	6.57
Los Angeles County	9,684,503	±2,610	0.02	1,658,231	±14,195	0.52	17.10	±0.1	0.36
California	36,575,460	±3,416	0.01	5,590,100	±38,396	0.42	15.30	±0.1	0.40

Notes: * Population for whom poverty status is determined. ** Staff 's analysis of data for the cities of El Segundo, Hermosa Beach, Lomita, Manhattan Beach, Palos Verdes Estates, Rancho Palos Verdes, and Rolling Hills Estates returned CV values greater than 15, indicating that the data were unreliable and may not accurately reflect local characteristics, thus the data for these cities is not reported.
Sources: US Census 2012a and OK Dept. of Commerce 2010.

Roughly, 14 percent of the population within six miles of the project site lives below the federal poverty level. Of the CCDs used to determine the poverty status within the six-mile buffer, the Inglewood CCD stands out with 20 percent of the population living below the poverty level, compared with the two other CCDs (South Bay Cities and Torrance) more moderate 5 and 7 percent, respectively. By contrast, California has about 15 percent of the population living below the poverty level. Therefore, the 14 percent of population living below the poverty level within six miles of the project site is comparable to the percentage of below-poverty-level-population in the cities in and around the six-mile buffer and Los Angeles County.

[6] ACS estimates for the CCDs that encompass a six-mile buffer of the project site were aggregated using the ACS calculator at the Oklahoma Department of Commerce, consistent with instructions received during the May 11 & 12, 2011 Census Workshop.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

The California Environmental Quality Act (CEQA) requires a list of criteria to determine the significance of identified impacts. A significant impact is defined by CEQA as “a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project” (CEQA and Guidelines, Section 15382).

Thresholds serve as the benchmark for determining if a project will result in a significant adverse impact when evaluated against existing conditions (e.g., "baseline" conditions). State CEQA Guideline Section 15064, subdivision (e) specifies that: "[e]conomic and social changes resulting from the project shall not be treated as significant effects on the environment.", Section 15064, subdivision (e) states that when "a physical change is caused by economic or social effects of a project, the physical change may be regarded as a significant effect in the same manner as any other physical change resulting from the project. Alternatively, economic and social effects of a physical change may be used to determine that the physical change is a significant effect on the environment. If the physical change causes adverse economic or social effects on people, those adverse effects may be used as a factor in determining whether the physical change is significant."

Staff has used Appendix G of the State CEQA Guidelines for this analysis, which specifies that a project could have a significant effect on population, housing, and law enforcement services, schools and parks if it would:

- Induce substantial population growth in an area, either directly or indirectly;
- Displace substantial numbers of people and/or existing housing, necessitating the construction of replacement housing elsewhere; or
- Adversely impact acceptable levels of service for police protection, schools, and parks and recreation.

Staff’s assessment of impacts on population, housing, police protection, schools, and parks and recreation are based on professional judgments, input from local and state agencies, and the industry-accepted two-hour commute range for construction workers and one-hour commute range for operational workers.

DIRECT/INDIRECT IMPACTS AND MITIGATION

Induce Substantial Population Growth

For the purpose of this analysis, staff defines “induce substantial population growth” as workers moving into the project area because of project construction and operation, thereby encouraging construction of new homes or extension of roads or other infrastructure. To determine whether the project would induce population growth, staff analyzes the availability of the local workforce and the population within the region. Staff defines “local workforce” for project construction as those workers residing within a two-hour commute of the project site. This area includes the Los Angeles-Long Beach-

Glendale Metropolitan Division (Los Angeles County), Santa Ana-Anaheim-Irvine MSA[7] (Orange County), and Riverside-San Bernardino-Ontario MSA (Riverside and San Bernardino Counties). Workers residing in these MSAs with greater than a two-hour commute would be considered non-local and would likely seek lodging during construction closer to the project site. Staff defines “local workforce” for project operation as workers residing within a one-hour commute of the project.

Socioeconomics Table 4 shows the historical and projected populations for the cities within the six-mile buffer plus Los Angeles County for reference. The cities of Gardena, Hawthorne, Lawndale and city and county of Los Angeles have the highest projected population growth in the project study area with an average growth of 14 percent. The city of Redondo Beach has a more modest growth of 9 percent projected between 2010 and 2020.

[7] An MSA contains a core urban area population of 50,000 or more, consists of one or more counties, and includes the counties containing the core urban area, as well as any adjacent counties that have a high degree of social and economic integration (as measured by commuting to work) with the urban core.

Socioeconomics Table 4
Historical and Projected Populations

Area	2000[1]	2010[2]	2020[3]	2035[3]	2040[4]	2050[4]	Projected Population Change 2010-2035	
							Number	Percent
Cities within the Project Study Area: Total*	525,434	542,776	560,700	589,400	-	-	46,624	8.59
El Segundo	16,033	16,654	16,900	17,000	-	-	346	2.08
Gardena	57,746	58,829	59,700	66,200	-	-	7,371	12.53
Hawthorne	84,112	84,293	89,600	96,300	-	-	12,007	14.24
Hermosa Beach	18,566	19,506	19,600	19,700	-	-	194	0.99
Lawndale	31,711	32,769	34,600	37,400	-	-	4,631	14.13
Lomita	20,046	20,256	21,000	21,900	-	-	1,644	8.12
Los Angeles	3,694,820	3,792,621	3,991,700	4,320,600	-	-	527,979	13.92
Manhattan Beach	33,852	35,135	35,500	36,000	-	-	865	2.46
Palos Verdes Estates	13,340	13,438	13,500	13,500	-	-	62	0.46
Rancho Palos Verdes	41,145	41,643	41,700	41,700	-	-	57	0.14
Redondo Beach	63,261	66,748	69,700	73,000	-	-	6,252	9.37
Rolling Hills Estates	7,676	8,067	8,100	8,200	-	-	133	1.65
Torrance	137,946	145,438	150,800	158,500	-	-	13,062	8.98
Los Angeles County	9,519,338	9,818,605	10,404,000[3] 10,441,441[4]	11,353,000[3] 11,120,284[4]	11,243,022	11,434,565	1,534,395**	15.63

Notes: *The city of Los Angeles is not included in project study area total as the majority of the city is outside of the project study area (a small portion is inside the project area). **Calculated using the highest 2035 population projection. – Data not available.
Sources: [1]US Census 2000, [2]US Census 2010a, [3]SCAG 2012, [4]CA DOF 2013.

Socioeconomics Tables 5a and **5b** shows the total labor by skill for the Los Angeles-Long Beach-Glendale Metropolitan Division and Santa Ana-Anaheim-Irvine and Riverside-San Bernardino-Ontario MSAs would be more than adequate to provide construction labor for the project. **Socioeconomics Tables 6a** and **6b** shows the project labor needs for each of the phases of construction compared with the total labor supply in the study area.

Socioeconomics Table 5a
Total Craft Labor by Skill in the Study Area:
Los Angeles-Long Beach-Glendale Metropolitan Division, Santa Ana-Anaheim-Irvine MSA, and Riverside-San Bernardino-Ontario MSA

Craft	Los Angeles-Long Beach-Glendale Metropolitan Division (Los Angeles County)				Santa Ana-Anaheim-Irvine MSA (Orange County)				Riverside-San Bernardino-Ontario MSA (Riverside & San Bernardino Counties)			
	Total Workforce (2010)	Total Projected Workforce (2020)	Growth from 2010		Total Workforce (2010)	Total Projected Workforce (2020)	Growth from 2010		Total Workforce (2010)	Total Projected Workforce (2020)	Growth from 2010	
			Number	Percent			Number	Percent			Number	Percent
Piling Crew	3,310 [1]	4,030	720	21.8	2,400 [1]	2,690	290	12.1	2,510 [1]	3,030	520	20.7
Carpenter	15,530	17,960	2,430	15.6	12,410	12,320	-90	-0.7	10,140	10,450	310	3.1
Laborer	23,160	27,810	4,650	20.1	11,900	12,700	790	6.6	11,870	13,380	1,510	12.7
Teamster	16,510 [2]	20,280	3,770	22.8	3,540 [2]	3,880	340	9.6	7,810 [2]	9,660	1,850	23.7
Electrician	10,310	11,360	1,050	10.2	4,880	5,150	270	5.5	4,000	4,520	520	13.0
Ironworker	1,130	1,270	140	12.4	380	390	10	2.6	700	670	-30	-4.3
Millwright	300	270	-30	-10.0	22,110 [6]	24,520	2,410	10.9	140	140	0	0.0
Boilermaker	240	280	40	16.7	59,590 [4]	61,660	2,080	3.5	52,650 [4]	57,040	4,390	8.3
Plumber	8,180 [3]	9,230	1,050	12.8	3,770 [3]	4,000	230	6.1	3,160 [3]	3,570	410	13.0
Pipefitter	8,180 [3]	9,230	1,050	12.8	3,770 [3]	4,000	230	6.1	3,160 [3]	3,570	410	13.0
Insulation Worker	93,060 [4]	108,580	15,520	16.7	250 [7]	270	20	8.0	52,650 [4]	57,040	4,390	8.3
Operating Engineer	3,310	4,030	720	21.8	2,400	2,690	290	12.1	2,510	3,030	520	20.7
Oiler/ Mechanic	1,780 [5]	1,870	90	5.1	390 [5]	380	-10	-2.6	610 [5]	660	50	8.2
Cement Finisher	2,420	3,020	600	24.8	1,760	1,930	170	9.7	2,420	2,570	150	6.2
Masons	2,420	3,020	600	24.8	1,760	1,930	170	9.7	2,420	2,570	150	6.2
Roofers	93,060 [4]	108,580	15,520	16.7	59,590 [4]	61,660	2,080	3.5	1,700	1,310	-390	-22.9
Sheet Metal Worker	2,230	2,320	90	4.0	950	960	10	1.1	1,440	1,580	140	9.7
Sprinkler Fitters	8,180 [3]	9,230	1,050	12.8	3,770 [3]	4,000	230	6.1	3,160 [3]	3,570	410	13.0
Painters	9,360	10,740	1,380	14.7	6,430	6,550	110	1.7	4,320	4,570	250	5.8

Notes: [1] Operating engineers and other construction equipment; [2] Industrial Truck and Tractor Operators; [3] Plumbers, Pipefitters, and Steamfitters; [4] Construction trades workers; [5] Maintenance Workers, Machinery; [6] Drywall and Ceiling Tile Installers; [7] Other Installation, Maintenance, and Repair Occupations; [8] Insulation workers, mechanical; [9] Architectural and Engineering Managers; [10] Supervisors of Construction and Extraction Workers; [11] Electricians; I & C - Control Room craft not included as data is not available.
Sources: RBEP 2012a Appendix 5.10B, Table 5.10B-1, CA EDD 2012.

Socioeconomics Table 5b
Total Supervision Labor by Skill in the Study Area: Los Angeles-Long Beach-Glendale Metropolitan Division, Santa Ana-Anaheim-Irvine MSA, and Riverside-San Bernardino-Ontario MSA

Supervision	Los Angeles-Long Beach-Glendale Metropolitan Division (Los Angeles County)				Santa Ana-Anaheim-Irvine MSA (Orange County)				Riverside-San Bernardino-Ontario MSA (Riverside & San Bernardino Counties)			
	Total Workforce (2010)	Total Projected Workforce (2020)	Growth from 2010		Total Workforce (2010)	Total Projected Workforce (2020)	Growth from 2010		Total Workforce (2010)	Total Projected Workforce (2020)	Growth from 2010	
			Number	Percent			Number	Percent			Number	Percent
Construction Managers	10,830	12,210	1,380	12.7	8,660	8,540	-120	-1.4	5,000	5,490	490	9.8
Engineering Managers	6,440 [8]	6,880	440	6.8	3,370	3,760	390	11.6	1,180 [8]	1,340	160	13.6
Engineers	48,800	54,380	5,580	11.4	21,120	24,110	2,990	14.2	7,270	8,120	850	11.7
Civil Engineers	7,450	8,360	910	12.2	3,580	4,180	600	16.8	2,110	2,310	200	9.5
Electrical Engineers	5,410	5,840	430	7.9	1,750	1,890	130	7.4	660	740	80	12.1
Health and Safety Engineers, Except Mining Safety Engineers and Inspectors	580	640	60	10.3	210	210	0	0.0	120	140	20	16.7
Mechanical Engineers	5,960	6,430	470	7.9	2,140	2,220	80	3.7	1,050	1,150	100	9.5
Boilermaker	240	280	40	16.7	59,590 [4]	61,660	2,080	3.5	52,650 [4]	57,040	4,390	8.3
Carpenters Supervisor	8,740 [9]	10,490	1,750	20.0	4,980 [9]	5,260	280	5.6	4,540 [9]	5,240	700	15.4
Electricians Supervisor	8,740 [9]	10,490	1,750	20.0	4,980 [9]	5,260	280	5.6	4,540 [9]	5,240	700	15.4
Insulation Workers, Mechanical-Supervisor	8,740 [9]	10,490	1,750	20.0	4,980 [9]	5,260	280	5.6	4,540 [9]	5,240	700	15.4

Supervision	Los Angeles-Long Beach-Glendale Metropolitan Division (Los Angeles County)				Santa Ana-Anaheim-Irvine MSA (Orange County)				Riverside-San Bernardino-Ontario MSA (Riverside & San Bernardino Counties)			
	Total Workforce (2010)	Total Projected Workforce (2020)	Growth from 2010		Total Workforce (2010)	Total Projected Workforce (2020)	Growth from 2010		Total Workforce (2010)	Total Projected Workforce (2020)	Growth from 2010	
			Number	Percent			Number	Percent			Number	Percent
Structural Iron and Steel Workers Supervisor	8,740 [9]	10,490	1,750	20.0	4,980 [9]	5,260	280	5.6	4,540 [9]	5,240	700	15.4
Millwrights Supervisor	10,250 [10]	11,450	1,200	11.7	3,670 [10]	3,990	320	8.7	3,690 [10]	4,170	480	13.0
Construction Laborers Supervisor	8,740 [9]	10,490	1,750	20.0	4,980 [9]	5,260	280	5.6	4,540 [9]	5,240	700	15.4
Operating Engineers and Other Construction Equipment Operators-Supervisor	8,740 [9]	10,490	1,750	20.0	4,980 [9]	5,260	280	5.6	4,540 [9]	5,240	700	15.4

Notes: [1] Operating engineers and other construction equipment; [2] Industrial Truck and Tractor Operators; [3] Plumbers, Pipefitters, and Steamfitters; [4] Construction trades workers; [5] Maintenance Workers, Machinery; [6] Other Installation, Maintenance, and Repair Occupations; [7] Insulation workers, mechanical; [8] Architectural and Engineering Managers; [9] Supervisors of Construction and Extraction Workers; [10] Supervisors of Installation, Maintenance, and Repair Workers; I & C - Control Room craft not included as data is not available.
Sources: RBEP 2013p, Attachment DR 31-1; CA EDD 2012.

Socioeconomics Table 6a
Total Craft Labor by Skill in the Study Area MSAs/MD versus Project Labor Needs*

Study Area MSAs					RBEP Construction Workforce Needs- Peak Month by Phase					
Craft	**Total Workforce (2010)**	**Total Projected Workforce (2020)**	**Growth from 2010**		**Craft**		**Demo Units 1-4**	**Construct New Power Block**	**Construct Control/ Admin bldg, Water treatment bldg, & sound wall**	**Demo Units 5-8 and Aux. Boiler #17**
			Number	**Percent**	Demolition/ Construction Period		Jan 2016 to Dec 2016 (12 mo.)	Mar 2017 to June 2019 (28 mo.)	Nov 2018 to Dec 2019 (14 mo.)	Jan 2019 to Dec 2020 (24 mo.)
					Peak Month(s)		June 2016	Aug./Sept. 2018	July 2019	July 2019/June 2020
Piling Crew	8,220	9,750	1,530	18.6	Piling Crew		2	0 (10)**	0 (10)	0
Carpenter	38,080	40,730	2,650	7.0	Carpenter		40	30	10	40
Laborer	46,930	53,890	6,960	14.8	Laborer		16	35	15	18
Teamster	27,860	33,820	5,960	21.4	Teamster		0	8	6	0
Electrician	19,190	21,030	1,840	9.6	Electrician		6	25	4	8
Ironworker	2,210	2,330	120	5.4	Ironworker		6	42	14	8
Millwright	22,940	25,310	2,370	10.3	Millwright		8	6	0	10
Boilermaker	112,480	118,980	6,500	5.8	Boilermaker		0	15	0	0
Plumber	15,110	16,800	1,690	11.2	Plumber		0	14	4	0
Pipefitter	15,110	16,800	1,690	11.2	Pipefitter		0	12	2	6
Insulation Worker	145,960	165,890	19,930	13.7	Insulation Worker		6	13	7	6
Operating Engineer	8,220	9,750	1,530	18.6	Operating Engineer		4	15	5	4
Oiler/ Mechanic	2,780	2,910	130	4.7	Oiler/ Mechanic		0	4	3	0
Cement Finisher	6,600	7,520	920	13.9	Cement Finisher		0	17	7	0
Masons	6,600	7,520	920	13.9	Masons		0	0	7	0
Roofers	154,350	171,550	17,200	11.1	Roofers		0	8	3	0
Sheet Metal Worker	4,620	4,860	240	5.2	Sheet Metal Worker		0	13	4	0
Sprinkler Fitters	15,110	16,800	1,690	11.2	Sprinkler Fitters		0	8	4	0
Painters	20,110	21,860	1,750	8.7	Painters		0	6	3	0
I & C-Control Room	-	-	-	-	I & C-Control Room		0	0	4	0
					Total	Craft	88	271	102	100
						Supervision	10	20	6	5
						Workforce	98	291	108	105

Notes: - Data not available. *The construction plan is based on a single shift composed of a 10-hour workday, Monday through Friday, and an 8-hour shift on Saturdays. **Number in parenthesis represents the peak workforce during construction for the specific trade type. **Sources:** RBEP 2012a, Appendix 5.10B, Table 5.10B-1; CA EDD 2012.

Socioeconomics Table 6b
Total Supervision Labor by Skill in the Study Area MSAs/MD versus Project Labor Needs*

Supervision	Total Workforce (2010)	Total Projected Workforce (2020)	Growth from 2010		Supervision	Demo Units 1-4	Construct New Power Block	Construct Control/Admin bldg, Water treatment bldg, & soundwall	Demo Units 5-8 and Aux. Boiler #17
			Number	Percent	Demolition/ Construction Period	Jan 2016 to Dec 2016 (12 mo.)	Mar 2017 to June 2019 (28 mos.)	Nov 2018 to Dec 2019 (14 mo.)	Jan 2019 to Dec 2020 (24 mo.)
					Peak Month(s)	June 2016	Aug./Sept. 2018	July 2019	July 2019/ June 2020
Construction Managers	24,490	26,240	1,750	7.1	Construction Managers	1	2	1	1
Engineering Managers	10,990	11,980	990	9.0	Engineering Managers	0	2	1	0
Engineers	77,190	86,610	9,420	12.2	Engineers	1	1 (2)**	0	1
Civil Engineers	13,140	14,850	1,710	13.0	Civil Engineers	0	1 (2)	1	0
Electrical Engineers	7,820	8,470	650	8.3	Electrical Engineers	0	0	1	0
Health and Safety Engineers, Except Mining Safety Engineers and Inspectors	910	990	80	8.8	Health and Safety Engineers, Except Mining Safety Engineers and Inspectors	1	1	1	1
Mechanical Engineers	9,150	9,800	650	7.1	Mechanical Engineers	0	1	1	0
Boilermakers	112,480	118,980	6,500	5.8	Boilermakers	0	1	0	0
Carpenters Supervisor	18,260	20,990	2,730	15.0	Carpenters Supervisor	1	1	0	0
Electricians Supervisor	18,260	20,990	2,730	15.0	Electricians Supervisor	1	1	0	0
Insulation Workers, Mechanical- Supervisor	18,260	20,990	2,730	15.0	Insulation Workers, Mechanical- Supervisor	1	1	0	0
Plumbers, Pipefitters, and Steamfitters	15,110	16,800	1,690	11.2	Plumbers, Pipefitters, and Steamfitters	0	1	0	0
Structural Iron and Steel Workers Supervisor	18,260	20,990	2,730	15.0	Structural Iron and Steel Workers Supervisor	1	2	0	0
Millwrights Supervisor	17,610	19,610	2,000	11.4	Millwrights Supervisor	1	1	0	0
Construction Laborers Supervisor	18,260	20,990	2,730	15.0	Construction Laborers Supervisor	1	2	0	1
Operating Engineers and Other Construction Equipment Operators-Supervisor	18,260	20,990	2,730	15.0	Operating Engineers and Other Construction Equipment Operators-Supervisor	1	2	0	1
					Total – Craft	88	271	102	100
					Total – Supervision	10	20	6	5
					Total – Workforce	98	291	108	105

Notes: *The construction plan is based on a single shift composed of a ten-hour workday, Monday through Friday, and an eight-hour shift on Saturdays.
*Number in parenthesis represents the peak workforce during construction for the specific trade type.
Sources: RBEP 2013p, Attachment DR 31-1; CA EDD 2012.

If the RBEP Application for Certification (AFC) is approved by the Energy Commission, project construction and demolition activities are anticipated to last 60 months (five years), from January 2016 until December 2020. The first activities to occur onsite would be the dismantling and removal of existing Units 1-4. Construction of the new power block would begin in the first quarter of 2017 and continue to the end of the second quarter of 2019 (approximately 28 months) when it would be ready for commercial operation. While the new power block is constructed, the new control building and water treatment building would be constructed and the Wyland Whaling Wall (sound wall) would be relocated. These activities would span approximately 14 months from the fourth quarter of 2018 to the end of the fourth quarter of 2019. Project construction and demolition activities would conclude with the removal of Units 5-8 and auxiliary boiler number 17 beginning in the first quarter of 2019 and concluding at the end of the fourth quarter of 2020, for a 24-month duration.

There would be an average and peak (Jan. 2019) workforce of approximately 149 and 338, respectively, comprising construction and demolition craft labor, heavy equipment operators, support, and construction management personnel on site.

The applicant did not provide an estimate of what proportion of the construction workforce would come from Los Angeles County or the neighboring counties of Orange and Riverside and what portion would come from other nearby counties in Southern California, and thus would seek lodging closer to the project site. However, in the AFC the applicant assumed that because of the size of the local construction workforce the majority of construction workers would come from Los Angeles County (RBEP 2012a, pg. 5.10-9). Energy Commission staff contacted the local building and construction trades council (Los Angeles/Orange Counties Building and Construction Trades Council [BCTC]) for more information about the local construction workforce in Los Angeles and Orange counties. BCTC staff, Ron Miller and Jim Adams, explained that information from their local unions shows there are more than sufficient union members available within a commuting distance of the RBEP (CEC 2013f). BCTC staff also indicated the recession has caused huge unemployment in their trades with unemployment in the local unions spanning 15 to 40 percent, which is only starting to decrease. According to the BCTC staff, projects like the RBEP require a certain ratio of apprentices to journeyman members for staffing the job site, so with their robust apprentice programs, most of which last five years, there are apprentices at all levels available for staffing. Based on the large local area labor pool, staff considers the majority of construction workers would commute daily to the project site and a small workforce, about 10 percent, would come from outside of the local commute area. During the peak construction period, approximately 34 workers could come from outside of the local commute area, with an average of 15 workers during the 60-month construction period.

The 21 operational staff needed for the RBEP would be drawn from the existing operational staff (RBEP 2012a, pg. 5.10-11). There would be no new workers hired, therefore no new residents would be added and RBEP would not create a substantial population influx.

Staff concludes the project's construction and operation workforces would not directly, or indirectly, induce a substantial population growth in the project area, and therefore, the project would create a less than significant impact.

Housing Supply

Socioeconomics Table 7 presents housing supply data for the project area. As of April 1, 2010, there were 215,953 housing units within a six-mile buffer of the project site with a vacancy of 9,883 units, representing a 4.58 percent vacancy rate. A 5 percent vacancy is largely industry-accepted as a minimum benchmark for a sufficient amount of housing available for occupancy (Virginia Tech 2006). The housing counts in the project area indicate a slightly insufficient amount of available housing units within a six-mile buffer of the project site. Los Angeles County's extensive hotel/motel lodging supply, as discussed below, would make up for availability of housing concerns.

Socioeconomics Table 7
Housing Supply in the Project Area

Subject	Area			
	Cities in a Six Mile Buffer of Project Site*		Los Angeles County	
	Number	Percent	Number	Percent
OCCUPANCY STATUS				
Total housing units	212,853	100	3,445,076	100
--Occupied housing units	203,105	95.4	3,241,204	94.1
--Vacant housing units	9,748	4.6	203,872	5.9
VACANCY STATUS				
Vacant housing units	9,748	100.00	203,872	100
For rent	5,012	51.4	104,960	51.5
For sale only	957	9.8	26,808	13.1
For seasonal, recreational, or occasional use	1,417	14.5	19,099	9.4
Other**	2,362	24.2	53,005	26.0

Notes: *Cities include El Segundo, Gardena, Hawthorne, Hermosa Beach, Lawndale, Lomita, Manhattan Beach, Palos Verdes Estates, Rancho Palos Verdes, Redondo Beach, Rolling Hills Estates, and Torrance.** Other includes rented, not occupied; sold, not occupied; migratory workers, and other vacant. **Source:** US Census 2010b

Los Angeles County has a total of 1,150 hotel/motel properties with an average of 96,900 hotel/motel rooms from October 2012 to September 2013 and an average occupancy rate of 76.4 percent (RBEP 2013p). In Redondo Beach, there are approximately 14 hotel/motel properties with 1,383 hotel/motel rooms as of October 2013 and average monthly occupancy rates from October 2012 to September 2013 of 79.1 percent. Recreational vehicle parks and campgrounds within six miles of the project site have limited availability and in some cases, imposed restrictions, so are not a consistent viable pose a stable option for project construction workers lodging.

Given the large supply of lodging choices in Redondo Beach and Los Angeles County and the estimated number of non-local project construction workers (peak estimate - 34 workers), staff expects no new housing would be required as a result of the project.

There would be no new workers hired as the 21 operational staff needed for the RBEP would be drawn from the existing operational staff, therefore no new residents would be added and no impact to the housing supply in the area would result.

Staff concludes the project’s construction and operation workforce would not have a significant adverse impact on the housing supply in the project area, Redondo Beach or Los Angeles County and therefore, the project would create a less than significant impact.

Displace Substantial Numbers of Existing Housing and People

The RBEP is proposed on the site of the existing AES Redondo Beach Generating Station, replacing the existing power plant so the project would not directly displace existing housing or people. The project would not induce substantial population growth or create the need for replacement housing to be constructed elsewhere, as previously discussed.

Staff concludes the project would have no impact on area housing as the project would not displace any people or necessitate the construction of replacement housing elsewhere.

Result in Substantial Physical Impacts to Government Facilities

As discussed under the subject headings below, the RBEP would not cause significant impacts to service ratios, response times, or other performance objectives relating to law enforcement, schools, or parks.

Law Enforcement

The RBEP proposed project site is located within the jurisdiction of the city of Redondo Beach Police Department (RBPD). Their single station and dispatch facility serves as headquarters and is located at 401 Diamond Street; approximately one mile from the proposed RBEP site. RBPD also has a pier substation located on Torrance Boulevard. RBPD’s staff includes 96 sworn police officers and 60 full-time civilians (CEC 2013d). RBPD is staffed so that a minimum of five officers and one supervisor are on duty at any given time. The department’s service standard is 96 officers per 67,000 in population. Based on the 2010 population count in Redondo Beach (66,748), a staff of approximately 96 officers would meet RBPD’s service standard. RBPD has formal mutual aid agreements with other local police departments.

The California Highway Patrol (CHP) is the primary law enforcement agency for state highways and roads. The city of Redondo Beach includes a small segment of the 405 freeway, and segments of Pacific Coast Highway (State Highway 1) and Hawthorne Boulevard (State Route 107). The CHP is the primary law enforcement agency for the 405 freeway and both CHP and RBPD serve the portions of Hawthorne Boulevard and Pacific Coast Highway within the city of Redondo Beach. CHP services include law enforcement, traffic control, accident investigation and the management of hazardous material spill incidents. The nearest CHP office is located in Torrance (CHP 2013). The **HAZARDOUS MATERIALS MANAGEMENT** section of this document discusses response times for hazardous material spill incidents.

Staff contacted RBPD to discuss the proposed project, ascertain their ability to provide law enforcement services to the project, and solicit comments or concerns they might have about the project. Police Captain Jeff Hink estimates a response time of zero to five minutes to the project site for priority calls and, based on call volume for any particular day, five to 30 minutes to the project site for non-priority calls. Captain Hink commented that increased project-related traffic near the construction site could delay the response time of emergency personnel to the site and other locations along Harbor Drive, especially during weekends and summer months when traffic in the area is at high capacity. Traffic and Transportation staff acknowledges there are potential traffic circulation concerns between beach activities and project construction workforce and trucks and has proposed Condition of Certification **TRANS-3**, which would require preparation and implementation of a traffic control plan to address the movement of workers, vehicles, and materials, including arrival and departure schedules and designated workforce and delivery routes. See the **TRAFFIC AND TRANSPORTATION** section of this document for a full assessment of impacts related to traffic and transportation.

Staff sent Captain Hink examples of the conditions of certification that are typically applied to projects like the RBEP to address construction and operations site security and traffic management. As mitigation for security, Hazardous Materials Management staff is proposing Conditions of Certification **HAZ-7** and **HAZ-8**, which would require the preparation of a construction site security plan and operation security plan and include a protocol for contacting law enforcement and the Energy Commission Compliance Project Manager (CPM) in the event of suspicious activity or emergency. See the **HAZARDOUS MATERIALS MANAGEMENT** section of this document for a full assessment of impacts related to hazardous materials.

Captain Hink responded to staff that the examples of conditions of certification staff sent would adequately address RBPD's concerns related to traffic flow and vehicle access to the area and reduce the need for police oversight. Captain Hink has indicated that the large construction site could become a target for crime, and could require RBPD to dedicate personnel to investigate related offences. Captain Hink further commented that during operations, RBPD may need to assign personnel to the project site on a periodic basis to maintain the peace if public protests and demonstrations occur (CEC 2014e); however, he has not indicated that construction and operation of the project would necessitate additional personnel or facilities for RBPD.

In the AFC, the applicant has addressed security measures for operations by proposing perimeter fencing and a 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; and a fire alarm monitoring system (RBEP 2012a, pg. 5.5-23). Also proposed are measures to conduct site personnel background checks, including employee and routine onsite contractors; site access protocol for vendors; and a protocol for hazardous materials vendors for security plan preparation and personnel background security checks. The security plan may include one or more of the following: security guards; security alarm for critical structures; perimeter breach detectors and onsite motion detectors; and video or still camera monitoring system.

Staff believes that the proposed Conditions of Certification **HAZ-7**, **HAZ-8**, and **TRANS-3** would mitigate site security and traffic movement concerns in the project area. Captain Hink's concerns about potential protests and demonstrations can be mitigated by these conditions and the applicant's proposed operations security measures. In addition, based on staff's communication with Captain Hink, RBPD has the authority, staff, and resources needed to deal with potential events, such as public protest and demonstrations should they occur.

As confirmed by Captain Hink, staff concludes the project would not result in law enforcement response times being affected so that they exceed adopted response time goals. The project would not necessitate alterations to police station or the construction of a new police station to maintain acceptable response times for law enforcement services; therefore, no associated physical impact would result. Staff concludes that for the above reasons, the project would create a less than significant impact.

Education

The RBEP site is located within the Redondo Beach Unified School District (RBUSD). RBUSD provides kindergarten through twelfth grade education at eight elementary schools, two middle schools, two high schools (one a continuation school), one learning academy, and non-public non-sectarian schools. The RBUSD has a combined enrollment of 8,967 students for the 2012/2013 school year (CDE 2013). **Socioeconomics Table 8** presents the enrollment for the current and previous two years, average pupil-to-teacher ratio, and average classroom size for the RBUSD. Correlating data for Los Angeles County is provided for reference.

Socioeconomics Table 8
School District Data

	Year	Enrollment	Pupil-to-Teacher Ratio	Average Class Size
Redondo Beach Unified School District	2012/2013	8,967	24.9	28.8
	2011/2012	8,658	24.0	28.7
	2010/2011	8,437	24.0	28.4
Los Angeles County	2012/2013	1,564,205	22.1	22.6
	2011/2012	1,578,215	22.2	23.0
	2010/2011	1,589,390	22.2	24.3

Source: CDE 2013.

Based on the pupil-to-teacher ratio and the average class size for RBUSD compared with the corresponding data for Los Angeles County, presented in **Socioeconomics Table 8** above, the RBUSD appears more crowded than the combined school districts in Los Angeles County. Staff contacted RBUSD staff to ascertain their district capacity. At the elementary school level, the California Department of Education (CDE) sets a pupil to teacher cap and allows class size exceptions through waivers. This classroom cap enables Energy Commission staff to gage an elementary school district's capacity. The CDE allows a pupil to teacher ratio of 33:1 for Kindergarten and under the Education Code, 33 students are allowed in a single Kindergarten class as long as the district does not exceed an overall Kindergarten average of 31 students. RBUSD has requested a class size waiver for the 2013/2014 year and retroactively for the 2012/2013 year for grades one through three from the CDE for 33:1 ratio district wide (CEC 2013h). Unlike the elementary schools, high schools do not have a pupil to teacher cap that staff can use to ascertain district capacity. District staff confirmed RBUSD is not overcrowded (CEC 2013h).

During construction, staff expects the majority of the labor force would be hired locally with approximately 10 percent of the workforce coming from outside the local Los Angeles County area. Based on a peak employment of 338 workers, approximately 34 new residents could temporarily relocate closer to the project site. Staff's research and communication with building and construction trades councils has shown that construction workers do not move their families with them when working on a project. Therefore, staff does not expect a significant adverse impact to the schools from construction of the proposed project.

RBEP would employ 21 workers from the existing workforce at the Redondo Beach Generating Station (RBEP 2012). As no additional operations employees would be hired, no workers are anticipated to relocate closer to the project site and therefore no children would permanently relocate within the RBUSD. There would be no school population growth and by extension would not necessitate the provision of new or physically altered government facilities (e.g. schools) in order to maintain acceptable service ratios.

School Impact Fees

The statutory school fees, as authorized under Section 17620 of the Education Code, for the current year for new industrial development in RBUSD is $0.47 per square foot of chargeable covered and enclosed space (CEC 2013h). The applicable fees are calculated prior to the issuance of building permits during plan review. Based on the preliminary project design, approximately 10,700 square feet would be considered chargeable covered and enclosed space (RBEP 2012a, pg. 5.10-12). Based on this preliminary estimate, approximately $5,029 in school fees would be assessed for RBUSD. Staff is proposing Condition of Certification **SOCIO-1** to ensure the payment of fees to the RBUSD. RBEP would be in compliance with Section 17620 of the Education Code through the one-time payment of statutory school impact fees to the Redondo Beach Union School District. Staff concludes the project would have a less than significant impact on schools.

Parks

Redondo Beach has 14 parks (97.35 acres), 17 parkettes (3.28 acres), and 59.63 of other parkland facilities (pier without commercial and parking area, county beach, community centers not in parks, and Southern California Edison right of way) for a combined total of approximately 160 acres of parkland (CRB 2013a, CRB 2013b, and CRB 2004). Amenities offered at these parks include tennis and racquetball center, sports field, basketball courts, little league field, picnic shelter, play area, playground equipment, gymnasium, track and field, off-leash dog park, salt water lagoon, BBQs, overnight camping, interpretive programs, scenic walkway, youth theater play equipment, amphitheatre banquet facilities, community center, teen center, senior center, historical museum, and scout house. The closest park to the project site is the Seaside Lagoon.

The city has a park standard of three acres per 1,000 residents (CRB 2004). ACS five year data (2008-2012) show the estimated population in Redondo Beach as 66,800[8] (US Census 2012b). Based on this current estimate, approximately 200 acres of parks would be needed to meet the park standard. The city has approximately 160 acres of parkland, equating to approximately 2.40 acres per 1,000 people, so does not meet its park standard.

Staff's analysis shows there would not be a large number of workers moving into the project area during project construction and no workers moving to the project area for project operations and therefore, there would be little, if any increase in the usage of or demand for parks or other recreational facilities.

Staff concludes the project would not result in substantial adverse physical impacts associated with the provision of new or physically altered government facilities in order to maintain acceptable service ratios, response times, or other performance objectives with respect to parks. The project would not increase the use of neighborhood or regional parks or recreational facilities to the extent that substantial physical deterioration of the facility would occur or be accelerated. The project would not necessitate the construction of new parks in the area, nor does the project propose any park facilities. For the above reasons, staff concludes the project would have a less than significant impact on neighborhood or regional parks and recreational facilities.

CUMULATIVE IMPACTS AND MITIGATION

A project may result in significant adverse cumulative impacts when its effects are cumulatively considerable; that is, when the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, other current projects, and probable future projects [Pub. Resources Code § 21083; Cal. Code of Regulations, tit. 14, §§ 15064, subd. (h); 15065, subd. (c); 15130; and 15355]. Mitigation requires taking feasible measures to avoid or substantially reduce the impacts.

In a socioeconomic analysis, cumulative impacts could occur when more than one project in the same area has an overlapping construction schedule, thus creating a demand for workers that cannot be met locally, or when a project's demand for public services does not match a local jurisdiction's ability to provide such services. An influx of non-local workers and their dependents can strain housing, schools, parks and recreation, and law enforcement services.

Because of the large labor supply in the Los Angeles area and the mobility of the labor supply, staff conducted a CEQANet[9] database search using Los Angeles County and the cities within the county as the geographic search parameters. Staff considered projects within these search parameters that would likely employ a similar workforce to the RBEP as part of the project's cumulative impact analysis for socioeconomics. Staff contacted planning staff with Los Angeles County, Redondo Beach, and the cities

[8] The five-Year ACS estimate for population in Redondo Beach is 66,800, with a margin of error of +/- 62, and a coefficient of variation of 0.06.
[9] The CEQANet database lists CEQA documents that have been submitted to the State Clearinghouse for state agency review.

adjacent to Redondo Beach (El Segundo, Hermosa Beach, Los Angeles, Manhattan Beach, and Torrance) to develop a list of large residential development, industrial, and commercial projects that could have construction schedules overlapping with the RBEP. The applicant anticipates that if the RBEP were approved, the project's 60-month demolition/construction would begin in January 2016.

Staff considers the following projects in **Socioeconomics Table 9** part of the cumulative setting for socioeconomic resources.

Socioeconomics Table 9
Cumulative Projects

Status	Project Name	Project Description	Location	Est./Actual Construction Start Date & Duration
Foreseeable	E&B Oil Development Project	Proposed onshore drilling and production site using directional drilling of 30 wells to access the oil and gas reserves in the tidelands (granted by the State of California to the city) and in an onshore area known as the uplands. Both of these areas are located within the Torrance Oil Field beneath the city. Relocate the city maintenance yard to another site and installation of offsite underground pipelines for the transport of the processed crude oil and gas from the project site to purchasers. Total of 30 oil wells, four water injection wells, and supporting production equipment.	Hermosa Beach	Unknown, Ballot measure needed before development. Estimated Fall 2014 for ballot measure.
Foreseeable	El Segundo Energy Center	Natural gas fired air-cooled 440-megawatt electrical generating facility. Project would require demolition of existing power plant and construction of project.	El Segundo	Demo/Construction est. end 2015 to 2018- a 24-26-month demo / construction period.
Planned/ Present	Cambria Suites, EA-844	152 room hotel – 71,000 sq. ft.	El Segundo	Unknown
Planned/ Present	Wiseburn High School	New high school, 180,000 to 240,000 sq. ft.	El Segundo	Mid-2015, 22 month construction period
Foreseeable	EA-986, Mattel	R&D and office, 14 stories, 300,000 sq. ft., 810-space, 8-story parking structure	El Segundo	Unknown
Planned/ Present	EA-781	Seven-Unit Residential Condominium, 14,313 sq. ft.	El Segundo	Unknown
Foreseeable	EA-997, Hotel	Five-story, 190 room hotel, 107,090 sq. ft.	El Segundo	Unknown, one to two year construction period.
Planned/ Present	EA-890, El Segundo Unified School District	304 Senior housing/assisted living facility up to 175,000 sq. ft.	El Segundo	Unknown
Foreseeable	West Aircraft Maintenance Area	Replace existing facilities and consolidate maintenance operations; paved area for aircraft parking, maintenance hangars, 300-space employee parking lot, storage, equipment related facilities, and ground run-up enclosure.	Los Angeles	Construction over an eight to ten year period
Planned/ Present	Elevator, Escalator, and Moving Walkway Modernization	Refurbish 212 outdated systems with new, modern units throughout the airport; new escalators, elevators, and walkways	Los Angeles	May 2009 to July 2016
	LAX Curbside Appeal Project	Phase 1: New Canopy, landscaping, light band, and new light poles in front of Tom Bradley International Terminal; Phase 2: Light band, light poles, and canopies in front of the terminal in the LAX Central Terminal Area		Phase 1: Summer 2012-Aug. 2013; Phase 2: Spring 2014-Summer 2016

Status	Project Name	Project Description	Location	Est./Actual Construction Start Date & Duration
Foreseeable	Phillips 66 Los Angeles Refinery Carson Plant - Crude Oil Storage Capacity Project	Installation of one new 615,000-barrel crude oil storage tank with geodesic dome, increasing the annual permit throughput limit of two existing 320,000 bbl crude oil storage tanks. Project includes two new feed/transfer pumps and one 14,000 bbl water-draw surge tank with associated pumps and pipelines. Also included is the installation of Tie-ins to the Pier "T" crude oil delivery pipeline from Berth 121 and construction of one new electrical power substation.	Carson	unknown construction start, 18-month construction period
Foreseeable	Jordan High School Major Renovation Project	Project includes demolition of approximately ten permanent buildings and 32 portable buildings, renovation of approximately 213,000 sq. ft. of existing building space, and construction of approximately 240,000 sq. ft. of new building space, to replace the classrooms that were demolished. At full buildout, the project site would consist of approximately 453,000 sq. ft. of total building space. The number of classrooms would decrease from 131 to 129 with a total maximum student capacity of 3,870. Capacity would decrease with the proposed project and there would be no change to enrollment. All phases of the proposed project would be contained within the existing boundaries of the school site.	Long Beach	Implementation of campus master plan in approximately six phases starting in January 2014 ending in 2028 (dependent on funding).
Planned/ Present	Crenshaw/ LAX Transit Corridor Project	An 8.5-mile light-rail line between existing Metro Exposition Line at Crenshaw & Exposition Blvds. to Metro Green Line's Aviation/LAX Station. Includes eight stations, a maintenance facility, park-ride lots, traction power substations and acquisition of rail vehicles and maintenance equipment.	Crenshaw Corridor, Inglewood, Westchester, and LAX area	Heavy construction set to begin spring 2014. Completion is expected by 2019.
Foreseeable	ENV-2012-1501-MND	Demolition of 22 single and multi-family residential units and approx. 2,000 sq. ft. of commercial floor area. Construction of new five-story mixed-use residential building with 122 residential units (11 units for very low-income households), and total of 93,885 sq. ft. floor area and 122 parking spaces. The building will include 3,500 sq. ft. commercial floor area and seven additional parking spaces for commercial use.	Los Angeles	est. 1-1.5- year construction period
Foreseeable	Palladium Residences	Continued operation as an entertainment and event venue, with repairs and interior restorations. Two additional buildings up to 28 stories and approximately 350 feet in height under one of two options: Option 1- Residential Option: up to 731 residential units in two buildings; Option 2- Residential/Hotel Option: up to 598 residential units and up to 250 hotel rooms and ancillary hotel uses including banquet, meeting and related retail space in the two buildings. Both Options include ground-floor retail and restaurant space; recreational and open space facilities, and up to 1,900 parking spaces	Los Angeles	construction start 2015 or later

Status	Project Name	Project Description	Location	Est./Actual Construction Start Date & Duration
Foreseeable	8150 Sunset Blvd Mixed-Use Project	Demolition of existing uses and development of a two- to 16-story mixed-use commercial/residential building, including approx. 111,310 sq. ft. commercial retail and restaurant within three lower levels (one subterranean) and one rooftop level, with 249 apartment units (28 affordable housing units) within twelve upper levels representing 222,560 gross sq. ft. residential space. Parking provided in a seven-level (three subterranean and semi-subterranean) parking structure. Total development would include up to 333,870 sq. ft. commercial and residential space.	Los Angeles	Construction begins in 2015 with completion and occupancy estimated in 2017.
Planned/ Present	ENV-2012-1111-MND / 11965-11979 1/4 W. Montana Avenue	Demolition of 32 dwelling units within two existing apartment buildings and the construction of a new five-story, 56-ft. high, 49-unit residential condominium project (incl.13 affordable dwelling units). Request two density bonus incentives: an 11-ft. increase in building height to 56-ft. in lieu of 45-ft. and the increase in, 89,350 sq. ft. floor area and 98 parking spaces.	Los Angeles	12-14 months minimum construction period
Foreseeable	I-405 Improvement Project	Either add one general purpose (GP) lane, or two GP lanes, or one GP lane and a tolled express lane in each direction of I-405 to be managed with the existing HOV lanes as a tolled express facility between SR-73 and Interstate 605. Improvements primarily in Orange County for approx. 16 miles between 0.2-mile south of Bristol Street and 1.4 miles north of I-605, as well as portions of SR-22, SR-73, and I-605.	Los Angeles and Orange counties.	2015 to 2019
Planned/ Present	Purple Line Extension	Nine-mile extension of the Metro Purple Line subway west from the current terminus at Wilshire/Western, plus seven new stations.	Miracle Mile, Beverly Hills, Century City and Westwood	Sect.1 construction est. 2014-2023; Sect. 2 construction est. 2019-2026; Sect. 3 construction est. 2027- 2035.

RBEP would employ an average of 149 workers per month during the 60-month demolition and construction period. The construction workforce would peak during months 82 and 83 with 338 workers onsite. Approximately 10 percent of the construction workforce is expected to be non-local and would likely relocate closer to the project site. Once operational, the RBEP would permanently employ 21 workers, drawn from the existing Redondo Beach Generating Station (RBGS) staff. No additional staff would be required.

Socioeconomics Table 10 presents the total labor force for the crafts specifically needed for the construction of RBEP. As shown in the table, the labor force within the Los Angeles-Long Beach-Glendale Metropolitan Division and the surrounding MSAs are more than sufficient to accommodate the labor needs for construction of the RBEP and the other future planned projects identified in **Socioeconomics Table 9** in the cumulative study area.

Socioeconomics Table 10
Total Labor Supply for Selected MSAs/MD

Total Labor for Selected MSAs/MD (Construction Workforce)*	Total Workforce for 2010	Total Projected Workforce for 2020	Growth from 2010	Percent Growth from 2010
Los Angeles-Long Beach-Glendale Metropolitan Division	304,650	351,150	46,500	15.3
Santa Ana-Anaheim-Irvine MSA	248,620	262,390	13770	5.5
Riverside-San Bernardino-Ontario MSA	239,500	262,370	22870	9.5
TOTALS	792,770	875,910	83140	10.5

Note: Total workforce includes only the crafts specifically needed for the RBEP. *See **Socioeconomics Tables 5a** and **5b** for a list of crafts included in the total construction workforce figures. **Source:** EDD 2012

The project would not have a significant adverse impact on area lodging or housing supply, but could have a temporary incremental impact when combined with the projects identified in **Socioeconomics Table 9**. However, as there is a large supply of lodging choices and sufficient housing supply in Redondo Beach and Los Angeles County, the project's slight increase in area population during project construction would not create a significant reduction in lodging and housing supply. As no additional operational workers would be hired for the RBEP, no new children would be added to the RBUSD and thus the project would not have an incremental impact on schools. Staff's proposed Condition of Certification **SOCIO-1** would ensure applicable school fees are paid by the project. The project would not have a significant adverse impact on neighborhood or regional parks or other recreational facilities. Construction workers who seek lodging closer to the project do not bring their families with them and generally return to their residences over the weekend. Because they are not likely to spend time at neighborhood parks and recreational facilities, the project would not have an incremental impact on neighborhood or regional parks or other recreational facilities. The project would not result in law enforcement response times being affected and would not increase the demand for law enforcement services. Thus, the project would not have an incremental impact on law enforcement services.

Staff concludes the proposed RBEP would not result in any significant and adverse cumulative impacts on population, housing, schools, parks and recreation, or law enforcement. **Socioeconomics Tables 5a** and **5b** show there is a more than sufficient workforce available for the RBEP project plus other future planned projects listed in **Socioeconomics Table 9**. Therefore, for the reasons discussed above, staff does not expect the construction or operation of the RBEP to contribute to any significant adverse cumulative socioeconomic impacts.

NOTEWORTHY PUBLIC BENEFITS

For the purpose of this analysis, staff defines noteworthy public benefits to include changes in local economic activity and local tax revenue that would result from project construction and operation. To assess the gross economic value of the proposed project, the applicant developed an input-output model (IMPLAN) using proprietary cost data and the IMPLAN Professional 3.0 software package. The assessment used Los Angeles County as the unit of analysis. Impact estimates reflect two different scenarios representing the demolition and construction phase and the operations phase of the project. For both phases, the applicant estimated the total direct, indirect, and induced economic effects on employment and labor income. Direct economic effects represent the employment, labor income, and spending associated with demolition, construction, and operation of the project. Indirect economic effects represent expenditures on intermediate goods made by suppliers who provide goods and services to the project. Induced economic effects represent changes in household spending that occur due to the wages, salaries, and proprietor's income generated through direct and indirect economic activity.

The resulting estimates from the IMPLAN analysis do not represent a precise forecast, but rather an approximate estimate of the overall economic effect. The IMPLAN model is a static model, meaning that it relies on inter-industry relationships and household consumption patterns, as they exist at the time of the analysis. This is important given that demolition of existing units 1 - 4 would not begin until the first quarter of 2016, power block construction would begin the first quarter of 2017, demolition of units 5-8 and auxiliary boiler no. 17 would begin the first quarter of 2019, with project completion not until the fourth quarter of 2020. The model also assumes that prices remain fixed, regardless of changes in demand, and that industry purchaser-supplier relationships operate in fixed proportions. The model does not account for substitution effects, supply constraints, economies of scale, demographic change, or structural adjustments.

Socioeconomics Table 11 reports the applicant's estimates of the economic impacts/benefits that would accrue to Los Angeles County due to project construction and operation. The applicant assumes that 100 percent of the materials and equipment spending for demolition and construction would occur within Los Angeles County and that around 90 percent of the demolition and construction labor and associated payroll would come from within Los Angeles County. With the 21 operations workforce coming from the existing RBGS workers, 100 percent of the operations payroll would occur within Los Angeles County. While the applicant assumes that 100 percent of the annual operations and maintenance expenditures would be made within Los Angeles County, the applicant acknowledges that some portion of the annual operations and maintenance budget may be spent in neighboring counties.

During the 60-month demolition and construction period, the project would generate almost 361 jobs (direct, indirect, and induced) and $178.2 million in labor income (direct, indirect, and induced). The average annual economic impact of project operations would equal roughly 29 jobs (including 21 existing direct jobs, indirect, and induced) and $3.7 million in labor income (direct, indirect, and induced).

Socioeconomics Table 11
RBEP Economic Benefits (2012 dollars)

Total Fiscal Benefits	
Estimated annual property taxes	$ 2.77 million to $3.04 million
State and local sales taxes:	
Construction	$3,073,440
Operation	$220,060
School Impact Fees	$5,029 RBUSD
Total Non-Fiscal Benefits	
Total capital costs	$250 million to $275 million
Construction payroll (incl. benefits)	$167.6 million
Operations payroll (incl. benefits)	$2.94 million
Construction materials and supplies	$35.125 million
Operations and maintenance supplies	$2,515,000
Total Direct, Indirect, and Induced Benefits	
Estimated Direct Benefits	
Construction Jobs	149 (average)
Operation Jobs	0 new jobs (21 from existing RBGS workforce)
Estimated Indirect Benefits	
Construction Jobs	30
Construction Income	$1,337,700
Operation Jobs	4
Operation Income	$607,440
Estimated Induced Benefits	
Construction Jobs	182
Construction Income	$9,218,030
Operation Jobs	4
Operation Income	$202,480
Summary of Local Benefits (to LA County)[1]	
Estimated Direct Benefits	
Construction payroll (incl. benefits) (represents 90 percent to LA County)	$150.8 million
Operations payroll (incl. benefits) (represents 100 percent to LA County)	$2.94 million
Construction materials & supplies (represents 100 percent to LA County)	$35.125 million
Operations & maintenance supplies (represents 100 percent to LA County)	$2,515,000

Note -[1] Based on applicant's estimates. **Source:** RBEP 2012a, 5.10-9 to 5.10-12.

PROPERTY TAX

The Board of Equalization (BOE) has jurisdiction over the valuation of a power-generating facility for tax purposes, if the power plant produces 50 megawatts (MW) or greater. For a power-generating facility producing less than 50 MW, the county has jurisdiction over the valuation. The RBEP would be a 496-MW power generating facility, therefore, BOE is responsible for assessing property value. The property tax rate is set by the Los Angeles County Auditor-Controller's office. Property taxes are collected and distributed at the county level.

Assuming a capital cost of $250 to $275 million and a property tax rate consistent with the current rate for the existing Redondo Beach Generation Station property (1.106685 percent), the project would generate approximately $ 2.77 to $3.04 million in property tax revenues during the first operation year of the project (RBEP 2012a, pg. 5.10-12). The property taxes assessed on the existing RBGS for FY 2010-2011 was $2.13 million. The estimated increase in property tax revenues generated by the RBEP is approximately $640,000 to $920,000. The increase in property taxes resulting from the RBEP project would be about 3 percent of Redondo Beach's property tax revenues for FY 2011-12 (CRB 2012).

PROPOSED CONDITIONS OF CERTIFICATION

SOCIO-1 The project owner shall pay the one-time statutory school facility development fees to the Redondo Beach Union School District as required by Education Code Section 17620.

Verification: At least 30 days prior to the start of project construction, the project owner shall provide to the compliance project manager, proof of payment to the Redondo Beach Union High School District of the statutory development fee.

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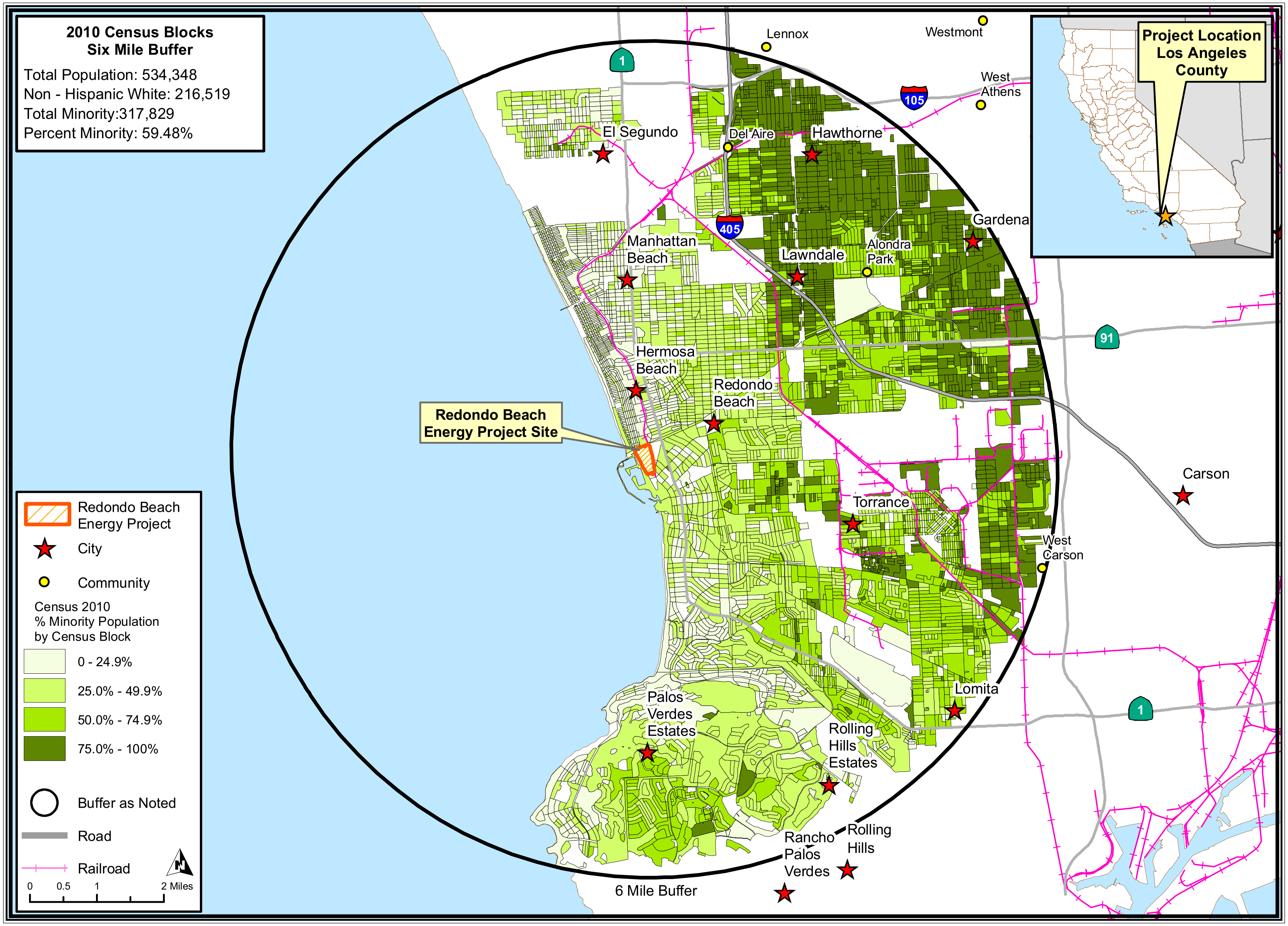
SOCIOECONOMICS - FIGURE 1

Redondo Beach Energy Project - Census 2010 Minority Population by Census Block - Six Mile Buffer

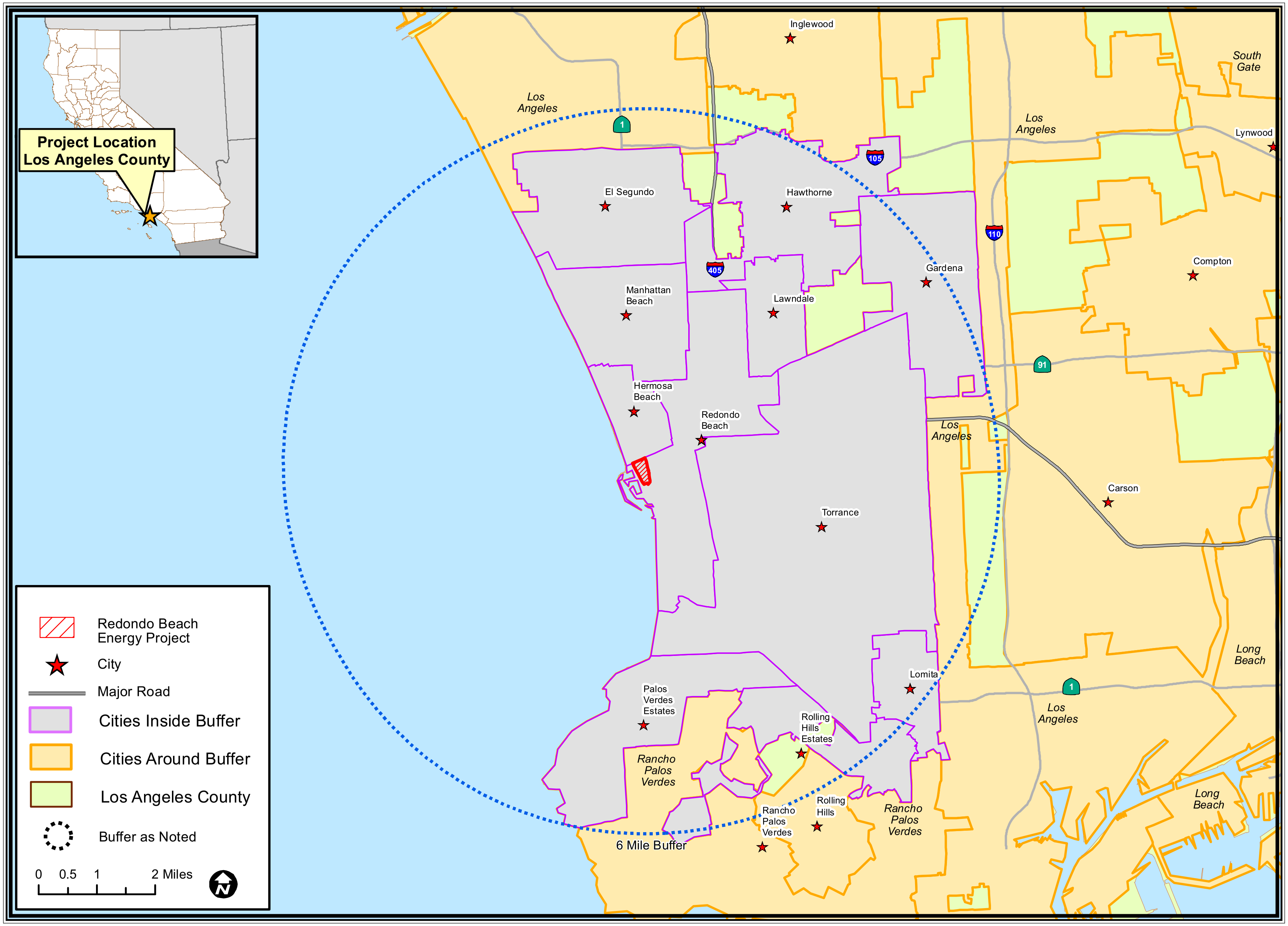


CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: Multinet, Census 2010 - PL94-171, Open Street Map City Data March 2013.

SOCIOECONOMICS - Figure 2

Redondo Beach Energy Project - Cities in and Around the Six Mile Buffer



CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: Open Street Map City Data March 2013.

SOIL AND WATER RESOURCES

Abdel-Karim Abulaban, P.E.

SUMMARY OF CONCLUSIONS

Based on the assessment of the proposed Redondo Beach Energy Project (RBEP), California Energy Commission (Energy Commission) staff concludes that the project would not have any significant impacts to soil and water resources. As recycled water produced by the West Basin Municipal Water District (WBMWD) and distributed by California Water Service Co. (Cal-Water) is readily available, staff recommends that it be used for construction and industrial purposes during operations rather than currently proposed potable water. It is staff's position that this is consistent with Energy Commission Water Policy and regulations and standards. Staff understands the applicant may not agree and additional information regarding recycled water use may be made available for further determination of its suitability for project use. Use of recycled water would result in additional savings of 100 acre feet (AF) of potable water during the five-year construction period and about 52 AF annually during project operation. This brings the total reduction in potable water during project operation to about 305 acre feet per year (AFY) that would be available for other beneficial uses. Staff proposes Condition of Certification **SOIL&WATER-6**, which would require the project to use recycled water for suitable construction uses and project operation. Additionally:

- The proposed project would result in a 0.17 million gallon per day (mgd) reduction in industrial waste water volume to the Pacific Ocean and a similarly proportional decrease in pollutant loading.
- The proposed project would result in the elimination of once-through cooling with ocean water from the existing RBGS.
- The proposed site has a long industrial history and would not require a lot of additional soil disturbance for the new facilities and as such would result in minimal losses to soil resources. Though some small losses in topsoil are expected during construction and operation from wind and water erosion, onsite management of stormwater runoff and sediment erosion as proposed by staff in Conditions of Certification **SOIL&WATER-1** and **SOIL&WATER-3** would ensure soil loss is kept to a minimum.
- Staff proposes Condition of Certification **SOIL&WATER-1,** which would require the proposed project to comply with the Clean Water Act and obtain discharge permits for construction through the State Water Resources Control Board and the city of Redondo Beach wet weather erosion control requirements. This condition would ensure that the impacts to waters of the United States from construction would be less than significant.
- Staff proposes Condition of Certification **SOIL&WATER-2**, which would require the proposed project to comply with Permit Order No. R4-2009-0068, NPDES NO. CAG674001, if hydrostatic testing waters are discharged to waters of the United States (US). This condition would ensure that the impacts to waters of the US from hydrostatic testing would be less than significant.

- Groundwater at the site is relatively shallow and potentially contaminated by petroleum by-products. Trench and foundation excavations would likely encounter shallow groundwater and dewatering would be required for stabilization. If dewatering is required for any construction activities, staff recommends the applicant comply with Condition of Certification **SOIL&WATER-3**, which would require the applicant to apply for coverage under a Regional Water Quality Control Board permit that would allow for the discharge of petroleum-contaminated groundwater from dewatering activities.
- Staff proposes Condition of Certification **SOIL&WATER-4,** which would require the proposed project to comply with the Clean Water Act and obtain discharge permits for operation through the State Water Resources Control Board. This condition would ensure that the impacts to waters of the United States from construction would be less than significant.
- Staff proposes Condition of Certification **SOIL&WATER-5**, which would require the proposed project to comply with the city of Redondo Beach code, Title 5 Chapter 4 article 5 – Wastewater System, Schedule of Fees and Charges. This condition would ensure that connections to the city's sewer system are completed appropriately and that annual fees are paid to the city.
- Staff proposes Condition of Certification **SOIL&WATER-7**, which would require the applicant to install water meters on site for accurate reporting of water use.
- The proposed project is located in Zone X and is about six feet above the 100-year return period flood.
- Coupled with sea level rise estimates, storm surge events in the Pacific Ocean could cause ocean water level increases of up to three feet during a 100-year return level event. This level of storm surge could reduce the proposed site's flood protection. However, even with high-end estimates of relative sea-level rise by 2050 (relative to 2000), the site would still be at least 3.0 feet above the current (2012) 100-year floodplain. This vertical separation should be sufficient to protect the project from flooding impacts.
- The proposed project would include use of air cooled condensers for cooling of the steam cycle. This technology significantly reduces the potential for use of other water supplies and is encouraged in accordance with the Energy Commission's water policy.
- The proposed project complies with SWRCB's Resolution No. 2010-0020,Policy for the Use of Coastal and Estuarine Waters for Power Plant Cooling (Once Through Cooling Plan (OTC)), requiring all coastal power plants that utilize OTC to meet new performance requirements (Best Technology Available [BTA]) through a reduction in intake volume and velocity. The proposed project achieves these goals through use of dry-cooling technology and reduced wastewater discharge.

Lastly, the applicant proposed to use approximately 100 AF of potable water for construction, which would last for about five years (annual average of 20 AFY). The project as proposed would have used 53 AFY of potable water, consisting of about 0.5 AFY for sanitary uses and 52 AFY for industrial uses. While this would reduce the amount of potable water used relative to baseline conditions from the existing Redondo

Beach Generating Station (RBGS), staff's recommended use of recycled water provides more water savings for other beneficial uses.

INTRODUCTION

The California Environmental Quality Act (CEQA) requires that the significant adverse environmental effects of a proposed project be identified and that such effects be eliminated or mitigated to the extent feasible (Pub. Resources Code, § 21002). CEQA defines a "significant effect" on the environment as a "substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project including water" (Cal. Code Regs., tit. 14, § 15382).

This section of the Preliminary Staff Assessment (PSA) analyzes the potential effects on soil and water resources by the proposed RBEP. This assessment incorporates information gathered by the Energy Commission staff and focuses on the potential for RBEP to:

- cause accelerated wind or water erosion and sedimentation;
- exacerbate flood conditions in the vicinity of the project;
- adversely affect surface or groundwater supplies;
- degrade surface or groundwater quality; and
- comply with all applicable laws, ordinances, regulations and standards (LORS) and state policies.

Where the potential for impacts is identified, staff proposes mitigation measures to reduce the significance of the impact and, as appropriate, recommends conditions of certification to ensure that any impacts are less than significant and the project complies with all applicable LORS.

LAWS, ORDINANCES, REGULATION, AND STANDARDS

The following federal, state, and local environmental LORS in **Soil and Water Resources Table 1** listed for the RBEP and similar facilities require the best and most appropriate use and management of groundwater resources. Additionally, the requirements of these LORS are specifically intended to protect human health and the environment. Actual project compliance with these LORS is a major component of staff's determination regarding the significance and acceptability of the RBEP with respect to the use and management groundwater resources.

Soil and Water Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Federal LORS	
Clean Water Act (33 U.S.C. Section 1257 et seq.)	The Clean Water Act (CWA) (33 USC § 1257 et seq.) requires states to set standards to protect water quality, which includes regulation of stormwater and wastewater discharges during construction and operation of a facility. California established its regulations to comply with the CWA under the Porter-Cologne Water Quality Control Act.
State LORS	
California Constitution, Article X, section 2	The California Constitution requires that the water resources of the state be put to beneficial use to the fullest extent possible and states that the waste, unreasonable use or unreasonable method of use of water is prohibited.
Water Code Sections 10910-10915	Signed into law in 2001 amending Sections 10910-10915 of the California Water Code. Requires public water systems to prepare water supply assessments (WSA) for certain defined development projects subject to the California Environmental Quality Act. 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 average-normal-year, single-dry-year, and multiple-dry-year conditions.
The Porter-Cologne Water Quality Control Act of 1967, California Water Code Section 13000 et seq.	Requires the State Water Resources Control Board (SWRCB) and the nine Regional Water Quality Control Boards (RWQCBs) to adopt water quality criteria to protect state waters. Those regulations require that the RWQCBs issue waste discharge requirements (WDRs) specifying conditions for protection of water quality as applicable. Section 13000 also states that the state must be prepared to exercise its full power and jurisdiction to protect the quality of the waters of the state from degradation. Although Water Code 13000 et seq. is applicable in its entirety, the following specific sections are included as examples of applicable sections.
California Water Code Section 13240, 13241, 13242, 13243, & Water Quality Control Plan for the Los Angeles Region Basin (Basin Plan)	The Basin Plan establishes water quality objectives that protect the beneficial uses of surface water and groundwater in the Region. The Basin Plan describes implementation measures and other controls designed to ensure compliance with statewide plans and policies, and provides comprehensive water quality planning.
California Water Code Section 13260	This section requires filing, with the appropriate RWQCB, a report of waste discharge that could affect the water quality of the state unless the requirement is waived pursuant to Water Code section 13269.
California Water Code Section 13550	Requires the use of recycled water for industrial purposes when available and when the quality and quantity of the recycled water are suitable for the use, the cost is reasonable, the use is not detrimental to public health, and the use will not impact downstream users or biological resources.
Water Recycling Act of 1991 (Water Code 13575 et. seq.)	The Water Recycling Act states that retail water suppliers, recycled water producers, and wholesalers should promote the substitution of recycled water for potable and imported water in order to maximize the appropriate cost-effective use of recycled water in California.
Water Conservation Act of 2009 (Water Code 10608 et. seq)	This 2009 legislative package requires a statewide 20% reduction in urban per capita water use by 2020. It requires that urban water retail suppliers determine baseline water use and set reduction targets according to specified requirements, and requires agricultural water suppliers prepare plans and implement efficient water management practices.
California Code of Regulations (CCR), Title 17, Division 1, Chapter 5,Group 4,	Requires prevention measures for backflow prevention and cross connections of potable and non-potable water lines to protect a public water supply system.

California Code of Regulations, Title 20, Division 2, Chapter 3, Article 1	The regulations under Quarterly Fuel and Energy Reports (QFER) require power plant owners to periodically submit specific data to the California Energy Commission, including water supply and water discharge information.
California Code of Regulations, Title 22 Division 4, Chapter 3	This section of the CCR defines recycled water quality treatment standards and specifies permissible uses for each recycled water class, to protect the health and safety of the public.
SWRCB Order 2009-0009-DWQ	The SWRCB regulates stormwater discharges associated with construction affecting areas greater than or equal to one acre to protect state waters. Under Order 2009-0009-DWQ, the SWRCB has issued a National Pollutant Discharge Elimination System (NPDES) General Permit for stormwater discharges associated with construction activity. Projects can qualify under this permit if specific criteria are met and an acceptable Stormwater Pollution Prevention Plan (SWPPP) is prepared and implemented after notifying the SWRCB with a Notice of Intent.
SWRCB Order 97-03-DWQ	The SWRCB regulates stormwater discharges associated with several types of facilities, including steam electric generating facilities. Under Order 97-03-DWQ, the SWRCB has issued a NPDES General Permit for stormwater discharges associated with industrial activity. Projects can qualify under this permit if specific criteria are met and an acceptable SWPPP is prepared and implemented after notifying the SWRCB with a Notice of Intent.
Los Angeles Regional Water Quality Control Board, Permit Order No. R4-2009-0068, NPDES NO. CAG674001	The Los Angeles Regional Water Quality Control Board issued this order to regulate discharges to surface waters that pose a *de minimus* threat.
Local LORS	
City of Redondo Beach Code, Title 5 Chapter 4 article 5 – Wastewater System, Schedule of Fees and Charges.	Defines local fees for sewer connections and services.
City of Redondo Beach Code, Title 5 Chapter 7 article 101: Stormwater and Urban Runoff Pollution Control.	Regulations for a Wet Weather Erosion Control Plan (WWECP)
State Policies and Guidance	
Integrated Energy Policy Report (Public Resources Code, Div. 15, Section 25300 et seq.)	In the 2003 Integrated Energy Policy Report (IEPR), consistent with SWRCB Policy 75-58 and the Warren-Alquist Act, the Energy Commission clearly outlined the state policy with regards to water use by power plants, stating that the Energy Commission would approve the use of fresh water for cooling purposes only where alternative water supply sources and alternative cooling technologies are shown to be "environmentally undesirable" or "economically unsound."
SWRCB Res. 2009-0011 (Recycled Water Policy)	This policy supports and promotes the use of recycled water as a means to achieve sustainable local water supplies and reduction of greenhouse gases. This policy encourages the beneficial use of recycled water over disposal of recycled water.
SWRCB Res. 75-58	The principal policy of the SWRCB that addresses siting of energy facilities is the Water Quality Control Policy on the Use and Disposal of Inland Waters Used for Power Plant Cooling, adopted by the Board on June 19, 1976, by Resolution 75-58. This policy states that use of fresh inland waters should only be used for cooling if other sources or other methods of cooling would be environmentally undesirable or economically unsound.
SWRCB Res. 77-1	SWRCB Resolution 77-1 encourages and promotes recycled water use for non-potable purposes and use of recycled water to supplement existing surface and groundwater supplies.

PROJECT DESCRIPTION

The proposed Redondo Beach Energy Project (RBEP) is a natural-gas-fired, combined-cycle, air-cooled electrical generating facility with a net generating capacity of 496 megawatts (MW) and gross generating capacity of 511 MW, that would replace, and be constructed on the site of the AES Redondo Beach Generating Station (RBGS), an existing and operating power plant in Redondo Beach, California. The project would consist of one 3-on-1 combined-cycle power block with three natural-gas-fired combustion turbine generators (CTG), three supplemental natural gas-fired heat recovery steam generators (HRSG), one steam turbine generator (STG), an air-cooled condenser, and related ancillary equipment. RBEP would also include natural gas compressors, water treatment facilities, emergency services, and administration and maintenance buildings. The project would be constructed entirely within the existing approximately 50-acre RBGS site. The existing RBGS Units 1 through 8 and auxiliary boiler no. 17 would be demolished as part of the project.

Construction would commence with the removal of the existing RBGS Units 1 through 4. Construction of the new power plant is expected to last for 60 months, from January 2016 through December 2020. RBGS Units 5–8 and auxiliary boiler no. 17 will be demolished starting the first quarter of 2019 through the fourth quarter of 2020. During the demolition and removal of RBGS Units 5–8, the Wyland Whaling Wall would be dismantled and moved to a new location directly in front of the new power block. The remaining buildings and structures left standing would be demolished and removed by the end of 2020.

The RBEP site encompasses approximately 50 acres and includes approximately 17 acres of construction laydown and parking, 10.5 acres where the new above-ground equipment of RBEP would be constructed, a 2.2-acre existing switchyard, and the remaining 20 acres which encompass the footprint of the existing RBGS aboveground equipment (stacks, turbines, control buildings, etc.). Figure 2.1-1 in the Application for Certification (AFC) shows the relationship between the proposed RBEP equipment and the larger, existing RBGS area within which it would be located.

Water Supply

For RBEP, the applicant proposes to use potable water provided by Cal-Water for process and potable uses. The project would tie into the existing onsite eight-inch-diameter main along Herondo Street. The annual water requirements for RBEP would be approximately 52.5 acre-feet per year, assuming it would operate continuously for the maximum permitted hours per year (6,835 hours per year) (RBEP 2012a). The expected range in water use rates would be between 42 and 226 gallons per minute (gpm). Water from Cal-Water would be fed directly through metering equipment into an existing 210,000-gallon service water tank (tank no. 1), and into a new 100,000-gallon service water tank (tank no. 3). Water from the service water tank no. 1 would also be used for fire protection. Water from the new service water tank no. 3 would be used as plant service water, irrigation water, makeup to the combustion turbine inlet air evaporative coolers, and raw feed to the cycle makeup water treatment system. Service water tank no. 1 would provide approximately two hours of fire protection storage. Service water tank no. 3 would provide 40 hours of storage in the event of a disruption in the supply (RBEP 2012a).

The applicant also proposes to use potable water for construction. Construction uses include dust suppression. Average water use during construction would be about 18,000 gpd and around 24,000 gpd during hydrostatic testing and commissioning. Commissioning is expected to take about 60 days. Average annual water use is not expected to exceed 22 AFY.

The proposed RBEP would employ 21 full-time employees. The expected water use for domestic purposes would be about 0.16 gpm, or about 0.25 AFY (RBEP 2012a). The city's water supply source is part groundwater (10 percent) and part imported surface water and recycled water. The city's water is supplied by Cal-Water, which receives both fresh water and recycled water from the West Basin Municipal Water District (WBMD).

Staff has determined that there is a readily available supply of tertiary treated recycled water from WBMWD that can be used for construction and industrial purposes during operations. Staff presents an analysis of this recommended water supply below.

Process Waste Water

The project would collect wash-down, general facility, and facility equipment drains in floor drains and sumps and route them to an oil/water separator system. Miscellaneous wastewaters, such as those from combustion turbine water washes and from some water treatment membrane-based system's cleaning operations would be collected in holding tanks or sumps and trucked offsite for disposal at an appropriate wastewater disposal facility. Wastewater streams that are unlikely to contain oil and grease, such as the cooler blowdown units and reverse osmosis reject, would bypass the oil/water separator. These process wastewaters would be collected in an onsite retention basin and discharged to the Pacific Ocean through an existing RBGS outfall Discharge rates would range between 11 and 71 gpm, with average annual discharge equaling about 5.6 million gallons per year (RBEP 2012a).

Use of tertiary treated recycled water recommended by staff could result in a change in wastewater quality discharge but staff anticipates the same treatment and wastewater management practices and disposal systems proposed by the applicant can be used to manage construction and industrial wastewater.

Sanitary Waste Water

Sanitary wastewater would be discharged to the facility's sanitary sewer collector system which discharges to the city of Redondo Beach's sanitary sewer line that bisects the project site. A discharge of approximately 0.16 gpm is expected from the proposed project during all operating conditions.

Stormwater

The proposed project would use the existing site stormwater drainage system. Stormwater in contact with industrial equipment is routed through the oil/water separator system where it would comingle with process discharge water. Oil-free water from the oil/water separator would be discharged to the same onsite retention basin above along with non-contact stormwater before discharge to the Pacific Ocean outfall.

SETTING

Groundwater

The proposed project site is located within the West Coast Basin of the Los Angeles Coastal Plain Groundwater Basin, which lies along the coast. The West Coast Basin has a total capacity of 6,500,000 acre-feet with an average yield of approximately 1,300 gallons per minute for municipal/irrigation wells (Department of Water Resources [DWR], 2004). The majority of the West Coast Basin is underlain by the Silverado aquifer (RBEP 2012a). With a yield of 80 to 90 percent of the groundwater extracted annually, the Silverado aquifer is the most productive aquifer in the West Coast Basin (DWR 2004).

There are currently two seawater barrier projects in operation: the West Coast Basin Barrier project, which runs from the Los Angeles Airport to the Palos Verde Hills, and the Dominguez Gap Barrier project, which covers the area of the West Coast Basin bordering the San Pedro Bay. Injection wells along these barriers create a groundwater ridge, which inhibits the intrusion of salt water into the subbasin to protect and maintain groundwater elevations (DWR 2004).

Based on a background review conducted by Ninyo & Moore (2011), historical high groundwater levels at the RBEP site have been mapped at a depth of approximately ten feet (California Department of Conservation, Division of Mines and Geology [CDMG], 1997). During subsurface exploration conducted on behalf of the applicant, groundwater was encountered at depths ranging from less than one foot to approximately 14 feet below the ground surface. The variability in the depth to groundwater encountered in the borings was primarily due to the difference in the ground surface elevations of the borings. Further, Dames & Moore reportedly recorded groundwater levels in 1952 ranging from approximately two feet above to one foot below mean sea level (MSL), and URS recorded similar groundwater levels in 2001 (Ninyo & Moore, 2011). Based on the reported data by Dames & Moore and URS, and the groundwater levels encountered by Ninyo & Moore (2011), the groundwater at the project site has been documented at an elevation ranging from approximately two feet above to one foot below MSL. Thus, groundwater may be encountered during excavation activities in the lower areas of the site (Ninyo & Moore, 2011). Groundwater, if encountered, could have potential impacts on project-related excavations and construction activities. Therefore, the potential impacts of groundwater should be evaluated prior to detailed design and construction, particularly in areas of deeper excavations.

Surface Water

Surface watersheds in California are divided into management areas by the state’s Regional Water Boards based on political and physiographic boundaries. The RBEP would be within the area regulated by the Los Angeles RWQCB. Water quality objectives for Redondo Beach and Hermosa Beach are contained in the Water Quality Control Plan for the Los Angeles Region (Los Angeles RWQCB, 1994). The King Harbor Marina and Hermosa Beach, a public beach owned by the city of Hermosa Beach, are located to the west of the site. No natural rivers, streams, ponds, or wetlands occur in or around the project area. There are one active and two inactive retention basins on the site. The active, lined retention basin has a capacity of one million gallons and is located near the center of the site. This retention basin is used for onsite runoff from storm drains, boilers, and sumps. The two inactive retention basins, located in the northeastern corner of the site, also are lined. The inactive retention basins have been decommissioned and associated drains have been closed off. Any water that collects in this area is pumped out and discharged to the ocean. Redondo Beach and Hermosa Beach are considered impaired water bodies on the 2010 EPA-approved Total Maximum Daily Load (TMDL)[1] list. Pollutants for which Redondo Beach and Hermosa Beach are listed as impaired are listed in Table 5.15-1 of the AFC (RBEP 2012a).

Assessment of Impacts and Discussion of Mitigation

This section provides an evaluation of the expected direct, indirect, and cumulative impacts to soil and water resources that could be caused by construction, operation, and maintenance of the RBEP. Staff's analysis consists of the following steps: establishing thresholds of "significance" used to determine if there is a potentially "significant" impact, gathering data related to construction and operation of the project, screening the data against the thresholds of significance, and then reaching a conclusion to determine whether or not the project presents a potentially "significant" impact. If staff determines that there is a significant impact then staff evaluates the applicants' proposed mitigation for sufficiency and staff may or may not recommend additional or entirely different mitigation measures that are potentially more effective than those proposed by the applicant. Mitigation is designed to reduce the effects of potentially significant RBEP impacts to a level that is less than significant.

Soil Resources

Staff evaluated the potential impacts to soil resources including the effects of construction and operation activities that could result in erosion and downstream transportation of soils and the potential for contamination to soils and groundwater. There are extensive regulatory programs in effect that are designed to prevent or minimize these types of impacts. These programs are effective, and absent unusual circumstances, an applicant's ability to identify and implement Best Management Practices (BMPs) to prevent erosion or contamination is sufficient to ensure that these impacts would be less than significant. The LORS and policies presented in **Soil and Water Resources Table 1** were used to determine the significance of RBEP impacts.

Water Resources

Staff evaluated the potential of RBEP to cause a significant depletion or degradation of surface water and groundwater resources. Staff considered compliance with the LORS and policies presented in **Soil and Water Resources Table 1** and whether there would be a significant impact under the California Environmental Quality Act (CEQA).

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[1] The TMDL calculates the maximum amount of a pollutant allowed to enter a waterbody so that the waterbody will meet and continue to meet water quality standards for that particular pollutant and allocates that load to point sources, (Wasteload Allocation), and nonpoint sources(Load Allocation), which include both anthropogenic and natural background sources of the pollutant.

To determine if significant impacts to soil or water resources would occur, the following questions were addressed consistent with Appendix G of the CEQA Guidelines. Where a potentially significant impact was identified, staff or the applicant proposed mitigation to ensure the impacts would be less than significant.

- Would the project violate any water quality standards or waste discharge requirements?
- Would the project substantially deplete groundwater supplies or interfere substantially with groundwater recharge such that there would be a net deficit in aquifer volume or a lowering of the local groundwater table level?
- Would the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, in a manner which would result in substantial erosion or siltation on- or off-site?
- Would the project substantially alter the existing drainage pattern of the site or area, including through the alteration of the course of a stream or river, or substantially increase the rate or amount of surface runoff in a manner which would result in flooding on- or off-site?
- Would the project create or contribute runoff water which would exceed the capacity of existing or planned stormwater drainage systems or provide substantial additional sources of polluted runoff?
- Would the project otherwise substantially degrade water quality?
- Would the project place housing within a 100-year flood hazard area as mapped on a federal Flood Hazard Boundary or Flood Insurance Rate Map or other flood hazard delineation map?
- Would the project place within a 100-year flood hazard area structures which would impede or redirect flood flows?
- Would the project expose people or structures to a significant risk of loss, injury or death involving flooding, including flooding as a result of the failure of a levee or dam?
- Would the project be inundated by seiche or tsunami?
- Would the project result in substantial soil erosion or the loss of topsoil?
- Does the project have impacts that are individually limited, but cumulatively considerable?

DIRECT/INDIRECT IMPACTS AND MITIGATION

A discussion of the direct and indirect RBEP construction and operations impacts and mitigation is presented below. For each potential impact evaluation, staff describes the potential effect and then analyzes potential impacts by applying threshold criteria for determining significance. If mitigation is warranted, staff provides a summary of the applicant’s proposed mitigation and a discussion of the adequacy of the proposed mitigation. In the absence of applicant-proposed mitigation or if mitigation proposed by the applicant is inadequate, staff mitigation measures are recommended.

Water Quality

Construction Stormwater Discharges

The project site comprises 50 acres of land. Approximately 17 acres of land within the 50-acre project site would be used for construction activities, including laydown, storage, and parking. RBEP construction would use only onsite laydown and construction parking areas. No new offsite linears are proposed for the project. No soil disturbance would be necessary to construct the new power blocks because the project would be constructed on an industrial site that has been completely disturbed and would utilize existing infrastructure as needed.

If not managed, operations or construction activities at the project site would have the potential to contaminate stormwater runoff, resulting in an adverse impact to local surface waters, specifically the Pacific Ocean. Ocean waters in the vicinity are protected from degradation by the Los Angeles Region Coastal Watershed Basin Plan (LACWBP).

The discharge for the site would be subject to regulation based on Beneficial Uses identified in the LACWBP. The site would likely also be subject to the West Coast Basin Plan including the South Santa Monica Bay Watershed that encompasses the city of Redondo Beach. The site would be subject to regulations by the Los Angeles Regional Board to protect the following beneficial uses:

- Industrial Service Supply (IND)
- Navigation (NAV)
- Water Contact Recreation (REC1)
- Non-Contact Water Recreation (REC1)
- Commercial and Sportfishing (COMM)
- Wildlife Habitat (WILD)
- Rare, Threatened, or Endangered Species (RARE)
- Spawning, Reproduction, and Development (SPWN)
- Marine Habitat (MAR)

During construction and operation, the stormwater collection system, comprising both existing and new elements, would be used to collect and process stormwater from the site. Stormwater that falls within process equipment containment areas would be collected and discharged to the existing RBGS process drain system, which consists of oil/water separation sumps and two retention basins. Stormwater that falls within the plant-wide pavement areas and outside the process equipment containment areas would be routed to an onsite retention basin, which also collects briny blowdown water from the cooling system and the heat recovery steam generator (HRSG). A small portion of stormwater may fall outside of the process containment and pavement areas. This portion of stormwater would either percolate directly into the soil or drain over the surface into the retention basins to assist with the removal of suspended solids. The oil-free stormwater from the process areas and from the pavement areas collected in the retention basins would be collected in the retention basin to be discharged to the Pacific Ocean via an existing outfall. The residual oil containing sludge would be collected via vacuum truck and disposed of as hazardous waste. See the **WASTE MANAGEMENT** section of this PSA for details about disposal locations and quantities.

The project owner would discharge stormwater to the same outfall currently utilized by the RBGS under the requirements of the Order No. R4-2007-0042, NPDES No. CA0004001.The stormwater discharge would join the waste discharge pipeline that extends 1,600 feet into the ocean. The applicant would be required to obtain a construction stormwater permit during construction and would be covered by project-specific Waste Discharge Requirements issued by the Los Angeles RWQCB for industrial stormwater discharges that occur during operation.

The estimated amount of soil disturbance resulting from RBEP construction activities requires that it be covered under the federal General Construction Permit (GCP), SWRCB Order No. 2009-0009-DWQ, requiring the applicant to prepare a Stormwater Pollution Prevention Plan (SWPPP) for submittal to the Los Angeles RWQCB. In addition to the SWPPP, the city of Redondo Beach also requires a Wet Weather Erosion Control Plan (WWECP) to cover any construction activities that take place during the wet season (October through April). To ensure compliance with the SWRCB Order and the city of Redondo Beach stormwater discharge requirements, the project should be required to comply with Condition of Certification **SOIL&WATER-1** which requires a construction Stormwater Pollution Prevention Plan (SWPPP) for the RBEP site and laydown areas. The SWPPP would specify BMPs that would prevent all construction pollutants, including erosion products, from contacting stormwater, eliminate or reduce non-stormwater discharges to waters of the Pacific Ocean, and require inspection and monitoring of BMPs.

The project would use up to 150,000 gallons (approximately 0.5 acre-foot) of water for hydrostatic testing of pipes. Hydrostatic testing often involves the use of chemicals that have the potential to impact surface waters. The project would test hydrostatic testing water for harmful constituents. If found clean then it would be disposed of in the storm drain. However, if the hydrostatic testing water is found to contain harmful constituents and the project chooses to discharge it to the waters of the United States, an additional permit may be required by the Los Angeles RWQCB. Permit Order No. R4-2009-0068, NPDES NO. CAG674001 allows for the discharge of water that contains substances that can be harmful to surface waters. If necessary, the applicant shall comply with Condition of Certification **SOIL&WATER-2**, which would require the applicant to obtain permit coverage for hydrostatic discharges under Permit Order No. R4-2009-0068, NPDES NO. CAG674001.

Recycled Water Supply for Industrial Use

Staff notes that disinfected tertiary treated recycled water that meets Title 22 regulations is available. Staff concludes it is a suitable substitute for the proposed use of potable water during project construction and industrial process use. WBMWD is the regional wholesaler and Cal-Water is the local retailer that would deliver the tertiary treated recycled water to the project. WBMWD is permitted by the RWQCB to produce and deliver tertiary treated recycled water with different quality characteristics. The tertiary treated supply contains concentrations of ammonia that can affect industrial uses and may require pretreatment before use. WBMWD has indicated they could do the necessary pretreatment or it could be done by the applicant. Pretreatment by the applicant may be feasible since demineralization of potable water for industrial uses is already planned. The applicant's proposed water treatment system would include a reverse osmosis system followed by exchangeable mixed bed demineralizer bottles. Staff anticipates the same treatment system would be used for treatment of the recycled water and that a step for treatment of ammonia can be added if needed. Based on discussions with WBMWD staff also understands there are cost effective treatment methods they could implement prior to delivery to the project.

Contaminated Groundwater

The Phase I Environmental Site Assessment (ESA) states that:

> "Groundwater underlying the site is known to be impacted by metals, dioxins, sulfide, VOCs, hydrazine, and 1, 4-dioxane. Groundwater is monitored as part of on-going subsurface investigations regarding former Southern California Edison operations at the site including former operation of waste-water retention basins (RBEP 2012a, Phase I ESA, p. 2). These investigations are currently overseen by the Department of Toxic Substances Control. The presence of groundwater contamination represents a Recognized Environmental Condition in connection with the site."

Due to the site's long industrial history, staff is concerned that pumping of contaminated groundwater could result in significant impacts to on- and off-site water resources or sensitive environmental receptors. The applicant did not provide any discussion of how contaminated groundwater would be discharged, what volumes may be expected, and how hazardous it could be to the environment. If groundwater dewatering is necessary, such dewatering might be regulated under permits intended for discharge of groundwater, such as permit No. R4-2008-0032, NPDES No. CAG994004. The RWQCB also has a number of permits that could apply depending on the quality of the discharge water and where it would be discharged. Staff proposes Condition of Condition of Certification **SOIL&WATER-3**, which would require the applicant to apply for coverage for the discharge of groundwater dewatering water if the applicant engages in groundwater dewatering at the proposed site. Coverage under Order No. R4-2008-0032, NPDES No. CAG994004 or other RWQCB permits may not be necessary if water quality tests reveal that local groundwater contamination does not exist. If tests show that groundwater is not contaminated then dewatering activities would be covered under the GCP (SWRCB Order No. 2009-0009-DWQ).

Industrial Wastewater and Stormwater Discharge

As stated above, during operation, the existing stormwater collection system would be used to collect and process stormwater from the site. The oil-free stormwater from the process areas and from the pavement areas collected in the retention basins would be discharged to the Pacific Ocean via an existing outfall. The residual oil containing sludge would be collected via vacuum truck and disposed of as hazardous waste (RBEP 2012a). See the **WASTE MANAGEMENT** section of this PSA for more details about waste streams.

The proposed RBEP would collect its industrial waste water consisting of reject water from the reverse osmosis system and blowdown from the HRSG in the same onsite retention basin that collects stormwater so that both are discharged to the Pacific Ocean through the same outfall currently utilized by the RBGS under the requirements of Order No. R4-2000-0085, NPDES No. CA0001201. The discharge rate could range from 11 to 71 gpm. The average annual discharge is expected to be about 11.6 million gallons or about 14 acre-feet per year, assuming 6,835 hours of annual operation.

The existing RBGS discharges approximately 889 million gallons per day (996,000 AFY) to the Pacific Ocean through once-through cooling units. Therefore the new project would allow for a 996,000 AFY reduction in discharge to the Pacific Ocean. This is a measureable reduction in pollutant loads sent to the ocean from the site.

Use of tertiary treated recycled water as recommended by staff could result in a slight increase and/or change in wastewater discharge characteristics because of the higher salt load common in treated wastewater. Staff anticipates that recycled water would be treated by reverse osmosis (RO) and mixed bed demineralizer bottles. The reject from the bottles would be disposed of offsite through regeneration. The applicant proposed to discharge the reject from the RO system to the outfall where a potable water supply was used for treatment. Staff believes it is possible the outfall could still be used but it is also common for wastewater generated from use of recycled water for industrial use to be discharged to the sanitary sewer. Further analysis is required to determine what the appropriate wastewater analysis method would be. At this time, staff does not have enough detailed information on the treatment system and methods the applicant would use for either potable or recycled water use in the industrial process. However, if the applicant uses either method the impacts from discharge would be less than significant. Where the applicant discharges it to the ocean, the resultant load to the ocean would still be a measurable reduction because of the significant reduction in overall use of water for project operation. However, the change in salt and other potential chemical concentrations could require the applicant to update their Report of Waste Discharge for a new NPDES permit filed for the proposed use of the outfall (see discussion below). Where wastewater is discharged to the sanitary sewer the applicant would be required to meet the water quality requirements of the wastewater treatment plant. This method may also lessen the burden of NPDES permitting for use of the outfall by limiting it to just stormwater discharge.

The proposed project is expected to be issued a new NPDES permit for operations discharge that would replace the existing Order No. R4-2000-0085, NPDES No. CA0001201. The new permit would require the implementation of Best Management Practices (BMPs) for both the project’s industrial discharge and the project’s operational stormwater discharges to the Pacific Ocean. BMPs would likely include pollutant source control, pollutant containment, a monitoring and sampling protocol, and an iterative process for improving initially implemented BMPs based on monitoring and sampling results.

The applicant submitted a draft Report of Waste Discharge application that would be filed with the Los Angeles RWQCB following Energy Commission approval of the project and before the first quarter of 2016 when construction would begin. The applicant also submitted minutes of a meeting between AES staff and Los Angeles RWQCB staff indicating that the applicant has discussed the application process and schedule with the RWQCB (RBEP 2012a, AFC Appendix 5.15B). The draft Report of Waste Discharge application would have to be updated to reflect the change in water chemistry from the use of recycled water and resultant wastewater discharge.

With implementation of BMPs and associated monitoring activities included in Board-issued WDRs, impacts to water quality from operation of the proposed RBEP would be less than significant. Staff proposes Condition of Certification **SOIL&WATER-4** which would require the applicant to obtain a permit for project operation from the Los Angeles RWQCB, prior to beginning construction. Staff also recommends condition of Condition of Certification **SOIL&WATER-5** in the event the applicant finds it is more effective to dispose of the industrial wastewater from use of recycled water to the sanitary sewer. This condition would require the applicant to comply with the requirements for discharge to city of Redondo Beach Municipal Code Chapter 5-4.5 and pay their necessary fees for connection and discharge.

Sanitary Wastewater

Sanitary wastewater would be discharged to the facility's sanitary sewer collector system which discharges to the city of Redondo Beach's sanitary sewer line that bisects the project site. A discharge of approximately 0.16 gpm is expected from the proposed project during all operating conditions. The city of Redondo Beach provided the applicant a will-serve letter dated July 16, 2012, indicating it has the capacity and intent to provide the site sewerage service. If the proposed RBEP discharges sanitary waste as described above, the impact from its disposal should be less than significant. Staff proposes Condition of Certification **SOIL&WATER-5** which would require the applicant to pay sanitary sewer fees ordinarily assessed by the city, in accordance with the city of Redondo Beach Municipal Code Chapter 5-4.5.

Water Supply

Construction

The applicant proposed to use potable water for dust suppression. Average water use during construction would be about 18,000 gallons per day (gpd) and around 24,000 gpd during hydrostatic testing and commissioning. Commissioning is expected to take about 60 days. Average annual water use is not expected to exceed 22 AFY.

The volume of water required for construction would be offset by the operational water savings during the life of the project. Construction of the project would result in a net reduction in local water use. Therefore, the project would have a positive impact in terms of water consumption during the life time of the project.

In Section 6.6.3 of the AFC, the applicant indicated that it would be infeasible to use recycled water for project uses. The reasons stated were that the two treatment plants likely to supply the recycled water are either 5.6 or 7.8 miles away and also that there is not enough recycled water to meet the demands of existing customers and future customers. The applicant indicates in the same section that there is a recycled water pipeline that runs by the project site that supplies recycled water to the nearby Yacht Club. The recycled water pipe is owned and operated by the WBMWD. The applicant stated that the WBMWD did not have excess recycled water to deliver to the project.

Staff contacted WBMWD on February 7, 2014 to discuss availability of recycled water to the project (CEC 2014a). Staff spoke with Mr. Joe Walters, Manager of Business Development at WBMWD. Staff was informed that WBMWD has recycled water available in the amount needed by the project. Staff also learned that the recycled water delivered in the pipeline that runs by the project site is disinfected tertiary treated water. Further, WBMWD informed staff that the recycled water line that runs by the project site is a 12-inch pipe and that it has extra capacity to supply the recycled water needed by the project. WBMWD stated that it would even pay for the costs to construct the connector pipe to connect to the existing pipe and that it also would provide engineering help to the project to design the connections to the existing pipe. In a subsequent conversation with Mr. Walters on June 30, 2014, staff was told that WBMWD is a wholesaler that sells the recycled water to a purveyor that delivers it to the end customer (CEC 2014c). The purveyor for the Redondo Beach area is Cal-Water. Mr. Walters stated that the rate charged by Cal-Water for Title 22 recycled water is $3.17 per CCF (CCF = 100 cubic feet), effective July 1, 2014, in addition to a monthly meter fee of $658. The official also informed staff that Cal-Water charges $3.96 per CCF for potable water for the same period, in addition to a monthly meter fee of $578. Assuming that RBEP will need approximately 50 AFY, the annual cost for potable water would be $93,200 while for recycled water it would be $76,950.

It is staff's position that given the ready availability and cost of disinfected tertiary treated recycled water for the RBEP from the WBWMD, the project should be constructed using tertiary treated recycled water. The recycled water supply available for the project would be suitable for use in dust suppression, concrete mixing, hydrostatic testing, and compaction. Staff's opinion is that it is appropriate to maximize the use of recycled water where potable water supplies can be preserved for other beneficial uses. This use would also be consistent with Energy Commission Water Policy and Section 13550 of the California Water Code. Further analysis of LORS compliance is provided below. Use of recycled water for construction activities would result in further savings in potable water use. Since the recycled water supplied by WBMWD is disinfected tertiary treated, it can be used for all construction activities where potable water can be used, and thus it is unlikely to affect the amounts needed.

Staff was informed by WBMWD representatives that there is an eight-inch recycled water extension in place along Herondo Street (CEC 2014b). The pipe runs on the south side of Herondo Street adjacent to the project property line. Further, a map provided by WBMWD (See **Soil and Water Resources Figure 1**) shows that there is a stub-out with a gate valve from the recycled water main going south to the property line of the RBEP. This means that there would not be any off-site construction activities needed to connect the project to the existing recycled water line and that all construction activities would be on-site. The project would just need to construct a line from the stub-out already in place to the collection and treatment facilities where the recycled water would be treated for use by the project. Given the currently proposed location of the water treatment facility at the project (AFC Figure 2.1-2), the pipeline would only traverse a short portion of the site requiring limited additional disturbance. It is also likely it can be constructed concurrently with other underground linears that run to the water treatment facility. As staff was informed by Mr. Walters, the recycled water pipeline has sufficient head to deliver the needed recycled water to the project so no lift station would be needed by the project to receive the recycled water.

Recycled Water Quality

Staff recognizes that where demineralized water is needed for power plant processes and operation, the recycled water would have to be treated to be suitable for use by the project equipment. Treatment for these uses would be required whether the water supply was potable water from Cal-Water or tertiary treated recycled water from WBMWD. Staff anticipates similar treatment of water would be required for use of recycled water for inlet air cooling, but little to no treatment would be required for use as fire water. The difference in treatment costs between the potable and recycled water would depend on the constituents of the recycled water. However, according to Mr. Walters of WBMWD, any advanced treatment costs would be close to $1,000/AF (CEC 2014c). Assuming that half of the water would need to be demineralized, that would add another approximately $25,000 of operational costs. This would bring the annual cost to use recycled water to approximately $101,950. However, even if potable water is used, it still would have to go through the demineralization process before it can be used for processes that require demineralized water. This means that the cost for potable water would have to be adjusted to include the demineralization costs and thus the total water costs are expected to be very close if not higher to use potable water compared with the costs for recycled water.

Staff also notes that maps provided by the applicant show an existing water treatment plant already in use by the existing project which could be utilized with some modification to treat the recycled water. WBMWD provided a list of constituents in the recycled water available for the project as shown in **Soil and Water Resources Table 2**, which lists the average monthly values as well as the annual average for year 2013. As discussed above, **Soil and Water Resources Table 2** shows higher levels of constituent concentrations in the recycled water compared with those of the potable water found in table 5.15-4 of the AFC, particularly TDS and ammonia. Annual average TDS in the recycled water is 862 mg/l, which is a little less than twice that in the potable water of 460 mg/l. Ammonia is known to cause corrosion of cooper and copper alloy piping. As shown in the table below, the recycled water contains elevated levels of ammonia (42 mg/l as N), a fact that was discussed in the conversation between staff and the WBMWD representative (CEC 2014a). As previously mentioned, this would affect the level and methods of treatment needed for the recycled water before it can be used for the project. WBMWD has indicated that there are relatively cost-effective methods for treatment of ammonia and that they are capable of treating the ammonia to the desired concentrations if needed.

Soil and Water Resources Table 2
Monthly Report of Recycled Water Quality
For Landscape and Industrial Water Users
West Basin Water Reclamation Plant Title 22 Product Water

Constituent	Unit	Period Covered												
		JAN	FEB	MAR	APR	MAY	JUN	JLY	AUG	SEP	OCT	NOV	DEC	Annual Average
T.D.S.	mg/L	780	870	870	760	840	940	920	910	870	880	840		862
pH	pH units	6.9	6.9	6.8	6.9	6.9	6.9	6.9	7.0	7.1	7.2	7.1	7.2	7.0
SODIUM	mg/L	156	186	189	168	181	195	190	194	176	188	169		181
CALCIUM	mg/L	43	54	49	44	51	55	58	55	55	55	49		52
MAGNESIUM	mg/L	21	26	26	23	24	26	28	29	26	27	24		26
SAR	meq/L	4.8	5.2	5.4	5.1	5.2	5.4	5.1	5.3	4.9	5.2	4.9	#DIV/0!*	#DIV/0!*
ECW (TDS/640)	mmho/cm	1.2	1.4	1.4	1.2	1.3	1.5	1.4	1.4	1.4	1.4	1.3	0.0	1.3
CHLORIDE	mg/L	275	331	261	288	313	301	306	312	280	275	285	274	292
BORON	mg/L	0.55	0.35	0.36	0.33	0.33	0.38	0.37	0.38	0.42	0.42	0.36		0.38
NITRATE (as N)	mg/L as N	3.9	3.8	4.0	3.4	2.6	3.4	3.6	4.2	2.0	2.1	2.1	0.87	3.0
AMMONIA (as N)	mg/L as N	44	40	41	42	44	41	42	38	41	42	48	46	42
TOTAL PHOSPHATE	mg/L as PO4	0.71	0.74	0.71	0.83	0.40	1.42	1.11	1.26	1.39	2.03			1.1
O-PHOSPHATE	mg/L as PO4	0.59	0.71	0.42	0.65	0.11	1.1	0.78	0.91	1.2	1.6	0.42		0.8
POTASSIUM	mg/L	18	18	20	17	19	19	18	18	18	18	18		18
TOT. ALKALINITY	mg/L as CaCO3	233	224	242	215	232	249	238	249	269	311	290		250
BICARBONATE	mg/L as CaCO3	233	224	242	215	232	249	238	249	269	311	290		250
BOD	mg/L	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3	< 3		3
C.O.D.	mg/L	33	31	36	33	39	28	33	32	28	39	38		34
IRON	mg/L	0.32	0.24	0.45	0.56	0.38	0.27	0.29	0.26	0.23	0.26	0.51		0.34
HARDNESS	mg/L as CaCO3	196	243	230	204	226	245	260	254	246	249	221		234
MANGANESE	mg/L	0.17	0.17	0.16	0.21	0.187	0.16	0.15	0.156	0.13	0.096	0.12		0.16
SULFIDE	mg/L	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1		0.1
SILICA	mg/L	16	16	19	15	14	17	18	19	18	18	19	15	17
SULFATE	mg/L	86	133	102	101	115	141	148	167	134	140	144	125	128
T.O.C.	mg/L	11	8.8	8.9	9.2	9.2	8.7	9.1	9.1	9.2	9.5	10	11	9
T.S.S.	mg/L	2	2	3	3	2	1	1	2	1	2	2	3	2

Source: WBMWD, personal communication (CEC 2014b)
*: The table was received from WBMWD with these entries.

Industrial

RBEP proposes to use about 52 AFY of potable water provided by Cal-Water for process water. Process water would be used for the generator turbine wash, evaporative cooling blowdown makeup, water treatment, and other purposes. The project would access this water through an existing eight-inch-diameter city of Redondo Beach potable water line serving the existing RBGS. Cal-Water has provided a will-serve letter (AFC Appendix 5.15A) indicating there is sufficient supply of potable water to accommodate the RBEP. The potable water that would be provided to the RBEP for use as process water and domestic water is currently allocated for industrial use at the existing Redondo Beach Generating Station (RBEP 2012a).

Based on water volumes from 2008 through 2011, the existing RBGS has historically used approximately 306 AFY while operating at only 5 percent of its annual maximum capacity. The existing RBGS therefore uses more potable water than is proposed for the RBEP, which would result in a net reduction of potable water use equal to 253 AFY and a net beneficial impact on local water supplies, despite a large increase in capacity factor and energy production (megawatt-hours).

As discussed above, staff believes that given the availability of disinfected tertiary treated recycled water for the RBEP from the WBWMD, the project should use tertiary treated recycled water for industrial purposes. This use would also be consistent with Energy Commission Water Policy and Section 13550 of the California Water Code. Further analysis of LORS compliance is provided below. Use of recycled water would result in additional savings of 100 AF of potable water during the five-year construction period and about 52 AF annually during project operation. This brings the total reduction in potable water during project operation to about 305 AFY that would be available for other beneficial uses. In addition, pursuant to Title 22, Div. 4, Ch. 3, California Code of Regulations, section 60307, the recycled water available is suitable for fire protection use. Thus, staff recommends that recycled water is also used for fire protection purposes, thereby resulting in further savings of potable water for beneficial uses.

In the LORS section below staff has analyzed the feasibility of using recycled water for all industrial applications. In summary staff concludes that use of recycled water is feasible and that the applicant should be required to use it for project operation and construction where suitable. Staff proposes Condition of Certification **SOIL&WATER-6** for that purpose.

Domestic

The RBEP would employ a staff of 21 in three rotating shifts. As a result, a minimal amount of potable water would be used for sanitary use, drinking, eye wash, and safety showers, as well as fire protection water. Average use is expected to be a fraction of one gpm, or approximately 1.2 AFY.

Staff proposes Condition of Certification **SOIL&WATER-6** which would require the applicant to pay for water supply connection fees assessed by Cal-Water in accordance with the Cal-Water's connection and rate policies.

To ensure that project water use is within the projected volumes analyzed herein, staff proposes Conditions of Certification **SOIL&WATER-6** and **-7**, which would require the applicant to report facility water use in compliance reports. If Conditions of Certification **SOIL&WATER-6** and **-7** are implemented as proposed, impacts to local water supplies would be less than significant.

Flooding

Staff reviewed the Federal Emergency Management Agency (FEMA) Redondo Beach (06037C1907F) Flood Insurance Rate Map (FIRM). The proposed project is not located within the 100-year flood zone as defined by FEMA. The site is located in Zone X, which is a zone of moderate flood potential (usually the area between 100-year and 500-year floods' boundaries). However, project implementation would not result in any structures that would impede or redirect flood flows and no impacts would occur. Therefore, flooding impacts due to the implementation of the project are expected to be less than significant.

Projected sea-level rise has the potential to reduce the effectiveness of local flood control measures by increasing the 100-year flood stage. The local protection from inundation is projected to be reduced up to 30 centimeters (1.0 foot) by 2030 and 61 centimeters (2.0 feet) by 2050 (relative to 2000 levels) (CEC, 2009; NAS, 2012). The site geotechnical report (Ninyo & Moore, 2011) acknowledges future sea-level rise. An Energy Commission study (CEC, 2009) also shows the project site may have reduced flood protection and inundation potential in the future. A significant rise in local sea water levels would also raise groundwater levels, and raise the fluvial base level, thereby potentially increasing the rate and extent of flooding.

The proposed project would have final grades between 13 and 17 feet above sea level. FEMA flood maps show that the 100-year flood elevation for Redondo Beach area is seven feet. Using the current projections of sea-level rise, separation between the site and the flood elevation is estimated to be reduced by up to 2.0 feet by the year 2050. However, if the minimum separation between the site and the surrounding floodplain is reduced from six feet to four feet there would still be a sufficient level of flood protection.

Storm Surge and Wave Run-up

Storm surge is usually defined by increased ocean water levels that occur during storms. Much like precipitation events and rainfall runoff events, storm surge events can be assigned recurrence intervals, e.g., 10-year, 100-year, etc. Storms may result in ocean water level increases that create increased threats of local flooding for shoreline property.

Coastal ecosystems, development, and public access are most at risk from short term storm events, including the confluence of large waves, storm surges, and high astronomical tides during a strong El Niño climatic event (OPC 2013).

Over the next few decades, episodes of heightened sea level associated with large winter storms and anomalous short period climate patterns will be of greater concern to infrastructure and development in coastal areas than the relatively slow increases that are projected in association with global sea-level rise alone (OPC 2013). The coast of

California has experienced two very large El Niño events over the past 30 years, in 1982 - 83 and 1997-98, when large storms resulted in hundreds of millions of dollars in storm damage to private property and public infrastructure. The damages occurred from a combination of elevated sea levels and large storm waves, especially when these factors coincided with high tides. During the 1983 El Niño event, sea levels were the highest ever recorded in San Diego, Los Angeles and San Francisco, 29.0 cm (11.4 in.), 32.3 cm (12.7 in), and 53.8 cm (21.2 in.), respectively, above predicted high tides. The water levels reached during these large, short term events have exceeded mean sea levels projected for 2030 and approach the values projected for 2050 (OPC 2013). Future sea level needs to be a starting point for project design considerations. Where feasible, consideration needs to be given to scenarios that combine extreme oceanographic conditions on top of the highest water levels projected to result from sea level rise over the expected life of the project.

Tebaldi et al. (2012) modeled the impacts of global sea level rise from climate change on storm surges and reported on the history and expected trends of storms at the Los Angeles Harbor (Gauge 9410660). The 100-year return level storms in this area result in about one meter (three feet) of local sea-level rise. Projections for local sea-level rise do not indicate that local sea-level rise has any relative influence on the magnitude of the 100-year storm surge. Therefore the 100-year storm surge in 2050 is expected to be the same as current conditions, about one meter, or three feet.

Storm surge is taken into account when FEMA conducts coastal zone flood analyses. The Base Flood Elevations (BFEs) are the sum of storm surge, wave run-up, and tidal effects. The site is not currently classified as being within the 100-year floodplain. Based on estimates stated above, the site classification could change by the year 2050. The site is vulnerable to flooding from extreme weather events and its protection may decrease in the future. However, even with high-end estimates of storm surge by 2050 (relative to 2000) (Tebaldi et al. 2012), the site would still be at least 3.0 feet above the current (2012) 100-year floodplain (FEMA, 2012). This vertical separation should be sufficient to protect the project from flooding impacts.

Tsunami and Seiche

The proposed site is within the zone identified by California Emergency Management Agency (CEMA) as a tsunami inundation zone and would be located adjacent to an enclosed bay or harbor that could be subject to seiches caused by tsunamis. While the offshore area of Los Angeles County area contains many faults and fault scarps capable of producing tsunamis, seismically induced sea waves are uncommon or rare. Therefore, inundation by tsunami or seiche, while possible, is unlikely and project implementation would not increase the potential for inundation. Furthermore, the site is above the expected inundation elevation and as such tsunami events are not expected to damage the facility or result in potentially significant impacts to the environment. A more detailed discussion of hazards posed by tsunami and seiche is included in the **GEOLOGY AND PALEONTOLOGY** section of this PSA.

CUMULATIVE IMPACTS AND MITIGATION

A project may result in a significant adverse cumulative impact where its effects are cumulatively considerable. "Cumulatively considerable" means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of reasonably foreseeable future projects (California Code of Regulations, tit. 14, §15130). The construction and operation activities of the various projects could potentially overlap and result in cumulative impacts to the same resource(s).

Potable Water Supply

The proposed project would create a net benefit for local water supplies, when considered cumulatively with any other project. The proposed project would result in a net reduction of 253 AFY. When considered cumulatively this 253 AFY benefit could be reduced by other new users, but would still be considered a net benefit to the local water supply system.

Use of recycled water readily available from WBMWD through Cal-Water for both construction and operation as recommended by staff would result in additional savings in potable water. Use of recycled water for construction would result in savings of 100 AF over the five-year construction period (average of 20 AFY). Use of recycled water for operation would result in an additional savings of about 52 AFY, which would bring the total savings in potable water during operation to about 305 AFY which would be available for other beneficial uses.

Water Quality

When considered cumulatively with other proposed projects, the RBEP would result in a net cumulative benefit in waste discharges to the Pacific Ocean. Industrial discharge flows would decrease because of decreased plant water use. Permitted average discharge flows are 0.19 mgd, whereas the RBEP discharges would average 0.02 mgd, which would be a 0.17 mgd reduction in water volume and a similarly proportional decrease in pollutant loading. When considered cumulatively this 0.17 mgd benefit could be reduced by other new users, but would still be considered a net benefit by reducing pollutant loads to the Pacific Ocean. The proposed project would also allow for the elimination of the existing once-through cooling discharge, permitted at 889 mgd.

COMPLIANCE WITH LORS

The Energy Commission’s power plant certification process requires staff to review each of the proposed project’s elements for compliance with LORS and state policies. Staff has reviewed the project elements and concludes that the proposed RBEP project would comply with all applicable LORS addressing protection of water resources, stormwater management, and erosion control, as well as drinking water, use of freshwater, and wastewater discharge requirements, as long as staff’s proposed conditions of certification are adopted and implemented. Summary discussions of project compliance with significant LORS and policies are provided below.

STORMWATER

Clean Water Act

Staff has determined that RBEP would satisfy the requirements of the National Pollutant Discharge Elimination System (NPDES) permit with the adoption of Conditions of Certification **SOIL&WATER-1** and **SOIL&WATER-2**. These conditions would ensure that the appropriate NPDES permits are obtained by the applicant.

PORTER-COLOGNE WATER QUALITY CONTROL ACT

Staff has concluded that RBEP would satisfy the applicable requirements of the Porter-Cologne Water Quality Control Act and adequately protect the beneficial uses of waters of the state through implementation of federal, state, and local requirements for management of stormwater discharges and pollution prevention and compliance with local grading and erosion control requirements, and compliance with local onsite wastewater system requirements.

California Water Code Section 13550

California Water Code section 13550 requires use of recycled water for industrial purposes when available and when the quality and quantity of the recycled water are suitable for the use, the cost is reasonable, the use is not detrimental to public health, and the use would not impact downstream users or biological resources.

The applicant provided detailed information in the Alternatives section of the AFC about the availability of both secondary and tertiary treated recycled water to the project. According to the applicant, there are three possible sources for recycled water: the Los Angeles Hyperion Treatment Plant (HTP) about 5.6 miles away, the Joint Water Pollution Control Plant (JWPCP) about 7.8 miles away, and the West Basin Municipal Water District (WBMWD), which acquires secondary treated wastewater from the HTP to treat it to recycled water standards and sell it to its customers. The applicant cited the distance to the treatment plants as the main reason why it would be too costly to obtain recycled water from them and that the WBMWD does not have enough supplies to meet the demand of current and prospective customers. However, the WBMWD owns a 12” recycled water pipeline that runs along Herondo St. adjacent to the north boundary of the project site to supply water to the King Harbor Yacht Club. WBMWD treats the secondary treated wastewater it purchases from the HTP to tertiary disinfected standards to supply the King Harbor Yacht Club for landscaping purposes. WBMWD also supplies tertiary treated wastewater to Cal-Water for distribution throughout its Rancho Dominguez District. The applicant stated that both Cal-Water and WBMWD do not produce recycled water in sufficient quantities to meet their existing customers. The applicant also stated that WBMWD and CSWC expressed their desire to purchase more secondary treated wastewater from the HTP for that purpose.

Energy Commission staff contacted Mr. Walters, manager of business development at WBMWD to verify the information provided by the applicant (CEC 2014). Staff was told that WBMWD has the capacity to supply about 50 AFY of tertiary treated disinfected recycled water to the RBEP. WBMWD also confirmed that the 12-inch pipeline does have the capacity to meet the maximum demand (flow rate) for the project. WBMWD would even pay for the permit application to the department of public health and also for the additional pipeline that would connect the RBEP to the existing 12-inch pipeline. It is worth noting that the HTP supplies only about 9 percent of its effluent to WBMWD and discharges the remaining 91 percent to the ocean. This means that the HTP has the capacity to supply any future needs of secondary treated wastewater to WBMWD. The WBMWD also expressed willingness to work with the applicant on the engineering of the connections from the RBEP to the existing pipeline.

According to Mr. Walters of WBMWD, the rate charged by Cal-Water for Title 22 recycled water is $3.17 per CCF, effective July 1, 2014, in addition to a monthly meter fee of $658 (CEC 2014c). Mr. Walters also informed staff that Cal-Water charges $3.96 per CCF for potable water for the same period, in addition to a monthly meter fee of $578. Assuming that RBEP will need approximately 50 AFY, the annual cost for potable water would be $93,200 while for recycled water it would be $$76,950. Staff concludes that recycled water is available to the project and that it is feasible to use. Staff therefore recommends that the project use recycled water for construction and industrial needs consistent with state water policy.

Staff therefore concludes that the applicant should be required to use recycled water for industrial purposes as it is available and its use would result in an economic benefit for the project as discussed above.

Therefore, based on the above analysis staff concludes there is adequate recycled water supply that is available to the project. The quality of the water is suitable for use at the power plant since it meets Title 22 tertiary treated recycled water standards and the supply is already being used locally for various municipal and industrial purposes. The cost is reasonable and the permitted current uses for landscaping and other industrial uses indicate there would be no biological impacts for use in project construction and operation. Use of recycled water would result in the savings of 100 AF of potable water during the five-year construction period and about 52 AF annually during project operation. Added to the reduction in potable water use of about 253 AFY that would result from switching to dry cooling, use of recycled water brings the total reduction in potable water during project operation to about 305 AFY that would be available for other beneficial uses. Furthermore, use of recycled water for fire protection purposes as recommended by staff would result in further savings of potable water for other beneficial uses.

Lastly, there would be no impacts to downstream users since WBMWD owns and controls the water supply and the water would otherwise be discharged to the ocean. Elimination of the discharge to the ocean would be an environmental benefit. Staff proposes Condition of Certification **SOIL&WATER-6** which requires the applicant to work with WBMWD on the details to connect to the 12-inch recycled water pipeline to start receiving project water for industrial purposes. The applicant should also be required to meter its water use from all sources in accordance with Condition of Certification **SOIL&WATER-7**. Staff understands the applicant may not agree and additional information regarding recycled water use may be made available for further determination of its suitability for project use.

WATER SUPPLY ASSESSMENT

California Water Code, Sections 10910-10915

Staff reviewed California Water Code, sections 10910-10915 to evaluate their applicability to the proposed project. The codes require public water systems to prepare water supply assessments (WSA) for certain defined development projects subject to the California Environmental Quality Act.

Staff determined that a WSA does not need to be prepared for the proposed project. The proposed project does not meet the definition or the intent of the code requiring a WSA. Prior to conducting a WSA, the preparer must determine whether the project meets the definition of “project” as described by the code.

According to section 10912, a "Project" means any of the following:

1. A proposed residential development of more than 500 dwelling units.
2. A proposed shopping center or business establishment employing more than 1,000 persons or having more than 500,000 square feet of floor space.
3. A proposed commercial office building employing more than 1,000 persons or having more than 250,000 square feet of floor space.
4. A proposed hotel or motel, or both, having more than 500 rooms.
5.
    A. Except as otherwise provided in subparagraph (B), a proposed industrial, manufacturing, or processing plant, or industrial park planned to house more than 1,000 persons, occupying more than 40 acres of land, or having more than 650,000 square feet of floor area.

    B. A proposed photovoltaic or wind energy generation facility approved on or after the effective date of the amendments made to this section at the 2011-12 Regular Session is not a project if the facility would demand no more than 75 acre-feet of water annually.

Though the proposed project meets none of the above classes of “Project,” staff reviewed other documents that provide guidance to those involved in water resource planning. Further guidance for how to interpret these sections of the Water Code is provided in a California Department of Water Resources document titled “Guidebook for Implementation of Senate Bill 610 and Senate Bill 221 of 2001 (DWR, 2003).”

A helpful interpretive section on page 3 of the Guidebook, explains how to interpret item (1) above. It states that a dwelling unit typically consumes 0.3 to 0.5 acre-foot of water per year (DWR, 2003). Thus 500 dwelling units could be interpreted to mean 150 to 250 acre-feet per year. In a typical year the proposed project would only use up to 53 acre-feet per year. Relative to the baseline (306 acre-feet per year) the proposed RBEP would use minus (–)253 acre-feet per year. The negative indicates a reduction in use and indicates that the project should be considered a recharger of water to the local system. The proposed RBEP therefore does not meet the criteria of item (1).

The Guidebook also provides guidance about how to interpret other items in the list. The Guidebook emphasizes that Water Supply Assessments are necessary in areas with a poorly understood water supply, or in an area where the project would increase the demand substantially, or by 10 percent (DWR, 2003). The project is located in a very well studied service area with many service connections, and further, it does not increase the demand on the system; in fact, it would decrease the demand on the system.

SWRCB Policy 75-58 and Energy Commission—Integrated Energy Policy Report (IEPR)-Power Plant Water Use and Wastewater Discharge Policy

The California Energy Commission, under legislative mandate specified in the *2003 Integrated Energy Policy Report*, (policy) and State Water Resources Control Board Resolution 75-58, will approve the use of fresh water for cooling purposes by power plants it licenses only where alternative water supply sources and alternative cooling technologies are shown to be environmentally undesirable or economically unsound. The IEPR policy also requires the use of zero-liquid discharge (ZLD) technologies unless such technologies are shown to be "environmentally undesirable" or "economically unsound."

The applicant has proposed to use freshwater for project operations including inlet air cooling. As discussed above staff has demonstrated that there is an alternative water supply that would be more environmentally and economically desirable than the proposed supply. Requiring use of recycled water for project operation would ensure compliance with the policy.

However, staff found out that WBMWD has the capacity to supply the project needs of recycled water and that the recycled water pipe that runs adjacent to the project sited has the extra capacity to carry the additional amounts to supply the project. WBMWD further stated that it would shoulder the costs of constructing the connector pipe from their main to the project and would offer their engineering expertise to help the project with designing and constructing the connection to the main line. Staff also made a comparison between the costs of recycled water vs. potable water from Cal-Water and found that recycled water would cost the project less than the cost of potable water. Staff therefore recommends that the project use recycled water supplied from WBMWD for its construction and industrial activities.

Additionally, the applicant proposes to use air cooling technology to reduce the amount of water required for plant operation. The air-cooled condenser would allow for the elimination of once-through cooling and wet cooling towers and significantly reduce the plant's water needs, by about 253 AFY compared to the baseline. Staff concurs with the applicant that the use of an air-cooled condenser is an economically sound practice that provides environmental benefits from significantly reduced water use. The use of recycled water for industrial purposes would result in larger savings of fresh water for potable use. Staff also notes that although the project would include a limited amount of water use for inlet air cooling, it would also include use of dry low NOx combustors which would conserve water use.

In addition, the Energy Commission's water policy also seeks to protect water resources from power plant wastewater discharges. To that end, the water policy specifies that the Energy Commission will require zero liquid discharge technologies (for management of power plant wastewaters) unless such technologies are shown to be 'environmentally undesirable' or 'economically unsound.' The RBEP would not utilize ZLD technologies, because the project would allow for a substantial reduction (0.17 mgd) in wastewater volume to the Pacific Ocean. Staff notes that the applicant proposes a number of water reuse and wastewater reduction systems which would include the following:

- The reject water stream from the reverse osmosis system would be discharged to a holding tank for reuse onsite such as equipment wash down, fire water loop, and closed-loop cooling.
- Blowdown (condensate removed from the HRSGs to reduce water contaminants) would be discharged to an atmospheric flash tank, where the flash steam would be vented to the atmosphere and the condensate would be cooled prior to transfer to a holding tank for reuse.
- Blowdown from the combustion turbine evaporative coolers would be discharged to the plant process drain system and stored for reuse onsite.
- Service water would be used for makeup to the combustion turbine evaporative coolers, equipment washdown, and other miscellaneous plant uses.

Staff anticipates that these same systems would also be used where tertiary treated recycled water is the operation water supply. Therefore, staff finds that the wastewater management would be in compliance with the intent of the water policy because it eliminates the significant portion of process wastewater discharge from the facility.

LOCAL LORS

Staff concludes that the implementation of Conditions of Certification **SOIL&WATER-5** RBEP would satisfy the applicable requirements of all local LORS by paying necessary local connection fees to the city of Redondo Beach for sanitary sewer disposal services.

NOTEWORTHY PUBLIC BENEFITS

- The proposed project would reduce the amount of water used relative to baseline conditions. The reduction in water use would be about 253 AFY. Switching to recycled water use, as recommended by staff, would result in additional saving of 52 AFY of potable water, for a total of 305 AFY of potable water saving.
- The proposed project would result in a 0.17 mgd reduction in discharge of industrial waste water to the Pacific Ocean and a similarly proportional decrease in pollutant loading. The proposed project would result in the elimination of once-through cooling from the existing Redondo Beach Generating System. SWRCB's Resolution No. 2010-0020 and adoption of a Policy for the Use of Coastal and Estuarine Waters for Power Plant Cooling (OTC Plan), requires all coastal power plants that utilize OTC to meet new performance requirements (Best Technology Available [BTA]) through a reduction in intake volume and velocity. The proposed project helps achieve the goals of the OTC Plan through dry-cooling and reduced discharge.

CONCLUSIONS

- The RBEP proposes to use a total of approximately 100 acre-feet (AF) for construction lasting about five years (annual average of 20 AFY) and 52.5 acre feet per year (AFY) for operation. This would reduce the amount of potable water used relative to baseline conditions, i.e. the Redondo Beach Generating Station (RBGS). The reduction in potable water use would be about 253 acre feet per year (AFY), which would result in additional supplies for other beneficial uses.
- Staff recommends that the project use recycled water produced by WBMWD and distributed by Cal-Water for construction and industrial purposes during operations. Staff concludes this is consistent with Energy Commission Water Policy and LORS and also would result in further savings of potable water. Staff understands the applicant may not agree and additional information regarding recycled water use may be made available for further determination of its suitability for project use. Use of recycled water would result in additional savings of 100 AF of potable water during the five-year construction period and about 52 AF annually during project operation. This would bring the total reduction in potable water during project operation to about 305 AFY that would be available for other beneficial uses.
- The proposed project would result in a 0.17 mgd reduction in industrial waste water volume to the Pacific Ocean and a similarly proportional decrease in pollutant loading.
- The proposed project would result in the elimination of once through cooling from the existing Redondo Beach Generating Station.
- The proposed site has a long industrial history and would not require a lot of additional soil disturbance for the new facilities and as such would result in minimal losses to soil resources. Though some small losses in topsoil are expected during construction and operation from wind and water erosion, onsite management of stormwater runoff and sediment erosion as proposed by staff in Conditions of Certification **SOIL&WATER-1** and **SOIL&WATER-3** would ensure soil loss is kept to a minimum.

- Staff proposes Condition of Certification **SOIL&WATER-1,** which would require the proposed project to comply with the Clean Water Act and obtain discharge permits for construction through the State Water Resources Control Board as well as city of Redondo Beach wet weather erosion control requirements. This condition would ensure that the impacts to waters of the United States from construction would be less than significant.
- Staff proposes Condition of Certification **SOIL&WATER-2**, which would require the proposed project to comply with Permit Order No. R4-2009-0068, NPDES NO. CAG674001, if hydrostatic testing waters are discharged to waters of the US. This condition would ensure that the impacts to waters of the United States from hydrostatic testing would be less than significant.
- Groundwater at the site is relatively shallow and potentially contaminated by petroleum products and by-products. Trench and foundation excavations will likely encounter shallow groundwater and dewatering would be required for stabilization. If the applicant engages in dewatering, staff would require that the applicant comply with Condition of Certification **SOIL&WATER-3**, which would require the applicant to apply for coverage under a permit that would allow for the discharge of petroleum-contaminated groundwater from dewatering activities.
- Staff proposes Condition of Certification **SOIL&WATER-4,** which would require the proposed project to comply with the Clean Water Act and obtain discharge permits for operation through the State Water Resources Control Board. This condition would ensure that the impacts to waters of the United States from construction would be less than significant.
- Staff proposes Condition of Certification **SOIL&WATER-5,** which would require the proposed project to comply with the city of Redondo Beach code, Title 5 Chapter 4 article 5 – Wastewater System, Schedule of Fees and Charges. This condition would ensure that connections to the city's sewer system are completed appropriately and that annual fees are paid to the city.
- Staff proposes Condition of Certification **SOIL&WATER-6**, which would limit the proposed project's water use to 53 AFY and require regular water use reporting to the Commission.
- Staff proposes Condition of Certification **SOIL&WATER-7**, which would require the applicant to install water meters on site.
- The proposed project is located in Zone X and is separated from the 100-year flood stage (flood with a 1 percent probability of occurrence in any year) by at least six feet.
- Coupled with projected sea level rise estimates, storm surge events in the Pacific Ocean could cause ocean water level increases of up to three feet during a 100-year return level event. This level of storm surge could reduce the proposed site's flood protection. However, even with high-end estimates of relative sea-level rise by 2050 (relative to 2000) (Tebaldi et al. 2012), the site would still be at least 3.0 feet above the current (2012) 100-year floodplain (FEMA, 2012). This vertical separation should be sufficient to protect the project from flooding impacts.

- The proposed project would include use of air cooled condensers for cooling of the steam cycle. This technology significantly reduces the potential for use of other water supplies and is encouraged in accordance with the Energy Commission's water policy.
- The proposed project complies with SWRCB's Resolution No. 2010-0020,Policy for the Use of Coastal and Estuarine Waters for Power Plant Cooling (Once Through Cooling Plan), requiring all coastal power plants that utilize OTC to meet new performance requirements (Best Technology Available [BTA]) through a reduction in intake volume and velocity. The proposed project achieves these goals through use of dry-cooling technology and reduced wastewater discharge.

PROPOSED CONDITIONS OF CERTIFICATION

NPDES AND WET WEATHER EROSION CONTROL PLAN CONSTRUCTION PERMIT REQUIREMENTS

SOIL&WATER-1: The project owner shall manage stormwater pollution from construction activities by fulfilling the requirements contained in State Water Resources Control Board's (SWRCB) *National Pollutant Discharge Elimination System (NPDES) General Permit for Stormwater Discharges Associated with Construction and Land Disturbance Activities (Order No. 2009-0009-DWG, NPDES No. CAS000002*) and all subsequent revisions and amendments. The project owner shall develop and implement a construction Stormwater Pollution Prevention Plan (SWPPP) for the construction of the project. In addition, the project owner shall prepare a Wet Weather Erosion Control Plan (WWECP) in accordance with the requirements of the City of Redondo Beach regulations.

Verification: 30 days prior to site mobilization, the project owner shall submit the construction SWPPP to the CBO and CPM for review and the SWRCB for review and approval. A copy of the construction SWPPP shall be kept accessible onsite at all times. Within ten days of its mailing or receipt, the project owner shall submit to the CPM any correspondence between the project owner and the Los Angeles RWQCB about the general NPDES permit for discharge of stormwater associated with construction and land disturbance activities. This information shall include a copy of the notice of intent and the notice of termination submitted by the project owner to the SWRCB. Also, the project owner shall prepare a WWECP in accordance with the city of Redondo Beach regulations and submit the WWECP to city of Redondo Beach for review and comment and to the CPM for review and approval.

HYDROSTATIC WATER DISCHARGE PERMIT REQUIREMENTS

SOIL&WATER-2: Prior to initiation of hydrostatic testing water discharge to surface waters, the project owner shall obtain a National Pollutant Discharge Elimination System permit for discharge to the Pacific Ocean. The project owner shall comply with the requirements of the Permit Order No. R4-2009-0068, NPDES NO. CAG674001 for hydrostatic testing water discharge. The project owner shall provide a copy of all permit documentation sent to the Los Angeles Regional Water Quality Control Board (RWQCB) or SWRCB to the CPM and notify the CPM in writing of any reported non-compliance.

Verification: 30 days prior to site mobilization, the project owner shall submit to the CPM documentation that all necessary NPDES permits were obtained from the Los Angeles RWQCB or State Water Board. 30 days prior to project operation, the project owner shall submit to the CPM a copy of the relevant plans and permits received. The project owner shall submit to the CPM all copies of any relevant correspondence between the project owner and the Water Board regarding NPDES permits in the annual compliance report.

GROUNDWATER DISCHARGE PERMIT REQUIREMENTS

SOIL&WATER-3: Discharge of dewatering water shall comply with the Los Angeles Regional Water Quality Control Board (RWQCB) and State Water Resources Control Board regulatory requirements. The project owner shall submit a Report of Waste Discharge (RWD) to the compliance project manager (CPM) and RWQCB for determination of which regulatory waiver or permit applies to the proposed discharges. The project owner shall pay all necessary fees for filing and review of the RWD and all other related fees. Checks for such fees shall be submitted to the RWQCB and shall be payable to the State Water Resources Control Board. The project owner shall ensure compliance with the provisions of the waiver or permit applicable to the discharge. Where the regulatory requirements are not applied pursuant to a National Pollutant Discharge Elimination System permit, it is the Energy Commission's intent that the requirements of the applicable waiver or permit be enforceable by both the Commission and the RWQCB. In furtherance of that objective, the Energy Commission hereby delegates the enforcement of the waiver or permit requirements, and associated monitoring, inspection, and annual fee collection authority, to the RWQCB. Accordingly, the Energy Commission and the RWQCB shall confer with each other and coordinate, as needed, in the enforcement of the requirements.

Verification: Prior to any dewatering water discharge, the project owner shall submit a RWD to the RWQCB to obtain the appropriate waiver or permit. The appropriate waiver or permit must be obtained at least 30 days prior to the discharge. The project owner shall submit a copy of any correspondence between the project owner and the RWQCB regarding the waiver or permit and all related reports to the CPM within ten days of correspondence receipt or submittal.

NPDES INDUSTRIAL PERMIT REQUIREMENTS

SOIL&WATER-4: Prior to site mobilization, the project owner shall obtain a National Pollutant Discharge Elimination System permit for industrial waste and stormwater discharge to the Pacific Ocean. The project owner shall discharge to the same outfall currently utilized by the Redondo Beach Generating Station under the requirements of Order No. R4-2007-0042, NPDES No. CA0004001. The project owner shall provide a copy of all permit documentation sent to the Los Angeles or State Water Board to the CPM and notify the CPM in writing of any reported non-compliance.

Verification: Prior to site mobilization, the project owner shall submit to the CPM documentation that all necessary NPDES permits were obtained from the Los Angeles or State Water Board. 30 days prior to project operation, the project owner shall submit to the CPM a copy of the Industrial SWPPP. The project owner shall submit to the CPM all copies of any relevant correspondence between the project owner and the Board regarding NPDES permits in the annual compliance report.

WATER AND SEWER CONNECTIONS

SOIL&WATER-5: The project owner shall pay the city of Redondo Beach all fees normally associated with industrial connections to the city's sanitary sewer system as defined in the city's code, Title 5 Chapter 4 Article 5, Wastewater System, Schedule of Fees and Charges.

Verification: 30 days prior to the scheduled connection to the city's sewer system, the project owner shall submit to the CPM a copy of the application to the city to connect to the system and the check submitted to pay the fees described above 30 days prior to the scheduled connection to the city's sewer system, the project owner shall submit to the CPM a copy of the application to the city to connect to the system and the check submitted to pay the fees described above. Fees paid to the city shall be reported in the Annual Compliance Report for the life of the project.

WATER USE AND REPORTING

SOIL&WATER-6: Water supply for project construction and industrial uses during project operation shall be recycled water supplied from Cal-Water. Water supply for domestic uses shall be potable water supplied from the city of Redondo Beach by Cal-Water. Water use for operation shall not exceed 52.5 AFY consisting of a maximum of 0.5 AFY of potable water for sanitary purposes and 52 AFY of recycled water for industrial purposes. Water use for construction shall not exceed 100 AF during the 60-month construction period. A monthly summary of water use shall be submitted to the CPM.

The recycled water use shall meet the requirements of California Code of Regulations, title 22, Division 4, Chapter 3 and Title 17, Division 1, Chapter 5. Hydrostatic testing water shall be recycled water meeting the same requirements. The project owner shall provide the CPM two copies of the executed agreement between the project owner and Cal-water for the supply of recycled water for project construction and operation. This agreement shall specify all terms and costs for the receipt and use of recycled water.

In the event of a recycled water delivery interruption, potable water may be used as an emergency backup supply for the period of time of the emergency. For the purpose of this condition, the term emergency shall mean the inability for the project to take or for Cal-Water to deliver, when it is necessary for the project to operate, recycled water to the project in a quantity sufficient to meet project demand due to Acts of God, natural disaster and other circumstances beyond the control of the project owner.

Verification: No later than 60 days prior to construction, the project owner shall submit to the CPM two copies of the executed agreement for the supply and onsite use of recycled water from Cal-water. The project owner shall submit to the CPM two copies of the Engineering Report and Cross Connection inspection report and include all comments from the Los Angeles RWQCB and the California Department of Public Health (DPH) prior to the delivery of recycled water from Cal-Water.

The project owner shall notify the CPM when potable water would be used for more than 72 hours of plant operation. Within the notification, the project owner shall provide justification for the extended use of potable water as an emergency backup supply and the expected duration of its use. The project owner shall not use potable water as an emergency backup supply for more than 72 hours of plant operation without CPM approval.

The project owner shall submit a water use summary report to the CPM monthly during construction and annually during operations for the life of the project. The annual report shall include calculated monthly range, monthly average, daily maximum within each month and annual use by the project in both gallons per minute and acre-feet. After the first year and for subsequent years, this information shall also include the yearly range and yearly average potable water used by the project.

WATER METERING

SOIL&WATER-7: Prior to the use of recycled and potable water during commercial operation, the project owner shall install and maintain metering devices as part of the water supply and distribution system. The project shall monitor and record in gallons per day the total volume(s) of recycled water and potable water from Cal-Water. Those metering devices shall be operational for the life of the project and must be able to record the volume from each source separately.

Verification: At least 30 days prior to use of any water source for project operation, the project owner shall submit to the CPM evidence that metering devices have been installed and are operational. The project owner shall provide a report on the servicing, testing, and calibration of the metering devices in the annual compliance report.

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CEC, 2009. The Impacts of Sea-Level Rise on the California Coast, Final Paper. California Energy Commission, Docket CEC-500-2009-024-F.

CEC, 2014a. Report of Conversation with Joe Walters, Manager of Business Development, West Basin Municipal Water District (WBMWD), re: Availability of Recycled Water for Project Operation on 02/04/14. Docket TN # 201836, Mar. 6, 2014.

CEC 2014b. Record of Conversation Between CEC Staff and Justin Pickard, Water Resources Engineer, California Water Service Co. (Cal-Water), re Water Quality Information for Title 22 Recycled Water. Docket TN # 202621, June 27, 2014.

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DWR, 2004. California's Groundwater Bulletin 118 – Coastal Plain of Orange County Groundwater Basin. Updated February 27, 2004.

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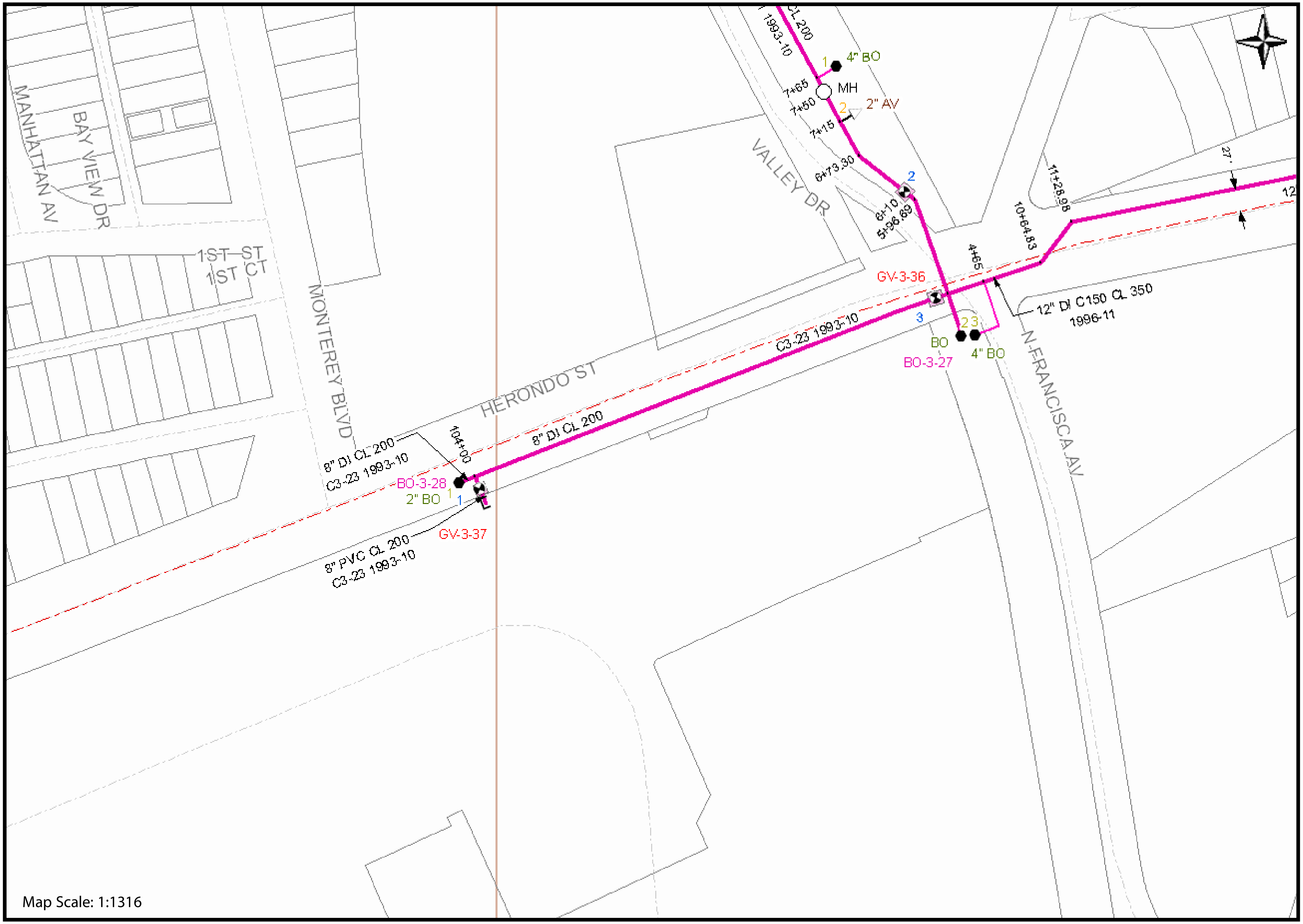
SOIL AND WATER RESOURCES - FIGURE 1

Redondo Beach Energy Project - Location of West Basin Municipal Water District (WBMWD) Recycled Water Main in the Project Area, and a Stub-out with a Gate Valve Coming Out of the Extension Line along Herondo Street going South Towards the Project Property Line.



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: West Basin MWD (WBMWD), Personal Communication (CEC 2014b)

TRAFFIC AND TRANSPORTATION

John Hope

SUMMARY OF CONCLUSIONS

Energy Commission staff has analyzed the information provided in the Application for Certification (AFC) and acquired from other sources to determine the potential for the Redondo Beach Energy Project (RBEP) to have significant adverse traffic and transportation-related impacts. Staff has also assessed the potential for mitigation proposed by the applicant and conditions of certification developed by staff to reduce any potential impacts to a less-than-significant level, as well as the feasibility and enforceability of those proposed mitigations and recommended conditions.

Staff proposes Conditions of Certification **TRANS-1** through **TRANS-6** to reduce potential impacts to less than significant and to ensure that the project would comply with all applicable laws, ordinances, regulations, and standards (LORS) pertaining to traffic and transportation.

INTRODUCTION

In compliance with California Environmental Quality Act (CEQA) and Energy Commission requirements, this analysis identifies the RBEP's potential impacts to the surrounding transportation systems and proposed mitigation measures (conditions of certification) that would avoid or lessen these impacts. It also addresses the project's consistency with applicable federal, state, and local transportation-related LORS.

APPLICANT-PROPOSED IMPROVEMENTS AND TRAFFIC MEASURES

In the AFC for the RBEP, the applicant has proposed the following roadway improvements and traffic measures:

- Construction and demolition contractors shall be required to prepare a Construction and Demolition Transportation Management Plan (TMP). The TMP would 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 would be restored to or near its preexisting condition based on the procedures established by the TMP. The construction and demolition contractors would 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.

SETTING

The proposed RBEP would occupy approximately 12.5 acres of the existing AES Redondo Beach Generating Station (RBGS) site within the incorporated city of Redondo Beach. The project site is located at the southeast corner of the intersection of Herondo Street and North Harbor Drive. The site is currently developed with an operating electrical generation facility.

The RBEP site is located in the coastal zone within western Los Angeles County. The area is largely built out with a range of residential, commercial, and industrial land uses. See the **LAND USE** section of this Staff Assessment for a discussion of the surrounding land uses. The city of Redondo Beach roadway system is a predominantly grid network with roadways connecting east-west to the Highway 1 - Pacific Coast Highway (PCH), east to Highway 107, and north to I-405 (San Diego Freeway). See **Traffic and Transportation Figure 1** for a regional map of roadways and surrounding cities.

The project would include the use of 17 acres of the existing RBGS site for construction laydown and parking. Refer to the **EXECUTIVE SUMMARY** section for a detailed discussion of the existing power generating facilities on-site and a description of the demolition and construction schedule.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

Traffic and Transportation Table 1 provides a general description of adopted federal, state, and local LORS pertaining to traffic and transportation that apply to this project.

Traffic and Transportation Table 1
Laws, Ordinances, Regulations, and Standards

Applicable LORS	Description
Federal	
Title 49, Code of Federal Regulations, Parts 171-177	Requires proper handling and storage of hazardous materials during transportation.
Title 14, Code of Federal Regulations, Section 77.13 (2)(i)	This regulation requires the project owner to notify the Federal Aviation Administration (FAA) of construction structures with a height greater than 200 feet from grade or greater than an imaginary surface extending outward and upward at a slope of 100 to 1 for a horizontal distance of 20,000 feet from the nearest point of the nearest runway of an airport with at least one runway more than 3,200 feet in length.
State	
California Vehicle Code, Sections 13369, 15275, 15278	Requires licensing of drivers and the classification of license for the operation of particular types of vehicles. A commercial driver's license is required to operate commercial vehicles. An endorsement issued by the Department of Motor Vehicles (DMV) is required to drive any commercial vehicle identified in Section 15278.
California Vehicle Code, Sections 31303-31309	Requires transportation of hazardous materials to be on the state or interstate that offers the shortest overall transit time possible.
California Vehicle Code, Sections 31600-31620	Regulates the transportation of explosive materials.
California Vehicle Code, Sections 32100-32109	Requires shippers of inhalation hazards in bulk packaging to comply with rigorous equipment standards, inspection requirements, and route restrictions.
California Vehicle Code, Sections 34000-34100	Establishes special requirements for vehicles having a cargo tank and for hazardous waste transport vehicles and containers, as defined in Section 25167.4 of the Health and Safety Code.
California Vehicle Code, Section 35550-35551	Provides weight guidelines and restrictions vehicles traveling on freeways and highways.
California Vehicle Code, Section 35780	Requires a single-trip transportation permit to transport oversized or excessive loads over state highways.
California Streets and Highways Code, Sections 660, 670, 672, 1450, 1460, 1470, 1480 et seq., 1850-1852	Requires encroachment permits for projects involving excavation in state and county highways and city streets.

Applicable LORS	Description
California Health and Safety Code, Section 25160	Addresses the safe transport of hazardous materials.
California Department of Transportation CA MUTCD Part 6 (Traffic Manual)	Provides traffic control guidance and standards for continuity of function (movement of traffic, pedestrians, bicyclists, transit operations), and access to property/utilities when the normal function of a roadway is suspended.
Local	
Los Angeles County Code; Chapter 16.22 Moving Permits	Requires a permit for vehicles or vehicle combinations exceeding statutory limitations (e.g., size, weight, loading of vehicles) on county roads, and on roads in some local jurisdictions.
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 Los Angeles Municipal Code	Requires an overload permit for vehicles or vehicle combinations exceeding statutory limitations (e.g., size, weight, loading of vehicles) on city roads.
City of Redondo Beach, General Plan, Circulation Element	Specifies long-term transportation planning goals and policies for the city of Redondo Beach.
City of Redondo Beach Municipal Code, Title 3, Chapter 7, Article 9	Requires a transportation permit for haul route and oversized loads. Exceptions to a designated route are allowed if trucks are going directly to a business for deliveries/pickups.
City of Redondo Beach Municipal Code, Title 9, Chapter 1, Article 12	Prohibits all construction activity except between the hours of 7:00 a.m. and 6:00 p.m. Monday through Friday and between the hours of 9:00 a.m. and 5:00 p.m. on Saturday. Prohibits all construction activity on Sundays or designated holidays.
City of Torrance Municipal Code	Requires a street use permit for vehicles or vehicle combinations exceeding statutory limitations (e.g., size, weight, loading of vehicles) on city roads.
City of Hermosa Beach Municipal Code, Chapter 10.24	Designates truck routes and truck travel on designated routes.
City of Manhattan Beach Municipal Code, Chapter 14.64	Requires a street use permit for haul routes and oversized loads.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHODS AND THRESHOLDS FOR DETERMINING SIGNIFICANCE

Significance criteria used in this document for evaluating environmental impacts are based on the CEQA Guidelines, the CEQA Environmental Checklist for Transportation/Traffic, and applicable LORS used by other governmental agencies. Specifically, staff analyzed whether the proposed project would result in the following:

1. Cause an increase in traffic which is substantial in relation to the existing traffic load and capacity of the street system (i.e., result in a substantial increase in either the number of vehicle trips, the volume-to-capacity ratio on roads, or congestion at intersections);

2. 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 non-motorized 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;

3. Conflict with an applicable congestion management program, including, but not limited to, level of service standards (LOS) and travel demand measures, or other standards established by the county congestion management agency for designated roads or highways;
4. Substantially increase hazards due to a design feature (e.g., sharp curves or dangerous intersections) or incompatible uses (e.g., farm equipment);
5. Result in inadequate emergency access;
6. Conflict with adopted policies, plans, or programs regarding public transit, bicycle, or pedestrian facilities, or otherwise decrease the performance or safety of such facilities;
7. Result in a change in air traffic patterns, including either an increase in traffic levels or a change in location that result in substantial safety risk;
8. Produce a thermal plume in an area where flight paths are expected to occur below 1,000 feet from the ground; or
9. Have individual environmental effects which, when considered with other impacts from the same project or in conjunction with impacts from other closely related past, present, and reasonably foreseeable future projects, are considerable, compound, or increase other environmental impacts.

CRITICAL ROADS AND FREEWAYS

The city of Redondo Beach Circulation Element classifies roadways in the city limits based on the average daily trips (ADT). The following describes the local and regional roadways that would be used for construction and operational traffic accessing the proposed project site. The regional roadways are shown in **Traffic and Transportation Figure 1**. The local roadways within the Redondo Beach city limits are shown in **Traffic and Transportation Figure 2**.

<u>Existing Regional and Local Transportation Facilities</u>

Interstate 405 (I-405): I-405 is a major north-south interstate highway which runs 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 South Western Avenue and Hawthorne Boulevard average between 252,000 and 258,000 vehicles per day (Caltrans 2014).

Interstate 110/State Route 110 (I-110/SR 110): I-110/SR 110 is a state and interstate highway in the Los Angeles area. The interstate portion (which ends at Interstate 10), as well as the SR 110 south of the US 101 interchange, is named the Harbor Freeway. The segment of SR 110 north from the US 101 interchange to Pasadena is named the historic Arroyo Seco Parkway. I-110/SR 110 connects San Pedro and the Port of Los Angeles with downtown Los Angeles and Pasadena. The Long Beach freeway (Interstate 710) is the principle means for freight to travel from the Port of Los Angeles to rail yards and warehouses further inland, but I-110 is also a major freight route. Daily traffic volumes on I-110, near its interchange with I-405, average between 213,000 and 260,000 vehicles per day (Caltrans 2014).

Pacific Coast Highway (PCH, State Highway 1): 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-lane north-south major arterial. Left-turn lanes are provided at major intersections and travel speeds are characteristic of commercial corridors. The speed limit along PCH near the project site is 35 miles per hour (mph). There is a raised median south of Avenue H that continues to Neece Avenue. Traffic volumes along PCH average from 27,500 to 62,000 vehicles per day (Caltrans 2014).

Herondo Street: Herondo Street is a four-lane east-west secondary arterial that connects Harbor Drive to PCH. Herondo Street becomes Anita Street to the east. There is a raised median along the entire section of Herondo Street, with left turn lanes at all major intersections. The speed limit along Herondo Street is 35 mph. Traffic volumes along Herondo Street average 14,000 vehicles per day (City of Redondo Beach, 2009; pgs. 21-22).

Anita Street/West 190th Street: Anita Street/West 190th Street is a four-lane east-west major arterial that connects the PCH to Hawthorne Boulevard and destinations to the east. Traffic volumes along Anita Street/West 190th Street average 26,000 vehicles per day (City of Redondo Beach, 2009; pgs. 21-22).

Catalina Avenue: Catalina Avenue is a four-lane north-south secondary arterial that runs from Herondo Street near the northern city boundary to Palos Verde Boulevard at the southern city boundary. There is a raised median between Beryl Street and Torrance Boulevard. Catalina Avenue carries between 12,000 and 16,000 vehicles per day (City of Redondo Beach, 2009; pgs. 21-22).

Beryl Street: Beryl Street is a southeast-northeast secondary arterial running between Harbor Drive and West 190th Street. Between Prospect Street and Catalina Street, Beryl Street has one lane in each direction with a two-way left-turn lane. Beryl Street carries an average 3,700 vehicles per day (City of Redondo Beach, 2009; pgs. 21-22).

Harbor Drive: Harbor Drive is a two-lane north-south collector within the city of Redondo Beach and a four-lane arterial within the city of Hermosa Beach (where it is renamed to Hermosa Avenue). Harbor Drive terminates at Pacific Avenue approximately ½ mile to the south of the project site. Hermosa Avenue terminates at 35th Street approximately 1 ¾ miles north of the project site. Within the city of Redondo Beach there is a two-way left-turn lane and a five-foot bike lane on both sides of the street. Within the city of Hermosa Beach, on-street bike sharrows (shared-lane markings) are provided. Within the city of Redondo Beach, Harbor Drive carries an average of 15,000 vehicles per day (City of Redondo Beach, 2009; pgs. 21-22).

Hawthorne Boulevard/SR 107: Hawthorne Boulevard/SR 107 is a six- to eight-lane north-south divided roadway that connects Palos Verdes Drive in Rancho Palos Verdes in the south to I-405 and destinations to the north. Hawthorne Boulevard is identified in the City of Torrance General Plan as a principal arterial. There are left-turn lanes at all major intersections. Traffic volumes along Hawthorne Boulevard average 48,000 vehicles per day between Artesia Boulevard to the north and 177th Street to the south (City of Redondo Beach, 2009; pgs. 21-22).

Torrance Boulevard: Torrance Boulevard is a four-lane east-west major arterial which ends in a cul-de-sac west of Catalina Avenue, less than one mile from the project site. Torrance Boulevard is one of the primary connections between I-110 to the east and the cities of Torrance and Redondo Beach to the west. Traffic volumes along Torrance Boulevard average from 13,000 to 25,000 vehicles per day in the vicinity of the project site (City of Redondo Beach, 2009; pgs. 21-22).

Heavy/Oversized Truck Route

The RBEP would include the delivery of large components of the facility (e.g., transformers) via heavy/oversized deliveries. The deliveries would come from the Port of Long Beach located within the city of Long Beach. A map of the planned truck route is shown in **Traffic and Transportation Figure 3**. The deliveries would originate from the port and would travel to the onsite laydown area. The applicant anticipates a maximum of 18 oversize trips (three trips per month for six months) would be required for the project. The applicant expects the heavy/oversize deliveries to occur during the late night (between 10:00 p.m. and 4:00 a.m.) which is considered common practice to reduce and minimize conflicts with traffic.

Due to the size of the transport vehicles the applicant would be required to use escort vehicles operated by a private truck escort service or the California Highway Patrol (CHP) personnel. In accordance with permit requirements, the applicant would be responsible for rolling road closures, temporary no parking and establishing alternative traffic routes if required by local jurisdictions.

Prior to any transport of heavy/oversized equipment the applicant would employ a preconstruction crew to make necessary temporary improvements along the route. These may include the temporary relocation of low hanging power and utility lines, street signals, and median landscaping. All preconstruction work would be done in accordance with local jurisdiction permitting requirements and would be returned to preconstruction condition following transport (RBEP 2012, Appendix 5.12A).

A list of the potentially affected roadways for the heavy/oversized truck route is listed in the **Traffic and Transportation Table 2**. Although the heavy/oversized deliveries would occur during the late night hours, it should be noted that the proposed route would take the slow moving trucks by the Little Company of Mary Hospital, which operates at all hours of the day, located along Torrance Boulevard. Staff is recommending implementation of Condition of Certification **TRANS-3** would require the applicant, as part of a traffic control plan (TCP), to notify the hospital that would be affected when roads may be partially closed. In addition, staff is recommending implementation of Condition of Certification **TRANS-1** which would require the applicant to obtain all necessary permits from affected jurisdictions for the transportation of heavy/oversized equipment associated with the RBEP project.

Traffic and Transportation Table 2
Heavy/Oversized Truck Route, Affected Roadways

County	City	Roadway
Los Angeles	Long Beach	Harbor Plaza
		Pico Avenue
		10th Street
		9th Street
		Santa Fe Avenue
	City of Los Angeles	Pacific Coast Highway
	City of Carson	Avalon Boulevard
	Los Angeles County (Unincorporated)	223rd Street
		Vermont Avenue
		Torrance Boulevard
		Normandie Avenue
	Torrance	190th Street
		Prairie Avenue
		Torrance Boulevard
	Redondo Beach	Pacific Coast Highway
		Catalina Avenue
		Beryl Street
		Harbor Drive

Source: RBEP 2012, Appendix 5.12A)

Level of Service

To quantify the existing baseline traffic conditions, the study area state highways, roadways, and intersections were analyzed in the AFC to determine their operating conditions. Based on the traffic volumes, turning movement counts, and the existing number of lanes at each intersection, the volume/capacity (V/C) ratios and levels of service (LOS) have been determined for each affected intersection and roadway segment.

LOS is a qualitative measure describing operational conditions within a traffic stream. It is used to describe and quantify the congestion level on a particular roadway or intersection and generally describes these conditions in terms of such factors as speed or vehicle movement. **Traffic and Transportation Table 3** summarizes roadway LOS for associated V/C ratios.

Traffic and Transportation Table 3
Level of Service Criteria for Roadways and Intersections

Level of Service	Volume/Capacity (v/c)	Delay per Vehicle (seconds)	Description
A	≤ 10	≤ 10	Free flow; insignificant delays
B	>10 and ≤ 20	>10 and ≤ 20	Stable operation; minimal delays
C	>20 and ≤ 35	> 20 and ≤ 35	Stable operation; acceptable delays
D	>35 and ≤ 55	>35 and ≤ 55	Approaching unstable flow; queues develop rapidly but no excessive delays
E	>55 and ≤ 80	> 55 and ≤ 80	Unstable operation; significant delays
F	>80	> 80	Forced flow; jammed conditions

Current Roadway Segment Conditions — LOS

Level of service standards for the roadways and intersections in the vicinity of the RBEP are established by and under the jurisdiction of two different agencies: Caltrans and the City of Redondo Beach. Staff used these LOS standards to evaluate potential RBEP-generated traffic impacts.

- City of Redondo Beach Circulation Element: The Circulation Element is a required chapter of the General Plan which evaluates the long-term transportation needs of the city and provides a plan to accommodate those needs. The city of Redondo Beach has established a service standard of LOS D or better for all major, secondary, and collector streets, LOS C for local streets, and LOS E for state highways (e.g., PCH). The city also has a goal for all city intersections to operate at LOS D or better. Where intersection operations currently exceed LOS D, the city pursues mitigation measures to achieve LOS D. If LOS D is not achievable at an intersection under existing baseline conditions with feasible mitigation, the LOS standard for the intersection is considered to be equal to the 2007/2008 intersection LOS (City of Redondo Beach, 2009; pg. 12).

  In addition, the city has a policy that establishes a LOS significance threshold in which a significant impact would result if one of the following three conditions is met:

  1. 4 percent increase in the V/C ratio at an intersection when the baseline intersection condition is LOS C,

  2. 2 percent increase in the V/C ratio at an intersection when the baseline intersection condition is LOS D, or

  3. 1 percent increase in the V/C ratio at an intersection when the baseline intersection condition is LOS E or worse (City of Redondo Beach, 2009; pg. 21).

- Caltrans: The *Guide for the Preparation of Traffic Impact Studies* (2000) states, "Caltrans endeavors to maintain a target LOS at the transition between LOS C and LOS D on state highway facilities; however, Caltrans acknowledges that this may not always be feasible and recommends that the lead agency consult with Caltrans to determine the target LOS. If an existing state highway facility is operating at less than the appropriate target LOS, the existing LOS should be maintained."

OTHER TRANSPORTATION SYSTEMS

Freight and Passenger Rail

A Burlington Northern Santa Fe Railroad rail line is located in the city of Redondo Beach which runs north/ south through the northeastern portion of the city limits. Several spur lines provide access to manufacturing uses. It should be noted that the project applicant is not proposing to use any rail lines for deliveries during construction or operation activities. Metro provides passenger rail service from the Redondo Beach Station which is located at the northern limit of the city of Redondo Beach.

Bus Service

Los Angeles County Metropolitan Transportation Authority (Metro) provides public transportation in the city of Redondo Beach. Within the city limits, Metro operates two bus routes that provide local and regional service. Additional bus service is provided in the city of Redondo Beach by the Beach Cities Transit, Torrance Transit, and Los Angeles Department of Transportation (LADOT) Commuter Express.

To encourage ridership of Metro rail, a park and ride facility is located at the Redondo Beach Station at 2406 Marine Avenue.

Bicycle and Pedestrian Facilities

Bicycle facilities are typically categorized into three classes: Class I, Class II, and Class III. Class I facilities include bike paths or trails with an exclusive right-of-way (ROW) for bicycles separate from vehicles. Class II facilities include bike lanes with an exclusive ROW for bicycles designated by roadway striping and signs. Class III facilities include bike routes signed for shared travel with motorized vehicles, without any striping. In addition, a shared-lane marking may be placed in the center of a travel lane to indicate that a bicyclist may use the full travel lane.

Near the project site, there is a Class I bicycle facility along The Strand (adjacent to the beach). There are Class II bicycle facilities along Grant Avenue, Harbor Drive, Diamond Street, and portions of Catalina Avenue and Esplanade. There is a Class III bicycle facility on Esplanade, between Pearl Avenue and Knob Hill.

The majority of roadways in the city provide paved sidewalks for pedestrians along both sides. In addition, several bicycle and pedestrian improvement projects are planned for existing pedestrian facilities in the city.

Airports/ Helipads

The nearest public airport is Zamperini Field Airport in Torrance which is approximately four miles southeast of the project site. In addition, the Los Angeles International Airport (LAX) is located approximately six miles north of the project site. The nearest military airport is the Los Alamitos Army Airfield located approximately 20 miles southeast of the project site.

The nearest helipads to the project site include the Trw Manhattan Beach helipad, Cosmodyne helipad, and Toyota Helistop heliport each located approximately three miles east, four miles north, and five miles east, respectively.

DIRECT/INDIRECT IMPACTS AND MITIGATION

The direct and indirect impacts of the proposed RBEP on traffic and transportation system are discussed in this section and based on an analysis that compares pre-RBEP and post-RBEP conditions. Staff evaluated the RBEP's impacts for two separate future scenarios: the peak construction month (when construction activity and employment would be maximized) and the first year of full operation. The below roadway segments and intersections were selected for evaluation because they provide the most direct route to the project site and would most likely be affected by project traffic during project construction and operation.

Heavy/ Oversized Loads

As discussed above, the proposed heavy/oversized load truck trips would occur outside of peak hours between the hours of 10 p.m. and 4 a.m. The traffic analysis conducted by the project applicant estimates that the existing LOS during the proposed heavy oversized trips would have insignificant delays (i.e., LOS A) and, thereby, the heavy/oversized load truck trips would have a negligible effect on traffic operations. The potential impacts as a result of the trips would be minimal. Proposed Condition of Certification **TRANS-3** would require the project applicant to obtain the necessary oversize/overweight permits from the appropriate jurisdictions for the transport of components from the Port of Long Beach to the RBEP site. Upon implementation of **TRANS-3**, there would be less than significant impacts resulting from heavy/oversized loads associated with the RBEP.

Truck Traffic

Construction equipment deliveries and construction-related truck traffic would contribute additional trips during the construction period. Equipment deliveries and construction truck traffic were estimated using a passenger car equivalent (PCE) factor of 1.5 cars per truck. Using this conversion, the anticipated 22 peak construction truck trips would generate approximately 33 PCE average daily trips. As summarized in the **Traffic and Transportation Table 4**, four truck trips would occur in the AM peak hour and four in the PM peak hour (based on PCE). The remaining truck trips would occur during typical construction work hours throughout the remainder of the day.

Oversized or overweight trucks with unlicensed drivers could present significant hazards to the general public and/or damage roadways. To ensure that trucks comply with weight, size, and route limitations set by the city of Redondo Beach Los Angeles County, and Caltrans, and that drivers are properly licensed, staff has included Condition of Certification **TRANS-1** to require the project owner to obtain roadway permits for vehicle sizes and weights, driver licensing, and truck routes. However, even properly sized and licensed trucks could damage roadways, creating significant public hazards. For this reason, staff has recommended Condition of Certification **TRANS-2** which requires that the project owner repair and restore all roads damaged during construction activities.

The applicant has identified that truck trips associated with project construction activities would occur throughout the day. As such, two truck trips would occur during the AM peak hour and two truck trips during the PM peak hour (see **Traffic and Transportation Table 4**). Although truck trips are identified to occur throughout the day, the potential remains for more than one truck to arrive at the project site prior to the start of construction activities in the early morning hours which could result in these trucks parking and idling on adjacent streets (e.g., Herondo Street, Harbor Drive). To ensure trucks do not park on adjacent streets, staff has recommended Condition of Certification **TRANS-3** to require the project owner to provide sufficient parking for trucks on the project site as needed.

It should be noted that the project area includes increased beach-related recreational activities (e.g., pedestrians, bicyclists). In the project area, beach-related recreational activities occur along or require crossing Harbor Drive. However, the project entrance is located along Harbor Drive which is not a designated truck route. Therefore, trucks associated with project construction activities would be required to use Herondo Street and then a one-block segment of Harbor Drive to access the project site. Trucks would be allowed to use this one-block segment of Harbor Drive to reach their destination in accordance with city of Redondo Beach regulations (Municipal Code, Title 3, Chapter 7, Article 9).

Energy Commission staff contacted the Redondo Beach Police Department (RBPD) to discuss the proposed project, ascertain their ability to provide law enforcement services to the project, and solicit comments or concerns they might have about the RBEP. Captain Hink commented that during project construction, increased project-related traffic near the construction site could delay the response time of emergency personnel to the site and other locations along Harbor Drive, especially during weekends and summer months when traffic in the area is at high capacity. Energy Commission staff provided Captain Hink with examples of conditions of certification that are typically applied to projects like the RBEP that address construction traffic management. To ensure adequate emergency response times, staff has recommended Condition of Certification **TRANS-3** which would require the project owner to prepare and implement a TCP that restricts the arrival and departure schedules and the designated workforce and delivery routes used for the movement of workers, vehicles, and materials.

Total Demolition/Construction Traffic

The RBEP construction period is proposed to begin in January 2016 commencing with the demolition of existing electricity generating units. The estimated time for completion of demolition/construction activities is December 2020. The maximum number of workers is estimated to be 338 workers during the peak construction period which is identified to occur during month 37 (RBEP 2012, AFC pg. 5.12-19).

The total workforce and truck trips generated during peak construction would be 709 daily roundtrips (676 worker trips added to 33 PCE truck trips). Approximately 684 of these roundtrips would occur during peak hours: 342 during the morning peak and 342 during the evening peak (RBEP 2012, AFC pg. 5.12-19). **Traffic and Transportation Table 4** summarizes all peak construction traffic generated by the RBEP. For affected local road segments, **Traffic and Transportation Table 5** summarizes existing 2012 peak hour traffic volumes and LOS and peak construction peak hour traffic volumes and LOS.

Traffic and Transportation Table 4
One-Way Trips During Peak Construction Period

Vehicle Type	Average Daily Trips (ADT)	AM Peak Hour[3] Trips			PM Peak Hour[4] Trips		
		In	Out	Total	In	Out	Total
Delivery/Haul Trucks[1]	22	1	1	2	1	1	2
PCE (1.5)[2]	33	2	2	4	2	2	4
Workers	676	338	0	338	0	338	338
Total Construction Traffic In PCE	709	340	2	342	2	340	342

[1]Worker traffic during the peak construction period. These figures assume the worst case traffic scenario of one worker per car.
[2] Passenger Car Equivalent (PCE) is a ratio of 1.5 passenger cars for each truck.
[3] The AM peak hour is 7:00 a.m.-9:00 a.m.
[4] The PM peak hour is 4:00 p.m.-6:00 p.m.
Source: RBEP 2012, AFC pg. 5.12-19

Based on an analysis of the RBEP location and surrounding transportation facilities, the following assumptions were used to distribute traffic related to the construction-workforce over the study area network:

- One-third of the trips would come from San Pedro, Long Beach, and communities located southeast of the RBEP site.
- One-third of the trips would come from Torrance, North Long Beach, and communities located to the east of the RBEP site.
- One-third of the trips would come from Gardena and communities located northeast of the RBEP site.

Traffic and Transportation Table 5
Affected Intersections: PM Peak Hour Trips and LOS during Peak Construction

Intersection	PM Peak Hour						
	Year 2012		Year 2019		2019 Plus Project Construction		Percentage Change in Volume
	Delay (seconds)	LOS	Delay (seconds)	LOS	Delay (seconds)	LOS	
PCH/Anita Street/Herondo Street	69.6	E	100+	F	100+	F	**3.3**
Catalina Avenue/Beryl Street	18.9	B	20.0	C	22.4	C	**4.5**
Catalina Avenue/Torrance Boulevard	16.9	B	17.4	B	18.8	B	4.6
PCH/Torrance Boulevard	67.0	E	100+	F	100+	F	**2.3**

Bold text indicates a significant impact
Source: RBEP 2012, AFC pg. 5.12-26

As shown in the **Traffic and Transportation Table 5**, two study intersections would operate at LOS F and one intersection would operate at LOS C during the PM peak hour with the project-added construction traffic. Project construction traffic would increase the intersection traffic volume by more than 1 percent at the intersections operating at LOS F and by more than 4 percent at the intersection operating at LOS C in the year 2019 (month 37, peak construction period, would occur in 2019 based on the proposed construction schedule). Based on significance thresholds established by the city of Redondo Beach (Circulation Element Policy P10), project traffic added to these three intersections during construction activities would result in a significant impact.

It should be noted that traffic volumes at the four study intersections were analyzed only during the PM peak hour because traffic volumes were identified as highest during the PM peak hour. Available traffic data was reviewed for the study intersections during both the AM and PM peak hours. In addition, the LOS was identified to be the same or worse during the PM peak hour at each intersection. Therefore, the analysis of potential traffic impacts to these four intersections conservatively focused on the PM peak hour and is considered representative of peak traffic conditions (RBEP 2013, pg. 30).

As indicated earlier in this analysis, staff recommends Condition of Certification **TRANS-2** and **TRANS-3** which would require the project owner to restore any road, easement, or right-of-way damaged by project construction and to prepare and implement a TCP that would address the movement of workers, vehicles, and materials, including staggering work force traffic and construction delivery arrival/departure times during non-peak hours and prohibiting use of three intersections during peak hours. Condition of Certification **TRANS-3** would require the project owner to obtain review and comment(s) from applicable agencies (e.g., city of Redondo Beach, Caltrans) on the proposed TCP along with final approval by Energy Commission staff. Upon implementation of the plan, construction traffic impacts would be reduced to less than significant.

Linear Facilities

The RBEP would utilize a site already developed with an electrical generating facility. No new off-site linears would be required that could affect the transportation roadway system in the project area. There would be no traffic impacts associated with the construction of off-site linears as part of the project.

Construction Workforce Parking and Laydown Area

RBEP construction would require 338 workers on-site during the peak construction period (RBEP 2012, p. 5.12-19). The applicant has proposed 17 acres on-site for construction laydown and parking areas to accommodate the workers. The parking areas designated by the applicant would accommodate over 1,000 parking spaces which would be more than adequate for the highest number of workers anticipated for RBEP construction.

In addition, staff's recommended Condition of Certification **TRANS-3** requires the applicant to prepare a TCP to ensure all construction worker parking is in place as designated in this analysis. Upon implementation of the plan, construction workforce parking impacts would remain less than significant.

Transportation of Hazardous Materials and Waste

During construction, no acutely hazardous materials would be used or stored onsite. The low-level hazardous materials planned for use during construction include gasoline, diesel fuel, oil, lubricants, cleaners, solvents, adhesives, and paint materials. Transportation of these materials would pose less-than-significant hazards to the public.

Please refer to the **HAZARDOUS MATERIALS MANAGEMENT** section of this Staff Assessment for a detailed description of hazardous waste associated with the project and proposed conditions of certification for the RBEP.

Aviation Impacts

Activities occurring during construction could require the use of tall equipment, such as cranes and derricks, on the project site. Title 14, Part 77.9 of the Code of Federal Regulations requires FAA notification for any proposed structure over 200 feet in height above ground level (AGL), regardless of the distance from an airport. For project compliance with FAA regulations, staff proposes Condition of Certification **TRANS-5**, which would require the project owner to submit a Form 7460-1 "Notice of Proposed Construction or Alteration" to the FAA for any construction equipment that may exceed the height restrictions.

RBEP Construction Impacts Conclusion

With implementation of the conditions of certification discussed in this analysis, construction of the RBEP would result in less-than-significant impacts to the traffic and transportation system in the vicinity of the project.

Operational Impacts and Mitigation

Workforce Traffic

Commercial operations of RBEP are expected to occur in the third quarter of 2019. The facility would be staffed by 21 permanent workers in three rotating shifts (RBEP 2012, AFC pg. 2-39).

RBEP Plant Operation Workforce	
Classification	**Proposed RBEP**
Plant Manager	1
Operations Leader	1
Maintenance Leader	1
Environmental Engineer	1
Power Plant Operators	10
Controls Specialty	5
Mechanic	1
Administration	1
Total	**21**

The applicant anticipates the trip distribution for operations to be the same as for construction workforce: approximately one-third from the cities of San Pedro and Long Beach, and communities located southeast of the RBEP site, one-third from the city of Torrance, North Long Beach, and communities located to the east of the RBEP site, and one-third from the city of Gardena and communities located northeast of the RBEP site.

During project operations, all state highways, roadways, and intersections near the RBEP would continue to function at LOS D or better, with the exception of PCH/Anita Street/Herondo Street and PCH/Torrance Boulevard intersections, which would operate at LOS F. However, traffic impacts to these intersections would be less than significant because they are already operating at LOS F, and operations traffic would only add an additional 46 daily PCE trips, which is less than 0.19 percent of pre-operational baseline traffic.

Because of the small number of trips generated by the operational workforce compared to existing traffic volumes, project operation would result in a minimal increase in traffic and would have a less than significant impact on overall LOS at studied intersections workers may use to access the project site.

Truck Traffic and Hazardous Materials Delivery

During operation, the RBEP would require six hazardous materials truck trips per month. These materials may include ammonia, cleaning solvents, diesel fuel, lubricants and other materials associated with RBEP operation. During project operation, aqueous ammonia, a regulated substance, would be delivered to the RBEP facility in accordance with Vehicle Code Section 32100.5, which addresses the transportation of hazardous materials that pose an inhalation hazard by requiring the transportation of hazardous materials to be on a state or interstate route that offers the shortest overall transit time possible (RBEP 2012, AFC pg. 5.12-31). The project owner’s proposed routes for hazardous material deliveries are generally the same as for regular truck deliveries. The routes used would be via I-405 to Highway 213 (South Western Avenue) to West 190th Street, to Anita Street to Herondo Street to North Harbor Drive to the RBEP project site.

Delivery of aqueous ammonia may be hazardous to the public if a spill were to occur. Therefore, staff recommends Condition of Certification **TRANS-4** to ensure that the project owner contracts with licensed hazardous materials and waste hauler companies that comply with all applicable regulations and obtain the proper permits and/or licenses from Caltrans and the Los Angeles County. For more information on hazardous materials used during project operation and applicable regulations, see the **HAZARDOUS MATERIALS MANAGEMENT** section of this Staff Assessment.

Parking

As indicated earlier, operations of the RBEP would employ a total of 21 operations staff. The plant would be operated in three rotating shifts and staffed 24 hours a day, seven days a week. As shown on the conceptual site plan, workforce parking would be provided at the north end of the site adjacent to the switchyard and would provide sufficient on-site parking. See the **LAND USE** section for additional information regarding parking and site plan configurations.

Emergency Access

Energy Commission staff does not anticipate emergency access issues to the project site. The site is directly accessed via Harbor Drive which would not present any obstructions or design challenges for emergency vehicles to access the site. Staff recommends Condition of Certification **TRANS-3** which includes a requirement that the TCP demonstrates and ensures sufficient fire access. On-site circulation of emergency vehicles would be subject to site plan review by the Redondo Beach Fire Department per conditions of certification in the **WORKER SAFETY AND FIRE PROTECTION** section of this Staff Assessment.

Airport Operations and Hazards

Title 14, Part 77 of the Code of Federal Regulations requires FAA notification for any proposed construction feature that would be 200 feet or taller above ground level. In addition, the same Federal Regulations require FAA notification for any proposed construction feature that would be taller than an imaginary surface extending outward and upward at a slope of 100 to 1 for a horizontal distance of 20,000 feet from the nearest point of the nearest runway of an airport with at least one runway more than 3,200 feet in length. No project structures are proposed that would exceed 200 feet in height. The tallest structures would be the power block stacks which would be 120 feet tall (RBEP 2012, AFC pg. 2-7). Based on the height of the power block stacks and an imaginary surface extending outward and upward at a slope of 100 to 1, an airport would need to be located within 2.27 miles (120-foot height x 100-foot slope extension = 12,000-foot distance) of the project site. The closest airport to the project site is approximately four miles and the closest helipad is approximately three miles distant. These stacks would be shorter than the 200-foot height threshold and outside an imaginary surface of the nearest airport and helipad, meaning that they would not penetrate navigable airspace and would not require notification of the FAA.

Thermal Plumes

The RBEP gas turbines and air cooled condensers (ACC) have the potential to generate thermal plumes during worst case conditions. These conditions would occur during full operation of RBEP during calm or very low wind meteorological conditions.

Thermal plumes have the ability to impact low flying aircraft and could cause moderate to severe turbulence to low-flying aircraft above the RBEP site. The FAA formally acknowledged plume hazards by amending the Aeronautical Information Publication to establish thermal plumes as flight hazards and recommend that pilots avoid overflight below 1,000 feet and fly upwind of facilities producing thermal plumes (FAA 2011). Aircraft flying through plumes can experience significant air disturbances, such as turbulence and vertical shear.

In the vicinity of the RBEP, there is a potential for low flying aircraft to be affected by the thermal plumes. Helicopters and small aircraft, such as those used by the Coast Guard and lifeguards, are routinely observed flying along Redondo Beach and areas near the RBEP. In addition, Energy Commission staff's review of the Los Angeles terminal area chart (TAC) effective December 12, 2013 to June 26, 2014; the RBGS is not a currently identified feature. Even though the tallest structures (power block stacks at 120 feet tall) would be shorter than the FAA 200-foot height threshold and outside an imaginary surface of the nearest airport and helipad, Energy Commission staff recommends the project owner light the stacks to mark their location as an additional safety measure.

Energy Commission staff uses a 4.3 meters per second (m/s) vertical velocity threshold for determining whether a plume may pose a hazard to aircraft. This velocity generally defines the point at which general aviation aircraft begin to experience more than light turbulence. The plume velocity analysis conducted by staff concludes that that the plumes generated by the RBEP would exceed 4.3 m/s between 1,000 feet and 2,250 feet above the RBEP under worst case conditions. This would generate a potential impact to aircraft that may fly over the RBEP site at low altitude. Therefore, staff proposes Condition of Certification **TRANS-6** which would require notification in accordance with FAA requirements to advise pilots of the potential overflight hazard associated with thermal plumes generated by the RBEP and the need to avoid overflight below 2,250 feet AGL. Notification requirements may include issuance of a Notice to Airmen (NOTAM), revision to local sectional charts, and addition of a new remark to the Automated Surface Observing System (ASOS). Upon implementation of Condition of Certification **TRANS-6,** the potential impacts to aviation would be less than significant.

See **Appendix TT-1** for detailed results of staff's plume velocity analysis for the RBEP.

RBEP Operation Impacts Conclusion

With implementation of the conditions of certification discussed above, impacts to ground and air transportation from operation of the HRBEP would be less than significant.

COMPLIANCE WITH LORS

Traffic and Transportation Table 6 provides an assessment of the RBEP's compliance with applicable LORS pertaining to traffic and transportation.

Traffic and Transportation Table 6
Project Compliance with Adopted Traffic and Transportation LORS

Applicable LORS	Description	Consistency
Federal		
Title 49, Code of Federal Regulations, Parts 171-177	Requires proper handling and storage of hazardous materials during transportation.	**Consistent.** Enforcement is conducted by state and local law enforcement agencies and through state agency licensing and ministerial permitting (e.g., California Department of Motor Vehicles licensing, Caltrans permits), and/or local agency permitting (e.g., Los Angeles County). Also, **TRANS-4** ensures compliance by requiring that the project owner contract with licensed hazardous material and waste hauler companies.

Applicable LORS	Description	Consistency
Title 14, Code of Federal Regulations, Section 77.13 (2)(i)	This regulation requires the project owner to notify the Federal Aviation Administration (FAA) of construction structures with a height greater than 200 feet from grade or greater than an imaginary surface extending outward and upward at a slope of 100 to 1 from the nearest point of the nearest runway of an airport with at least one runway more than 3,200 feet in length.	**Consistent.** The RBEP would not include project structures 200 feet tall or higher and is not located with the restricted zone of an operating airport (imaginery surface extending at 100 to 1 slope), and therefore does not require the project owner to file FAA Form 7460-1, Notice of Proposed Construction or Alteration. For project compliance with FAA regulations, staff is proposing Condition of Certification **TRANS-5**, which would require the project owner to submit a Form 7460-1 "Notice of Proposed Construction or Alteration" in the event construction equipment is used, that would exceed 200 feet.
State		
California Vehicle Code, Sections 13369, 15275, 15278	Requires licensing of drivers and the classification of license for the operation of particular types of vehicles. A commercial driver's license is required to operate commercial vehicles. An endorsement issued by the Department of Motor Vehicles (DMV) is required to drive any commercial vehicle identified in Section 15278.	**Consistent.** The project owner would require that contractors and employers be properly licensed and endorsed when operating such vehicles. **TRANS-1**, which requires proper driver licensing, ensures compliance.
California Vehicle Code, Sections 31303-31309	Requires transportation of hazardous materials to be on the state or interstate route that offers the shortest overall transit time possible.	**Consistent.** The project owner would require shippers of hazardous materials to use the shortest route possible to and from the project site. The proposed routes are consistent with this requirement. Also, **TRANS-4** would ensure compliance by requiring that the project owner contract with licensed hazardous material and waste hauler companies.
California Vehicle Code, Sections 31600-31620	Regulates the transportation of explosive materials.	**Consistent.** The RBEP would not use explosive materials as defined in Section 12000 of the Health and Safety Code.
California Vehicle Code, Sections 32100-32109	Requires shippers of inhalation hazards in bulk packaging comply with rigorous equipment standards, inspection requirements, and route restrictions.	**Consistent.** The project owner would require shippers of inhalation hazards (including ammonia) to comply with all route restrictions, equipment standards, and inspection requirements. Also, **TRANS-4** would ensure compliance by requiring that the project owner contract with licensed hazardous material and waste hauler companies.
California Vehicle Code, Sections 34000-34100	Establishes special requirements for vehicles having a cargo tank and for hazardous waste transport vehicles and containers, as defined in Section 25167.4 of the Health and Safety Code.	**Consistent.** The project owner would require shippers of hazardous materials to maintain their hazardous material transport vehicles in a manner that would enable the vehicles to pass California Highway Patrol inspections. Also, **TRANS-4** (would ensure compliance by requiring that the project owner contract with licensed hazardous material and waste hauler companies.

Applicable LORS	Description	Consistency
California Vehicle Code, Section 35550	Regulates weight guidelines and restrictions upon vehicles traveling on freeways and highways. A single axle load shall not exceed 20,000 pounds, the load on any one wheel or wheels supporting one end of an axle are limited to 10,500 pounds, and the front steering axle load is limited to 12,500 pounds.	**Consistent.** The project owner would ensure compliance with weight restrictions and would require heavy haulers to obtain necessary permits prior to delivery of any heavy haul load. Also, **TRANS-1** (which requires the project owner to comply with limitations on vehicle sizes and weights, driver licensing, and truck routes) would require compliance.
California Vehicle Code, Section 35551	Defines the maximum overall gross weight as 80,000 pounds and mandates that the gross weight of each set of tandem axles not exceed 34,000 pounds.	**Consistent.** The project owner would require compliance with weight restrictions and would require heavy haulers to obtain necessary permits prior to delivery of any heavy haul load. Also, **TRANS-1** (which requires the project owner to comply with limitations on vehicle sizes and weights, driver licensing, and truck routes) would require compliance.
California Vehicle Code, Section 35780	Requires a single-trip transportation permit to transport oversized or excessive loads over state highways.	**Consistent.** The project owner would comply with this code by requiring that heavy haulers obtain a Single-Trip Transportation Permit for oversized loads. Also, **TRANS-1** (which requires the project owner to comply with limitations on vehicle sizes and weights, driver licensing, and truck routes) would require compliance.
California Health and Safety Code, Section 25160	Addresses the safe transport of hazardous materials	**Consistent.** The project owner would comply by requiring that shippers of hazardous wastes are properly licensed by the Department of Toxic Substances Control (DTSC), and that hazardous waste transport vehicles are in compliance with DTSC requirements. **TRANS-1** (which requires the project owner to comply with limitations on vehicle sizes and weights, driver licensing, and truck routes) and **TRANS-4** (which requires the project owner contract with licensed hazardous material and waste hauler companies) would ensure compliance.
California Department of Transportation CA MUTCD Part 6 (Traffic Manual)	Provides traffic control guidance and standards for continuity of function (movement of traffic, pedestrians, bicyclists, transit operations), and access to property/utilities when the normal function of a roadway is suspended.	**Consistent.** **TRANS-3** would require the project owner to prepare and implement a Traffic Control Plan.
Local		
City of Long Beach Municipal Code Title 10 Vehicles and Traffic, Section 10.41	Requires a special permit for overweight vehicles (greater than 80,000 pounds, but no more than 95,000 pounds).	**Consistent.** **TRANS-3** would require the applicant to obtain the necessary permits associated with the heavy haul plan and provide copies of the permit to the Energy Commission Compliance Project Manager (CPM).
City of Los Angeles Municipal Code, Section 62.137	Requires an overload permit for vehicles or vehicle combinations exceeding statutory limitations (as to size, weight, and loading of vehicles) on City roadways.	**Consistent.** **TRANS-3** would require the applicant to obtain the necessary permits associated with the heavy haul plan and provide copies of the permit to the CPM.

Applicable LORS	Description	Consistency
City of Carson Municipal Code, Chapter 2, Part 7, Section 3262	Requires a special permit for overweight vehicles (greater than 80,000 pounds, but no more than 95,000 pounds).	**Consistent.** **TRANS-3** would require the applicant to obtain the necessary permits associated with the heavy haul plan and provide copies of the permit to the CPM.
Los Angeles County Code, Title 16 Highways, 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	**Consistent.** **TRANS-3** would require the applicant to obtain the necessary permits associated with the heavy haul plan and provide copies of the permit to the CPM.
City of Torrance Municipal Code, Section 74.5.4	Requires a street use permit for vehicles or vehicle combinations exceeding statutory limitations (e.g., size, weight, loading of vehicles) on City roads.	**Consistent.** **TRANS-3** would require the applicant to obtain the necessary permits associated with the heavy haul plan and provide copies of the permit to the CPM.
City of Redondo Beach, Circulation Element of the City General Plan	Specifies long-term transportation planning goals and policies in the City of Redondo Beach. Sets LOS D or better for all major, secondary, and collector streets, LOS C for local streets, and LOS E for State Highways, as the minimum acceptable LOS on City roadways. The City endeavors to maintain LOS D or better for all City intersections	**Consistent.** All state highways, roadways, and intersections near the RBEP would continue to function at LOS D or better during project construction except for three intersections (PCH/Anita Street/Herondo Street, Catalina Avenue/Beryl Street, and PCH/Torrance Boulevard). Condition of Certification **TRANS-3** (which requires the applicant to prepare and implement a traffic control plan would reduce temporary impacts to traffic operations at these three intersections to a less-than-significant level. During project operations, all state highways, roadways, and intersections near the RBEP would continue to function at LOS D or better, with the exception of PCH/Anita Street/Herondo Street and PCH/Torrance Boulevard intersections, which would operate at LOS F. However, traffic impacts to these intersections would be less than significant because they are already operating at LOS F, and operations traffic would only add an additional 46 daily PCE trips, which is less than 0.19 percent of pre-operational baseline traffic.
City of Redondo Beach, Municipal Code, Title 3, Chapter 7, Article 9	Requires a transportation permit for haul route and oversized loads. Exceptions to designated route are allowed if trucks are going directly to a business for deliveries/pickups.	**Consistent.** **TRANS-3** would require the applicant to obtain the necessary permits associated with the heavy haul plan and provide copies of the permit to the CPM.
City of Redondo Beach Municipal Code, Title 9, Chapter 1, Article 12	Prohibits all construction activity except between the hours of 7:00 a.m. and 6:00 p.m. Monday through Friday and between the hours of 9:00 a.m. and 5:00 p.m. on Saturday. Prohibits all construction activity on Sundays or designated holidays.	**Consistent.** **TRANS-3** would require the applicant to restrict truck deliveries to allowable hours for construction activities.
City of Hermosa Beach Municipal Code, Chapter 10.24	Designates truck routes and truck travel on designated routes	**Consistent.** **TRANS-3** would require the applicant to obtain the necessary permits associated with the heavy haul plan and provide copies of the permit to the CPM.

Applicable LORS	Description	Consistency
City of Manhattan Beach Municipal Code, Chapter 14.64	Requires a street use permit for haul routes and oversized loads	**Consistent.** **TRANS-3** would require the applicant to obtain the necessary permits associated with the heavy haul plan and provide copies of the permit to the CPM.

CUMULATIVE IMPACTS

A project may result in a significant adverse cumulative impact when its effects are cumulatively considerable. Cumulatively considerable means that the incremental effects of an individual project are significant when viewed in connection with the effects of (1) past projects; (2) other current projects; and (3) probable future projects (California Code of Regulations, Title 14, Section 15130).

To analyze the cumulative effect of the project with reasonably foreseeable projects, Section 15130(b) of the CEQA Guidelines allows a lead agency to analyze cumulative impacts by either:

A) A list of past, present, and probable future projects producing related or cumulative impacts, including, if necessary, those projects outside the control of the agency, or

B) A summary of projections contained in an adopted local, regional or statewide plan, or related planning document, that describes or evaluates conditions contributing to the cumulative effect.

Energy Commission staff developed a list of past, current, and probably future projects in the vicinity of the RBEP project that may cumulatively impact transportation and traffic either during the construction/demolition phase or operation phase of the project. The project vicinity is defined locally as the city limits of the city of Redondo Beach or regionally as areas which may collectively impact the major, primary, and/or state facility roadways which would likely be used by the RBEP workforce. These roadways are identified in **Traffic and Transportation Figure 1**. The cumulative projects are listed in **Traffic and Transportation Table 7** below.

CUMULATIVE TRAFFIC IMPACTS

Staff reviewed known past, current, and probable future projects in the vicinity of the proposed RBEP project, which staff defined as the city of Redondo Beach, Torrance, Lawndale, and the surrounding Beach cities (e.g., Manhattan Beach, Hermosa Beach). This area contains projects which may cumulatively contribute to traffic along the affected roadways which would be impacted by the RBEP. Trips generated by these projects occur within the transportation network used by RBEP and may combine with RBEP trips to result in cumulative impacts to the LOS of nearby highways, roadways, and intersections. Cumulative impacts would be a concern during construction of the RBEP, but not during operations; RBEP operations would generate a maximum of 21 daily one-way vehicle trips, a minimal increase in traffic that would have a less than significant impact on overall traffic counts.

Cumulative Projects which have been approved have included mitigation measures to make road improvements to directly reduce the traffic impacts associated with their project. Road improvements required as part of the project would directly reduce the potential impacts to within acceptable city LOS standards.

As discussed above, the RBEP would have the potential to increase traffic in the project area during the demolition phase of the existing electrical generating facility and during construction activities of the RBEP. Staff is recommending Condition of Certification **TRANS-3** requiring the applicant to implement a Traffic and Control Plan which would require the staggering of work force traffic and construction deliveries through non-peak hours. Operational traffic would be the substantially similar as the existing electrical generating facility and would not decrease the LOS in the affected area. Based on the short-term increase in traffic associated with construction activities, implementation of a Traffic Control Plan during construction activities (see Condition of Certification **TRANS-3**), and the minimal increase in traffic due to RBEP operation, staff concludes the RBEP would not result in cumulative impacts to traffic and transportation.

Traffic and Transportation Table 7
Development Considered in the Cumulative Condition

Project Number	Project	Distance from Project Site	Project Description	Status of Project
1	Greenstreet	0.17	20,000- sq. ft. commercial development	Planned / Present
2	Shade Hotel	0.20	Hotel with 54 rooms, conference space for up to 60 people, event/wedding space for up to 150 people, a rooftop Skydeck pool area and its own Zinc@Shade lounge featuring breakfast, lunch and dinner.	Planned / Present
3	E&B Oil Development	0.56	Proposed onshore drilling and production site using directional drilling of 30 wells to access the oil and gas reserves in the tidelands (granted by the State of California to the City) and in an onshore area known as the uplands. Both of these areas are located within the Torrance Oil Field beneath the City. Relocate the city maintenance yard to another site and installation of offsite underground pipelines for the transport of the processed crude oil and gas from the project site to purchasers. 30 oil wells, four water injection wells, and supporting production equipment.	Foreseeable
5	Manhattan Village Shopping Center Enhancement	3.35	A net increase of approx. 123,672 sq. ft. restaurant and retail (approx. 194,644 sq. ft. new area and demolition of approx. 70,972 sq. ft. existing retail, restaurant, and cinema) to be developed within three components. The shopping center would include a total of approx. 696,509 sq. ft. An “equivalency program” is proposed that provides for the exchange between land uses based on P.M. peak traffic equivalency factors. A max of 133,389 sq. ft. net new area (approx. 204,361 sq. ft. new area and demolition of approx. 70,972 sq. ft. existing retail, restaurant, and cinema) would be developed for a total of up to 706,226 sq. ft. Approx, 544 parking spaces would be provided in surface parking areas and within multiple parking structures.	Foreseeable
6	Marine Avenue Hotels	3.36	Two hotels- Hyatt Place and Residence Inn by Marriott. Total between both hotels: 310 guest rooms and 35,000 sq. ft. of related meeting space with recreational vehicle parking and storage area. Hyatt Place is 92,672 sq. ft. with 155 rooms, restaurant, lounge, 1,500+ sq. ft. meeting space, outdoor pool and whirlpool, exercise room, business center, sundry shop and guest laundry. Four stories with max building height of approx. 61 feet. Residence Inn by Marriott is 116,146 sq. ft. with 154 rooms, breakfast dining area, 1,325+ sq. ft. meeting space, outdoor pool and whirlpool, exercise room, outdoor sport court, picnic area with grill, business center, sundry shop and guest laundry. Four stories with max building height of approx. 52 ft.	Planned / Present
7	EA-993, The Point	3.83	119,275 sq. ft. total. Shopping center (71,343 sq. ft.), restaurant (25,627 sq. ft.), and office (27,338 sq. ft.).	Foreseeable
8	SR-1 (PCH) at SR-107 Hawthorne Blvd. Intersection	4.01	Improve and reconfigure intersection of PCH and Hawthorne Blvd, with additional left-turn lanes to provide dual left-turn lanes and right-turn pocket along both the eastbound and westbound approaches along PCH.	Planned / Present

CONCLUSIONS AND RECOMMENDATIONS

Staff analyzed the proposed RBEP's impacts to the nearby traffic and transportation system. With implementation of the proposed conditions of certification listed below, the RBEP would comply with all applicable LORS related to traffic and transportation and would result in less than significant impacts to the traffic and transportation system.

1. Implementation of Condition of Certification **TRANS-1** would require the applicant to comply with applicable jurisdictions' requirements of vehicle size and weights, vehicle licensing, truck routes and other applicable limitations. The project owner would also be required to obtain all necessary transportation permits for roadway use.

2. Implementation of Condition of Certification **TRANS-2** would require the project applicant restore any road, easement, or right-of-way damaged by project construction.

3. Implementation of Condition of Certification **TRANS-3** would the applicant prepare and implement a traffic control plan (TCP) that would ensure sufficient parking during project construction and operation. In addition, the TCP would require the applicant stagger work force traffic and construction delivery arrival/departure times during non-peak hours and maintain adequate emergency access for the duration of project construction and operation.

4. Implementation of Condition of Certification **TRANS-4** would require the applicant obtain the necessary permits for the transport of all hazardous waste/materials associated with the project.

5. Implementation of Condition of Certification **TRANS-5** would require the applicant to implement all necessary obstruction marking and lighting in accordance with FAA requirements.

6. Implementation of Condition of Certification **TRANS-6** would require the applicant to advise pilots of the potential aviation hazards associated with thermal plumes and to avoid overflight of the facility below 2,250 feet AGL.

PROPOSED CONDITIONS OF CERTIFICATION

TRANS-1 Roadway Use Permits and Regulations

The project owner shall comply with limitations imposed by Caltrans and other relevant jurisdictions, including the city of Redondo Beach and f Los Angeles County, on vehicle sizes and weights, driver licensing, and truck routes. In addition, the project owner or its contractor shall obtain necessary transportation permits from Caltrans and all relevant jurisdictions for roadway use.

Verification: In the Monthly Compliance Reports (MCRs), the project owner shall submit copies of any permits received during that reporting period. In addition, the project owner shall retain copies of these permits and supporting documentation in its compliance file for at least six months after the start of commercial operation.

TRANS- 2 Restoration of All Public Roads, Easements, and Rights-of-Way

The project owner shall restore all public roads, easements, and rights-of-way that have been damaged due to project-related construction activities. Restoration of significant damage which could cause hazards (such as potholes) must take place immediately after the damage has occurred. The restoration shall be completed in a timely manner to the road's original condition in compliance with the applicable jurisdiction's (city of Redondo Beach and Los Angeles County) standards.

Verification: Prior to the start of site mobilization, the project owner shall photograph or videotape all affected public roads, easements, right-of-way segment(s), and/or intersections. The project owner shall provide the photograph or videotape to the CPM and the affected local jurisdiction(s). The purpose of this notification is to request that these jurisdictions consider postponement of any planned public right-of-way repair or improvement activities in areas affected by project construction until construction is completed, and to coordinate any concurrent construction-related activities that cannot be postponed.

If damage to public roads, easements, or rights-of-way occurs during construction, the project owner shall notify the CPM and the affected local jurisdiction(s) to identify sections of public right-of-way to be repaired. At that time, the project owner shall establish a schedule for completion and approval of the repairs. Following completion of any public right-of-way repairs, the project owner shall provide to the CPM letters signed by the affected local jurisdiction(s) stating their satisfaction with the repairs.

TRANS-3 Traffic Control Plan, Heavy Hauling Plan, and Parking/Staging Plan

Prior to the start of construction of the RBEP, the project owner shall prepare a TCP for the RBEP's construction and operations traffic. The TCP shall address the movement of workers, vehicles, and materials, including arrival and departure schedules and designated workforce and delivery routes. The project owner shall consult with the Caltrans, the City of Redondo Beach, and the applicable local jurisdictions in the preparation and implementation of the TCP. The project owner shall submit the proposed TCP to Caltrans and applicable local jurisdictions in sufficient time for review and comment, and to the Energy Commission Compliance Project Manager (CPM) for review and approval prior to the proposed start of construction and implementation of the plan.

The Traffic Control Plan shall include:

- A work schedule designed to ensure that the project does not significantly impact LOS on the local and regional transportation network in the project's vicinity. The project owner shall use one or more of the following measures to reduce impacts to LOS: staggered work shifts, off-peak work schedules (arriving or departing from about 6:00 p.m. - 7:00 a.m. and from about 9:00 a.m. - 4:00 p.m.), and/or a park-and-ride program for construction employees;
- Provisions for an incentive program, such as employer-sponsored commuter vans to encourage construction workers to carpool;
- Timing of heavy equipment and building material delivery to the site, which shall occur during off-peak traffic hours;
- Routes to the project site to be used by construction worker vehicles and truck traffic, including trucks carrying hazardous materials. Routes shall avoid use of the PCH/Anita Street/Herondo Street, Catalina Avenue/Beryl Street, and PCH/Torrance Boulevard intersections during peak hours, as the percent increase in the V/C ratio at these intersections would exceed the LOS significance threshold;
- Timing of construction-related trips, with trips scheduled for off-peak hours if possible. Prohibiting any new crew construction shift to begin between the hours of 7 a.m. and 9 a.m.;
- The property owner and contractor(s) shall make available information on public transportation within the project vicinity and surrounding counties and cities to RBEP construction and operations workforce;
- Provisions for redirection of construction traffic with safety equipment (e.g., flag person, cones, signage), as necessary, to ensure traffic safety and minimize interruptions to non-construction related traffic flow;
- Placement of necessary signage, lighting, and traffic control devices at the project construction site and lay-down areas;
- A heavy-haul plan addressing the transport and delivery of heavy and oversized loads requiring permits from the California Department of Transportation (Caltrans), other state or federal agencies, and/or the affected local jurisdictions including Los Angeles County, city of Long Beach, city of Manhattan Beach, city of Hermosa Beach, city of Torrance, and city of Redondo Beach;
- Permitted temporary closure of travel lanes or disruptions to street segments and intersections during construction activities;
- Traffic diversion plans (in coordination with the city of Redondo Beach and Los Angeles County) to ensure access during temporary lane/road closures;
- Access to residential and/or commercial property located near construction work and truck traffic routes;
- Insurance of access for emergency vehicles to the project site;

- Advance notification to residents, businesses, emergency providers, and hospitals that would be affected when roads may be partially closed;
- Identification of safety procedures for exiting and entering the site access gate;
- Timing of equipment deliveries to the project site to occur between the hours of 7 a.m. to 6 p.m.;
- Requiring any delivery truck(s) that arrive at the site prior to allowable construction start time (7 a.m. on weekdays and 9 a.m. on Saturdays) to be parked on the project site;
- Parking/Staging Plan (PSP) for all phases of project construction and for project operation to require all project-related parking, including delivery trucks, occurs on-site.

Verification: At least 60 calendar days prior to the start of construction, the project owner shall submit the TCP to the applicable agencies for review and comment and to the CPM for review and approval. The project owner shall also provide the CPM with a copy of the transmittal letter to the agencies requesting review and comment.

At least 30 calendar days prior to the start of construction, the project owner shall provide copies of any comment letters received from the agencies, along with any changes to the proposed development plan, to the CPM for review and approval.

TRANS-4 Hazardous Materials

The project owner shall ensure that permits and/or licenses are secured from the California Highway Patrol, Caltrans, and all other relevant jurisdictions from the transport of hazardous materials.

Verification: In the Monthly Compliance Reports (MCRs), the project owner shall include in its MCRs copies of all permits/ licenses acquired by the project owner and/or subcontractors concerning the transport of hazardous substances.

TRANS-5 Obstruction Marking and Lighting

The project owner shall install blinking obstruction marking and lighting on any construction equipment that exceeds 200 feet in height in accordance with FAA requirements, as expressed in the following documents:

- FAA Advisory Circular 70/7460-1K
- FAA Safety Alert for Operators (SAFO) 09007.

Upgrades to the required lighting configurations, types, location, or duration shall be implemented consistent with any changes to FAA obstruction marking and lighting requirements.

Verification: At least 60 days prior to the start of construction, the project owner shall submit to the CPM for approval of final design plans for construction equipment depicting the required air traffic obstruction marking and lighting.

TRANS-6 Pilot Notification and Awareness

The project owner shall initiate the following actions to ensure pilots are aware of the project location and potential hazards to aviation:

- Submit a letter to the FAA requesting a Notice to Airmen (NOTAM) be issued advising pilots of the location of the RBEP and recommending avoidance of overflight of the project site below 2,250 feet AGL. The letter should also request that the NOTAM be maintained in active status until all navigational charts and Airport Facility Directories (AFDs) have been updated.
- Submit a letter to the FAA requesting a power plant depiction symbol be placed at the RBEP site location on the Los Angeles Sectional Chart with a notice to "avoid overflight below 2,250 feet AGL".
- Request that Southern California Terminal Radar Approach Control (TRACON) submit aerodrome remarks describing the location of the RBEP plant and advising against direct overflight below 2,250 feet AGL to the:
- FAA AeroNav Services, formerly the FAA National Aeronautical Charting Office (Airport/Facility Directory)
- Jeppesen Sanderson Inc. (JeppGuide Airport Directory, Western Region)
- Airguide Publications (Flight Guide, Western States)

<u>**Verification:**</u> Within 30 days following the start of construction, the project owner shall submit draft language for the letters of request to the FAA (including Southern California TRACON) to the CPM for review and approval.

At least 60 days prior to the start of operations, the project owner shall submit the required letters of request to the FAA and request that Southern California TRACON submit aerodrome remarks to the listed agencies. The project owner shall submit copies of these requests to the CPM. A copy of any resulting correspondence shall be submitted to the CPM within ten days of receipt.

If the project owner does not receive a response from any of the above agencies within 45 days of the request (or by 15 days prior to the start of operations) the project owner shall follow up with a letter to the respective agency(s) to confirm implementation of the request. A copy of any resulting correspondence shall be submitted to the CPM within ten days of receipt.

The project owner shall contact the CPM within 72 hours if notified that any or all of the requested notices cannot be implemented. Should this occur, the project owner shall appeal such a determination, consistent with any established appeal process and in consultation with the CPM. A final decision from the jurisdictional agency denying the request, as a result of the appeal process, shall release the project owner from any additional action related to that request and shall be deemed compliance with that portion of this condition of certification.

REFERENCES

City of Redondo Beach. November 2009. *Redondo Beach General Plan, Circulation Element*.

California Department of Transportation (Caltrans). 2012. Website: *http://traffic-counts.dot.ca.gov/* Accessed January 2, 2014.

Redondo Beach Energy Project. 2012. *Redondo Beach Application for Certification (AFC) 12-AFC-03*. Prepared by AES.

Redondo Beach Energy Project. 2013. *Redondo Beach Energy Project, Data Responses Set 1A – Responses to CEC Staff Data Requests 1-7, 11-12, 14-19, 24-25, 29-47* (TN# 201167). November 2013. Prepared by AES.

Federal Aviation Administration (FAA) 2011. *Aeronautical Information Manual, Section 5: Potential Flight Hazards, Subsection 7-5-15: Avoid Flight in the Vicinity of Thermal Plumes (Smoke Stacks and Cooling Towers)*. Website: *https://www.faa.gov/air_traffic/publications/atpubs/aim/aim0705.html* Accessed January 14, 2014.

APPENDIX TT-1: PLUME VELOCITY ANALYSIS

Joseph Hughes

INTRODUCTION

The following provides assessment of vertical plume velocities for the Redondo Beach Energy Project's (RBEP) air-cooled condenser (ACC) and combustion gas turbines (CTGs)/heat recovery steam generators (HRSGs) exhaust stack plumes. Staff completed calculations to determine the worst-case vertical plume velocities at different heights above the stacks based on the applicant's proposed facility design and expected operations. The purpose of this appendix is to provide documentation of the method used to estimate worst-case vertical plume velocities to assist evaluation of the project's impacts on aviation safety in the vicinity of the proposed facility.

PROJECT DESCRIPTION

The RBEP is a proposed natural-gas fired, combined-cycle, air-cooled electrical generating facility that would have a net generating capacity of 496 megawatts (MW) and gross generating capacity of 511 MW. The project would consist of three natural-gas-fired Mitsubishi Power Systems America (MPSA) 501D CTGs, three HRSGs, one steam turbine generator (STG), an ACC, and related ancillary equipment.

PLUME VELOCITY CALCULATION METHOD

Staff has selected a calculation approach from a technical paper (Best 2003) to estimate the worst-case plume vertical velocities for the RBEP exhausts. The calculation approach, which is also known as the "Spillane approach", used by staff is limited to calm wind conditions, which are the worst-case wind conditions. The Spillane approach uses the following equations to determine vertical velocity for single stacks during dead calm wind (i.e. wind speed = 0) conditions:

(1) $(V^*a)^3 = (V^*a)_o{}^3 + 0.12^*F_o{}^*[(z-z_v)^2-(6.25D-z_v)^2]$

(2) $(V^*a)_o = V_{exit}{}^*D/2^*(T_a/T_s)^{0.5}$

(3) $F_o = g^*V_{exit}{}^*D^2{}^*(1-T_a/T_s)/4$

(4) $Z_v = 6.25D^*[1-(T_a/T_s)^{0.5}]$

Where: V = vertical velocity (m/s), plume-average velocity

a = plume top-hat radius (m, increases at a linear rate of $a = 0.16^*(z- z_v)$

F_o= initial stack buoyancy flux m^4/s^3

z = height above stack (m)

z_v= virtual source height (m)

V_{exit}= initial stack velocity (m/s)

D = stack diameter (m)

T_a= ambient temperature (K)

T_s= stack temperature (K)

g = acceleration of gravity (9.8 m/s^2)

Equation (1) is solved for V at any given height above the stack (and then added to stack height to obtain height above ground) that is above the momentum rise stage for single stacks (where z > 6.25D) and at the end of the plume merged stage for multiple plumes. This solution provides the plume-average velocity for the area of the plume at a given height above ground; the peak plume velocity would be two times higher than the plume-average velocity predicted by this equation. As can be seen the stack buoyancy flux (F_o) is a prominent part of Equation (1). The calm condition calculation basis clearly represents the worst-case conditions, and the vertical velocity will decrease substantially as wind speed increases from calm conditions.

For multiple stack plumes, where the stacks are equivalent, the multiple stack plume velocity during calm winds was calculated by staff in a simplified fashion, presented in the Best Paper as follows:

(5) $V_m = V_{sp}*N^{0.25}$

Where: V_m = multiple stack combined plume vertical velocity (m/s)

V_{sp} = single plume vertical velocity (m/s), calculated using Equation (1)

N = number of stacks

Staff notes that this simplified multiple stack plume velocity calculation method predicts somewhat lower velocity values than the full Spillane approach methodology as given in data results presented in the Best paper (Best 2003).

EQUIPMENT DESIGN AND OPERATING PARAMETERS

AIR COOLED CONDENSOR DESIGN AND OPERATING PARAMETERS

The design and operating parameter data for the project's ACC is provided in **Plume Velocity Table 1**.

Plume Velocity Table 1
ACC Operating and Exhaust Parameters

Parameter	Air Cooled Condenser		
Number of Cells	25		
Cell Height (ft)	83 (25.30 meters)		
Cell Diameter (ft)	30 (9.14 meters)		
Ambient Temperature (°F)	33	63.3	106
Ambient Relative Humidity (%)	93.80	75.20	9.60
Duct Firing	No	No	No
Number of Cells in Operation	23	25	25
Evaporative Cooler	Off	On	On
Heat Rejection (MW/hr)	299	295	307
Exhaust Temperature (°F)	75	106	156
Exhaust Velocity Per Cell (ft/s)[a]	23.2 (7.06 m/s)	22.3 (6.80 m/s)	20.9 (6.36 m/s)
Exhaust Flow Rate (lb/hr)	$100*10^6$	$99*10^6$	$85*10^6$

Source: RBEP 2014f, Table DR68-1 and staff calculations.
a. Cell velocities were calculated from the ACC exhaust flow rates.

GAS TURBINES/HRSGS DESIGN AND OPERATING PARAMETERS

The design and operating parameter data for the CTGs/HRSGs stack exhausts are provided in **Plume Velocity Table 2**. The applicant provided operating parameters for 33, 63.3, and 106 degree Fahrenheit (ºF) cases at CTG loads of 70, 80, 90, and 100 percent; however the worst-case vertical plume velocities occur during full load operations. Therefore the exhaust operating parameters shown correspond to full load operation for the corresponding ambient conditions.

Plume Velocity Table 2
Gas Turbine/HRSG Exhaust Parameters

Parameter	Combustion Turbine Generators/HRSGs					
Number of CTG/HRSG Stacks	3					
Stack Heights (ft)	140 (42.67 meters)					
Stack Diameters (ft)	18 (5.49 meters)					
Distance Between Stacks (ft)	119.24 (36.34 meters)					
CTG Load (%)	100					
Ambient Temperature (°F)	33		63.3		106	
Ambient Relative Humidity (%)	93.80		75.20		9.60	
HRSG Duct Firing	Yes	No	Yes	No	Yes	No
Exhaust Temperature (°F)	398	402.1	395.8	399.7	415.2	405.8
Exhaust Velocity (ft/s)	79.02 (24.09 m/s)	78.97 (24.07 m/s)	74.76 (22.79 m/s)	74.68 (22.76 m/s)	74.44 (22.69 m/s)	73.22 (22.32 m/s)

Source: RBEP 2012a, Appendix 5.1B, Table 5.1B.2 and Appendix 5.1C, Table 5.1C.4.

PLUME VELOCITY CALCULATION RESULTS

Using the Spillane calculation approach, the plume average vertical velocities at different heights above ground were determined by staff for calm conditions for the CTGs/HRSGs and the ACC. Staff calculated plume average vertical velocities for the ACC assuming that all cells have fully merged for the three ambient cases shown in **Plume Velocity Table 1** and determined that the worst-case predicted plume velocity occurred during colder ambient conditions; specifically the 33 degree Fahrenheit (°F) condition. Staff's calculated plume average velocity values are provided in **Plume Velocity Table 3**. The combined cell velocities are calculated by combining adjacent cells per Equation 5.

Plume Velocity Table 3
ACC Worst-Case Predicted Plume Velocities (m/s)[a]

Height Above Ground (ft)[b]	33°F	63.3°F	106°F
300	7.58	7.49	7.18
400	6.95	6.90	6.80
500	6.43	6.38	6.34
600	6.01	5.98	5.96
700	5.69	5.65	5.64
800	5.42	5.39	5.38
900	5.19	5.16	5.16
1,000	5.00	4.97	4.97
1,100	4.83	4.81	4.81
1,200	4.68	4.66	4.66
1,300	4.55	4.53	4.53
1,400	4.43	4.41	4.42

Height Above Ground (ft)[b]	33°F	63.3°F	106°F
1,500	4.33	4.31	4.31
1,600	4.23	4.21	4.22
1,700	4.14	4.12	4.13
1,800	4.06	4.04	4.05
1,900	3.98	3.96	3.97
2,000	3.91	3.89	3.90

Source: Staff calculations.
Notes:
a. The Traffic and Transportation section describes a plume average vertical velocity of 4.3 m/s to be the critical velocity of concern to light aircraft. 1 m/s is equal to 3.2808 ft/s, therefore 4.3 m/s is equal to 14.11 ft/s.
b. FAA regulations state that an aircraft may not be operated below an altitude of 1,000 feet above the highest obstacle when flying over congested areas. 1 foot is equal to 0.3048 meters, therefore, 1,000 feet is equal to 304.4 meters.

Staff calculated plume average vertical velocities for all six operating cases shown in **Plume Velocity Table 2** for the CTGs/HRSGs and determined the worst-case predicted plume velocities occurred at 100 percent load without duct firing for the 33 ºF ambient condition. Staff's calculated plume average velocity values are provided in **Plume Velocity Table 4**. The combined stack velocities are calculated by combining adjacent stacks per Equation 5.

Plume Velocity Table 4
CTGs/HRSGs Worst-Case Predicted Plume Velocities (m/s)[a]

100 % Load at 33 °F Ambient, Without Duct Firing			
Height Above Ground (ft)[b]	Plume Diameter (m)	Number of Merged Stacks[c]	Velocity (m/s)
300	14.88	1.00	8.58
400	24.63	1.00	6.86
500	34.39	1.10	6.18
600	44.14	1.37	5.96
700	53.90	1.63	5.81
800	63.65	1.90	5.70
900	73.40	2.17	5.61
1000	83.16	2.44	5.53
1100	92.91	2.71	5.47
1200	102.66	2.98	5.41
1300	112.42	3.00	5.26
1400	122.17	3.00	5.11
1500	131.93	3.00	4.98
1600	141.68	3.00	4.87
1700	151.43	3.00	4.76
1800	161.19	3.00	4.66
1900	170.94	3.00	4.57
2000	180.69	3.00	4.48
2100	190.45	3.00	4.41
2200	200.20	3.00	4.33
2300	209.95	3.00	4.27
2400	219.71	3.00	4.20
2500	229.46	3.00	4.14

Source: Staff calculations.
Notes:
a. The Traffic and Transportation section describes a plume average vertical velocity of 4.3 m/s to be the critical velocity of concern to light aircraft. 1 m/s is equal to 3.2808 ft/s, therefore 4.3 m/s is equal to 14.11 ft/s.
b. FAA regulations state that an aircraft may not be operated below an altitude of 1,000 feet above the highest obstacle when flying over congested areas. 1 foot is equal to 0.3048 meters, therefore, 1,000 feet is equal to 304.4 meters.
c. Merged stacks were calculated by adding the plume diameter to the stack diameter and dividing by the distance between stacks.

As explained in the Traffic and Transportation section, a plume average vertical velocity of 4.3 m/s has been determined by staff to be the critical velocity of concern to light aircraft. FAA regulations state that an aircraft may not be operated below an altitude of 500 feet when flying over other than congested areas, or 1,000 feet above the highest obstacle when flying over congested areas (14 C.F.R., § 91.119). Because RBEP would be located in a congested area, staff identified plume average vertical velocities at 1,000 feet (values are also shown in **Plume Velocity Tables 3 and 4** at 500 feet). As shown in **Plume Velocity Table 3 and 4**, the ACC and CTGs/HRSGs exhausts at 1,000 feet above ground are estimated to be 5.00 and 5.53 meters per second (m/s), respectively. The ACC exhaust plume average vertical velocity is calculated to drop below 4.3 m/s at a height of approximately 1,530 feet. The CTGs/HRGs exhausts plume average vertical velocity is calculated to drop below 4.3 m/s at a height of approximately 2,250 feet.

The velocity values listed in **Plume Velocity Table 3 and 4** are plume average velocities across the area of the plume. The maximum plume velocity, based on a normal Gaussian distribution, is two times the plume average velocities shown in the table.

WIND SPEED STATISTICS

The meteorological monitoring station closest to the proposed site is the Los Angeles International Airport Station (LAX), which is approximately 7.3 miles north of the proposed RBEP. There are no complex terrain features between the monitoring station and the proposed project site, therefore, meteorological data collected at the LAX station are considered to be representative of the project site. Wind roses and wind frequency distribution data was collected for 2005 through 2009. Calm winds for the purposes of the reported monitoring station statistics are those hours with average wind speeds below 0.5 m/s. The data shows that calm winds occurred 5 percent of the time and the average wind speed was 2.2 m/s. Wind speeds greater than or equal to 2.1 m/s occurred 49.8 percent of the time (RBEP 2012a, Appendix 5.1C).

CONCLUSIONS

The calculated worst case calm wind condition vertical plume average velocities from the RBEP's ACC and CTGs/HRSGs are predicted to exceed 4.3 m/s at heights at or above 1,000 feet above ground level. Specifically, for the ACC, this critical threshold is expected to be exceeded up to 1,530 feet above ground level and the CTGs/HRSGs are expected to exceed the critical threshold up to 2,250 feet above ground level.

The vertical velocities from the equipment exhausts at given heights above the stacks decrease as wind speeds increase. The plume average vertical velocities for the ACC and CTGs/HRSGs would remain relatively high, and would exceed 4.3 m/s above 1,000 feet above ground level during calm or very low wind speed conditions. These low wind speed conditions lasting an hour or more occur 5 percent of the time. Additionally, shorter periods of dead calm winds, lasting long enough to increase the vertical plume average velocities to heights up to peak heights, can also occur during hours with low average wind speeds.

The reader should refer to the **TRAFFIC AND TRANSPORTATION** Section for a discussion of impacts to aviation.

REFERENCES

Best, P. et al. 2003. Aviation Safety and Buoyant Plumes. Presented at the Clean Air Conference, Newcastle, New South Wales, Australia. By Peter Best, Lena Jackson, Mark Kanowski of Katestone Environmental, Toowong, Queensland, Australia and Kevin Spillane of Bendigo, Victoria, Australia.

RBEP 2012a – Applicant/AES Southland Development (TN 68597). Application for Certification for the Redondo Beach Energy Project Volumes 1 and 2, dated November 20, 2012. Submitted to CEC/Robert Oglesby on November 21, 2012.

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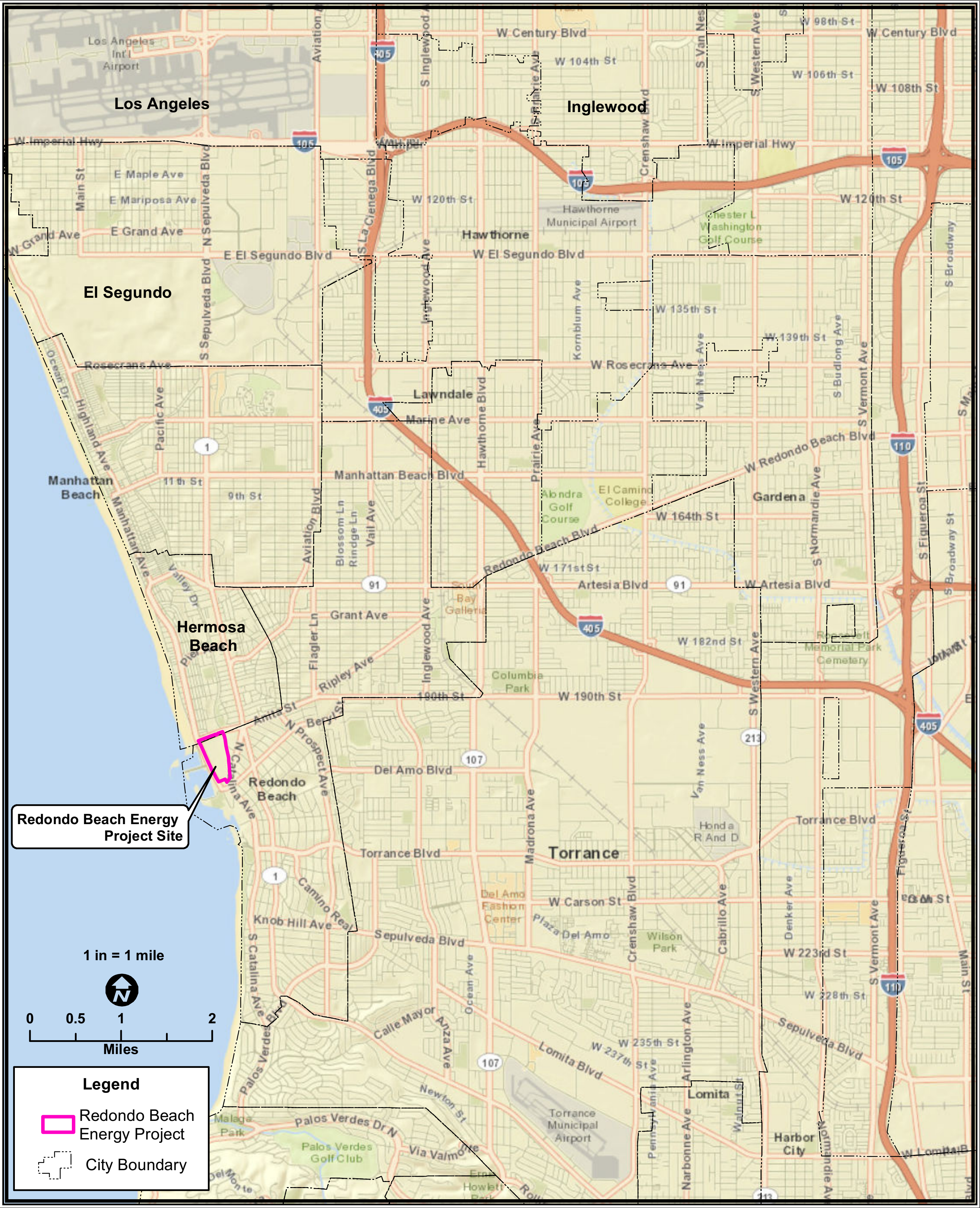
TRAFFIC AND TRANSPORTATION - FIGURE 1

Redondo Beach Energy Project - Regional Transportation Facilities



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

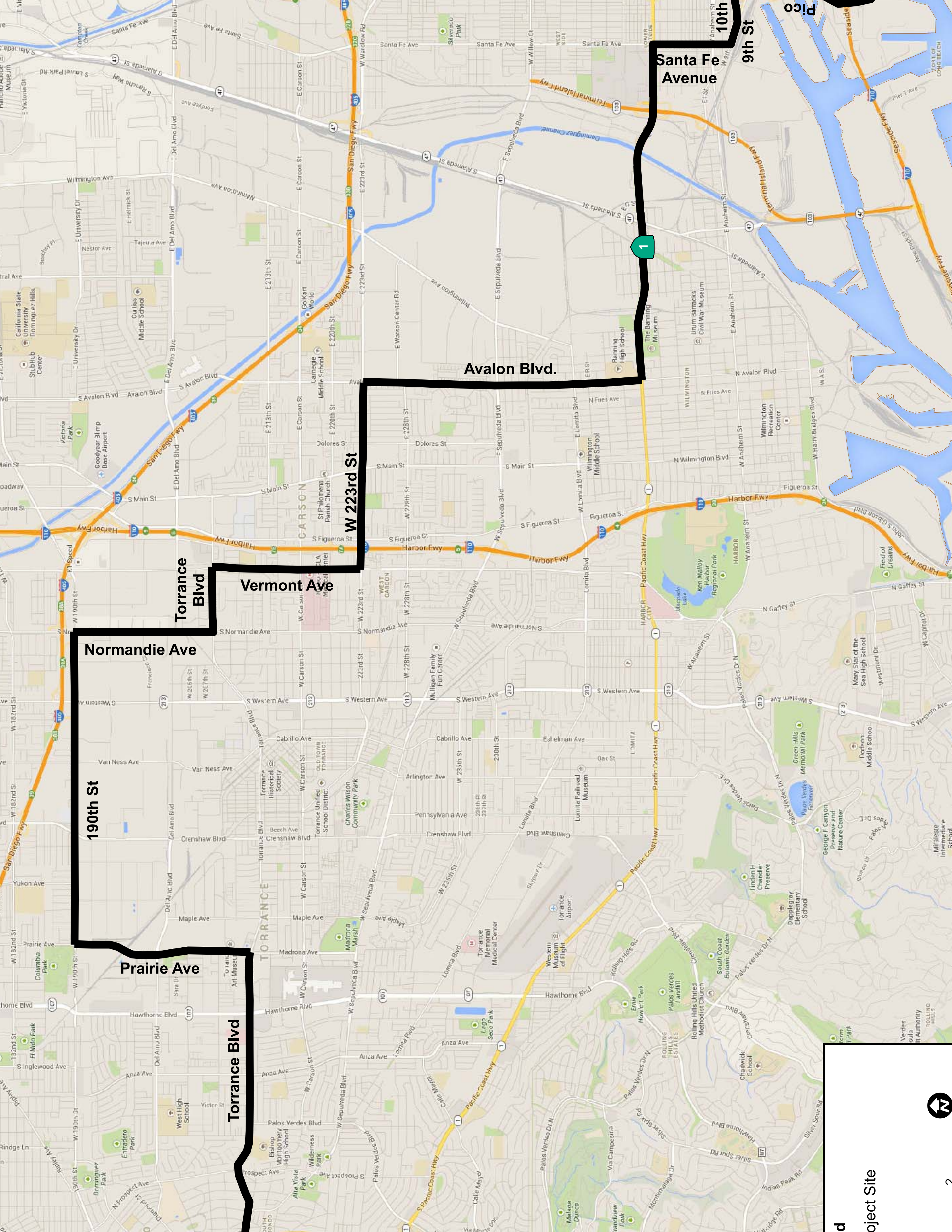
Source: ESRI Basemap, CH2MHILL

TRAFFIC AND TRANSPORTATION - FIGURE 2

Redondo Beach Energy Project - Local Transportation Facilities

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

Source: ESRI Basemap, CH2MHILL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TRANSMISSION LINE SAFETY AND NUISANCE

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SUMMARY OF CONCLUSIONS

The applicant, AES Southland Development, LLC, proposes to transmit power from the proposed Redondo Beach Energy Project (RBEP) to Southern California Edison's (SCE's) 230-kV power grid via the existing SCE 230-kV switchyard and transmission lines. The proposed RBEP would replace the operating Redondo Beach Generating Station (RBGS). Since RBEP would utilize the existing area grid line, no new off-site transmission facilities would be needed. The only new RBEP-related line would be a new on-site generation-tie (gen-tie) line connecting the RBEP power block to the existing SCE switchyard adjacent to the RBEP.

Since the gen-tie line is proposed for the SCE service area, it would be designed, routed, operated, and maintained according to SCE guidelines for line safety and field management, which conform to applicable laws, ordinances, regulations and standards. At 496 net megawatts (MW) and 511 gross MW, RBEP's generating capacity would be much less than the 1,356 net MW for the units of the existing RBGS meaning that there would be a net reduction in the power and current flowing in the transmission lines exiting the power plant site. With the proposed Conditions of Certification TLSN-1 through -4, any safety and nuisance impacts from construction and operation of the proposed tie-in line would be less than significant.

INTRODUCTION

The applicant proposes to transmit power from the proposed RBEP to the SCE power grid through the SCE switchyard at the site of the existing RBGS. The only new project line would be the new generation-tie (gen-tie) line between RBEP's power block and the on-site SCE switchyard. The RBEP effects of potential concern are (a) the field and non-field impacts associated with the new gen-tie line along its proposed route and (b) the effects of the new RBEP power flow on the existing SCE power grid to which it would be connected via the SCE switchyard. All related health and safety laws, ordinances, regulations, and standards (LORS) are currently aimed at minimizing such impacts. Staff's analysis focuses on the following issues taking into account both the physical presence of the line and the physical interactions of its electric and magnetic fields:

- aviation safety;
- interference with radio-frequency communication;
- audible noise;
- fire hazards;
- hazardous shocks;
- nuisance shocks; and,
- electric and magnetic field (EMF) exposure.

The federal, state, and local laws and policies below apply to the control of the field and non-field impacts of electric power lines. Staff's analysis examines the project's compliance with these requirements.

METHODOLOGY AND THRESHOLDS FOR DETERMINING ENVIRONMENTAL CONSEQUENCES

The potential magnitude of the field and non-field impacts of concern in this staff analysis depends on compliance with the listed design-related LORS and industry practices. These LORS and practices have been established to maintain impacts below levels of potential environmental significance. Thus, if staff determines that the project would comply with applicable LORS, we would conclude that any transmission line-related safety and nuisance impacts would be less than significant. The nature of these individual impacts is discussed below together with the potential for compliance with the LORS that apply.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

Transmission Line Safety and Nuisance (TLSN) Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable LORS	Description
Aviation Safety	
Federal	
Title 14, Part 77 of the Code of Federal Regulations (CFR),"Objects Affecting the Navigable Air Space"	Describes the criteria used to determine the need for a Federal Aviation Administration (FAA) "Notice of Proposed Construction or Alteration" in cases of potential obstruction hazards.
FAA Advisory Circular No. 70/7460-1G, "Proposed Construction and/or Alteration of Objects that May Affect the Navigation Space"	Addresses the need to file the "Notice of Proposed Construction or Alteration" (Form 7640) with the FAA in cases of potential for an obstruction hazard.
FAA Advisory Circular 70/7460-1G, "Obstruction Marking and Lighting"	Describes the FAA standards for marking and lighting objects that may pose a navigation hazard as established using the criteria in Title 14, Part 77 of the CFR.
Interference with Radio Frequency Communication	
Federal	
Title 47, CFR, section 15.2524, Federal Communications Commission (FCC)	Prohibits operation of devices that can interfere with radio-frequency communication.
State	
California Public Utilities Commission (CPUC) General Order 52 (GO-52)	Governs the construction and operation of power and communications lines to prevent or mitigate interference.
Audible Noise	
Local	
City of Redondo Beach General Plan (1953).	Identifies existing noise sources within the community and assists the city in making land use decisions.
City of Redondo Beach Municipal Code (2012).	Establishes performance standards for planned residential or other noise-sensitive land uses.
Hazardous and Nuisance Shocks	
State	
CPUC GO-95, "Rules for Overhead Electric Line Construction"	Governs clearance requirements to prevent hazardous shocks, grounding techniques to minimize nuisance shocks, and maintenance and inspection requirements.

Applicable LORS	Description
Title 8, California Code of Regulations, section 2700 et seq. “High Voltage Safety Orders”	Specifies requirements and minimum standards for safely installing, operating, working around, and maintaining electrical installations and equipment.
National Electrical Safety Code	Specifies grounding procedures to limit nuisance shocks. Also specifies minimum conductor ground clearances.
Industry Standards	
Institute of Electrical and Electronics Engineers (IEEE) 1119, “IEEE Guide for Fence Safety Clearances in Electric-Supply Stations”	Specifies the guidelines for grounding-related practices within the right-of-way and substations.
Electric and Magnetic Fields	
State	
GO-131-D, CPUC ”Rules for Planning and Construction of Electric Generation Line and Substation Facilities in California”	Specifies application and noticing requirements for new line construction including EMF reduction.
CPUC Decision 93-11-013	Specifies CPUC requirements for reducing power frequency electric and magnetic fields.
Industry Standards	
American National Standards Institute (ANSI/IEEE) 644-1944 Standard Procedures for Measurement of Power Frequency Electric and Magnetic Fields from AC Power Lines	Specifies standard procedures for measuring electric and magnetic fields from an operating electric line.
Fire Hazards	
State	
Title 14, California Code of Regulations, sections 1250-1258, “Fire Prevention Standards for Electric Utilities”	Provides specific exemptions from electric pole and tower firebreak and conductor clearance standards and specifies when and where standards apply.

SETTING AND EXISTING CONDITIONS

As discussed by the applicant (AES 2012 p. 5.9-1), the proposed RBEP would be located within the approximately 50-acre site of the currently operating RBGS, which would be demolished and removed. The site is bounded to the north by residential areas of the city of Hermosa Beach, to the east by a storage facility and office buildings, and to the south by mixed use residential and commercial areas. To the west are King Harbor Marina and the Pacific Ocean. The right-of-way for the existing 230-kV SCE lines extends eastward between Herondo Street and the existing SCE switchyard, separating the site from area residences, the closest of which is approximately 100 feet across Herondo Avenue. RBEP would have a gross generating capacity of 511 MW, which, as noted, is much less than the nominal output of 1,356 MW specified for the existing RBGS units. Since the proposed gen-tie line would be within existing facility boundaries, its operation would (as with the existing RBGS) not produce the type of residential field exposure that has been of health concern in recent years. The magnitude of line electric fields depends on the applied transmission voltage. Since the proposed and existing grid lines would be transmitted at the same 230 kV, the resulting electric fields would remain the same along the proposed gen-tie and existing grid lines. The companion magnetic field is the only field component that directly depends on power and current levels and would thus affect the magnetic field levels within the existing grid and proposed gen-tie line. Since there would be reduced current flow during RBEP operations, there would be a corresponding decrease in the related magnetic fields.

PROJECT DESCRIPTION

The proposed RBEP gen-tie line would be:

- A new, 937-foot 230-kV gen-tie overhead line connecting the RBEP power block with the existing on-site SCE switchyard which would continue to be used for transmitting power from the SCE switchyard to the area's SCE power system.

The line's conductors would be aluminum steel-reinforced cables located on steel structures as typical of similar SCE lines. The applicant provided the details of the proposed support structures as related to line safety, maintainability, and field reduction efficiency. The supports would have a maximum height of 75 feet (AES 2012 p. 3-9 and Figure 3.1-2).

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

DIRECT IMPACTS AND MITIGATION

Aviation Safety

Any potential hazard to area aircraft would relate to the potential for collision in the navigable airspace. The requirements in the LORS listed on **TLSN Table 1** establish the standards for assessing the potential for obstruction hazards within the navigable space and establish the criteria for determining when to notify the FAA about such hazards. These regulations require FAA notification (using FAA Form 7460-1) in cases of structures over 200 feet from the ground, or if the structure were to be less than 200 feet in height but located within the restricted airspace in the approaches to public or military airports. For airports with runways longer than 3,200 feet, the restricted space is defined by the FAA as an area extending 20,000 feet from the runway. For airports with runways of 3,200 feet or less, the restricted airspace would be an area that extends 10,000 feet from this runway. For heliports, the restricted space is an area that extends 5,000 feet. The FAA assess the needed for specific mitigation from the submitted information.

The nearest public airport to the RBEP site is the Zamperini Field Airport in Torrance, California which is approximately four miles to the southeast. Los Angeles International Airport is approximately 5.8 miles to the north. The nearest military airport is the Los Alamitos Army Airfield which is approximately 20 miles to the southeast. The applicant identified three private heliports and their respective distances from the RBEP location of the gen-tie line. Staff has assessed the potential for an aviation hazard with regard to (a) the height of the proposed project line and (b) distances and orientation from identified runways and established that the line would not pose a collision hazard to aviation area or aircraft. We thus do not recommend a condition of certification regarding aviation safety. The applicant has provided the required Form 7460-1 to the FAA as usual for lines of the proposed voltage class and physical dimensions (AES 2012, pp. 3-11, 3-12 and Appendix 3C).

Interference with Radio-Frequency Communication

Transmission line-related radio-frequency interference is one of the indirect effects of line operation and is produced by the physical interactions of line electric fields. Such interference is due to the radio noise produced by the action of the electric fields on the surface of the energized conductor. The process involved is known as *corona discharge*, but is referred to as *spark gap electric discharge* when it occurs within gaps between the conductor and insulators or metal fittings. When generated, such noise manifests itself as perceivable interference with radio or television signal reception or interference with other forms of radio communication. Since the level of interference depends on factors such as line voltage, distance from the line to the receiving device, orientation of the antenna, signal level, line configuration and weather conditions, maximum interference levels are not specified as design criteria for modern transmission lines. The level of any such interference usually depends on the magnitude of the electric fields involved and the distance from the line. The potential for such impacts is therefore minimized by reducing the line electric fields and locating the line at a distance from inhabited areas.

The proposed gen-tie line would be built and maintained according to standard practices that minimize surface irregularities and discontinuities. Moreover, the potential for such corona-related interference is usually of concern for lines of 345 kV and above, and not for 230-kV lines such as the proposed line. The proposed low-corona designs are used for SCE lines of similar voltage rating to reduce surface electric field gradients and the related potential for corona effects. Since the proposed gen-tie line would be located within the RBEP property boundaries, staff does not expect any corona-related radio-frequency interference or complaints along the proposed on-site route and does not recommend any related condition of certification. Both the existing SCE and proposed RBEP-related line segments would be operated at the current 230 kV meaning that there would be no change in the transmission voltage and noted electric field effects. The companion magnetic field (as previously noted) is the only component that depends directly on the power and related current flow and would thus vary with changes in the current level.

Audible Noise

The noise-reducing designs related to electric field intensity are not specifically mandated by federal or state regulations in terms of specific noise limits. As with radio noise, such audible noise is limited instead through design, construction, or maintenance practices established from industry research and experience as effective without significant impacts on line safety, efficiency, maintainability, and reliability. As with radio noise, audible noise usually results from the action of the electric field at the surface of the line conductor and could be perceived as a characteristic crackling, frying, or hissing sound or hum, especially in wet weather. Since the noise level depends on the strength of the line electric field, the potential for perception can be assessed from estimates of the field strengths expected during operation. Such noise is usually generated during rainfall, but mainly from overhead lines of 345 kV or higher. It is, therefore, not generally expected at significant levels from lines of less than 345 kV as proposed for RBEP.

Research by the Electric Power Research Institute (EPRI 1982) has validated this by showing the fair-weather audible noise from modern transmission lines to be generally indistinguishable from background noise at the edge of a right-of-way of 100 feet or more; the proposed line would be routed within the property boundaries of the proposed RBEP and away from area residences (AES 2012, p. 5.13-3). Since the low-corona designs are also aimed at minimizing field strengths, staff does not expect the proposed line operation to add significantly to current background noise levels in the project area. For an assessment of the noise from the proposed project and related facilities, please refer to staff's analysis in the **NOISE AND VIBRATION** section.

Fire Hazards

The fire hazards addressed through the related LORS in **TLSN Table 1** are those that could be caused by sparks from conductors of overhead lines, or that could result from direct contact between the line and nearby trees and other combustible objects.

Standard fire prevention and suppression measures for similar SCE lines would be implemented for the proposed project line (AES 2012, p. 3-12). The applicant's intention to ensure compliance with the clearance-related aspects of GO-95 would be an important part of this mitigation approach. Condition of Certification **TLSN-3** is recommended to ensure compliance with important aspects of the fire prevention measures.

Hazardous Shocks

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

No design-specific federal regulations have been established to prevent hazardous shocks from overhead power lines. Safety is assured within the industry from compliance with the requirements specifying the minimum national safe operating clearances applicable in areas where the line might be accessible to the public.

The applicant's stated intention to implement the GO-95-related measures against direct contact with the energized line (AES 2012, p.3-13) would serve to minimize the risk of hazardous shocks. Staff's recommended Condition of Certification **TLSN-1** would be adequate to ensure implementation of the necessary mitigation measures.

Nuisance Shocks

Nuisance shocks are caused by current flow at levels generally incapable of causing significant physiological harm. They result mostly from direct contact with metal objects electrically charged by fields from the energized line. Such electric charges are induced in different ways by the line's electric and magnetic fields.

There are no design-specific federal or state regulations to limit nuisance shocks in the transmission line environment. For modern overhead high-voltage lines, such shocks are effectively minimized through grounding procedures specified in the National Electrical Safety Code (NESC) and the joint guidelines of the American National Standards Institute (ANSI) and the Institute of Electrical and Electronics Engineers (IEEE). For the proposed project line, the project owner will be responsible in all cases for ensuring compliance with these grounding-related practices within the right-of-way.

The potential for nuisance shocks around the proposed line would be minimized through standard industry grounding practices (AES 2012, p. 3-11). Staff recommends Condition of Certification **TLSN-4** to ensure such grounding for RBEP.

Electric and Magnetic Field Exposure

The possibility of deleterious health effects from EMF exposure has increased public concern in recent years about living near high-voltage lines. Both electric and magnetic fields occur together whenever electricity flows, and exposure to them together is generally referred to as *EMF exposure*. The available evidence as evaluated by the CPUC, other regulatory agencies, and staff has not established that such fields pose a significant health hazard to exposed humans. There are no health-based federal regulations or industry codes specifying environmental limits on the strengths of fields from power lines. Most regulatory agencies believe, as staff does, that health-based limits are inappropriate at this time. They also believe that the present knowledge of the issue does not justify any retrofit of existing lines.

Staff considers it important, as does the CPUC, to note that while such a hazard has not been established from the available evidence, the same evidence does not serve as proof of a definite lack of a hazard. Staff therefore considers it appropriate, in light of present uncertainty, to recommend feasible reduction of such fields without affecting safety, efficiency, reliability, and maintainability.

While there is considerable uncertainty about EMF health effects, the following facts have been established from the available information and have been used to establish existing policies:

- Any exposure-related health risk to the exposed individual will likely be small.
- The most biologically significant types of exposures have not been established.
- Most health concerns are about the magnetic field.
- There are measures that can be employed for field reduction, but they can affect line safety, reliability, efficiency, and maintainability, depending on the type and extent of such measures.

State's Approach to Regulating Field Exposures

In California, the CPUC (which regulates the installation and operation of many high-voltage lines owned and operated by investor-owned utilities) has determined that only no-cost or low-cost measures are presently justified in any effort to reduce power line fields beyond levels existing before the present health concern arose. The CPUC has further determined that such reduction should be made only in connection with new or modified lines. It requires each utility within its jurisdiction to establish EMF-reducing measures and incorporate such measures into the designs for all new or upgraded power lines and related facilities within their respective service areas. The CPUC further established specific limits on the resources to be used in each case for field reduction. Such limitations were intended by the CPUC to apply to the cost of any redesign to reduce field strength or relocation to reduce exposure. Publicly owned utilities, which are not within the jurisdiction of the CPUC, voluntarily comply with these CPUC requirements. This CPUC policy resulted from assessments made to implement CPUC Decision 93-11-013.

The CPUC has revisited the EMF management issue to assess the need for policy changes to reflect the available information on possible health impacts. The findings specified in Decision D.06-1-42 of January 2006, did not point to a need for significant changes to existing field management policies. Since there are no residences in the immediate vicinity of the proposed project line, there would not be the long-term residential EMF exposures mostly responsible for the health concern of recent years. The only project-related EMF exposures of potential significance would be the short-term exposures of plant workers, regulatory inspectors, maintenance personnel, visitors, or individuals in the vicinity of the line. These types of exposures are short term and well understood as not significantly related to the health concern.

In keeping with this CPUC policy, staff requires a showing that each proposed overhead line would be designed according to the safety and EMF-reducing design guidelines applicable to the utility service area involved. These field-reducing measures can impact line operation if applied without appropriate regard for environmental and other local factors bearing on safety, reliability, efficiency, and maintainability. Therefore, it is up to each applicant to ensure that such measures are applied in ways that prevent significant impacts on line operation and safety. The extent of such applications would be reflected by ground-level field strengths as measured during operation. When estimated or measured for lines of similar voltage and current-carrying capacity, such field strength values can be used by staff and other regulatory agencies to assess the effectiveness of the applied reduction measures. These field strengths can be estimated for any given design using established procedures. Estimates are specified for a height of one meter above the ground, in units of kilovolts per meter (kV/m), for the electric field, and milligauss (mG) for the companion magnetic field. Their magnitude depends on line voltage (in the case of electric fields), the geometry of the support structures, degree of cancellation from nearby conductors, distance between conductors, and, in the case of magnetic fields, amount of current in the line.

Since the CPUC currently requires that most new lines in California be designed according to safety and the EMF-reducing guidelines of the electric utility in the service area involved, their fields are required under this CPUC policy to be similar to fields from similar lines in that service area. Designing the proposed project line according to existing SCE field strength-reducing guidelines would constitute compliance with the CPUC requirements for line field management.

Industry's and Applicant's Approach to Reducing Field Exposures

The present focus is on the magnetic field because unlike electric fields, it can penetrate the soil, buildings, and other materials to produce the types of human exposures at the root of the health concern of recent years. The industry seeks to reduce exposure, not by setting specific exposure limits, but through design guidelines that minimize exposure in each given case. As one focuses on the strong magnetic fields from the more visible high-voltage power lines, staff considers it important, for perspective, to note that an individual in a home could be exposed to much stronger fields while using some common household appliances than from high-voltage lines (National Institute of Environmental Health Services and the U.S. Department of Energy, 1998). The difference between these types of field exposures is that the higher-level, appliance-related exposures are short term, while the exposures from power lines are lower level, but long term. Scientists have not established which of these types of exposures would be more biologically meaningful in the individual. Staff notes such exposure differences only to show that high-level magnetic field exposures regularly occur in areas other than around high-voltage power lines.

As with similar SCE lines, specific field strength-reducing measures would be incorporated into the proposed line's design to ensure the field strength minimization currently required by the CPUC in light of the concern over EMF exposure and health.

The field reduction measures to be applied include the following:

1. increasing the distance between the conductors and the ground to an optimal level;
2. reducing the spacing between the conductors to an optimal level;
3. minimizing the current in the line; and,
4. arranging current flow to maximize the cancellation effects from interacting of conductor fields.

Since no residences would be near the route of the proposed project gen-tie line, the long-term residential field exposures at the root of the health concern of recent years would not be significant. The field strengths of most significance in this regard would be as encountered at the edge of the line's right-of-way. These field intensities would depend on the effectiveness of the applied field-reducing measures. The applicant assessed the field impacts of RBEP operation by estimating electric and magnetic field intensities along the routes of the new gen-tie line and the interconnection between the SCE switchyard and the area power grid. Staff is in agreement with the applicant's assessment approach regarding field intensities and dissipation rates. The maximum electric field intensity from the existing 230-kV SCE lines at the center of the rights-of-way (from Redondo Beach to the La Fresa, Mesa, and Lighthipe substations respectively), was estimated at 0.9 kV/m, and 0.07 kV/m at the edge of the right-of-way. The maximum intensities of the companion magnetic field were estimated at 46 mG at the center of the right-of-way and 35 mG at its edge (AES 2012, p. 3-10). These are as staff would expect for SCE lines of the same voltage and current-carrying capacity.

The electric field intensity along the route of the new gen-tie line (as it connects the power block and the SCE switchyard) was calculated as 0.79 kV/m at the center of the right-of-way and 0.25 kV/m at the edge. The magnetic field estimates for the center of the same right-of-way was calculated as 74.2 mG and 17.1 at the project boundary. These field strength values are similar to those of similar SCE lines (as required under current CPUC regulations) but, in the case of the magnetic field, the estimates are much less than the 200 mG currently specified by the few states with regulatory limits. The requirements in Condition of Certification **TLSN-2** for field strength measurements are intended to assess the applicant's assumed field reduction efficiency.

CUMULATIVE IMPACTS

Operating any given project may lead to significant adverse cumulative impacts when its effects are considered cumulatively considerable. "Cumulatively considerable" means in this context that the incremental field and non-field effects of an individual project would be significant when considered together with the effects of past, existing, and future projects (Cal. Code Regs., tit. 14, §15130). When field intensities are measured or calculated for a specific location, they reflect the interactive, and therefore, cumulative effects of fields from all contributing conductors. This interaction could be additive or subtractive depending on prevailing conditions. Since the proposed project's transmission line would be designed, built, and operated according to applicable field-reducing SCE guidelines (as currently required by the CPUC for effective field management), any contribution to cumulative area exposures should be at levels expected for SCE lines of similar voltage and current-carrying capacity and not considered environmentally significant in the present health risk-based regulatory scheme. The actual field strengths and contribution levels for the proposed line design would be assessed from the results of the field strength measurements specified in Condition of Certification **TLSN-2**.

COMPLIANCE WITH LORS

As previously noted, current health-risk-driven CPUC policy on EMF management requires that any high-voltage line within a given area be designed to incorporate the field strength-reducing guidelines of the main area utility lines to be interconnected. The utility in the case of RBEP is SCE. Since the proposed project's 230-kV line and related switchyards would be designed according to the respective requirements of the LORS listed in **TLSN Table 1**, and operated and maintained according to current SCE guidelines on line safety and field strength management, staff considers the proposed design and operational plan to be in compliance with the health and safety requirements of concern in this analysis. The actual contribution to the area's field exposure levels would be assessed for the proposed route from results of the field strength measurements required in Condition of Certification **TLSN-2**.

NOTEWORTHY PUBLIC BENEFITS

The proposed tie-in line would pose a specific, although insignificant risk of the field and nonfield effects of concern in this analysis. Its building and operation would, therefore, not yield any public benefits regarding the effort to minimize any human risks from these impacts. Since the generated power would be lower than from the existing on-site RBGS units, replacing RBGS with the proposed RBEP would reduce the current-related magnetic fields from the project site. This would constitute a net benefit in the project area.

FACILITY CLOSURE

If the proposed RBEP were to be closed and all related structures are removed as described in the **PROJECT DESCRIPTION** section, the minimal electric shocks and fire hazards from the physical presence of this tie-in line would be eliminated. Closure and removal would also eliminate the potential for the line's field and non-field impacts assessed in this analysis in terms of nuisance shocks, radio-frequency impacts, audible noise, and electric and magnetic field exposure, and aviation safety. Since the line would be designed and operated according to existing SCE guidelines, these impacts would be as expected for SCE lines of the same voltage and current-carrying capacity and therefore, at levels reflecting compliance with existing health and safety LORS.

CONCLUSIONS

Since staff does not expect the proposed 230-kV transmission tie-in line to pose an aviation hazard according to current FAA criteria, we do not consider it necessary to recommend specific location changes on the basis of a potential hazard to area aviation.

The potential for nuisance shocks would be minimized through grounding and other field-reducing measures that would be implemented in keeping with current SCE guidelines (reflecting standard industry practices). These field-reducing measures would maintain the generated fields within levels not associated with radio-frequency interference or audible noise.

The potential for hazardous shocks would be minimized through compliance with the height and clearance requirements of CPUC's General Order 95. Compliance with Title 14, California Code of Regulations, section 1250, would minimize fire hazards while the use of low-corona line design, together with appropriate corona-minimizing construction practices, would minimize the potential for corona noise and its related interference with radio-frequency communication in the area around the route.

Since electric or magnetic field health effects have neither been established nor ruled out for the proposed RBEP and similar transmission lines, the public health significance of any related field exposures cannot be characterized with certainty. The only conclusion to be reached with certainty is that the proposed line's design and operational plan would be adequate to ensure that the generated electric and magnetic fields are managed to an extent the CPUC considers appropriate in light of the available health effects information. The long-term, mostly residential, magnetic exposure of health concern in recent years would be insignificant for the proposed line given the absence of residences along the proposed on-site route. On-site worker or public exposure would be short term and at levels expected for SCE lines of similar design and current-carrying capacity. Such exposure is well understood and has not been established as posing a significant human health hazard.

Since the proposed project's line would be operated to minimize the health, safety, and nuisance impacts of concern to staff and would be routed through an area with no nearby residences, staff considers the proposed design, maintenance, and construction plan as complying with the applicable LORS. With implementation of the four recommended conditions of certification, any such impacts would be less than significant around the route.

PROPOSED CONDITIONS OF CERTIFICATION

TLSN-1 The project owner shall construct the proposed 230-kV gen-tie transmission line according to the requirements of the California Public Utility Commission's GO-95, GO-52, GO-131-D, Title 8, and Group 2, High Voltage Electrical Safety Orders, sections 2700 through 2974 of the California Code of Regulations, and Southern California Edison's EMF reduction guidelines.

Verification: At least 30 days prior to the start of construction of the transmission line or related structures and facilities, the project owner shall submit to the compliance project manager (CPM) a letter signed by a California registered electrical engineer affirming that the lines will be constructed according to the requirements stated in the condition.

TLSN-2 The project owner shall use a qualified individual to measure the strengths of the electric and magnetic fields from the proposed 230-kV gen-tie line and the existing SCE lines at the points of maximum intensity within and at the edge of the rights-of-way as reflected in the estimates provided by the applicant. The measurements shall be made before and after energization according to the American National Standard Institute/Institute of Electrical and Electronic Engineers (ANSI/IEEE) standard procedures. These measurements shall be completed no later than six months after the start of operations.

Verification: The project owner shall file copies of the pre-and post-energization measurements with the CPM within 60 days after completion of the measurements.

TLSN-3 The project owner shall ensure that the right-of-way for the proposed gen-tie line is kept free of combustible material, as required under the provisions of Public Resources Code section 4292 and Title 14, California Code of Regulations, section 1250.

Verification: During the first five years of plant operation, the project owner shall provide a summary of inspection results and any fire prevention activities carried out along the right-of-way and provide such summaries in the Annual Compliance Report on transmission line safety and nuisance-related requirements.

TLSN-4 The project owner shall ensure that all permanent metallic objects within the right-of-way of the proposed gen-tie line are grounded according to industry standards regardless of ownership.

Verification: At least 30 days before the lines are energized, the project owner shall transmit to the CPM a letter confirming compliance with this condition.

REFERENCES

EPRI — Electric Power Research Institute 1982. Transmission Line Reference Book: 345 kV and Above.

AES Southland Development 2012, LLC .Application for Certification for the Redondo Beach Energy Project, Volumes I, II and III dated 11/02/12. Submitted to the California Energy Commission on 11/12/2012.

National Institute of Environmental Health Services 1998. An Assessment of the Health Effects from Exposure to Power-Line Frequency Electric and Magnetic Fields. A Working Group Report. August 1998.

VISUAL RESOURCES

Jeff Juarez

SUMMARY OF CONCLUSIONS

The existing electrical power plant site (Redondo Beach Generating Station [RBGS]) would be used for construction and operation of the proposed Redondo Beach Energy Project (RBEP). Compared to other development in the surrounding area of the project site, the RBGS and the Southern California Edison (SCE) switchyard transmission structures are the most visually prominent, built features in the project area.

Critical off-site viewpoints, referred to as key observation points (KOPs), were selected to represent primary viewer groups and sensitive viewing locations in a defined area surrounding the project site where visual impacts could occur. For the proposed RBEP, nine KOPs were evaluated by Energy Commission staff (staff). Staff has identified potentially significant visual resources impacts at KOPs 5, 8, and 9.Visual impacts at KOPs 1, 2, 3, 4, 6, and 7 are considered less than significant.

Staff evaluated the potential effects of the five-year schedule for the proposed demolition of RBGS structures and construction of the RBEP. Staff concludes that demolition, construction, and commissioning activities would substantially degrade the existing visual character and quality of the site and its surroundings. Staff proposes Condition of Certification **VIS-1** requiring preparation and implementation of a Demolition, Construction, and Commissioning Screening Plan to reduce this impact to less than significant.

Staff analyzed the potential for the proposed project to create a new source of substantial light or glare during demolition, construction, commissioning, and operation that would adversely affect day or nighttime views in the area. Staff concludes that the RBEP would produce substantial light and glare that would create a potentially significant impact on day and nighttime views in the project area. Staff proposes Conditions of Certification **VIS-2** and **VIS-3** to reduce the effects of lighting and glare on nighttime views to less than significant. In addition, staff proposes Condition of Certification **VIS-4** to require preparation and implementation of a Surface Treatment Plan to reduce the effects of glint and glare from project structure surfaces on daytime views to less than significant.

Section 30251 of the California Coastal Act requires that the scenic and visual qualities of coastal areas be considered and protected as a resource of public importance. Permitted development must be sited and designed to restore and enhance visual quality in visually degraded areas where feasible. Staff assessed the potential effects of the proposed project to the visual character and quality of the site and its surroundings and the visual compatibility between the RBEP site and its coastal environment. While the RBEP would represent a general visual and aesthetic improvement over the existing condition, staff concludes that although the proposed project would relocate the Wyland Whaling Wall to screen the west side of the RBEP power block and enclose the proposed plant’s major mechanical components, the applicant has not yet adequately proposed any specific, detailed, or enforceable measures to effectively restore and enhance visual quality at the project site from all areas adjacent to the project site. Its

Conceptual Landscape Plan does not adequately address the proposed project's impacts to visual resources located north, east, and south of the site (see KOPs 5, 8, and 9, of the "Visual Change for the KOPs" subsection below). The proposed siting of the RBEP structures in the northeast portion of the project site without adequate screening presents potentially significant visual impacts due to their close proximity to differing adjacent uses, such as residential and commercial uses; their scale, mass, and industrial aesthetic is visually incompatible with said uses, resulting in a degradation of the visual character and quality of the coastal environment, as viewed from those KOPs. To minimize the impacts at KOPs 5, 8, and 9, staff proposes that the applicant should prepare and present a site screening and landscape concept plan for review by staff and the public. The concept plan should be submitted to allow ample time for review and consideration in the Final Staff Assessment (FSA). A condition of certification requiring a final site screening and landscape plan to be prepared and implemented based on an acceptable concept plan will be proposed in the FSA. In preparing the concept plan, the project owner should consider and incorporate the screening and landscape techniques from the options listed below. Staff also is receptive to considering options developed by the applicant, so long as those options satisfy the overall goal of minimizing visual impacts at KOPs 5, 8, and 9 and meeting the following objectives: (1) screen the major facilities and structures of the RBEP from public view; (2) create a gradual visual transition between the project site and its adjacent uses; and (3) ensure greater visual compatibility between the project site and its surrounding coastal environment.

Site Screening and Landscape Concept Plan options:

A. Enhance the architectural design of the turbine hall enclosures and air-cooled condenser, and install a multi-layered arrangement of evergreen trees and shrubs on the north and south sides of the power block, SCE 230-kV switchyard, and ancillary facilities and structures to effectively screen those sides of the RBEP from public view. The hall enclosures and air-cooled condenser (ACC) should:

    a. Exhibit aesthetic unity through materials, textures, colors, and details;

    b. Incorporate architectural elements or details consistent with the buildings of the adjacent harbor and commercial areas;

    c. Use non-reflective materials, textures, colors, details, imagery, and/or finishes;

    d. Maximize visual interest through patterns, projections, and/or recesses;

    e. Incorporate landscaping such as flowering trees, shrubs, and vines on the east side of the power block, adjacent to the hall enclosures and the ACC.

B. Relocate the Wyland Whaling Wall to the east side of the power block (which includes the turbine hall enclosures and ACC) and install a multi-layered arrangement of evergreen trees and shrubs on the north, west, and south sides of the power block, SCE 230-kV switchyard, and ancillary facilities and structures to effectively screen those sides of the RBEP from public view;

C. Construct a new, structurally-sound screening wall on the east side of the power block and install a multi-layered arrangement of evergreen trees and shrubs on the north and south sides of the power block, SCE 230-kV switchyard, and ancillary facilities and structures to effectively screen those sides of the RBEP from public view. The new screening wall should:

   a. Be at least of equal height to the heat recovery steam generator turbine hall enclosure;

   b. Reduce wall mass and scale through the use of setbacks, offsets, or stepping of wall planes and avoid overly large, flat expanses of wall planes of a single material, finish/texture, or color;

   c. Incorporate architectural elements or details consistent with the buildings of the adjacent harbor and commercial areas;

   d. Use non-reflective materials, textures, colors, details, imagery, and/or finishes;

   e. Maximize visual interest through patterns, projections, and/or recesses;

   f. Incorporate landscaping such as flowering trees, shrubs, and vines in front of the screening wall.

In addition, the Site Screening and Landscape Concept Plan should:

1. Replace all landscaping located in the south area of the project site adjacent to the Salvation Army Senior Residence Center and the Sunrise/Best Western Hotel with effective screening landscaping;
2. Install screening landscaping in the southeast portion of the project site adjacent to the Information Technology Center surface parking area;
3. Install screening landscaping along the north edge of the project site adjacent to Herondo Street.
4. Install screening landscaping along the west edge of the project site adjacent to N. Harbor Drive, from Herondo Street to Marina Way.
5. Landscape permanent parking areas.
6. Provide decorative and/or accent landscaping at key locations throughout the project site, such as site entrances and adjacent to public areas.

As proposed, the project is not in compliance with applicable laws, ordinances, regulations, and standards (LORS); however, the project would be in compliance with successful implementation of Conditions of Certifications 1 through 4 and an effective site screening and landscape plan. The proposed project’s compliance with LORS will be determined in the FSA.

INTRODUCTION

Visual resources are the natural and cultural features of the environment that can be viewed. Visual resources also include “sensitive viewing areas,” which are areas consisting of uses such as residential, recreational, travel routes, and tourist destinations, and the people within those use areas, or “sensitive viewers.” This analysis focuses on whether the RBEP would cause significant adverse visual impacts and whether the project would be in compliance with applicable LORS. The California Environmental Quality Act (CEQA) requires the California Energy Commission to determine the potential for significant impacts to visual resources resulting from the proposed project.

Visual Resources Appendix-1 (VR Appendix-1), Visual Resources Terms, Definitions, and Analysis Method, describes the visual resources methodology employed for the CEQA analysis (Energy Commission staff's methodology), and the "Method and Threshold for Determining Significance" subsection below describes the thresholds for determining environmental consequences (as discussed above in the "Summary of Conclusions" subsection). In accordance with staff's procedure, conditions of certification are proposed as needed to reduce potentially significant impacts (under CEQA) to less than significant levels or to the extent possible, and to ensure LORS conformance, if feasible.

This section describes existing visual resources conditions in the vicinity of the proposed RBEP and assesses changes to those conditions that would occur from the demolition of the Redondo Beach Generating Station (RBGS) and construction and operation of the proposed project.

Energy Commission staff visited the project site and surveyed visual resources in the project area in July and October 2013. The descriptions of visual resources in this analysis are based on staff's direct observations, proposed project materials and data prepared by the applicant and submitted to the Energy Commission in 2012 and 2013, and other planning documents and information addressing visual resources conditions and issues in the project area.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

Laws, ordinances, regulations, and standards (LORS) pertaining to aesthetics and protection of sensitive visual resources are summarized below. Further details on applicable LORS and analysis of the proposed project's consistency with specific policies and ordinances are discussed below under the subsection, "Compliance with Laws, Ordinances, Regulations, and Standards." No federal LORS pertaining to visual resources are applicable to the proposed RBEP.

STATE

California Coastal Act of 1976

The California Coastal Commission (Coastal Commission) was established by voter initiative in 1972 and later made permanent by the California State Legislature through adoption of the California Coastal Act of 1976 (Coastal Act) (Pub. Resources Code § 30000 et seq.). The Coastal Act includes policies addressing many environmental and land use management issues and defines the Coastal Zone boundary where those policies apply. Section 30001.5 of the Coastal Act includes a declaration to "protect, maintain, and where feasible, enhance and restore the overall quality of the coastal zone environment and its natural and artificial resources." Section 30251 of the Coastal

Act requires that the scenic and visual qualities of coastal areas be considered and protected as resources of public importance.

Implementation of Coastal Act policies is accomplished primarily through preparation of local coastal programs (LCPs) by local municipalities that are located wholly or partly in the Coastal Zone. Coastal Act policies are the standards by which the Coastal Commission evaluates the adequacy of an LCP. An LCP includes a land use plan (LUP), which may be the relevant portion of the local general plan, including any maps necessary to administer the plan; and zoning ordinances, zoning district maps, and other legal instruments necessary to implement the LUP (Coastal Commission 2012).

Redondo Beach is a shoreline community, a portion of which is in the state's Coastal Zone, and the project site is located entirely within the Coastal Zone. A coastal element including policies and a land use plan (CLUP) was adopted by the Redondo Beach City Council and certified (with conditions) by the Coastal Commission in 1981. In 2003, the City of Redondo Beach separated the CLUP into two areas: Area 1 and Area 2, the latter of which contains the proposed project site. While the Coastal Commission certified an LCP for Area 1 in 2003, an LCP for Area 2 was not certified until 2011, after modifications suggested by the Coastal Commission to the LCP were made by the city of Redondo Beach and passed by public voters in 2010 (AES Southland Development 2012).

For this evaluation, because the amended LCP has not been released to the public, staff refers to the document entitled, "Measure G Ballot Text and Supplemental Ballot Pamphlet," which includes the text of the amendment approved by the voters in 2010 and is now part of the approved LCP (AES Southland Development 2012).

LOCAL

City of Redondo Beach General Plan

The applicable goals, objectives, and policies in the city of Redondo Beach General Plan that pertain to visual and aesthetic resources are contained in its Land Use Element and Recreation and Parks Element. The Land Use Element of the General Plan establishes goals, objectives, policies, and implementation programs to guide the manner in which new development will occur and existing uses will be conserved in the city of Redondo Beach. According to the Land Use Element (LUE), the city's land use policies are structured at two levels: (a) policies which pertain to the city at-large, and (b) policies which pertain only to specific sub-areas or portions of the city. Many of the policies that guide development in the sub-area in which the project site is located are contained in the City of Redondo Beach Harbor/Civic Center Specific Plan.

City of Redondo Beach Harbor/Civic Center Specific Plan

The City of Redondo Beach Harbor/Civic Center Specific Plan (HCCSP) is the fundamental community development policy document that governs and determines the future development and character of the Harbor/Pier and Civic Center areas of the city; it serves to clarify the city's goals, objectives, and expectations for the future of the area. The HCCSP states, "In recognition of the critical importance and significance of the Harbor/Civic Center area relative to the City's physical and economic future, the

Redondo Beach City Council directed that a separate specific plan be conducted, to more precisely determine and protect the future function and character of this area, in conjunction with the general plan planning process" (HCCSP 2008).

The HCCSP serves as a supplemental policy and planning document to the city's general plan and local coastal program; it further refines the goals, objectives, and policies of those documents for the Harbor/Pier and Civic Center areas of the city. It also reinforces and builds upon the policies of the local coastal program, including visual and aesthetic resources-related policies promoting and ensuring enhanced and continued public physical and visual access to the coast, and promoting the provision of additional amenities and design features in coastal area development. The project site is located within Catalina Avenue Corridor Sub-Area, Zone 2 and situated on the only property within this zone. The project site is subject to HCCSP area-wide and sub-area goals, objectives, and policies.

SETTING

PROJECT AREA CHARACTERISTICS

The project site is located in the coastal city of Redondo Beach. Hermosa Beach is located north of Redondo Beach, and the city of Torrance is located to the east and south. Regionally, Redondo Beach is located at the southern end of the Santa Monica Bay, between the cities of Santa Monica and Rancho Palos Verdes. The Santa Monica, San Gabriel, and Santa Ana mountain ranges are located to the far north, northeast, and southeast, respectively.

The project site is situated at the base of a bowl-shaped area bordered generally by Herondo Street/Anita Street to the north, Diamond Street to the south, and Prospect Avenue to the west. The topography in this area rises upward in elevation to the east, from approximately 20 feet above sea level at the northeast corner of the project site to approximately 200 feet above sea level at the intersection of Anita Street and Prospect Avenue, located one-half mile east. The topography north of the project site rises in elevation more gently and uniformly from west to east, as does the area that lies south of Diamond Street. The King Harbor and Marina area is situated at a slightly lower elevation to the west of the project site. The terrain throughout the area surrounding the site is generally characterized by small rolling hills, dips, and valleys.

A grid pattern of development oriented south-southwest overlays the bowl-shaped area in such a way that shifts sightlines away from the project site and toward the ocean. However, as will be discussed later, the power plant is the predominant feature in the landscape for viewers in close proximity to the project site, and especially for those situated along the upward-sloping area between Herondo /Anita streets and Beryl Street. This is because the grid pattern within this particular area maintains strong sightlines toward the project site. Where views are unobstructed, at least partial visibility of the power plant is provided throughout the bowl-shaped area.

The area surrounding the project site is largely built-out with low-scale and dense residential areas to the north, east, and south. In addition, commercial and some light-industrial areas are located to the east, King Harbor and coastal commercial areas to the west, and commercial areas containing large hotels to the south. The residential areas consist of high- and medium-density, multi-family developments to the north, and low- and medium-density, multi-family buildings to the east and south. Single-family residential areas are located further east along the upper edge of the bowl-shaped area, west of Prospect Avenue. The Hermosa Beach shoreline is located northeast of the project site, just across N. Harbor Drive, and Redondo Beach State Park is located one-half mile south. Pacific Coast Highway, State Route 1 (PCH), a major north-south arterial in the region, is less than one-quarter mile east of the project site; Herondo/Anita streets, which run along the north side of the project site and through the center of the city, are at the west end of a corridor that provides direct access to the Interstate Highway 405, located to the east. A portion of The Strand, a 22-mile paved bike path that runs along the Pacific Ocean shoreline and traverses several coastal communities, is situated along Redondo Beach and the Marina.

PROJECT SITE CHARACTERISTICS

The proposed RBEP will be constructed on approximately 10.5 acres within the existing approximately 50-acre Redondo Beach Generating Station (RBGS) site. The project site is bordered by Herondo Street to the north, N. Francisca Avenue to the east, commercial and mixed uses to the south, and N. Harbor Drive to the west. The project site is relatively flat, with a difference in elevation of approximately ten feet between the west and east sides and the north and south sides of the site. The formal entry to the power plant is located on N. Harbor Drive, south of Herondo Street and across from Yacht Club Way, which is one of three roads, including Marina Way and Portofino Way, that branch from N. Harbor Drive and serves the King Harbor area.

The existing unit housing and administration buildings are located on the west side of the project site and are set back from N. Harbor Drive approximately 80 to 100 feet. The area between the street and buildings contains an eight-foot tall masonry wall, landscaping, which includes palm trees, broad-canopy trees, tall shrubs, and assorted groundcovers, and driveways and vehicle access ways. The portion of landscaping along the west side of the project site is denser and taller between Marina Way and Beryl Street than the landscaping between Marina Way and Herondo Street. An eight-foot tall masonry wall fronted by tall, broad-canopy trees and low shrubs is located along the north edge of the site adjacent to Herondo Street, and a chain-link fence surrounds the remaining edges of the site. The Wyland Whaling Wall, which is 95 feet tall and 568 feet long, is located along the west and south sides of the building housing containing RBGS Units 5-8.

The majority of the existing RBGS aboveground structures, including five 219-foot tall boiler exhaust stacks, steam turbines, generators, boilers, administration building, and unit housing buildings are located along the western edge of the site, adjacent to N. Harbor Drive. The proposed RBEP structures would be located mostly in the northeastern portion of the site, on what are currently abandoned secondary containment structures for fuel oil storage tanks that have been removed, and on unused or underutilized areas of the power plant. The parking area and the area of the Southern California Edison (SCE) 230-kilovolt (kV) switchyard that presently occupy the north portion of the site would remain at their current locations as part of the RBEP. The Whaling Wall would be relocated on the site to the west side of the new RBEP power block. For screening purposes, wall extensions are proposed at the north and south ends of the Whaling Wall and would partially wrap around the northwest and southwest corners of the power block structures. The Whaling Wall mural would not carryover to the wall extensions.

Adjacent commercial uses and structures outside the RBEP property boundaries include: The Information Technology Center (ITC), a three-story commercial office building complex and its associated parking structure to the southeast between the site and N. Catalina Avenue; a low-profile mini-storage facility (that is a part of ITC) to the east between the site and N. Francisca Avenue; a two-story Sunrise (formerly Best Western) Hotel to the south between the site and Beryl Street; and the three-story Salvation Army/Roland Mindeman Senior Residence Center located also between the site and Beryl Street and east of the Sunrise Hotel. Other adjacent uses east of the project site include a construction-related facility (a dirt haul/sand and gravel company), the Cannery Row Artists Studios, the newly constructed Greenstreet Retail Center, and a U.S. Postal Service facility.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

THRESHOLDS FOR DETERMINING SIGNIFICANCE

The California Environmental Quality Act (CEQA) provides a series of broad policy statements addressing environmental protection, including the requirement to: “Take all action necessary to provide the people of this state with clean air and water, enjoyment of *aesthetic, natural, scenic,* [emphasis added] and historic environmental qualities…” (Pub. Resources Code § 21001 [b]).

Staff uses the environmental checklist in the “Aesthetics” section of Appendix G of the California Environmental Quality Act Guidelines (State CEQA Guidelines) and professional practices for visual resource assessments to evaluate the potential effects of a project on visual resources. From the State CEQA Guidelines, an impact on visual resources is considered significant if the project would:

- have a substantial adverse effect on a scenic vista;
- substantially damage scenic resources, including but not limited to trees, rock outcroppings, and historic buildings within a state scenic highway;
- substantially degrade the existing visual character or quality of the site and its surroundings, or;
- create a new source of substantial light or glare that would adversely affect daytime or nighttime views in the area.

The thresholds for determining impacts on visual resources are generally based on these significance criteria. The subsection, “Direct and Indirect Impacts and Mitigation Measures,” (below) includes a complete analysis of impacts from the proposed project.

“Vista” is sometimes defined as a distant view through or along an avenue or opening. For this visual resources analysis, scenic vista is further defined as a view that includes remarkable or memorable scenery or a view of a natural or cultural feature that is indigenous to the area. The proposed RBEP would be constructed and operated in a developed area of the Southern California coastline. Uninterrupted views of the Pacific Ocean are available from Redondo Beach State Park, the Redondo Beach Pier, and points within the King Harbor area. However, most landside views in the vicinity of the existing project site include built elements typical of coastal development in similar urbanized areas near the coast. No particular view in the project vicinity has a level of scenic appeal that could distinguish it as a scenic vista. Because the RBEP would have no impact on a scenic vista, no further analysis of the project relating to this criterion is necessary. In addition, there are no officially designated state scenic highways in the region of the project site; therefore, no further analysis of the project relating to this criterion is necessary. The following analysis will examine whether the proposed project would potentially substantially degrade the existing visual character or quality of the site and its surroundings, or create a new source of substantial light or glare that would adversely affect daytime or nighttime views in the area.

ANALYSIS METHOD

The method for this assessment of impacts on visual resources is primarily adapted from guidelines used by the U.S. Forest Service, U.S. Bureau of Land Management, and U.S. Department of Transportation. These guidelines are useful and meaningful for assessing the potential impacts of projects in various environmental settings, including the setting for the proposed RBEP.

The process to evaluate potential impacts on visual resources from construction and operation of the RBEP involved these general steps:

- Define the visual environment, or visual sphere of influence (VSOI), within which visual impacts could occur. Staff prepared a VSOI for this project.
- Describe sensitive viewpoints and the process to select key observation points, or critical viewpoints, within the VSOI for the project.
- Evaluate the potential effects of the project on visual resources based on the estimated visual sensitivity of the viewing public, the probability that the project site and area would demonstrate a noticeable visual impact with project implementation, and the estimated magnitude of the visual change that would occur with project construction and operation.
- Evaluate whether the proposed project would comply with applicable LORS for protection of visual and aesthetic resources.

VR Appendix-1 provides further detail on the approach and process used in this visual resources analysis.

Visual Sphere of Influence

The VSOI for the proposed RBEP takes into account the estimated visibility of its most visible structures on the project site, existing development in the area, topography, and other variables potentially affecting visibility of the site. The highest level of visibility exists when the viewer is stationary and has unobstructed, direct, and close-up views of the site (e.g., nearby residents). A lower level of visibility exists, for example, when the viewer is farther from the site (e.g., residents that are approximately a mile or more from the site) and/or are traveling on local roadways not immediately adjacent to the site.

The limits of the VSOI for the project generally extend to encompass the furthest distance at which potentially significant visual impacts could occur. For the views of the RBEP, this distance was determined by staff to be approximately one mile. At greater distances, the mass of project structures in the views would be much less dominant compared with views at closer distances. **Visual Resources (VR) Figure 1a** shows the results of the viewshed analysis for the proposed project.

Process to Select Key Observation Points

Sensitive Viewing Areas and Identification of Key Observation Points

Refinement of the visual analysis for the proposed RBEP involved identifying critical viewpoints, or KOPs, which are selected that would most clearly show the visual effects of the proposed project. A KOP may also represent primary viewer groups (e.g., recreationists) that could potentially be affected by the project. Results of the VSOI analysis, field visits, and a photographic survey for the RBEP resulted in selection of nine critical viewpoints to represent views from areas with relatively high levels of visual sensitivity. The selected KOPs represent viewing conditions for nearby residential, tourist, and recreational areas are identified as follows, and for each KOP, the equivalent KOP and figure number from the applicant's 2012 AFC and Response to Data Requests are provided in parentheses:

- KOP 1 – View from Moonstone Park (KOP 1, Figure 5.13-2 A, B)
- KOP 2 – View from Seaside Lagoon (KOP 2, Figure 5.13-3 A, B)
- KOP 3 – View from Redondo Beach Pier (KOP 3, Figure 5.13-4 A, B)
- KOP 4 – View from Hermosa Beach Pier (KOP 6 – Character View, Figure WSQ-1A, B)
- KOP 5 – View from north side of Herondo Street (KOP DR 44, Figure DR 44-1A, B)
- KOP 6 – View from Pacific Coast Highway and Herondo/Anita Streets (KOP 4, Figure 5.13-5R A, B)
- KOP 7 – View from north side of Anita Street at N. Paulina Avenue (KOP DR 45, Figure 45-1R A, B)
- KOP 8 – View from N. Catalina Avenue at N. Francisca Avenue (KOP DR 46, Figure DR 46-1A, B)
- KOP 9 – View from east side of N. Catalina Avenue at Beryl Street (9KOP DR 47, Figure DR 47-1A, B)

VR Figure 1a shows the KOPs for the proposed project, along with the VSOI, and **VR Figure 1b** depicts the KOPs together with the topography of the area surrounding the project site. **VR Figure 1c** depicts the KOP locations identified by Build a Better Redondo (BBR) and NoPowerPlant.com, local groups that represent residents and voters of Redondo Beach and Hermosa Beach, and Redondo Beach City Council member Bill Brand, in their 2013 document, "AES Redondo Data Adequacy

Assessment." In this document, BBR points out that the KOPs originally submitted in the AFC did not adequately represent the impacts that would be produced by the proposed power plant, and indicated that their KOPs would be "…more representative of the real impacts of the plant on views." The locations of staff's KOPs and supporting photographs taken adjacent to the project site that are analyzed here are very similar to those of BBR. In its assessment of the AFC, staff also determined that the Applicant's KOPs were inadequate and requested additional and modified KOPs. **VR Figure 2** shows further detail of the project site, including both existing and proposed facilities.

PROJECT VISUAL DESCRIPTION

Visual Resources Table 1 (VR Table 1) provides a list of the major project features, along with their dimensions, that would contribute to visual change of the landscape. A more detailed discussion of the proposed project is presented in the **PROJECT DESCRIPTION** section of this document.

The proposed project components would be located on the existing approximately 50-acre RBGS site. No off-site linear elements are proposed for the RBEP, although one 230-kV transmission interconnection would be constructed on-site to connect the power block to the existing SCE switchyard. If constructed, the RBEP facilities, combined with the existing SCE switchyard, would occupy approximately 10.5 acres of the approximately 50-acre site.

Currently, the existing RBGS aboveground facilities occupy approximately 20 acres of the project site. **VR Table 1** summarizes the dimensions and quantities of the proposed project components that would be visible to the public from off-site locations. Many of the project's major components, such as the HRSGs and CGTs, would be fully enclosed in large hall enclosures to avoid visibility of the more intricate, mechanical components of the power block. The exteriors of the major project components would be neutral gray or tan in color and have a flat, untextured finish. With the exception of the turbine hall enclosures, which would be aluminum, and the transformer walls, which would be concrete, the components' primary material would be steel.

Visual Resources Table 1
Visually Prominent Proposed RBEP Components

Project Component	Length (feet)	Width (feet)	Height (feet)	Diameter (feet)	Power block (quantity)	Elsewhere on Site (quantity)
Heat Recovery Steam Generator (HRSG) Stacks	-	-	140	18	3	-
Transmission Pole	-	-	80 - 135	-	1	-
Turbine Hall Enclosure - HRSG	349	95	83.5	-	1	-
Air-Cooled Condenser (ACC)	209	174	83	-	1	-
Transmission A-Frame	-	-	75	-	4	-
Turbine Hall Enclosure - Combustion Gas Turbine (CGT)	349	126	60.5	-	1	-
Existing Service Water Tank (to remain)	-	-	48	40	-	1
Steam Turbine Generator (STG) Enclosure	77	73	40	-	1	-
Distilled Water Tank	-	-	30	28	-	1
New Service Water Tank	-	-	30	28	-	1
Transformer Wall	53	42	30	-	4	-
Source: AES Southland Development 2012						

STEPS IN THE KOP ANALYSIS

Photographs are taken of the project site to show existing conditions from the KOPs. The existing condition (baseline) photographs taken from the selected KOPs are used to prepare representative visual simulations of the proposed project or project feature. The simulations portray the relative scale and extent of the project. The photograph of the existing condition and the visual simulation (proposed condition) are reviewed for each KOP to determine the potential effects of the project on visual resources. Figures are referenced below and included at the end of this analysis to show the visual simulations for each KOP.

The evaluation of the visual sensitivity for each representative KOP includes consideration of five factors: *visual quality, viewer concern, visibility, number of viewers,* and *duration of view* (see Diagram 1 in **VR Appendix-1**). *Overall viewer exposure* for each KOP is generally based on an average of the values for site visibility, number of viewers, and duration of view. *Overall visual sensitivity* is generally based on an average of the values for visual quality, viewer concern, and overall viewer exposure. **VR Appendix-1** includes definitions for the key terms used in this analysis.

The assessment of visual impacts by staff is based on the change that would occur from the introduction of new built elements in the VSOI. The *overall visual change* is typically based on an average of the values for *contrast, dominance,* and *view blockage* for each KOP. The rating scale to assess visual sensitivity and visual change ranges from low to high for each factor. **Visual Resources Appendix-2 (VR Appendix-2),** Key Observation Point Evaluation Matrix and Visual Impact Determination Conclusions, describes the rating scale and summarizes the evaluations for each KOP's existing and proposed condition and the visual impact determination conclusion of the proposed project at each KOP. The ratings for *overall visual sensitivity* and *overall visual change* are combined to determine the visual impact significance for each KOP using **VR Appendix-1, Table 5** – KOP Visual Impact Significance Determination).

KOP Visual Sensitivity

KOP 1 – View from Moonstone Park in King Harbor Marina (Existing Condition)

KOP 1 was photographed from Moonstone Park (**VR Figure 3a**, existing view) a small park located approximately one-quarter mile west of the RBGS and just south of the terminus of Marina Way. The park is situated in the western portion of the King Harbor Marina. The Marina extends north-south along the west side of N. Harbor Drive and parallel to the western edge of the project site. The Marina contains boat slips, apartment buildings, restaurants, yacht and canoe club facilities, and offices. The Marina also includes the Science, Education, and Adventure Laboratory (SEA Lab), a coastal science education center operated by the Los Angeles Conservation Corps that provides free and low-cost programs to people of all ages, and the Spectrum Building, which hosts indoor and outdoor fitness programs for adults and children through the Spectrum Fitness Club. The SEA Lab is located in the northeast corner of the Marina, at N. Harbor Drive and Yacht Club Way, and the Spectrum Building is on N. Harbor Drive at Marina Way.

KOP 1 represents the eastward view of the RBGS from the park and the adjacent boat slips, apartment and commercial buildings, yacht and canoe clubs, offices, and parking areas; therefore, the view is seen by Marina boat and seaside residents, tourists, visitors, boaters and recreationists, and Marina-area workers. According to the AFC, "As many as 10 percent of the boats moored in the harbor areas are permanent residents" (AES Southland Development 2012).

The RBGS strongly characterizes eastward views from the Marina, particularly those from the western portion of the Marina and the boat slips, and it dominates views from other areas of the Marina that are located nearer to or on N. Harbor Drive. The upper portions of the 200-foot tall stacks, boilers, and other project site structures of the RBGS are highly visible in the background of this view. The middleground of the view (just beyond a parking area) depicts the masts of sail boats situated in the Marina's boat slips. Palm trees within the Marina and along the west and east sides of N. Harbor Drive partially screen the lower portions of the power plant from this viewpoint. A portion of the Whaling Wall is visible on the right, also screening the lower portions of the power plant structures. A unit housing building is shown to the left of the Whaling Wall. A fairly large plume is visible in the upper right portion of the photograph. The park contains little or no trees that screen the RBGS from the viewpoint.

The RBGS is composed of immense, complex, and mechanical structures in an area where the built environment is generally characterized by elements typical of coastal communities in the region: low-scale buildings, maritime facilities, recreational spaces, and residential, commercial, and tourist-oriented uses. There is little or no visual coherence or harmony in the eastward views from either KOP 1 or nearby viewpoints in the Marina. While the Whaling Wall does help to enhance the view east, it does not completely screen the upper portions of the RBGS structures, and it screens only approximately one-third of the power plant's horizontal frontage along N. Harbor Drive. The existing RBGS is a visually discordant built element in the view; therefore, **visual quality** from KOP 1 is characterized as ***low***.

Viewers at KOP 1 are boat residents, boaters, tourists, and recreationists engaged in passive and active recreational activities. Other viewer groups in the vicinity of KOP 1 include apartment residents, Marina-area workers, and visitors to the SEA Lab and the Spectrum Building. On N. Harbor Drive, viewers include motorists, bus riders, bicyclists, joggers, and pedestrians. **Viewer concern** of the viewers at KOP 1, including apartment residents, tourists, and patrons of the SEA Lab and Spectrum Building is considered ***high***, as they would be highly concerned about the visual quality and character of the Marina and their coastal views. **Viewer concern** of Marina-area workers is considered ***moderate to high***, because although these viewers have extended and repeated views of their surroundings on a daily basis, they would have high expectations for the visual quality of the coastal area, in which their businesses and workplaces are a located and dependent upon. **Viewer concern** of viewers traveling on N. Harbor Drive is ***moderate***, as their expectations for the visual quality of the coastal area may be higher than for those of a typical urban setting.

Under existing conditions, the lower portions of the of the RBGS structures are partially screened by the Whaling Wall and mature trees, but given their height and bulk, the relatively flat elevation west of the project site, and the close proximity to the power plant, views of the RBGS from KOP 1 are mostly unimpeded. In addition, although the buildings in the Marina tend to be oriented westward to maximize views of the ocean and coastal area, they contain east-facing windows, doors, and exterior spaces such as balconies and swimming pools, and the RBGS structures are visible from them; therefore, **visibility** of the project site from this location and from other areas of the Marina is ***high*****.**

As a coastal destination for recreation and tourism, the Marina encounters a high number of users and visitors throughout the year. In addition, a high number of motorists travel on N. Harbor Drive. According to the AFC, it averages 10,170 vehicles per day between Beryl Street and Herondo Street (AES Southland Development 2012). The **number of viewers** at KOP 1 is ***high***.

The **duration of view** of the RBGS from KOP 1 varies depending on the viewer group: for residents and boaters who live and recreate in the area, the duration may be *high*; for Marina visitors and tourists, ***moderate to high***; and for viewers traveling on N. Harbor Drive, ***moderate*****.**

Based on the ratings for **visibility, number of viewers**, and **duration of view, overall viewer exposure** for KOP 1 is considered ***high***.

Due to the dominance of the RBGS in views from KOP 1 and other Marina viewpoints, **visual quality** is characterized as ***low***. **Viewer concern** is characterized as *moderate* *to* ***high****.* Based on the ratings for **visual quality, viewer concern**, **and overall viewer exposure, overall visual sensitivity** for KOP 1 is considered ***moderate****.*

KOP 2 – View from Seaside Lagoon (Existing Condition)

The Seaside Lagoon is located in the southern portion of King Harbor Marina and is less than one-quarter mile southwest of the Whaling Wall and major RBGS structures. KOP 2 was photographed from just outside of the Seaside Lagoon parking area, along Portofino Way (**VR Figure 4a**, existing view). Seaside Lagoon is a public recreation facility open during the summer. It consists of a large saltwater lagoon for swimming, volleyball courts, sunbathing and playground areas, and dining and event facilities. This area of the Marina also includes restaurants, boat slips, and the three-story Portofino Hotel & Marina, located at the west end of Portofino Way. This KOP represents the viewpoint of lagoon and Marina viewers in the southern portion of the harbor.

The RBGS and the Whaling Wall are located in the center of the view. The palm trees and landscaping on N. Harbor Drive are shown on either side and in front of the power plant. Palm trees and landscaping planted in or along the edges of the parking areas within the Marina are shown in the middleground of the right and left sides of the view. A commercial building with a blue-colored roof is shown in the far left side of the view, beyond a parking area.

Similar to the vicinity of KOP 1, this area of the Marina is characterized by low-scale buildings, maritime facilities, recreational spaces, and residential, commercial, and tourist-oriented uses. The RBGS dominates the views to the north and northeast and from the southern portion of the Marina. There is little or no visual coherence or harmony in the north and northeast views from KOP 2. While the Whaling Wall helps to enhance northward views, it does not completely screen the upper portions of the RBGS structures. The existing RBGS is a visually dominant built element in the view; therefore, **visual quality** from KOP 2 is characterized as ***low*****.**

Viewers at KOP 2 are primarily boat residents, boaters, Seaside Lagoon visitors, hotel and restaurant patrons, and Marina-area workers, and their viewer concern is similar to that of the viewer groups at KOP 1; therefore, **viewer concern** at KOP 2 is considered ***moderate to high*** in certain instances.

Sightlines from KOP 2 toward the power plant are mostly unobstructed, with the Whaling Wall, the palm trees and broad-canopy trees along N. Harbor Drive, and the small- to medium-height trees in the parking areas providing some screening of the lower portions of the RBGS structures. However, the upper portions of the structures are clearly visible and the overall presence of the power plant is obvious from this viewpoint.

From KOP 2, the RBGS is clearly visible. The Whaling Wall and some of the landscaping adjacent to the project site are effective at screening the lower portions of the project site; however, the palm trees in front of the Whaling Wall partially screen only the Whaling Wall. Given the height and bulk of the power plant structures, the low-scale buildings in the area, the relatively flat elevation west of the project site, and the close proximity to the power plant, the views of the RBGS from KOP 2 are mostly unimpeded. In addition, much of the Marina's development is oriented mostly to the west to maximize ocean and coastal views; however, the Marina's buildings and open spaces also provide eastward views. **Visibility** of the RBGS from this location is ***high***.

The Marina encounters a high number of users and visitors throughout the years, as it offers a variety of recreational and tourist-based activities; therefore, the **number of viewers** at KOP 1 is ***high*.**

Residents, visitors, and workers of the Marina have opportunities to view the RBGS for extended periods of time while living, working, and recreating in the Marina; therefore, **duration of view** from KOP 2 is considered ***high*.**

Based on the ratings for **visibility, number of viewers**, and **duration of view, overall viewer exposure** for KOP 2 is considered ***high***.

Due to the dominance of the RBGS in views from KOP 2, **visual quality** is characterized as ***low***. **Viewer concern** is characterized as ***high**.* Based on the ratings for **visual quality, viewer concern**, and **overall viewer exposure, overall visual sensitivity** for KOP 2 is considered ***moderate to high**.*

KOP 3 – View from Redondo Beach Pier (Existing Condition)

The Redondo Beach Pier is located approximately one-half mile south of the RBGS. KOP 3 was photographed from the westernmost edge of the Pier, at a point located at the convergence of two walkways in an open area away from the Pier's shops and restaurants (**VR Figure 5a**, existing view). To the east of the viewpoint is The Pier Shopping Center, which includes shops, restaurants, offices, and a plaza, and just south of this viewpoint is Fisherman's Wharf. This KOP represents the view of the RBGS from a location that is the destination of tourists and coastal residents, and it is also representative of the view from Veterans Park, which is a public park located less than one-quarter mile southeast of the viewpoint and adjacent to the beach. The park offers views of the ocean, the beach, and the Pier.

The RBGS is shown in the center of the view, in the background beyond the Marina. The palm trees and assorted landscaping in the northern portion of the Marina and along N. Harbor Drive are visible in the middleground of the view, from the center to the left, screening lower portions of both the power plant and the Whaling Wall. In the foreground of the view is the blue-roofed commercial building (occupied by a restaurant) situated in the southern portion of the Marina; the various palm trees and vegetation of its landscaped grounds are visible in front of and to the right of the building. Also in the foreground and to the far right of the view are smaller, Marina-based buildings. To the right of the view and in the background is the tan-colored Crowne Plaza Hotel. To the left of the view and in the distant background beyond the Marina and Redondo Beach is the Santa Monica Mountains' ridgeline.

From KOP 3, the coastal landscape has a high scenic value due to the ocean, the Marina, distant mountains, coastal architecture, and an expansive sky. However, the RBGS presents a visually discordant built element in the landscape; its massive, industrial-like structures tower over the otherwise uniformly low-scale buildings in the area. No other structures, including the hotel, are similar in height, mass, or form as the RBGS structures, which clearly visually dominate the coastal landscape. The RBGS stacks and boilers, in particular, disrupt the skyline and visual cohesiveness of the area's built form. The scenic quality of the coastal landscape does provide visual relief from the otherwise visually discordant power plant. Overall, the **visual quality** from KOP 3 is characterized as ***moderate to high***.

Viewers at KOP 3 are primarily residents and tourists visiting the Pier and patronizing its shops and restaurants, fishing, and strolling along its walkways. In addition to providing Marina views, this viewpoint offers expansive views of the ocean and coast, from the Santa Monica Mountains in the north to the Rancho Palos Verdes bluffs in the south. **Viewer concern** at KOP 3 is considered ***high***, as viewers at this location would be highly concerned about the visual quality and character of the Pier, and for their ocean and coastal views.

The RBGS boilers and 200-foot tall stacks are clearly visible from KOP 3, as they rise well above all other structures of the Marina. The Marina-area landscaping is largely effective in screening the lower portions of the power plant, the Whaling Wall, Crowne Plaza hotel, and other Marina buildings from this viewpoint, but given the height and bulk of the power plant structures, and the close proximity of the power plant to the viewpoint, the views of the RBGS structures from KOP 3 are unobstructed. **Visibility** of the RBGS structures from this location is ***high***.

The Pier encounters a high number of users on a daily basis, considering that activities and events are held there year-round, and it is close to the Marina and other nearby coastal destinations; therefore, the **number of viewers** for KOP 3 is ***high***.

Local visitors and tourists at the Pier have opportunities to view the RBGS site for extended periods of time while engaging in sightseeing, shopping, strolling, and fishing. However, the Pier also provides views of high scenic value to the west, north, and south, thereby lessening the duration of time a viewer may spend viewing toward the power plant in the northeast; therefore, overall, **duration of view** from KOP 3 of the project site is considered ***moderate to high***.

Based on the ratings for **visibility, number of viewers**, and **duration of view, overall viewer exposure** for KOP 3 is **considered *high***.

Due to the dominance of the RBGS in views from KOP 3, **visual quality** is characterized as ***moderate to high***. **Viewer concern** is characterized as ***high**.* Based on the ratings for **visual quality, viewer concern**, and **overall viewer exposure**, **overall visual sensitivity** for KOP 3 is considered ***high**.*

KOP 4 – View from Hermosa Beach Pier (Existing Condition)

The Hermosa Beach Pier is located at the west end of Pier Avenue in Hermosa Beach and approximately three-quarters of a mile northwest of the project site. KOP 4 was photographed from the terminus of the pier (VR Figure 6a, existing view). To the north of the viewpoint are the coastal cities of the Santa Monica Bay and, further north, the Santa Monica Mountains. To the east of KOP 4 are the beach and a commercial corridor that extends east-west across the city along Pier Avenue. Along the beach, to the north and south of Pier Avenue, are mostly medium- and high-density residential areas characterized by two- and three-story beachfront residential buildings. The beachfront homes and buildings are painted in pastel shades of blue, pink, and orange, as well as tan and white, and many have terracotta-colored roofs, all of which are typical of southern California coastal communities. The beach terminates at the northern border of Redondo Beach. To the south of the pier, beyond Hermosa Beach, is King Harbor Marina. The project site is located east of the Marina. Further south is the Rancho Palos Verdes hills. The viewpoint at KOP 4 represents the views of the residents, tourists, and recreationists who visit the pier, Pier Avenue, and the beach.

The stacks and boilers of the RBGS, shown as a cluster of wide, massive vertical elements in the center-right of the view, are clearly visible in the background beyond the beach. The SCE transmission lines are also visible in the background extending to the left (east) from the power plant. The landscaping on N. Harbor Blvd. and the Whaling Wall are visible to the right of the structures. In the middleground of the right portion of the view is the Crystal Cove Apartments and boat slip area of the Marina. The Rancho Palos Verdes hills are shown in the far distant background beyond the Marina.

From this KOP, the ocean, beach, low-scale beachfront residential buildings, distant hills, and an expansive sky contribute to the scenic value of the coastal landscape. However, the RBGS presents a visually discordant built element in the landscape; its structures tower over the otherwise uniformly low-scale coastal development of the surrounding area. No other structure, including the hotels and office buildings in either Redondo Beach or Hermosa Beach is similar in height, bulk, or form as the RBGS structures. The RBGS stacks and boilers, in particular, interrupt the otherwise low skyline and disrupt the visual cohesiveness of the coastal landscape. Overall the **visual quality** at KOP 4 is characterized as ***moderate to high***.

Viewers at KOP 4 are primarily residents, tourists, and recreationists visiting the pier, Pier Avenue, and the beach. The viewpoint offers expansive views of the ocean and coastline, from the Santa Monica Mountains in the north to the Rancho Palos Verdes bluffs in the south. **Viewer concern** for viewers at KOP 4 is considered ***high***, as they would be highly concerned about the visual quality and character of the coastal landscape, and for their ocean and coastal views.

The RBGS is clearly visible from KOP 4, due to the height, bulk, and form of the stacks and boilers. In addition, because of the close proximity of the power plant to the beach, and lack of screening between the power plant and the beach, beach visitors have clear views of the upper portions of the RBGS structures; therefore, visibility of the RBGS from this viewpoint is ***high***.

The Hermosa Beach Pier, Pier Avenue, and the beach encounter a high number of users throughout the year, considering the shopping, recreational, and scenic opportunities available in the area of the pier; therefore, the number of viewers for KOP 4 is considered ***high***.

KOP 4 provides the local visitors and tourists in the vicinity of the pier opportunities to view the RBGS site for extended periods of time while they engage in recreational and leisure activities. However, the pier, Pier Avenue and the beach also provide views of high scenic value to the west, north, and south, thereby limiting the duration of time a viewer spends viewing the power plant situated to the southeast; therefore, overall, **duration of view** of the project site is considered ***moderate*** at KOP 4.

Based on the ratings for **visibility, number of viewers**, and **duration of view, overall viewer exposure** for KOP 4 is considered ***moderate to high***.

Visual quality at KOP 4 is characterized as ***moderate to high***. **Viewer concern** is characterized as ***high****.* Based on the ratings for **visual quality, viewer concern**, and **overall viewer exposure**, overall visual sensitivity for KOP 4 is considered ***moderate to high.***

KOP 5 – View from Herondo Street at Valley Drive (existing condition)

This KOP was taken from the northeast corner of Herondo Street at Valley Drive, in front of the multi-story residential buildings at this location (**VR Figure 7a**, existing view). Valley Drive intersects the north side of Herondo Street, and N. Francisca Avenue intersects the south side of Herondo Street. Adjacent to this viewpoint is a small plaza and, along the east side of Valley Drive, Veterans Parkway, a north-south linear green space that traverses the cities of Hermosa Beach and Manhattan Beach. From this viewpoint, multi-story residential areas extend east and west along the north side of Herondo Street. In addition to the residential areas, commercial buildings and public spaces (Kay Etow Park and Veterans Parkway) are located along the north side of Herondo Street. The SCE transmission line corridor is located across from the viewpoint, along the south side of Herondo Street, and the mini-storage facility extends along N. Francisca Avenue. The KOP primarily represents the views of the project site from residents on Herondo Street and Valley Drive.

The uppermost portions of the RBGS stacks and boilers are in the background of the view, beyond the storage facility and transmission lines and towers, which are in the foreground. The ITC building is in the background and to the left of the view. The hills of Rancho Palos Verdes are in the far distant background.

From this viewpoint, the power plant and transmission lines and towers are dominant in the landscape; their looming structures are easily noticeable and strongly contribute to the industrial feel of the area. From the ground-level, there are no natural or built features of high scenic value that are observable, except for the Rancho Palos Verdes hills. From many of the upper levels of the nearby residential buildings, whatever limited views of the ocean are provided somewhat enhance scenic quality. However, overall, visual quality for KOP 5 is characterized as ***low to moderate***.

Viewers at KOP 5 are primarily the residents of the medium- and high-density residential areas on Herondo Street and travelers on Herondo Street and Valley Drive. For the viewers in the area of the KOP, **viewer concern** is ***high***, as they would be highly concerned about the visual quality and character of their coastal community and coastal views.

From this viewpoint, the RBGS structures and transmission facilities are clearly visible to the south and southwest. The residential buildings, which are taller than the adjacent storage building and have windows and balconies oriented to the south and southwest, appear to have more expansive views of the project site, especially from their upper levels. The power plant is clearly visible from the ground and would be clearly visible from the upper levels of the nearby residential buildings; therefore, **visibility** of the RBGS from this location is ***high*.**

Given the medium- and high-density residential areas on Herondo Street and on Valley Drive, the **number of viewers** for KOP 5 is ***high***.

The **duration of view** of the RBGS site for viewers in the vicinity of KOP 5 traveling west on Herondo Street or south on Valley Drive is ***moderate***, due to the orientation of the streets and the sightlines they provide toward the project site. The **duration of view** of the RBGS from residences in the vicinity of KOP 5 is considered ***high***, due to the height and orientation of the residential buildings on Herondo Street, which provide fixed sightlines to the south and southwest and expansive views of the project site.

Based on the ratings for **visibility, number of viewers**, and **duration of view, overall viewer exposure** for KOP 5 is considered ***high***.

The **visual quality** at KOP 5 is characterized as ***low to moderate***. **Viewer concern** is characterized as ***high****.* Based on the ratings for **visual quality, viewer concern**, and **overall viewer exposure, overall visual sensitivity** for KOP 5 is considered ***moderate to high***.

KOP 6 – View of Entrance to King Harbor from Pacific Coast Highway (existing condition)

The viewpoint at KOP 6 is located at the northeast corner of the intersection of Pacific Coast Highway 1 (PCH) and Herondo Street/Anita Street (from the intersection, Herondo Street extends west and Anita Street extends east), and it is approximately one-quarter mile east of the RBGS (**VR Figure 8a**, existing view). The viewpoint lies at the south end of a commercial corridor that extends from the intersection north through Hermosa Beach. To the south of the viewpoint is the SCE transmission line corridor. Further south along PCH is a commercial area, and southwest along N. Catalina Avenue, which begins at the intersection and runs south parallel to PCH, are commercial and residential areas. As previously noted, multi-story residential buildings are located along the north side of Herondo/Anita Street. KOP 6 represents the view of the RBGS from the vicinity of the intersection.

The RBGS is shown from left to right in the background of the view. The SCE transmission lines and towers are shown in the foreground and middleground, and the existing onsite SCE 230-kV switchyard is somewhat noticeable in front of Units 1-4, in the far right portion of the view. The Redondo Beach/King Harbor monument sign is partially shown on the left side of the view, and a low-scale commercial building on N. Catalina Avenue is shown beyond the monument sign. Some landscaping around the bases of the monument sign and SCE towers is shown in the foreground of the view.

The power plant and transmission facilities are visually dominant in the view, and they are visually discordant elements in the context of the relatively low-scale commercial and residential buildings within the general area of the KOP. From this viewpoint, one has very limited views of the ocean, and the Marina is not visible; therefore, **visual** quality from KOP 6 is characterized as ***low*.**

Viewers at KOP 6 are primarily residents on Anita Street and travelers on PCH, Herondo/Anita Street, and N. Catalina Avenue. Because of the nearby beach, harbor, and other coastal-related recreational destinations in the area, viewers may have high expectations for the visual quality and character of the coastal area; therefore, **viewer concern** for viewers at KOP 6 is considered ***moderate to high**.*

The RBGS is clearly visible from KOP 6, as are the SCE transmission lines and towers; there is little or no screening of the power plant and its transmission facilities from this viewpoint. The RBGS is noticeably lower in elevation than the KOP location, which is situated on a relatively flat area that gradually descends westward between the viewpoint and the project site. A precipitous drop in elevation along the eastern edge of the project site places the lowest portions of the power plant out of view from the KOP. Overall, views of the RBGS are mostly unobstructed from this viewpoint, with only the lowest portions of the power plant structures not visible due to the lower elevation of the project site. **Visibility** of the project site from this location is ***high***.

According to the AFC, the average number of vehicles per day on PCH is 48,250; Anita Street: 22,100; Herondo Street: 11,000; and N. Catalina Avenue: 16,000 (AES Southland Development 2012); therefore, the **number of viewers** at KOP 6 is considered ***high*.**

Viewers in the vicinity of KOP 6 and traveling north or south on PCH and N. Catalina Avenue would have a **duration of view** of the RBGS site that is ***low to moderate***, as their primary focus is forward and away from the project site, which lies to the west. Viewers traveling west on Herondo/Anita Street in the vicinity of KOP 6 have a duration of view that is ***high***, given the distance of travel along this corridor; the project site lies in their direction of travel; and the orientation of Herondo Street/Anita Street offers a near-direct line of sight to the power plant.

Based on the ratings for **visibility, number of viewers**, and **duration of view, overall viewer exposure** for KOP 6 is considered ***moderate to high*.**

Due to the dominance of the RBGS in views from KOP 6, **visual quality** is characterized as ***low*. Viewer concern** is characterized as ***moderate to high**.* Based on the ratings for **visual quality, viewer concern**, and **overall viewer exposure, overall visual sensitivity** for KOP 6 is considered ***moderate**.*

KOP 7 – View from Anita Street at N. Paulina Avenue (existing condition)

KOP 7 is located on Anita Street, at the intersection with N. Paulina Avenue, which is a north-south local street located south of Anita Street (**VR Figure 9a**, existing condition). The KOP is approximately 175 feet above sea level and just west of the point where the slope of Anita Street begins to slope down toward the ocean. To the west and east of the viewpoint are low-density, multi-family and single-family residential areas, respectively; to the north are low- and high-density residential areas. Most of the residential buildings along Anita Street are multi-story buildings. South of the viewpoint, across Anita Street, is the SCE transmission line corridor, and beyond the corridor and up to Diamond Street are low-density, single-family residences. Two-story homes with balconies and roof- and garage-top decks characterize the single-family residential area. The low-density residential areas often consist of buildings with three stories, including garages at the ground level. These residential neighborhoods are situated along the uppermost sides of the bowl-shaped area, at elevations roughly between 125 and 200 feet above sea level. The viewpoint generally represents the view of the project site from the street and residential buildings in this area.

The view from KOP 7 shows Anita Street and the transmission line corridor in the foreground, residential areas in the middleground, and the power plant in the background. In the distant background beyond the power plant is the ocean. Toward the bottom right area of the view is the Redondo Beach/King Harbor entry monument. To the left and just in front of the power plant is the ITC building; to the left just beyond the RBGS is the King Harbor Marina area.

From the viewpoint at KOP 7, the RBGS and transmission facilities dominate the coastal landscape. The massive and intricate structures of the power facilities are discordant built elements among the low-scale residential and coastal-oriented development in this area of Redondo Beach. The high scenic value of the ocean serves as a visual backdrop to the low-scale built elements of the coastal area; however, this visual appeal only somewhat helps to enhance the scenic quality of the view, which is dominated by the power plant; therefore, **visual quality** from KOP 7 is characterized as ***low to moderate***.

Viewers at KOP 7 are primarily the residents of the surrounding residential areas, and their **viewer concern** is considered ***high***, as they would be highly concerned about the visual quality and character of their coastal community and ocean views. For viewers heading west and entering the coastal area of Redondo Beach, they may also have high expectations for the visual quality and character of the coastal area; therefore, their **viewer concern** is considered ***high*.**

From this viewpoint, the RBGS structures and transmission facilities are clearly visible; they obstruct an otherwise expansive, clear view of the ocean and harbor area and generally degrade views of the coastline. Because of the downward sightlines from this KOP, nearly all portions of the RBGS structures and transmission line towers are visible. For the residential areas just north of the KOP and south of Anita Street that are situated along the elevated, west- and southwest-facing edges of the bowl-shaped area, the project site and its vertical elements are highly visible. For viewers traveling west on Anita Street, as they crest the road's highpoint and begin to descend into the bowl-shaped area, the manifest RBGS creates an adverse, indelible image of the coastal landscape, and strongly mars the visual experience of entering a coastal area. **Visibility** of the RBGS from this KOP is ***high*.**

Given the multi-story, medium- and high-density residential buildings in the vicinity of KOP 7, and that as a major arterial, Anita Street potentially serves up to 50,000 vehicles per day; the **number of viewers** for KOP 7 is considered ***high***.

For residents in the vicinity of KOP 7, the residential buildings along Anita Street offer views of the coast and the power plant due to their southwest-facing orientation, height, and lack of screening, and extended views of the RBGS structures would be provided from their upper-level windows and balconies; therefore, the **duration of view** for residents in this area is considered ***high*** at KOP 7. Viewers in the vicinity of KOP 7 and traveling west on Anita Street would have a **duration of view** of the RBGS site that is ***high,*** due to the westward orientation, distance, and steep, sloping nature of Anita Street.

Based on the ratings for **visibility, number of viewers**, and **duration of view, overall viewer exposure** for KOP 7 is considered ***high*.**

The **visual quality** at KOP 7 is characterized as ***low to moderate***. **Viewer concern** is characterized as ***high**.* Based on the ratings for **visual quality, viewer concern**, and **overall viewer exposure, overall visual sensitivity** for KOP 7 is considered ***moderate to high.***

KOP 8 – View from N. Francisca Avenue at N. Catalina Avenue (existing condition)

KOP 8 is located on the northeast corner of the intersection of N. Catalina Avenue and N. Francisca Avenue (**VR Figure 10a**, existing view). Adjacent to this viewpoint, along the east side of N. Catalina Avenue, are medium-density, multi-family residential areas. South of this location is low-density, multi-family residential development on N. Francisca Avenue. Across from the viewpoint, on the west side of N. Catalina Avenue, is mostly commercial development. The streets to the east and west of N. Francisca Avenue—N. Gertruda Avenue and N. Elena Avenue, respectively—also have low-density, multi-family residential development. The residential development in the area is generally characterized by two- and three-story apartment and townhouse buildings, which often include balconies. The residential buildings in the vicinity of KOP 8 are situated at a lower elevation in the bowl-shaped area, at approximately 30 to 50 feet above sea level; however they still are roughly 15 to 35 feet higher in elevation than the project site. The viewpoint generally represents the view of the project site from N. Francisca Avenue and the adjacent, parallel streets.

The photograph depicts the northeast portion of the project site, located in the background beyond the commercial buildings on the west side of N. Catalina Ave. A part of the RBGS facilities is shown beyond the ITC building that occupies the left portion of the view. The upper portion of the yellow and orange-painted storage facility is visible in the background, to the right of the ITC building. The upper portion of a transmission tower is shown in the center-left of the view, in the distant background. A single large tree on one of the commercial properties is shown in the center of the view. Just to the right of the tree is the Cannery Row Artists Studios, and to the far right of the view is a portion of the new Greenstreet Center, a neighborhood-serving retail development that now stretches across the area shown as being under construction in the center-right of the view. The recently completed retail center blocks views of the Cannery Row Studios from N. Catalina Avenue.

From KOP 8, the commercial development along N. Catalina Avenue provides a modest degree of scenic quality that is typical of commercial corridors in the area. There are no unique natural or built elements that enhance the view from this location. The RBGS structures are shown in the view, but they do not visually dominate the landscape from this viewpoint. The low-scale residential and commercial development and landscaping of the area provides a somewhat typical residential scene. The small portion of the ocean that is visually accessible from the street enhances the scenic quality of the view. Overall, the **visual quality** from KOP 8 is characterized as ***moderate*.**

Viewers at KOP 8 are primarily the residents of N. Francisca Avenue, who walk, drive, bike, and occupy the spaces along this street. For them, **viewer concern** is considered ***high*,** as they would be highly concerned about the visual quality and character of their coastal community.

From this viewpoint, the RBGS structures and transmission facilities are not very visible. This is due in part because the sightlines from N. Francisca Avenue and adjacent parallel streets are oriented mostly toward the northeast portion of the project site, where currently there are no tall, vertical structures; the tallest elements of the power plant are located on the west side of the project site. Visibility of the RBGS is further reduced by the buildings around the viewpoint that obstruct views of the power plant structures. However, just south of KOP 8, the uppermost portions of the RBGS structures are visible from street-level and the balconies of the west- and southwest-facing sides of the residential buildings on N. Francisca Avenue. From the balconies, neither the building heights nor the street trees are tall or wide enough to screen views of the tallest RBGS elements. For viewers heading north on N. Catalina Avenue, the RBGS is not very visible as it is off to the left (west). However, for viewers heading southwest on N. Catalina Avenue, the RBGS structures are highly visible for a brief period (i.e., approximately 20 seconds); therefore, overall, **visibility** of the RBGS structures from the vicinity of KOP 8 is ***moderate*.**

Given the multi-story, low- and medium-density residential buildings in the vicinity of KOP 8, the **number of viewers** at this KOP is considered ***moderate****.*

Given the limited visibility of the project site from street level on N. Francisca Avenue, and the higher degree of visibility of the site from the southwest-facing residential balconies in the vicinity of KOP 8, the overall **duration of view** for residents in this area is considered ***moderate*** from KOP 8. Viewers in the vicinity of KOP 8 heading northwest on N. Francisca Avenue toward N. Catalina Avenue have a **duration of view** of the RBGS site that is ***low to moderate***, due to the relatively short distance between N. Francisca Avenue and N. Catalina Avenue, and the lack of a traffic signal light at this intersection where viewers could potentially have a longer duration of view of the project site if they have to stop; however, for viewers in the vicinity of KOP 8 moving southwest on N. Catalina Avenue and in the direction of the project site, the **duration of view** is ***moderate*.**

Based on the ratings for **visibility, number of viewers**, and **duration of view, overall viewer exposure** for KOP 8 is considered ***moderate*.**

The **visual quality** from KOP 8 is characterized as ***moderate***. **Viewer concern** is characterized as ***high.*** Based on the ratings for **visual quality, viewer concern**, and **overall viewer exposure, overall visual sensitivity** for KOP 8 is considered ***moderate to high.***

KOP 9 – View from N. Catalina Avenue at Beryl Street (existing condition)

KOP 9 is located at the southeast corner of the intersection of N. Catalina Avenue and Beryl Street (**VR Figure 11a**, existing view). To the north and west of this viewpoint are commercial land use areas on N. Catalina Avenue and Beryl Street. To the south, along N. Catalina Avenue, are low- and medium-density, multi-family residential areas, and to the east, along Beryl Street, are low- and medium-density, multi-family residential and commercial areas. Further west, on N. Harbor Drive, are coastal commercial areas adjacent to King Harbor. Across from the viewpoint, on the northwest corner of the intersection, is the Three-story Salvation Army Senior Residence Center. The north side of the Salvation Army property abuts the southern edge of the project site. The Best Western/Sunrise hotel is located west of the Salvation Army property and also abuts the south side of the project site. On the southwest corner of the intersection is the five-story Crowne Plaza Hotel. The residential areas on N. Catalina Avenue and south of Beryl Street are characterized by two- to four-story buildings with little or no setback from the street. Similar to the other residential buildings in the general area of the project site, the multi-family buildings on N. Catalina Avenue have balconies. The viewpoint at KOP 9 generally represents the view of the project site from residents, tourists, and recreationists in the vicinity of the intersection, and particularly those with sightlines to the north.

The Salvation Army building is depicted in the left portion of the view. In the background of the right portion of the view is the ITC parking structure located on the right (west) side of N. Catalina Avenue. The ITC building is visible just to the right of and beyond the parking structure. The project site is generally located beyond the Salvation Army building and to the left of the parking structure. A chain-link fence and trees along a portion of the eastern edge of the project site are shown in the center-right of the view. Portions of the existing power plant structures are shown beyond the Salvation Army building.

From this viewpoint, the power facilities are discordant built elements among the residential and coastal development in this area of Redondo Beach. Generally, the architecture and built form of the coastal area provides an appealing visual experience, but there are no particularly visually interesting landscape features or built elements; therefore, **visual quality** for KOP 9 is characterized as ***moderate*.**

Viewers at KOP 9 are assumed to primarily be residents, tourists, and recreationists whose **viewer concern** is considered ***high***, as these groups would be highly concerned about the visual quality and character of the coastal community in which they live and recreate.

KOP 9 sits at a low point along N. Catalina Avenue; from this viewpoint, the slope of N. Catalina Avenue increases in elevation from 25 feet above sea level to 50 feet above sea level within just one-quarter mile to the south. Due to its higher elevation and slight northwest orientation, viewers within this portion of N. Catalina Avenue have visibility primarily of the west side of the project site and the existing RBGS structures. As viewers approach the viewpoint location at the intersection, the west and east extents of the project site become more visible from N. Catalina Avenue, which begins at this point to shift toward the northeast. The project site is highly visible from the north-facing sides of the buildings situated on N. Catalina Avenue, and especially from those in the immediate area of the intersection. From KOP 9, the upper portions of the RBGS structures are visible to the left of and beyond the Salvation Army building. North of the viewpoint, viewers on N. Catalina Avenue have diminishing visibility of the project site, as the elevation of the street is similar to that of the project site and because the street shifts slightly northeast and away from the site; therefore, overall, **visibility** of the RBGS from the vicinity of KOP 9 is considered ***moderate to high***.

Given the multi-story residential areas and hotels in the vicinity of KOP 9, the **number of viewers** for KOP 9 is considered ***high***.

As mentioned, the north-facing windows and exterior spaces of the residential buildings and hotels on N. Catalina Avenue and on Beryl Street provide views of the power plant. Staff assumes that residential and hotel units with fixed, northward sightlines would allow for long viewing durations of the project site. Viewers heading north within the sloping quarter-mile portion of N. Catalina Avenue would have much shorter viewing durations due to the short distance they would be traveling as they approach the intersection. Viewers traveling west or east on Beryl Street have short viewing duration while traveling through the intersection, because the project site is to the north and out of the sightlines of these viewers. Overall, viewers in the vicinity of KOP 9 have a **duration of view** of the RBGS site that is ***moderate to high***.

Based on the ratings for **visibility, number of viewers**, and **duration of view, overall viewer exposure** for KOP 9 is considered ***moderate to high***.

The **visual quality** at KOP 9 is characterized as ***moderate***. Viewer concern is characterized as ***high***. Based on the ratings for **visual quality, viewer concern**, and **overall viewer exposure, overall visual sensitivity** for KOP 9 is considered ***moderate to high***.

DIRECT AND INDIRECT IMPACTS AND MITIGATION MEASURES

This assessment of impacts on visual resources examines and addresses impacts that would occur from construction and operation of the power plant components at the RBEP site. Due to the multi-year construction periods for the proposed project, impacts on visual resources from construction activities are considered to be long term rather than temporary.

Section 5.13.2.5 of the AFC, “Impact Significance,” states that, “The proposed project would not substantially degrade the existing visual character of the project site and its surroundings”, and further, “The existing visual quality of the project area would be improved in all views, due to the removal of the Redondo Beach Generating Station and/or the placement of the smaller RBEP in a location that substantially reduces its prominence in views.” Staff disagrees with the applicant’s assessments that the RBEP, as proposed, would not substantially degrade the existing visual character of its surroundings, and that the project area would be improved in all views.

As discussed under KOP Visual Sensitivity, the RBGS visually degrades the project site and its coastal surroundings. As will be discussed in the following sections, the RBEP represents a general improvement in visual quality in comparison to the baseline (existing) condition; however, the shifting of the power plant footprint from the west side of the project site to its northeast area would degrade views from viewpoints to the east, north, and potentially south of the site. While the massing and height of the RBEP structures would be smaller in scale and visual prominence than those of the existing structures, the shifting of the project footprint places the new structures in an area where currently there is none, and thus introduces or intensifies visual impacts where currently they either do not exist or are less intense.

Section 5.13.4 of the AFC, “Mitigation Measures,” concludes that no mitigation measures are required for the proposed project because it “…would not degrade the existing visual character and quality of the site, and would not create a new source of substantial light and glare that would adversely affect day or nighttime views in the area.” But as staff indicated above, the shifting of the power plant footprint from the west side of the site to its northeast area creates new visual impacts, including those created by light and glare, to sensitive viewers to the east and north. These impacts require mitigation to reduce or avoid their severity on the viewers in those areas.

Visual Change for the KOPs

The discussion above under the subsection, “Steps in the KOP Analysis,” summarizes the process to determine impact significance. **VR Appendix-2** shows the KOP evaluation matrix summarizing the process to determine the visual impacts conclusions described below.

KOP 1 – View from Moonstone Park in King Harbor Marina (with proposed power plant)

The visual simulation for KOP 1 shows the RBEP as it would appear at the end of demolition and construction activities for viewers at Moonstone Park and in the vicinity of the Marina (VR Figure 3b, simulated view). In the left portion of the view, beyond the park and boat slips, is the Whaling Wall in its new location in the northeast area of the project site. Just beyond the Whaling Wall are the three new RBEP exhaust stacks (refer to VR Table 1 for the dimensions of the RBEP structures). The uppermost portions of the 140-foot tall stacks are visible among the palm trees located in the Marina and on N. Harbor Drive. No other RBEP structures are visible in this view, as the Whaling Wall would screen all of the other power block components of the project site from this viewpoint (such as the HRSG and CGT Turbine Hall Enclosures, the Air-Cooled Condenser, the STG Enclosure, and the Transformer Walls). From this angle, the new stacks appear clustered together; this is because the stack locations would be oriented from east to west, whereas the RBGS stacks were built along a north-south orientation and are fully visible across the field of view from this viewpoint. In the right portion of the photograph, also beyond the park and boat slips, are the commercial buildings located along N. Catalina Avenue that are currently blocked from view by the existing RBGS structures. In the distant background beyond the commercial buildings are residential areas situated along the uppermost edge of the bowl-shaped area to the east of the project site.

From KOP 1, the RBEP structures would not substantially contrast with the relatively low-scale coastal development, unlike the existing RBGS structures. The stacks would be visible from this viewpoint, as they would extend higher than the 95-foot tall Whaling Wall; however, their height would be much lower than the existing, 200-foot tall stacks, and their closer, built arrangement from this angle reduces their profile. In addition, the new stacks would be partially screened by the array of palm trees in the Marina area. The new stacks may be seen from KOP 1 but would not attract attention. Overall, the degree of visual **contrast** that would be created by the new power plant exhaust stacks compared to existing conditions is considered ***low***.

Unlike the existing power plant, the RBEP stacks would not dominate eastward views from the Marina. The smaller and fewer RBEP stacks would occupy a smaller proportion of the field of view from KOP 1 than the existing structures, and their overall scale appears to be more congruous with the other visible, built features in the landscape. From this viewpoint, the right side of the view opens and the adjacent commercial and residential areas to the east are visible, and also a greater proportion of the sky can be seen. Compared to existing conditions, **view dominance** and view **blockage** in the field of view are considered ***low*.**

The overall visual change is typically based on an average of the values for ***contrast*, *dominance***, and ***view blockage***. Although overall visually sensitivity for KOP 1 is considered ***moderate***, the overall visual change for the proposed RBEP compared to existing conditions is ***low***. From this viewpoint, demolishing the RBGS structures and replacing them with the fewer and smaller structures of the RBEP would change the visual resource conditions to a substantial degree. For the other viewpoints in the Marina that were previously discussed under KOP 1, the degree of visual contrast, dominance, and view blockage presented by the RBEP is similar for those viewpoints, because the new stacks and other major components of the RBEP would be fewer and smaller than the existing structures; they would be located further away from N. Harbor Drive (approximately 450 to 500 feet); and they would be more effectively screened by the Whaling Wall, as only the new stacks extend higher than the wall. Compared to the existing conditions, implementation of the RBEP would not substantially degrade the existing visual character or quality of the site and its surroundings for views at or near KOP 1, and the impact is considered less than significant.

KOP 2 – View from Seaside Lagoon (with proposed power plant)

The visual simulation for KOP 2 shows the RBEP as it would appear for a viewer in the vicinity of Seaside Lagoon (**VR Figure 4b**, simulated view). The right side of the photograph shows only a small portion of the uppermost top of one of the new stacks, with its neutral gray/tan finish noticeable beyond the palm trees and other landscaping of the Marina and N. Harbor Drive. The other two stacks appear to be screened by the trees. The Whaling Wall is noticeably smaller in this view than in the existing view, as it would be located further away from the viewpoint (approximately one-third of a mile compared to one-quarter of a mile), but it would still be observable by the viewer. From this viewpoint, the area to the east now appears more open, and a greater portion of the sky is visible. No other visual changes to the landscape appear in this view.

From KOP 2, the RBEP stacks would not contrast with the relatively low-scale coastal development and open areas of the Marina, unlike the existing RBGS structures. Although one stack, and potentially all three stacks, would be visible from the vicinity of this viewpoint, they would not be very noticeable due to their greater distance from the viewer and because of their reduced dimensions, as compared to the existing power plant structures. The visual effect of the RBEP stacks would not be similar to the effect of the existing RBGS; the new stacks may be seen from KOP 2 but would not attract as much attention. Overall, the degree of visual contrast that would be created by the new power plant stacks compared to existing conditions is considered *low*.

The visual simulation for KOP 2 depicts a decrease in the height, bulk, and massing of the structures at the project site, and the proportion of the total field of view occupied by the RBEP structures is substantially less than that of the existing structures. The new structures would not dominate the landscape from this viewpoint due to several factors: their reduced scale, their distance from the viewer, and the screening provided by the Whaling Wall and existing landscaping in and adjacent to the Marina; therefore, the level of **dominance** by the RBEP structures is considered ***low***. And compared to the existing RBGS, the new power plant structures of the RBEP would create a ***low*** degree of **view blockage**.

For KOP 2, although the overall visual sensitivity is considered ***moderate to high***, the overall visual change for the proposed RBEP compared to existing conditions is ***low***. Compared to the existing conditions, implementation of the RBEP would not substantially degrade the existing visual character or quality of the site and its surroundings for views at or near KOP 2, and the impact is considered l**ess than significant**.

KOP 3 – View from Redondo Beach Pier (with proposed power plant)

The visual simulation for KOP 3 shows the RBEP as it would appear for a viewer on Redondo Beach Pier, as well from areas adjacent to the Pier, such as Veterans Park (**VR Figure 5b,** simulated view). The center of the photograph shows the upper portions of the three new stacks beyond the palm trees, landscaping, and commercial buildings of the Marina. From this angle, the stacks do not appear clustered and are shown in their east-west orientation. A very small portion of the HRSG enclosure is shown in front of the stacks. In this view, the stacks appear approximately the same height as the adjacent Crowne Plaza Hotel, and some of the palm trees in the foreground appear taller than the stacks. A glimpse of the Whaling Wall is shown to the left of the stacks, just beyond the existing palm trees. As with KOPs 1 and 2, the Whaling Wall is noticeably smaller from this viewpoint, as it would be located further away from its current location (approximately three-quarters of a mile compared to just over one-half mile), and it appears hardly observable from this viewpoint. From Veterans Park, located southeast of KOP 3, the new structures would appear smaller and less visible. From KOP 3 the area to the west of the project site (roughly the center of the view) appears more open, and a greater portion of the sky is visible. No other visual changes to the landscape appear in this view.

From KOP 3, the RBEP stacks would not contrast with the relatively low-scale coastal development and open areas of the Marina, unlike the existing RBGS structures. Although the three stacks and small portions of the power block would be visible from the vicinity of this viewpoint, they would not be very noticeable due to their greater distance from the viewer and because of their smaller dimensions, as compared to the existing power plant structures. The visual effect of the RBEP stacks would not be similar to the effect of the existing RBGS. The new power plant structures may be seen from KOP 3 but would not attract attention. Overall, the degree of visual **contrast** that would be created by the RBEP structures compared to existing conditions is considered ***low*.**

The visual simulation for KOP 3 depicts a decrease in the height, bulk, and massing of the structures at the RBEP site, and the proportion of the total field of view occupied by the RBEP structures is substantially less than that of the existing structures. The new structures would not dominate the landscape due to their reduced scale, their distance from the viewer, and the screening provided by the Whaling Wall and existing landscaping in and adjacent to the Marina; therefore, the level of **dominance** by the RBEP structures is considered ***low*.** And compared to the existing RBGS, the new power plant structures of the RBEP would create a ***low*** degree of **view blockage**.

For KOP 3, although the overall **visual sensitivity** is considered ***high*,** the overall **visual change** for the proposed RBEP compared to existing condition is ***low*.** Compared to the existing condition, implementation of the RBEP would improve the visual character and quality of the site and its surroundings for views at or near KOP 3; therefore, the **impact** is considered **less than significant**.

KOP 4 – View from Hermosa Beach Pier (with proposed power plant)

The visual simulation for KOP 4 shows the RBEP as it would appear for viewers on Hermosa Beach Pier and in areas adjacent to the pier, such as Pier Avenue and Hermosa Beach (**VR Figure 6b**, simulated view). The proposed RBEP is shown to the center-left of the simulated view, whereas the existing power plant is shown to the center-right of the existing condition view. The simulated view depicts the upper portions of all three, neutral gray RBEP stacks and a portion of the HRSG enclosure. The Whaling Wall is shown to the right of the power block. This view begins to illustrate the visual accessibility from the north of the unscreened areas of the new facilities, as the

Whaling Wall, which wraps around a portion of the north side of the power block from west to east, screens a portion of this side of the power block. Also depicted is one of seven palm trees planted in a row in front of the wall extension, as reflected in the proposed Landscape Concept Plan (**VR Figure 6c**). All proposed landscaping in the simulated views is shown as it would appear after 5 years of growth (AES Southland Development 2012). As shown in the view, the new RBEP structures are smaller in overall scale than the RBGS structures; however, the RBEP remains visible and would attract attention.

Like the existing power plant, the color, height, and forms of the new RBEP structures, which would be visible from KOP 4 for the reasons stated above, would contrast with the relatively low-scale, beach-style structures of the coast, although they would do so to a much lesser degree than the RBGS. The level of visual contrast created by the existing power plant to the surrounding coastal environment would be improved with implementation of the new RBEP because of its reduced scale. The degree of visual **contrast** that would be created by the proposed project at the project site compared to existing conditions is considered ***moderate***.

The visual simulation for KOP 4 depicts an overall decrease in the height, bulk, and massing of the new structures at the RBEP site, as compared to the existing conditions, and the proportion of the total field of view occupied by the new facilities appear to be less than that of the existing structures. The new structures would be conspicuous, and they would dominate the landscape, but because of their reduced scale and distance from the viewer, they would do so to a much lesser degree than the existing structures. The proposed palm trees would do little to screen the RBEP structures, and only the wall extension is effective in screening views of the power block. But at this distance, it would be difficult to distinguish between the wall extension and the power block, as the former would be similar in color and finish to the structures it screens. Compared to existing conditions, **view dominance** is considered ***low to moderate***. And compared to the existing RBGS, the new structures of the RBEP would create a ***low*** degree of **view blockage.**

For KOP 4, although the **overall visual sensitivity** is considered ***moderate to high***, the **overall visual change** for the proposed RBEP compared to existing conditions is ***low to moderate***. Compared to the existing conditions, implementation of the RBEP would not substantially degrade the existing visual character or quality of the site and its surroundings for views at or near KOP 4, and the impact is considered less than significant.

KOP 5 – View from Herondo Street at Valley Drive (with proposed power plant)

The visual simulation for KOP 5 shows the RBEP as it would appear for viewers in the vicinity of this intersection looking south, particularly from the north side of Herondo Street (**VR Figure 7b**, simulated view). The RBEP power block is shown in the center of the view, beyond the mini-storage facility and the transmission line towers. The RBEP structures depicted in the view, from front to back, include the ACC, the HRSG/CGT enclosures, and the three stacks. In the simulated view, the structures are shown with a neutral tan finish. Also depicted is one of the three proposed tall palm trees planted in a cluster at 25-foot intervals at the east edge of the project site, as reflected in the proposed Landscape Concept Plan (VR Figure 6c). The proposed palm tree is located just to the left of the transmission line towers, beyond the existing trees and mini-storage facility on N. Francisca Avenue. From this viewpoint, the upper portions of the north side of the power block and the three new stacks are clearly visible; they would be situated directly in the sightline of southward views and would have no screening. As discussed under KOP 4 (proposed condition), the proposed wall extension from the Whaling Wall would not screen the power block from all viewpoints to the north. Compared to the existing condition, the new power block structures would appear similar in height to the existing RBGS stacks, which are further away from the viewpoint.

The visual simulation for KOP 5 illustrates the proposed change in the arrangement and massing of structures at the power plant site. Under the proposed RBEP, the power block would be constructed in the northeast area of the project site, in the current location of the decommissioned fuel oil tank storage areas. The existing RBGS structures are situated along the west side of the project site, as shown in the right portion of the KOP 5 existing view (**VR Figure 7a**). The new RBEP structures would fill an area of space at the project site that currently has no vertical structures. As shown in the visual simulation for KOP 5, the new RBEP structures, combined with the existing transmission line towers, would contrast with the buildings of the surrounding environment; their massive, industrial-like vertical elements, blocky forms, and immense, flat, metallic surfaces would not be congruous with the relatively low-scale commercial development in the area. Because of its relatively large scale and close proximity to the viewpoint, the RBEP would have a visual effect on nearby sensitive viewers. Compared to the existing condition, the **visual contrast** created by the proposed RBEP power plant structures at the project site is considered ***moderate to high***.

As shown in the simulated view for KOP 5, compared to the existing condition, the new structures would occupy a similar proportion of the field of view. The new structures, although fewer in number and not as tall and massive as the existing structures, appear prominently in the simulated view, and they would be conspicuous to sensitive viewers with southward views in the vicinity of KOP 5, such as viewers in the adjacent residential buildings along Herondo Street and Valley Drive. As proposed, the RBEP would demand attention and be dominant in the landscape. The degree of **visual dominance** of the proposed project compared to the existing condition is considered ***moderate.***

The simulation view for KOP 5 shows that from this viewpoint, similar to the existing condition, there would be no views of the ocean, and the new structures would not block views of any notable natural features. However, from the upper-level stories of south-facing residential buildings in the vicinity of KOP 5, views of the Rancho Palos Verdes hills to the south would be partially blocked by the new structures, while views to the southwest from these buildings may become more open. The location of the new structures at the project site and removal of the RBGS power block structures would allow for greater visual accessibility to the ocean and the Marina/King Harbor from the upper levels of these buildings. From street level, the proportion of sky appears to remain the same as with the existing condition. Overall, implementation of the RBEP would create a *low to moderate* degree of view blockage.

Overall visual sensitivity for KOP 5 is considered ***moderate to high***. The **overall visual change** for the proposed RBEP compared to existing conditions with implementation of the project is ***moderate***. Compared to existing condition, the proposed RBEP would degrade the existing visual character and quality of the site and its surroundings for views at or near KOP 5, and the **impact** is considered **potentially significant.**

KOP 6 – View of entrance to King Harbor from Pacific Coast Highway (with proposed power plant)

The visual simulation for KOP 6 shows the RBEP as it would appear for viewers in the vicinity of the intersection looking west, particularly from the north side of Herondo/Anita streets (**VR Figure 8b**, simulated view). The RBEP project site is shown in the center of the view, beyond the intersection and SCE transmission line corridor. The RBEP structures depicted in the view, from left to right, include the HRSG/CGT enclosures, one stack (the other two stacks are obscured by existing landscaping located at the intersection), the ACC, and the backside of the Whaling Wall extension on this side of the power block. In the simulated view, the structures are shown in neutral tan/light gray colors. Further to the right is a cluster of service water tanks, the tallest of which is an existing 48-foot tall water tank that will remain on the site. The existing onsite SCE 230-kV switchyard and its gray, 60-foot tall A-Frame tower structure is visible beyond the water tanks. Beyond the water tanks and switchyard tower is a row of 12 palm trees to supplement the street planting along N. Harbor Drive (on the west side of the project site), as reflected in the proposed Landscape Concept Plan (**VR Figure 6c**). From this viewpoint, the RBEP would be highly visible.

The visual simulation for KOP 6 illustrates the proposed RBEP structures as they would appear to viewers to the east of the project site – unscreened by the Whaling Wall, wall extensions, or new landscaping. The visual simulation shows that, from this viewpoint, compared to the existing condition, the RBEP structures would be overall smaller in scale and less intricate; however, they would be closer to the viewer, adjacent commercial uses, and the King Harbor entry monument sign than the existing RBGS facilities. From this viewpoint, the new large, blocky, industrial-like structures would contrast with the surrounding area. Compared to the existing condition, the **visual contrast** that would result from the proposed RBEP structures at the project site is considered ***moderate*.**

As shown in the simulated view for KOP 6, compared to the existing condition, the overall smaller, fewer, and more compactly arranged structures at the RBEP site would occupy a smaller proportion of the field of view. In addition, the approximately 25-foot drop in elevation adjacent to the east side of the project site helps to reduce the perceived height of the structures from this viewpoint, as the lower portions of the structures are not visible. In spite of these factors, the RBEP appears prominently in the simulated view, and, as with the existing facilities, they would be conspicuous to sensitive viewers with westward views in the vicinity of KOP 6. As proposed, the RBEP would attract attention and be dominant in the landscape. The degree of **visual dominance** of the proposed project compared to the existing condition is considered ***moderate*.**

The simulation view for KOP 6 shows that from this viewpoint, the ocean would be more visually accessible, as compared to the existing condition, due to the overall smaller, more compact RBEP; however, overall, implementation of the RBEP would result in a ***moderate*** degree of **view blockage**.

Overall visual sensitivity for KOP 6 is considered *moderate*. The **overall visual change** for the proposed RBEP compared to existing conditions with implementation of the project is ***moderate.*** Compared to existing condition, the proposed RBEP would not degrade the existing visual character and quality of the site and its surroundings for views at or near KOP 6, and the **impact** is considered **less than significant**.

KOP 7 – View from Anita Street at Paulina Avenue (with proposed power plant)

The visual simulation for KOP 7 shows the RBEP as it would appear for viewers in the vicinity of the intersection looking west, particularly from the north side of Anita Street (**VR Figure 9b**, simulated view). It would also appear similarly to viewers at other viewpoints east of the project site (i.e., in the bowl-shaped area) and situated at the same or similar elevation as KOP 7. The RBEP project site is shown in the center-right portion of the view. The RBEP structures depicted in the view, from left to right, include the HRSG/CGT enclosures, three stacks (one partially obscured by a transmission line tower), the top of the STG enclosure, and the ACC. Beyond the RBEP structures is the backside of the Whaling Wall, and the wall extensions are shown to the left of the HRSG/CGT enclosures and to the right of the ACC. Further to the right is the cluster of service water tanks. The RBEP structures are shown with a neutral gray-tan finish. The proposed palm trees are depicted: to the left of the HRSG/CGT enclosures; to the left of the stacks; in front of the ACC; and to the right of the wall extension on the right side of the view. The palm trees proposed to be installed on N. Harbor Drive are shown beyond the service water tanks and the transmission line towers in the far right side of the simulation.

The visual simulation for KOP 7 illustrates the overall mass and visual prominence of the RBEP structures. The large, blocky, industrial-like HRSG/CGT enclosures and ACC would be unscreened and visible from this KOP and other similarly elevated viewpoints south of Anita Street. In addition, the transmission lines and towers would remain highly visible. Although the new RBEP structures would be smaller in scale than those of the existing power plant, and its main power-generating facilities would be enclosed, the overall level of visual **contrast** would not substantially change. Compared to the existing condition, the visual contrast that would result from the proposed RBEP structures is considered ***low to moderate***.

As shown in the simulated view for KOP 7, compared to the existing condition, the overall smaller, fewer, and more compactly arranged structures at the RBEP site would occupy a smaller proportion of the field of view. However, the RBEP structures appear prominently in the simulated view, and they would be conspicuous to sensitive viewers with westward views. From this elevation, only the lowest portions of the proposed structures are not visible from this viewpoint. As proposed, the RBEP would be conspicuous and dominant in the landscape; however, the degree of **visual dominance** of the proposed project compared to the existing condition is considered ***moderate.***

The simulation view for KOP 7 shows that from this viewpoint, the ocean would be more visually accessible, as compared to the existing condition, due to the smaller, more compact RBEP. Overall, implementation of the RBEP would create a ***low*** degree of **view blockage**.

Overall visual sensitivity for KOP 7 is considered ***moderate to high***. The **overall visual change** for the proposed RBEP compared to existing conditions with implementation of the project is ***low to moderate***. Compared to existing condition, the proposed RBEP would not degrade the existing visual character and quality of the site and its surroundings for views at or near KOP 7, and the **impact** is considered **less than significant.**

KOP 8 – View from N. Catalina Avenue at N. Francisca Avenue (with proposed power plant)

The visual simulation for KOP 8 shows the RBEP as it would appear for viewers in the vicinity of the intersection looking north, particularly from N. Francisca Avenue (**VR Figure 10b**, simulated view). The RBEP power block is shown in the center of the view, beyond the ITC building on the left, the upper portion of the mini-storage facility in the center-left, and the Cannery Row Studios and the Greenstreet Center in the center-right. In this view, the mini-storage facility appears much lower than the viewpoint; this is due to the abrupt change in elevation that occurs along this portion of the east side of the project site. The RBEP structures depicted in the view, from left to right, include the HRSG/CGT enclosures, two of the three stacks, and the ACC. In the simulated view, the structures are shown with a neutral gray-tan finish. From this viewpoint, the upper portions of the east side of the power block and the new stacks are clearly visible; they would be situated directly in the sightline of northward views and would have no screening.

The visual simulation for KOP 8 illustrates the visual disharmony between the existing built commercial structures and residential buildings in the vicinity of the viewpoint. Although the new power plant structures would be smaller in scale than those of the existing condition, they would be placed in an area of the project site where no buildings currently exist, creating a substantial change in the level of contrast between the RBEP's structures and the adjacent commercial and residential buildings. The visual disharmony and relatively large scale of the RBEP structures would result in an acute visual effect for its viewers. Compared to the existing condition, the **visual contrast** that would result from the proposed RBEP structures at the project site is considered ***high*****.**

As shown in the simulated view for KOP 8, compared to the existing condition, the proposed RBEP structures would occupy a greater proportion of the field of view. Although the lower portions of the project site are not visible from this viewpoint due to the elevation change, large portions of the hall enclosures and stacks would be visible. From this angle, two of the new stacks would be visible, and one stack would be slightly taller than the ITC commercial building to the left. In the center-right of the simulated view, the area under construction was recently completed as a surface parking area for the Greenstreet Center project. A screening wall was constructed at the back of the parking area, along the east side (facing the viewer) of Cannery Row Studios (the wall's steel posts are shown in the simulated view, giving a sense of the height of the screening wall). The screening wall blocks a small portion of the RBEP's hall enclosure. Overall, the RBEP structures would be noticeable to sensitive viewers with northward views. From this viewpoint, the RBEP would attract attention and be dominant in the landscape. The degree of **visual dominance** of the proposed project compared to the existing condition is considered ***moderate***.

The simulation view for KOP 8 shows that from this viewpoint, no view blockage would occur with implementation of the RBEP. From further south on N. Francisca Avenue, where residential buildings are located at a higher elevation, the limited view of the ocean available to viewers here would be blocked. However, with the removal of the RBGS structures, a greater view of the ocean would be opened to viewers in the upper levels of the residential buildings. Overall, implementation of the RBEP would create a ***low to moderate*** degree of **view blockage**.

Overall visual sensitivity for KOP 8 is considered ***moderate to high***. The **overall visual change** for the proposed RBEP compared to existing conditions with implementation of the project is ***moderate***. Compared to existing condition, the proposed RBEP would degrade the existing visual character and quality of the site and its surroundings for views at or near KOP 8, and the impact is considered potentially significant.

KOP 9 – View from N. Catalina Avenue at Beryl Street (with proposed power plant)

The visual simulation for KOP 9 shows the RBEP as it would appear for viewers in the vicinity of the intersection looking north (**VR Figure 11b**, simulated view). The new structures of the RBEP are shown in the center-right portion of the view, between the Salvation Army senior residence center and the ITC parking structure, and beyond both the existing and proposed landscaping. In the simulated view, the structures are shown with a neutral gray-tan finish. The view also depicts proposed palm trees, which are shown between the power block and the existing palm and broad canopy trees located adjacent to the fence along the south portion of the project site. According to the proposed Landscape Concept Plan (VR Figure 6c), "six tall trees (palm)" would be planted at 50-foot intervals along the south side of the power block. The palm trees would be installed between the Whaling Wall extension, which partially wraps around the south side of power block from west to east (not visible in this view), and the eastern edge of the project site. The simulated view illustrates that the existing landscaping is more effective than the palm trees in screening the power block structures. From this viewpoint, the south side of the power block and the three new stacks are visible; they would be situated directly in the sightline of northward views. At this distance, the power block is similar in height to the adjacent parking structure, while the stacks rise clearly above the height of the structure.

As shown in the visual simulation for KOP 9, the new RBEP structures would contrast with the buildings of the surrounding environment; their vertical elements, blocky forms, and immense, flat surfaces would not be compatible with the forms of the relatively low-scale development in the area. The degree of **visual contrast** of the proposed project compared to the existing condition is considered ***moderate to high***.

The new RBEP structures would occupy a proportion of the field of view similar to or greater than that of the existing condition. The new structures, while not as tall and massive as the existing structures, still appear prominently in the simulated view, and they would be conspicuous to sensitive viewers with northward views in the vicinity of KOP 9, such as viewers at the Salvation Army Senior Residence Center, the Crowne Plaza Hotel, and in adjacent residential areas. From the viewpoint at KOP 9, the RBEP would be conspicuous in the landscape. The degree of **visual dominance** of the proposed project compared to the existing condition is considered ***moderate to high*.**

The simulation view for KOP 9 shows that from this viewpoint, similar to the existing condition, there would be no views of the ocean, and the new structures would not block views of any notable natural features. With the removal of the RBGS structures and construction of the new power block in the northeast part of the project site, a greater degree of visual accessibility to the ocean would be provided from the upper-level stories of west- and northwest-facing buildings and exterior spaces in the area. From the street level, the proportion of sky appears to remain the same, as compared to the existing condition. Overall, implementation of the RBEP would create a ***low to moderate*** degree of **view blockage**.

Overall visual sensitivity for KOP 9 is considered ***moderate to high***. The **overall visual change** for the proposed RBEP compared to existing conditions with implementation of the project is ***moderate***. Compared to existing conditions, the proposed RBEP would degrade the existing visual character and quality of the site and its surroundings for views at or near KOP 9, and the **impact** is considered **potentially significant.**

PROJECT DEMOLITION AND CONSTRUCTION

Construction Overview

Demolition and construction activities at the RBEP project site would last 60 months, commencing during the first quarter of 2016 and running continuously through the fourth quarter of 2020.

Two large areas totaling approximately 17 acres located wholly on the approximately 50-acre project site would be used for construction laydown, storage, and parking. One area (6.5 acres) is located along the north side of the project site, which currently serves parking and ancillary uses, and is adjacent to Herondo Street. The second area (10.25 acres) is located south and southwest sides of the site, which currently is occupied by the abandoned fuel oil storage tanks, and is adjacent to N. Catalina Avenue and the ITC, Salvation Army, and Sunrise hotel properties. The construction of the proposed above-ground facilities would primarily take place on 10.5 acres of the northeast portion of the site. Access to the site during demolition and construction activities would generally be from Herondo Street. **VR Figure 2** delineates the construction laydown/parking and new construction areas. Demolition and construction activities would primarily take place during daylight hours, with the possibility of construction activities sometimes taking place at night to comply with scheduling requirements or to complete critical construction activities.

The existing eight-foot masonry wall and landscaping located along the northern edge of the project site would provide some visual screening to buffer views from the north of the laydown/parking areas.

The Whaling Wall, which screens the lower portions of the unit housing structure for Units 5-8, and the portion of the unit housing structure for Units 1-4 would temporarily remain in place to provide visual screening to buffer views from the west of demolition and construction activities; however, no existing or proposed visual screening would buffer views during the demolition of the unit housing structure for Units 1-4, which would occur in 2020. In 2019, the Whaling Wall would be permanently relocated to screen the west side of the new power block, but views of the demolition site of Units 5-8 and the laydown/parking area from the southwest would be screened by the relatively dense landscaping along the southwest edge of the project site.

Little or no existing or proposed visual screening would buffer views from the south and the east, and particularly from the upper portions of the bowl-shaped area.

The following section discusses the effects of the construction and demolition impacts on visual resources, particularly sensitive viewer groups (primarily residents and recreationists) at the closest viewing distances to the project site.

Construction-Related Effects

The existing masonry wall and landscaping along the north side of the site would visually screen the 6.5-acre laydown/parking area and the demolition and construction area from viewers north of the site, but mostly from street level. Viewer groups in the upper levels of the adjacent residential buildings to the north would have a moderate to high degree of visibility of the demolition and construction activities at the project site.

The Whaling Wall and the housing unit structure for Units 1-4 would buffer views from the west. The Whaling Wall would be disassembled and relocated concurrently with the demolition of Units 5-8, but views of the demolition site and the laydown/parking area from the southwest would be screened by the relatively dense landscaping along the southwest edge of the project site; therefore, viewer groups in the southwest area of the King Harbor Marina would have a low to moderate degree of visibility of the demolition and construction activities.

The demolition area of Units 1-4 would be visible to viewers west of the project site once the administration building and the structure housing Units 1-4, which temporarily remained standing to visually screen this area of the site, are finally demolished. The northwest edge of the site has no visual screening to buffer views from the west, and viewer groups in the in the northwest portion of King Harbor Marina would have a high degree of visibility of the demolition activities.

The approximately ten-acre laydown/parking area in the southern portion of the site would create a visual impact on viewers located to the south and southeast. The existing, mature trees in this area of the site, in addition to existing landscaping along N. Catalina Avenue, would provide some visual buffering from street level, but sightlines toward the site from the upper levels of nearby buildings (such as the Salvation Army Senior Residence Center) would allow for greater visibility of not only the laydown/parking area, but also the demolition and construction areas; therefore viewer groups in the adjacent buildings to the south would have a high degree of visibility of the demolition and construction activities at the project site.

With little or no visual screening to buffer views from the east of the laydown/parking and primary construction areas of the project site, viewer groups in the adjacent residential areas to the east would have a high degree of visibility of the demolition and construction activities.

The intensity of the long-term construction and demolition impact on visual resources would be greatest for the viewer groups located to the north, northwest, east, and south of the project site. For the viewer groups southwest of the project site, the impact would be less acute, but they still would be perceptible. The presence and movement of heavy construction equipment and vehicles, large-scale construction and demolition work, and generation of dust over an approximately five-year construction time frame at the project site is considered a significant visual impact of the proposed project. The long-term construction time frame could impact the ground surface of the project site from movement of heavy equipment and temporary storage of construction materials. Existing landscaped areas, mature trees, and the ground surface of the site that would not be permanently impacted by operation of the RBEP could be damaged or destroyed during project construction. Construction impacts at the RBEP site would cause substantial degradation of the existing visual character of the site and its surroundings, and the impact is considered **significant.**

Staff proposes Condition of Certification **VIS-1** to require preparation and implementation of a Demolition, Construction, and Commissioning Screening Plan to screen demolition, construction, and commissioning activities at the project site, including all construction, laydown, and parking areas, from public views. Implementation of **VIS-1** would reduce construction-related impacts to visual resources at the project site to less than significant.

Although the purpose of screening fencing is to reduce or block views of demolition and construction sites and parking areas, the screening material could either be decorative and visually attractive or blend somewhat with the surrounding environment. Types of possible screening fencing include unobtrusive designs of dark green or other relatively neutral colors. Other options include mesh vinyl material printed with outdoor images (e.g., a beach and palm tree scene).

RBEP Lighting

Overview of Project Lighting

Project Construction

Section 2.2.2.9 of the AFC, "Construction Lighting," summarizes lighting requirements for night construction and commissioning activities. According to the AFC, most construction activities would occur during daytime hours, although additional hours may be necessary to make-up schedule deficiencies or complete critical and task-specific work. During some construction periods and the project commissioning/startup phase, the AFC states that work would continue 24 hours per day, seven days per week. The AFC indicates that nighttime construction and commissioning lighting would be, to the extent possible, shielded and directed toward the center of the site where construction activities would occur to prevent light from straying off-site, and that task-specific lighting would be used to the extent practical and in compliance with worker safety regulations (AES Southland Development 2012). The AFC also states, "Despite these measures, there may be limited times during the construction/commissioning period when the project site may appear as a brightly lit area as seen in close views and from distant hillside residential areas" (AES Southland Development 2012).

Project Operation

Section 5.13.2.3.5 of the AFC, "Lighting," points out that the RBEP may be operated 24 hours per day, seven days per week and would require night lighting for safety and security. The proposed lighting would provide illumination for operation under normal conditions, for safety under emergency conditions, and for egress under emergency conditions. To reduce off-site lighting impacts, the AFC states that lighting at the facility would be restricted to areas required for safety and operation, and that exterior lights would be hooded and directed on-site to minimize significant light or glare. In addition, low-pressure sodium laps and non-glare fixtures would be installed, and "switched lighting circuits" would be provided for areas where continuous illumination is not required for safety or normal operation to minimize the amount of lighting potentially visible off-site (AES Southland Development 2012).

Section 5.13.2.4.6 of the AFC, "Light and Glare," states that the red lights required by the Federal Aviation Administration (FAA) for aircraft safety, which are currently atop the existing RBGS stacks, would be replaced by red FAA aviation safety lights on the proposed shorter and fewer stacks. A marina navigation beacon atop one of the RBGS units would be removed and relocated (although its proposed location has not been determined). And the lighted catwalks along the boilers for worker safety would be eliminated. Lighting would be placed in open areas on the site, mounted to buildings, and affixed to the HRSG stacks (AES Southland Development 2012).

Light and Glare Effects

Project Construction

Although lighting of construction worker parking areas is not discussed in the AFC, staff assumes that security lighting of the construction and laydown parking areas shown on **VR Figure 2** would be necessary. Although the applicant states that nighttime construction lighting would be shielded and directed toward the activities to the extent feasible, and that task-specific lighting would be used to the extent practical, no further details are provided (e.g., a process requiring the project owner to respond to a construction-related lighting complaint). Based on the applicant's summary of construction lighting, staff concludes that long-term lighting for demolition, construction, and commissioning activities would create a new source of substantial light or glare that would adversely affect nighttime views in the area. Staff proposes Condition of Certification **VIS-2** to require measures to minimize the potential impacts of lighting for demolition, construction, and commissioning work. Implementation of **VIS-2** would reduce construction lighting impacts to less than significant.

Project Operation

To restrict off-site light and glare effects, lighted areas not used on a regular basis would be provided with switches or motion detectors to operate lights when necessary, and all lighting would have non-glare, shielded fixtures placed in and directed toward only those areas where illumination is needed. In addition, the red FAA aviation safety lights would be fewer in number and situated atop shorter HRSG stacks, and the elevated, boiler catwalk lighting would be eliminated from the site.

The applicant briefly describes project operations lighting in the AFC and concludes that there would likely be a reduction in ambient lighting conditions in the area surrounding the project site, and that night lighting effects of the RBEP would be considerably less than those of the RBGS. But staff is unclear as to the extent of the proposed lighting and little detail is provided in the AFC (e.g., the number, locations, and height of the light fixtures). Although the proposed power facility would be smaller in scale in comparison to the RBGS, operation of the RBEP in the northeast portion of the project site would introduce new lighting sources where there are no power generating facilities (with the exception of the existing switchyard). Staff concludes that permanent RBEP lighting would create a new source of substantial light or glare that would adversely affect nighttime views in the area. Staff proposes Condition of Certification **VIS-3** to require preparation and implementation of a comprehensive Lighting Management Plan for the RBEP to reduce the potential impacts of project operations lighting to less than significant.

The applicant has not proposed any measures requiring surface treatments to minimize glare from project structure surfaces. As proposed, glare from project structure surfaces would adversely affect daytime views in the project area, and staff considers this to be a potentially significant impact of the RBEP. Staff proposes Condition of Certification **VIS-4** to require preparation and implementation of a Surface Treatment Plan to reduce the effects of glare from project surfaces to less than significant.

Visible Plumes

When a thermal power generation facility is operated at times when the ambient temperature is low and *relative humidity* is high, the warm moisture (water vapor) in the exhaust plume condenses as it mixes with the cooler ambient air, resulting in formation of a visible plume[1]. (This is similar to when the moisture-laden air in a person's breath on a cold day is chilled to the point where the water vapor condenses into lots of tiny droplets of liquid water, forming a visible cloudy fog.) Formation of visible plumes typically occurs on cool, humid days when the outdoor air is at or near *saturation*[2].

Section 5.13.2.4.7 of the AFC, "Water Vapor Plumes," states, "Based on previous experience with these kinds of systems, formation of visible plumes from the project will be an unlikely occurrence related to unusual combination of near freezing temperatures and damp conditions and that, if present, the plumes would be relatively small" (AES Southland Development 2012). Based on the RBEP's exhaust gas characteristics and ambient air conditions, staff concluded that conditions would be unlikely to cause formation of visible plumes above the project's exhaust stacks. The RBEP would not include wet cooling towers with evaporative cooling. Instead, the RBEP would use dry

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[1] Relative humidity is the percentage of the amount of water vapor in the air. The colder the air, the less water vapor it can carry.
[2] Saturated air is air containing the maximum amount of water vapor possible at a given temperature.

cooling (the ACCs) for heat rejection with no possibility of forming water vapor plumes. No impact on visual resources would occur pertaining to visible plumes.

Cumulative Impacts

Section 15130 of the CEQA Guidelines requires a discussion of cumulative impacts of a project when the project's incremental effect is *cumulatively considerable*. According to CEQA Guidelines Section 15065(a)(3), "[c]umulatively considerable means that the incremental effects of an individual project are significant when viewed in connection with the effects of past projects, the effects of other current projects, and the effects of probable future projects." Sections 15130 and 15355 of the CEQA Guidelines both stress cumulative impacts in the context of *closely related* projects and from projects *causing related impacts*. The goal of such an analysis is twofold: first, to determine whether the overall long-term impacts of all such projects would be cumulatively significant; and second, to determine whether the RBEP itself would cause a "cumulatively considerable" (and thus significant) incremental contribution to any such cumulatively significant impacts.

For this analysis, the impacts of cumulative projects (i.e., related projects) on visual resources are limited to those that could combine with the proposed project's visual resources impacts. The geographic scope of the area that could be subject to a cumulative visual effect is limited to the area very near the energy plant. This analysis addresses the incremental effects of the proposed RBEP combined with these projects (see **VR Figure 12**):

- E&B Oil Development Project
- The Shade Hotel
- Greenstreet Center

E&B Oil Development

On August 10, 1993, the Hermosa Beach City Council approved a conditional use permit (CUP) to allow development of an oil production facility on city-owned property and construction of an off-site oil pipeline. On May 8, 1990, an Environmental Impact Report (EIR) was certified by the city council along with the city's Statement of Overriding Considerations for the proposed oil development project. On February 4, 1998, the California Coastal Commission approved a Coastal Development Permit with conditions for the proposed project. As of March 2012, after several years of litigation related to the project, the project applicant (E&B Natural Resources Management Corporation) has obtained, subject to voter approval, the rights to drill and produce oil and gas from the City Maintenance Yard site (E&B Natural Resources Management Corporation 2012).

The project consists of development of an onshore drilling and production facility that would utilize directional drilling techniques to access oil and gas reserves in the offshore tidelands area and from the onshore uplands area of the city of Hermosa Beach. The project is proposed on the current site of the city's approximately 1.3-acre maintenance yard, located at 555 6th Street. The project site is bounded on the east by Valley Drive and on the south by 6th street, and it is approximately seven blocks east of the beach.

The project site would have 30 oil wells, four water injection wells, and supporting production equipment. The project also includes placement of underground oil and gas pipelines and associated meters and valve stations extending into the city of Redondo Beach and Torrance (E&B Natural Resources Management Corporation 2012). The city maintenance yard is approximately one-third of a mile north of the RBEP site.

Development of the oil and gas production facility would occur in four phases: (1) site preparation, (2) drilling and testing, (3) final design and construction, and (4) development and operations. As part of the Phase I activities, which is anticipated to occur for approximately six months, a temporary 32-foot tall sound attenuation wall and a six-foot chain link fence with green screening fabric would be installed along the perimeter of the project site, and trees and shrubs would be planted along the edges of the site abutting public streets (Valley Drive and 6th Street). As part of the Phase 2 activities, an 87-foot tall drill rig will be used to drill up to three test wells and one water disposal/injection well. Phase 2 activities would take place over approximately 12 months, although the drill rig would be removed from the site after drilling concludes during this time frame. As part of the Phase 3 activities, which is expected to last 14 months, the temporary 32-foot tall sound attenuation wall would be removed, a permanent 16-foot tall split-face block wall would be constructed around the site perimeter, final and permanent landscaping, including additional evergreen trees, shrubs, and vines, would be installed, to the satisfaction of city of Hermosa Beach requirements, and permanent lighting would be installed. As required by the CUP, lighting only for site security and operations safety would be installed and would be directed downward and shielded to avoid reflective glare, light spillage beyond the site, and illumination of the nighttime sky. Just prior to the start of Phase 4 activities, the temporary 32-foot tall sound attenuation wall would be reinstalled inside of the 16-foot tall block wall. As part of the Phase 4 activities, an 87-foot tall drill rig will be used to drill the remaining wells (up to 30 oil and gas wells and four water disposal/injection wells). The drilling of the wells is expected to last for the first 30 months of this phase, while oil development operations at the site would occur for a period of approximately 30 to 35 total years. During periods of the up to 35-year time span of Phase 4, a 110-foot tall workover rig would be present on site for up to 90 days per year for well maintenance. The rigs would be installed with the use of a large crane with a 150-boom (E&B Oil Development 2012). The workover rig would have an open truss structure, while the drill rig would be enclosed with a three-sided acoustical shield. The drill rig dimensions are as follows: top of the drill rig, including its acoustical cover, would be 7.5 feet by eight feet; mid-rig would be 11 feet by 12 feet; and the base would be 14 feet by 15 feet. The workover rig would be three feet by six feet (City of Hermosa Beach 2014).

The 2014 Draft Environmental Impact Report (DEIR) for this project concluded that the impacts to visual resources, as they relate to scenic vistas, designated scenic resources, and light and glare, created by the drill rig, workover rig, and the large crane/150-foot boom during Phases 2 and 4 would be significant and unavoidable, while the visual impacts when the rigs and crane/boom are not present during the oil and gas operations under Phases 1, 3, and the majority of 4, would be less than significant with implementation of mitigation measures (City of Hermosa Beach 2014).

The DEIR also concluded that impacts to visual resources, as they relate to scenic vistas, designated scenic resources, and light and glare, caused by construction of the pipeline component of the project during Phase 3 would be less than significant with implementation of mitigation measures (City of Hermosa Beach 2014).

There is no specific timeline for this project at this time, although if the project is approved by the voters of Hermosa Beach in the near future, an overlap in construction and drilling activities for this project and the demolition and construction activities for the RBEP may occur.

The Shade Hotel

The Shade Hotel project was originally approved by the Redondo Beach Harbor Commission on September 12, 2011, and a subsequent addendum to its Mitigated Negative Declaration and amendments to its Conditional Use Permit, Harbor Commission Design Review (including Sign Review and Landscape and Irrigation Plan Review), and Coastal Development Permit for modifications to the project were approved on October 8, 2012. The modified project added 9 guest rooms and 18,290 square feet of site area to the originally approved project (City of Redondo Beach 2012a).

Shade Hotel involves the development of a 47,520-square foot, 54-room hotel with ancillary event space including a lounge, ballroom, conference room, bar, and restaurant on 1.79 acres (78,291 square feet) of land in the Marina area. The hotel project site is located at 655 N. Harbor Drive, which is across from, and less than one-fifth of a mile southwest of, the power plant site and just east of the Marina boat docks. The site was last occupied by a 13,211-square foot restaurant. The hotel site will consist of three buildings with a maximum height of 45 feet, surface parking with 102 parking spaces, public open space characterized by decorative paving, and landscaping (City of Redondo Beach 2012a). The architectural design of the hotel, including form, bulk, mass, materials, and height, will be compatible with other coastal hotels and development in the area.

The approved project will incorporate project site lighting design and low-reflectance surface materials to avoid or reduce impacts to day or nighttime views due to light and glare, and lighting will be limited to those areas requiring light for safety or function (City of Redondo Beach 2011a). In addition, the site plan will enhance an existing public view corridor that extends westward across the site from N. Harbor Drive; the public view corridor will be widened from approximately 73 feet to approximately 84 feet, and it will be viewable from approximately 150 feet along N. Harbor Drive (City of Redondo Beach 2012a).

The 2011 Initial Environmental Study and Mitigated Negative Declaration concluded that the project would have a *less than significant* impact on scenic vista resources and the existing visual character or quality of the site and its surroundings, and that it creates *no impact* related to light or glare (City of Redondo Beach 2011a). These conclusions were unchanged by the subsequent modified project that was approved in 2012.

Demolition and construction activities at the hotel project site have begun. The project is scheduled to be completed in 2015 (Redondo Beach Hospitality Company, LLC). Given that demolition and construction activities for the proposed RBEP would not begin until 2016, staff does not foresee any construction overlap between these two projects.

Greenstreet Center

The Greenstreet Center project was ultimately approved on August 12, 2012 by the Redondo Beach Planning Commission after considering amendments on multiple occasions to the previously approved Conditional Use Permit, Planning Commission Design Review, and Coastal Development Permit (City of Redondo Beach 2012a). On August 18, 2011, the Planning Commission certified a Mitigated Negative Declaration for the project.

Greenstreet involves the development of a 15,749-square foot retail commercial shopping center, restaurant, and eco-friendly car wash on a combined 1.55 acres (67,404 square feet) of land within a commercial-zoned area. The project site is located at 901 N. Catalina Avenue, between N. Gertruda Avenue to the north and N. Francisca Avenue to the south. It is less than one-fifth of a mile east of the power plant site. The mini-storage facility is situated just west of the site, and the Cannery Row Studios abut the south edge of Greenstreet property. The ITC complex is across N. Francisca Avenue to the south. Across N. Catalina Avenue to the east is residential development. The Greenstreet site will consist of three buildings with an average height of 30 feet, outdoor plazas, 84 parking spaces, and landscaping (City of Redondo Beach 2012a). The architectural design of the shopping center buildings, including form, bulk, mass, materials, and height, will be compatible with other commercial development in the area. Greenstreet will visually improve the west side of N. Catalina between N. Gertruda Avenue and N. Francisca Avenue, as currently this area is characterized by several undeveloped and underutilized properties.

City of Redondo Beach Planning Department staff concluded that the construction of Greenstreet would not have an impact on public views to significant landmarks or scenic vistas as there are no designated public view corridors identified in the city’s general plan in the area of the project site. In addition, planning staff determined that light and glare created by the project would be typical of commercial development in the area, and that the impact was not considered significant due to the limited size of the development and the physical separation of the project from potentially impacted uses (City of Redondo Beach 2011b). As a condition of approval for the project, the Planning Department required a final exterior lighting plan for review and approval (City of Redondo Beach 2012b).

The 2011 Initial Environmental Study and Mitigated Negative Declaration concluded that the project would have *no impact* on either scenic vista or scenic highway resources, would not have a demonstrable negative aesthetic effect, and would create a *less than significant* impact related to light or glare (City of Redondo Beach 2011b). The environmental documents indicated that no significant unmitigated impacts would occur as a result of the project (City of Redondo Beach 2012b).These conclusions were unchanged by the subsequent modified project that was approved in 2012.

Construction of the Greenstreet site is near completion. Given that demolition and construction activities for the proposed RBEP would not begin until 2016, there would be no construction overlap between these two projects.

The purpose and use of the two commercial development projects described above are unrelated and smaller in scale than the RBEP, but they are being discussed here because they may produce closely related impacts to the visual character or quality of their surroundings and introduce new sources of substantial light or glare that may adversely affect views in the viewshed area of the RBEP to a level that could potentially be cumulatively considerable.

As discussed in their respective environmental and administrative documents, the Shade Hotel and Greenstreet would create new sources of light and glare that could have adverse effects on their sites and surroundings; however, both projects will incorporate site lighting features and non-reflective materials to reduce or eliminate potential significant impacts to on- and off-site sensitive viewers from light and glare; therefore, their impacts would not be considered cumulative. The proposed RBEP would also be required to incorporate and implement measures to minimize the potential significant impacts of long-term lighting associated with demolition, construction, and commissioning work. In addition, it would be required to minimize or avoid impacts related to light and glare during project operations.

The Shade Hotel and Greenstreet projects would not degrade the visual character or quality of their sites and surroundings, as their uses and architectural designs would be compatible with their respective settings within the coastal area. The Greenstreet project in particular would improve the visual quality of the N. Catalina Avenue commercial corridor, as it would entail development of a neighborhood-serving retail center of contemporary architectural design on properties that are currently either undeveloped or underutilized. In terms of the existing visual character or quality of the site and its surroundings, staff concludes that that the two commercial projects would not produce a cumulative impact, and therefore, they would not contribute to the anticipated related impact produced by the RBEP.

In terms of visual access, only glimpses of the ocean are available from points along the streets adjacent to the Greenstreet project site, including N. Catalina Avenue, N. Gertruda Avenue, and N. Francisca Avenue. The Marina is not visible from these locations. Although Greenstreet would obstruct these limited views, staff does not consider this effect to be significant. For the Shade Hotel, the site plan will maintain visual access of the Marina from N. Harbor Drive by configuring the buildings around a plaza that opens out toward the ocean. From points further east of the Shade Hotel site, visual access to the Marina may be slightly impeded, as the overall scale of the new hotel buildings would be larger than the existing restaurant building (which is approximately 30 feet tall); however, at 45 feet tall, the low profile and the configuration of the buildings would avoid substantial blocking of views toward the ocean (one building and a portion of another would be situated perpendicular as opposed to parallel to the Marina, thereby avoiding a continuous building along the Marina's edge). The Shade Hotel and Greenstreet would reduce visual access to the ocean and the Marina; however, their combined effect would be insignificant. From points along the streets adjacent to the Greenstreet Center, the RBEP would restrict already limited visual access of the ocean and the Marina, but it would not affect visual access from points near the Shade Hotel. Staff concludes that that the two commercial projects combined with the RBEP would not produce a cumulative impact on visual access.

While the E&B Oil Production Project would cause significant and unavoidable impacts to visual resources within its surroundings, its effects would not contribute to the anticipated impact produced by the RBEP. Although the oil production site is relatively close in proximity to the RBEP site, it lies outside of the viewshed, or the bowl-shaped area, surrounding the RBEP site. Due to the nature of the topography, the predominant south and southwest orientation of the development adjacent to the RBEP site, and the dense multi-family development along Herondo/Anita/190th Streets, visibility of the oil production site from the RBEP viewshed is unlikely. And while the rigs and crane/boom during Phases 2 and 4 may be observable from elevated areas of the viewshed and from distant, lower areas of Redondo Beach, such as from the Pier, any visual impacts created by the structures at those distances would be reduced by mitigation measures stipulated in the DEIR, and would be minimized by the blending of the structures into the built landscape of multi-story hotels and other commercial buildings, multi-family residential buildings, and the landscaping within the immediate coastal area.

Summary of Project Effects

As described above, criteria for determining the significance of impacts on visual resources are based on the environmental checklist form in Appendix G of the CEQA Guidelines. This discussion summarizes the effects of the RBEP on visual resources and the corresponding significance criteria for evaluating impacts on visual resources.

Substantial Adverse Effect on a Scenic Vista

Would the proposed project have a substantial adverse effect on a scenic vista?

No.

Uninterrupted views of the Pacific Ocean are available from the higher-elevated areas east of the project site. From the immediate area of the project site, uninterrupted westward views capture the Marina. Most landside views in the vicinity of the existing project site include built elements typical of coastal development in urbanized coastal areas. No particular view in the project vicinity has a level of scenic appeal that could distinguish it as a scenic vista; therefore, the proposed project would have no impact relative to this criterion.

Substantially Damage Scenic Resources, Including But Not Limited to, Trees, Rock Outcroppings, and Historic Buildings within a State Scenic Highway

Would the proposed project substantially damage scenic resources, including but not limited to, trees, rock outcroppings, and historic buildings within a state scenic highway?

No.

The City of Redondo Beach General Plan designates the segment of the PCH through its planning area as a major arterial, and it is not designated as a scenic resource by the city. Furthermore, the PCH is not an officially designated state scenic highway in the region; therefore no impact would occur relative to this criterion.

Substantially Degrade the Existing Visual Character or Quality of the Site and its Surroundings

Staff identifies the following visual resources impacts relative to this criterion:

Would the proposed project substantially degrade the existing visual character or quality of the site and its surroundings*?*

The RBEP would not substantially degrade the existing visual character of the site and its surroundings for views at or near KOPs 1, 2, 3, 4, 6, and 7

The proposed project would substantially degrade the existing visual character or quality of the site and its surroundings in the following areas:

- *Construction-Related Effects* – The proposed RBEP would require the presence and movement of heavy construction equipment and vehicles, large-scale construction and demolition work, and generation of dust over a five-year construction schedule. The construction impacts would cause substantial degradation of the existing visual character of the site and its surroundings over that time period, and its impacts are considered significant.
- *KOP 5* – Overall visual sensitivity for KOP 5 is ***moderate to high***, and the overall visual change for the proposed RBEP is ***moderate***. Compared to the existing condition, implementation of the RBEP would substantially degrade the existing visual character of the site and its surroundings for views at or near KOP 5, and its impacts are considered potentially significant.
- *KOP 8* – Overall visual sensitivity for KOP 8 is ***moderate to high***, and the overall visual change for the proposed RBEP is ***moderate***. Compared to the existing condition, implementation of the RBEP would substantially degrade the existing visual character of the site and its surroundings for views at or near KOP 8, and its impacts are considered potentially significant.
- *KOP 9* – Overall visual sensitivity for KOP 9 is ***moderate to high***, and the overall visual change for the proposed RBEP is ***moderate***. Compared to the existing condition, implementation of the RBEP would substantially degrade the existing visual character of the site and its surroundings for views at or near KOP 9, and its impacts are considered potentially significant.

Create a New Source of Substantial Light or Glare That Would Adversely Affect Daytime or Nighttime Views in the Area

Would the proposed project create a new source of substantial light or glare that would adversely affect daytime or nighttime views in the area*?*

Yes. Staff identifies these visual resources impacts relative to this criterion:

- *Project construction lighting* – The frequency of nighttime work over the five-year construction schedule is unknown; however, the project site could appear as a brightly lit area for limited times during project construction and commissioning. Staff assumes that security lighting of the construction parking areas would be necessary. Staff concludes that the lighting for demolition, construction, and commissioning activities would create a new source of substantial light or glare that would adversely affect nighttime views in the area, and the impact is considered potentially significant.

- *Project operations lighting* – Although the applicant states that there would likely be a reduction in ambient lighting conditions in the area surrounding the project site and night lighting effects of the RBEP would be considerably less than those of the RBGS, very little information is provided on project operations lighting. Although the proposed power facility would be smaller in scale in comparison to the RBGS, operation of the RBEP power block in the northeast portion of the project site would introduce new lighting sources where there are currently no power-generating facilities. Staff concludes that project operations lighting would create a new source of substantial light or glare that would adversely affect nighttime views in the area, and the impact is considered potentially significant.
- *Potential daytime glint or glare from project structures* – Glint or glare from project structure surfaces would adversely affect daytime views in the project area, and the impact is considered potentially significant.

As discussed above, the visually degraded baseline condition of the project site is only generally improved upon by the proposed project. The RBEP would introduce new or perpetuate existing significant and potentially significant impacts to the surrounding environment of the project site. The following section will discuss the proposed project's compliance with applicable laws, ordinances, regulations, and standards, and identify proposed conditions of certification that would reduce significant and potentially significant impacts to less than significant if successfully implemented.

COMPLIANCE WITH LAWS, ORDINANCES, REGULATIONS, AND STANDARDS (LORS)

The Energy Commission's Siting Regulations address agency and staff responsibilities for review of compliance with applicable laws, ordinances, regulations, standards, and plans (Cal. Code Regs., tit. 20, § 1744). Section 1744 of the Siting Regulations requires each agency responsible for enforcing the applicable mandate to assess the adequacy of the applicant's proposed compliance measures to determine whether the facility will comply with the mandate. Staff's responsibility is to assist and coordinate the assessment of the conditions of certification to ensure that all aspects of the facility's compliance with applicable laws are considered (Cal. Code Regs., tit. 20, § 1744[b]).

Section 1744 of the Energy Commission's Siting Regulations states that "[t]he Applicant's proposed compliance measures and each responsible agency's assessment of compliance shall be presented and considered at hearings on the application…" (Cal. Code Regs., tit. 20, § 1744[c]). The Siting Regulations further specify staff's responsibilities: "If the applicant or any responsible agency asserts that an applicable mandate cannot be complied with, the Commission staff shall independently verify the non-compliance, and advise the Commission of its findings in the hearings" (Cal. Code Regs., tit. 20, § 1744[d]). "Comments and recommendations by an interested agency on matters within that agency's jurisdiction shall be given due deference by Commission staff" (Cal. Code Regs., tit. 20, § 1744[e]).

VR Table 2 (below) provides the LORS pertaining to protection of visual and aesthetic resources.

As amended and passed by the city of Redondo Beach voters as part of Measure G in 2010, the city's Coastal Land Use Plan allows for the reduction in size and modernizing of the AES Redondo Beach Generating Plant (RBGS) on a portion of the existing plant site, and requires that it be subject to applicable conditional use permit procedures and public utilities facility requirements under the Coastal Land Use Plan implementing ordinance, and also subject to the California Energy Commission application process for power plants and related facilities (City of Redondo Beach 2010). Because the Energy Commission's permitting process under Section 25500 of the Warren-Alquist Act supersedes both state and local agencies in the certification of power plant sites in the state, the proposed project is subject only to review and approval by the Commission. The Commission invites the local jurisdiction review and comment on RBEP final design and site plans prior to construction.

The summary of applicable LORS in **VR Table 2** includes several that address minimizing the visual impacts of industrial uses by requiring landscaping, buffers, and shielding. The Land Use Element of the city's General Plan (LUE) includes a policy that requires, where the city has jurisdiction, public sites to incorporate landscaped setbacks, walls, and other appropriate elements to mitigate operational and visual impacts on adjacent uses (Policy 1.46.5 in VR Table 2). The city's Coastal Land Use Plan Implementing Ordinance designates the zoning for the project site as P-GP, or Public-Generating Plant Zone. The LUE also requires that industrial uses incorporate buffers to protect abutting residential properties from the impacts of light and visibility of operations through the use of setbacks, enclosures, and other techniques (Policy 1.57.1 in **VR Table 2).** In addition, the city's Harbor/Civic Center Specific Plan calls for utility-related structures or facilities to be shielded and buffered from view using techniques such as decorative fences, walls, or natural landscaping (Policy 5.2.2 in VR Table 2).

Section 5.13.2.5 of the AFC, "Impact Significance," concludes that "The existing visual quality of the project area would be improved in all views; due to the removal of the Redondo Beach Generating Station and/or the placement of the smaller RBEP in a location that substantially reduces its prominence in views" (AES Southland Development 2012). Staff disagrees with the applicant's assessment. While demolition of the RBGS on the west side of the project site and construction and operation of the new, smaller power plant in the northeast portion of the site would improve views from the west, views from the north, south, and east of the site would be substantially affected by the new power plant. As proposed, the project is not in compliance with local LORS, as the project site would not have effective buffering or shielding elements to mitigate visual impacts on adjacent areas to the north, east, and south, notably the adjacent residential neighborhoods and the N. Catalina Avenue commercial corridor (see, for example, VR Figures 7b, 10b, and 11b). However, the proposed project would be in compliance and the potentially significant impacts would be reduced to less than significant with successful preparation and implementation of a site screening and landscape plan.

The project proposes to enclose the facility's major mechanical components, such as the HRSG and CGT, to shield the intricate structures and their operations from public view; however, the large, flat, and unadorned walls of the enclosures create blocky, industrial-like structures that are visually impactful. In addition, the ACC is visually and aesthetically similar to the hall enclosures. The enclosures and ACC are unscreened and highly visible to areas in the north, south, and east. In terms of landscaping, the project site contains small- to medium-height trees along its north side, fairly dense landscaping along its southwest edge, and some mature vegetation in its southeast area. The east side of the site contains the least amount of landscaping. As part of the AFC, the applicant submitted a conceptual landscape plan (Figure 9c) depicting proposed landscaping as it would appear five years after installation. The plan shows proposed palm trees in single rows adjacent to portions of the north and south sides of the power block, and along a portion of the west side of the site. Generally, palm trees are insufficient as a screening device, unless they are planted in densely arranged groups, as opposed to single row formation. Little or no landscaping is proposed along the north, south, or east sides of the project site. Without effective landscape screening or other buffering elements in the north, east, and south areas of the project site, the RBEP facilities would be exposed to views from these directions. As proposed, the project is not in compliance with local LORS requiring industrial uses to minimize their visual impacts through buffers, screens, and shielding, as the conceptual landscape plan would not effectively screen views of the power block from adjacent commercial uses and residential areas to the north, south, and east. However, the proposed project would be in compliance and the potentially significant impacts would be reduced to less than significant with successful preparation and implementation of a site screening and landscape plan.

And as discussed earlier in this assessment, the Wyland Whaling Wall would be relocated further east from its location near the west edge of the project site along N. Harbor Drive to the west side of the RBEP power block in the northeast portion of the site. While the Whaling Wall is an effective screening device that buffers views from the west, and would be even more effective given that the RBEP facilities would be smaller than the existing RBGS, it would be ineffective in buffering views from the north, south, and east. Relocating the Whaling Wall would not effectively screen views of the power block from the adjacent commercial uses and residential areas to the north, south, and east. As proposed, the project is not in compliance with the policies requiring industrial uses to minimize their visual impacts through buffers, screens, and shielding; however, the proposed project would be in compliance and the potentially significant impacts would be reduced to less than significant with successful preparation and implementation of a site screening and landscape plan.

The summary of applicable LORS in **VR Table 2** includes policies that address visual quality and compatibility between differing types of uses in the city and the Coastal Zone. Section 30251 of the California Coastal Act states, “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” (California Coastal Commission 2013). The city’s LUE requires that development project structures be designed and sited to mitigate visual impacts attributable to the AES Redondo Beach generating facilities and the SCE transmission corridors (Policy 1.37.4 in VR Table 2), and that industrial buildings be designed to convey a high quality of visual and aesthetic character through the implementation of a variety of design considerations (Policy 1.53.3 in VR Table 2). Several policies in the LUE require landscaping to achieve compatibility between industrial and public sites and existing development and to improve visual image and landscape quality in areas of the city where currently there is none (Policies 1.55.3—1.55.6 in VR Table 2). In addition to requiring physical buffers such as landscaping to address visual impacts of industrial facilities, the city requires buffers, setbacks, and other elements as transitions to ensure compatibility between land uses characterized by differing functions, activities, density, scale, and mass.

As discussed in this analysis, the proposed RBEP would be visually incompatible with the commercial and residential areas surrounding the project site and with the coastal area, due to the scale, form, and mass of the proposed structures. Although the proposed project would be smaller in scale than the RBGS, the RBEP would continue to substantially degrade the visual quality of the coastal environment in Redondo Beach. Staff has discussed the inadequacies of the proposed hall enclosures, conceptual landscape plan, and relocation of the Whaling Wall to screen, shield, and buffer the project site from public views to the north, south, and east. But the proposed project is also inadequate in providing either physical or aesthetic transitional elements to ensure better compatibility between differing land uses, enhancing visual quality, and conveying a high quality of visual and aesthetic character. The proposed siting of the power block to the northeast portion of the site places power-generating facilities in relatively close proximity to residential areas and neighborhood-serving uses without any meaningful transitional element between the incompatible uses. Furthermore, the proposed project lacks any architectural elements that could enhance visual compatibility between uses and substantially improve visual quality and aesthetic character on the site and in its surrounding environment. As proposed, the project is not in compliance with the policies requiring industrial facilities and uses to be compatible with differing land uses; however, the proposed project would be in compliance and the potentially significant impacts would be reduced to less than significant with successful implementation of Condition of Certification VIS-4 and preparation and implementation of a site screening and landscape plan.

The LUE requires that the on-site lighting of industrial uses be unobtrusive and constructed or located so that only the intended area is illuminated and off-site glare is minimized (Policy 1.57.2 in **VR Table 2**). As discussed in this assessment's "Summary of Project Effects," the potential for the proposed project to create significant impacts due to light and glare is substantial. The AFC does not include information for staff to assess whether the light and glare generated on-site by the project would be unobtrusive and that off-site glare would be minimized. While staff agrees with the applicant that the RBEP facilities would result in a reduction in the amount of night lighting on the project site and night lighting effects of the RBEP would be less than that of the RBGS, staff does not concur with the applicant's assessment that such effects would be either substantially less or considerably less than those of the existing condition. As proposed, the project is not in compliance with the policies requiring industrial projects provide adequate transitions between and be compatible with differing adjacent and surrounding uses; however, the proposed project would be in compliance and the significant and potentially significant impacts would be reduced to less than significant with successful implementation of Conditions of Certification **VIS-2** and **VIS-3.**

Section 5.13.2.3.1 of the AFC, "Project Structures and Dimensions," states that "The exteriors of major project equipment would be treated with a neutral gray or tan finish to optimize its visual integration with the surrounding environment" (AES Southland Development 2012). Staff does not agree with the applicant's assessment. Painting bulky, angular, industrial-type structures in the same continuous color of flat gray (or another similarly neutral color) is an ineffective method to ensure compatibility between the power plant site, the surrounding commercial and residential areas, and the coastal environment, in general. Staff refers readers to the simulated views for KOPs 8 and 9 (see **VR Figures 10b** and **11b**), which depict the visual contrast created by the proposed project structures. As proposed, the project is not in compliance with the policies requiring industrial projects provide adequate transitions between and be compatible with differing adjacent and surrounding uses; however the proposed project would be in compliance and the significant and potentially significant impacts reduced to less than significant with successful implementation of Condition of Certification **VIS-4**.

The Coastal Act expressly authorizes the Coastal Commission to participate in the proceedings for any thermal power plant under the Energy Commission's siting authority that is proposed in the Coastal Zone (Pub. Resources Code § 30413[d] and [e]). The Coastal Commission's participation may include preparation and submittal of a written report to the Energy Commission specifying provisions regarding the proposed site and related facilities to meet the objectives of the Coastal Act. The Coastal Commission's report findings must consider conformance of the site with certified LCPs administered by jurisdictions that would be affected by any such development (Pub.

Resources Code § 30413[d][5]). The Coastal Commission's report findings must consider "[t]he potential adverse effects that the proposed site and related facilities would have on aesthetic values" (Pub. Resources Code § 30413[d][3]). As of publication of this PSA, the Coastal Commission had not submitted a written report on the proposed RBEP.

Visual Resources Table 2
Proposed Project Consistency with Applicable Visual Resources LORS

<table>
<tr><th>Applicable LORS</th><th>Description</th><th>Consistency (assumes implementation of staff-recommended conditions of certification)</th></tr>
<tr><td colspan="3">Federal</td></tr>
<tr><td>None</td><td></td><td></td></tr>
<tr><td colspan="3">State</td></tr>
<tr><td>California Coastal Act of 1976</td><td>Section 30251. The scenic and visual qualities of coastal areas shall be considered and protected as a resource of public importance. 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 the area, and, where feasible, to restore and enhance visual quality in visually degraded areas.</td><td>To be determined in the Final Staff Assessment (FSA)</td></tr>
<tr><td colspan="3">Local</td></tr>
<tr><td>City of Redondo Beach General Plan Land Use Element (1992)</td><td>Goal 1H. Continue and enhance existing commercial districts which contribute revenue to the city and are compatible with adjacent residential neighborhoods.

Objective 1.37. Provide for the development of the North Catalina Avenue Corridor as a distinct center of community-oriented and marine-related service commercial and light industrial uses.

Policy 1.37.4. Design and site structures to mitigate the noise, vibration, visual, and other impacts attributable to the AES Redondo Beach generating facilities and Southern California Edison transmission corridors.</td><td>To be determined in the FSA</td></tr>
<tr><td></td><td>Goal 1K. Provide for public uses which support the needs and functions of the residents and businesses of the city.

Policy 1.46.5. Require, where the city has jurisdiction, that public sites be designed to incorporate landscaped setbacks, walls, and other appropriate elements to mitigate operational and visual impacts on adjacent land uses.</td><td>To be determined in the FSA</td></tr>
<tr><td></td><td>Goal 1N. Ensure a high quality of the city’s built environment, architecture, landscape, and public open spaces and sidewalks.

Objective 1.53. Attain residential, commercial, industrial and public buildings and sites which convey a high quality visual image and character.

Policy 1.53.3. Require that commercial and industrial buildings be designed to convey a high quality of visual and aesthetic character, utilizing design considerations such as:
a. Modulation and articulation of building elevations, inclusion of recessed or projecting windows, entries, or arcades, and other elements which avoid flat and undifferentiated surfaces and “box-like” structures;
b. incorporation of vertical terminus or well-defined roofline;
c. architectural treatment of all elevations; and
d. use of quality and durable materials.

Policy 1.53.10. Require that all building facades visible from public streets and abutting properties be designed to continue the architectural character established for street facing elevations.</td><td>To be determined in the FSA</td></tr>
</table>

Applicable LORS	Description	**Consistency** (assumes implementation of staff-recommended conditions of certification)
	Objective 1.55. Provide for the landscaping of residential commercial, industrial and public sites to be compatible with existing development exhibiting significant and recognized landscape and site design assets and establish an improved visual image and landscape quality where not currently existing in the city. ***Policy 1.55.3***. Require that development projects submit and implement a landscaping plan. ***Policy 1.55.4***. Encourage property owners to maintain existing vegetation on developed sites and replace unhealthy or dead landscape. ***Policy 1.55.5***. Encourage developers to incorporate mature and specimen trees and other significant vegetation which may exist on a site into the design of a development project for that site. ***Policy 155.6***. Require that surface parking lots incorporate trees which will provide extensive shade cover within two years of completion of construction (e.g., canopy coverage versus vertical palms).	*To be determined in the FSA*
	Goal 1O. Ensure compatibility among the various types and densities of land uses to be accommodated in the city. *Objective 1.57.* Incorporate functional and physical buffers, setbacks, and other elements as transitions between land uses characterized by differing functions, activities, density, scale, and mass. ***Policy 1.57.1.*** Require that parcels developed for commercial and industrial uses incorporate buffers with abutting residential properties which adequately protect the residential use from the impacts of noise, light, visibility of activity, vehicular traffic, and risks to property, and maintain open space and visual access (horizontal and vertical setbacks, structural or landscape enclosures, insulation, and other). ***Policy 1.57.2.*** Require that the on-site lighting of commercial and industrial uses be unobtrusive and constructed or located so that only the intended area is illuminated, off-site glare is minimized, and adequate safety is provided.	*To be determined in the FSA*
City of Redondo Beach General Plan Recreation and Parks Element (2004)	***Goal 8b***. Improve the overall quality of life and desirability of the city and its coastline by providing parkland, public recreation facilities, and recreational and educational programs for Redondo Beach residents and visitors ***Objective 8.2a***. Maintain and enhance existing recreation resources, maximize recreation opportunities, improve accessibility to the coastline, provide view corridors to the beach and marina from the surrounding area, and restore a sense of place in the Coastal Zone. ***Policy 8.2a.8.*** Preserve and enhance unique and valuable community resources as part of the planning and development of parks and recreation areas. Such resources include significant scenic and visual resources; cultural/historic resources; and natural resources such as water features, wildlife habitats, and native vegetation.	*To be determined in the FSA*
	Objective 8.2b. Maintain and develop a well-balanced park system by providing an adequate quantity and quality of parks and recreation areas throughout the City. ***Policy: 8.2b.12***. Provide additional recreation opportunities and parkland for residents to the maximum extent possible, while adhering to the city's Statement of Financial Principles.	*Consistent.* The applicant proposes to provide public open space on a majority of the project site (approximately 37 acres).

Applicable LORS	Description	**Consistency** (assumes implementation of staff-recommended conditions of certification)
City of Redondo Beach Harbor/Civic Center Specific Plan (2008)	***5.2.1 Goals and Objectives, Area-Wide**.* Retain the existing, compatible, and attractive low scale and limited building density of the area. ***5.2.2 Infrastructure/Utilities Policies**.* Services, meters, and utility-related structures or facilities (including ground level or roof-mounted free-standing air conditioning/heating units) that must be located on or within a use or parcel, should, as much as possible or feasible, be constructed, installed so as to be shielded and buffered from view. Shielding techniques may include but not be limited to the use of small planters, decorative fences, or walls, or the use of appropriate sizes and species of natural landscaping, etc. ***5.6.1 Goals and Objectives, Catalina Avenue Corridor Sub-Area**.* Ensure that the physical and environmental (relative to noise, light and glare, and traffic) integrity of the larger, intact, and established lower-density residential areas along the corridor (particularly on the eastern side of the Avenue between Beryl Street and Garnet Street) are respected, maintained, and protected. ***5.6.2 Policies, Urban/Architectural Design Policies (Zone 2).*** Maximum Permitted Building Density – To be determined by the City Planning Commission during the appropriate Site Plan and Design Review procedures associated with and necessary for the issuance of a conditional use permit. Maximum Permitted Building Height – To be determined by the city Planning Commission during the appropriate Site Plan and Design Review procedures associated with and necessary for the issuance of a conditional use permit. Required (Horizontal Building Setbacks – To be determined by the city Planning Commission during the appropriate Site Plan and Design Review procedures associated with and necessary for the issuance of a conditional use permit. Recommended Massing/Articulation – To be determined by the city Planning Commission during the appropriate Site Plan and Design Review procedures associated with and necessary for the issuance of a conditional use permit. ***Supplemental Recommended Urban/ Architectural Design Policies (Zone 2).*** In consideration of the various lower and moderate-density commercial and residential land uses surrounding the zone, implement, as possible and financially feasible any reasonable means, methods, or ways of eliminating entirely or reducing, as much as possible, the range of significant adverse environmental impacts that are created through operation of the Southern California Edison Plant (these measures could include, but are not limited to: external noise walls or fences, landscaping shields and buffering, additional internal noise insulation or air quality filtering systems, etc.).	*To be determined in the FSA*
City of Redondo Beach Coastal Land Use Plan (2010)	***Section 7**.* The following policy amendment was approved as part of Measure G in 2010 and became effective January 14, 2011. ***Section VI. Subsection D. Policy 9.*** Allow the reduction in size and modernizing of the AES Redondo Beach Generating Plan on a portion of the existing plant site, subject to applicable conditional use permit procedures and public utilities facility requirements under the Coastal Land Use Plan implementing ordinance, and subject to the California Energy Commission application process for power plants and related facilities. Permit the AES Redondo Beach Generating Plant site to be converted to parks, open space, and recreation facilities, if the site is acquired for such purposes in the future by a public, non-profit or private agency.	*Consistent.* The project proposes a smaller-scale power plant on a reduced footprint on the AES project site. The applicant proposes to provide public open space on a majority of the project site (approximately 37 acres). Energy Commission staff will review the proposed

Applicable LORS	Description	**Consistency** (assumes implementation of staff-recommended conditions of certification)
		project's final plans for compliance with relevant LORS requirements and will request that the city of Redondo Beach Planning Director participate in the review of said plans.
City of Redondo Beach Municipal Code Zoning Ordinance (2013) Title 10 – Planning and Zoning Chapter 5 Coastal Land Use Plan Implementing Ordinance	***Section 31***. This ordinance was approved as part of Measure G in 2010 and became effective January 14, 2011. ***Article 2. 10-5.1114. Development standards: P-GP generating plant zone.*** (a) Floor area ratio; (b) Building height; (c) Stories; (d) Setbacks; (e) General regulations; (f) Parking regulations; (g) Sign regulations; (h) Landscaping regulations; (i) Coastal Development Permits; (j) Procedures	*To be determined in the FSA*
	Article 3. General Regulations; Division 3. All Zones*.* *10-5.1530. Screening of mechanical equipment in all zones.* Mechanical equipment and utilities, with the exception of solar heating panels, shall be architecturally screened from view. Roof-top mechanical equipment and appurtenances to be used in the operation or maintenance of a building shall be installed so as not to be visible from any point at or below the roof level of the subject building. This requirement shall apply in construction of new buildings, and in any alteration of mechanical systems of existing buildings that result in significant changes in such roof-top equipment and appurtenances. The features so regulated shall in all cases be either enclosed by outer building walls or parapets, or grouped and screened in a manner architecturally compatible with the building. Minor features not exceeding one foot in height shall be exempted from this regulation, except that such minor features shall be of a color that minimizes glare and blends in with the building. ***10-5.1532. Metal, unorthodox, and unusual buildings in all zones.*** (a) No building permit shall be issued for the construction of any building within the city which utilizes galvanized iron or a sheet metal or aluminum exterior covering for all or part of the structure, or which utilizes construction materials which are substantially different than normally used, or which are of a character or appearance which may be injurious to the property values in the immediate area or contrary to the public health, safety, and welfare of the community without first obtaining approval of the Planning Commission pursuant to the provisions of Section 10.5.2502 (Planning Commission Design Review)	*To be determined in the FSA*

Applicable LORS	Description	**Consistency** (assumes implementation of staff-recommended conditions of certification)
	Article 4. Special Use Regulations*.* ***10-5.1614. Public utility facilities****.* (a) Purpose. The purpose of this section is to ensure that new public utility facilities and additions to existing facilities are compatible with surrounding properties and consistent with the public health, safety, and welfare of the city. While these regulations recognize the authority of applicable state agencies, it is the intent of the city to exercise any and all authority that it may have now or in the future under the California Constitution or general law with regard to the construction of any improvements or the making of any other changes to any public utility facility in the city. Inasmuch as it cannot be predicted with reasonable certainty at this time which such improvements, facilities or changes may be proposed to be made in the future, the source of the authority of the applicable state agency thereover and, consequently, the authority of the city thereover, it is necessary to write this section in general terms and allow its application to vary with the facts and the law governing each case.	*To be determined in the FSA*
	Article 7. Landscaping Regulations*.* ***Section 10-5.1900 Landscaping regulations****.* (a) Purpose. The purpose of this section is to establish standards for installation of landscaping in order to enhance the aesthetic appearance of properties within the city, ensure the quality, quantity, and appropriateness of landscape materials, effect a functional and attractive design, improve compatibility between land uses, conserve water, control soil erosion, and preserve the character of existing neighborhoods.	*To be determined in the FSA*
	Article 10. Coastal Development Permits*.* ***10-5.2200—10-52238****.* The Coastal Development Permit procedure is established to ensure that review process for public or private development within the Coastal Zone conforms to the policies and procedures of the California Coastal Act (Division 20 of the Public Resources Code), and implementing regulations (California Code of Regulations, Title 14, Division 5.5), and the City of Redondo Beach Certified Land Use Plan. The requirements in this article shall be applied in a manner that is most protective of coastal resources and public access.	*To be determined in the FSA*
	Article 12. Procedures*.* ***10-5.2502. Planning Commission Design Review****.* (a) Purpose. Planning Commission Design Review is established to ensure compatibility, originality, variety, and innovation in the architecture, design, landscaping, and site planning of developments in the community. The provisions of this section will serve to protect property values, prevent the blight and deterioration of neighborhoods, promote sound land use, encourage design excellence, and protect the overall health, safety, and welfare of the City.	*To be determined in the FSA*

CONCLUSIONS

Impacts on visual resources were assessed based on the magnitude of the anticipated incremental changes to the visual environment, considering the appropriate baseline conditions (i.e., existing conditions), and the estimated effects of those changes on sensitive viewer groups.

Because of the five-year schedule for the proposed demolition of RBGS structures and construction of the RBEP, staff concludes that demolition, construction, and commissioning activities would substantially degrade the existing visual character and quality of the site and its surroundings. Staff proposes Condition of Certification **VIS-1** requiring preparation and implementation of a Demolition, Construction, and Commissioning Screening Plan to reduce this impact to less than significant.

Lighting of the project site and structures during demolition, construction, commissioning, and operation would create new sources of substantial light or glare that would adversely affect day and nighttime views in the area. Staff proposes Conditions of Certification **VIS-2** and **VIS-3** to reduce the effects of light and glare on visual resources, including preparation and implementation of a Lighting Management Plan. Condition of Certification **VIS-4** is proposed to require preparation and implementation of a Surface Treatment Plan to reduce the effects of daytime glare from project structure surfaces to less than significant.

Section 30251 of the California Coastal Act requires that the scenic and visual qualities of coastal areas be considered and protected as a resource of public importance. Permitted development must be sited and designed to restore and enhance visual quality in visually degraded areas where feasible. However, with the exception of relocating the Wyland Whaling Wall to screen the west side of the RBEP power block, the applicant has not yet adequately proposed any specific, detailed, or enforceable measures to restore and enhance visual quality at the project site. Its proposed Landscape Concept Plan does not adequately address the proposed project's impacts to visual resources located north, east, and south of the site (see KOPs 5, 8, and 9).

The proposed siting of the RBEP structures in the northeast portion of the project site without adequate screening presents acute visual impacts due to their close proximity to differing adjacent uses; their scale, mass, and industrial aesthetic is visually incompatible with said uses, resulting in a continued degradation of the visual character and quality of the coastal environment. To reduce the visual impacts of the proposed power plant to less than significant, staff proposes, to work with the project owner to prepare and present a site screening and landscape concept plan that would effectively screen the major facilities and structures of the RBEP from public view, create a gradual visual transition between the project site and its adjacent uses, and ensure greater visual compatibility between the project site and its surrounding coastal environment. The site screening and landscape concept plan would be reviewed by staff and the public, and a condition of certification requiring a final site screening and landscape plan to be prepared and implemented based on an acceptable concept plan will be proposed in the FSA.

PROPOSED CONDITIONS OF CERTIFICATION

VIS-1 Temporary Screening of Demolition, Construction, and Commissioning. The project owner shall prepare and implement a Demolition, Construction, and Commissioning Screening Plan (Construction Screening Plan) to screen project demolition, construction, and commissioning activities and areas on the project site, including all construction, laydown, and parking areas, from public view.

A. The project owner shall prepare, install, and maintain a construction screening fence along the perimeter of the project site for all areas visible from public use areas, including Herondo Street, King Harbor Marina/N. Harbor Drive, and N. Catalina Avenue.

B. The project owner shall submit the Construction Screening Plan to the compliance project manager (CPM), the Planning Director of the City of Redondo Beach, and the Executive Director of the Coastal Commission for simultaneous review and comment. Any comments on the plan from the city and the Coastal Commission shall be provided to the CPM. The project owner shall not purchase or order any materials for screening fencing until written approval of the final plan is received from the CPM. Modifications to the Construction Screening Plan are prohibited without the CPM's approval.

C. The Construction Screening Plan shall include three printed sets of full-size plans (24" x 36", minimum), three sets of 11" x 17" reductions, and a digital copy in PDF format, and contain the following information:

1. A detailed Construction Screening Plan at a proper scale (1"=40") showing proposed fence locations, height, materials, and details.

2. Graphics showing options for screening materials. The examples shall include fence materials in unobtrusive colors as well as printed decorative designs. Possible options include knitted polyethylene material, bottom-locking fence slats with chain link fencing, pre-printed mesh fabric, or printable mesh vinyl.

3. A detailed schedule for completion of the construction screening installation.

4. A procedure for monitoring and replacement of damaged or worn fencing.

5. The screening fence for the power plant site shall be opaque and no less than eight feet tall.

6. All screening fencing shall be well maintained and repaired or replaced, when damaged or worn, in a timely manner for the duration of project demolition, construction, and commissioning.

Verification: At least 120 calendar days before the start of site mobilization (i.e., the start of ground disturbance at the project site), the project owner shall submit the Construction Screening Plan to the CPM, the Planning Director of the City of Redondo Beach, and the Executive Director of the Coastal Commission for simultaneous review and comment. The project owner shall provide the CPM with a copy of the transmittal letters submitted to the city and the Coastal Commission requesting those agencies' respective reviews of the Construction Screening Plan. The CPM shall deem the Construction Screening Plan acceptable to any of those agencies that do not provide their review comments to the CPM within 30 calendar days of receipt of said plan.

If the CPM determines that the Construction Screening Plan requires revision, the project owner shall provide a plan with the specified revision(s) for review and approval by the CPM. A copy of the revised plan shall be provided to the city's Planning Director and the Executive Director of the Coastal Commission. No work to implement the Construction Screening Plan shall begin until final plan approval is received from the CPM.

The project owner shall install all construction screening before the start of site mobilization. The project owner shall notify the CPM within seven calendar days of installing the screening fencing that it is ready for inspection.

The project owner shall report any work required to repair or replace temporary screening fencing in the Monthly Compliance Report for the project.

VIS-2 Site Lighting – Project Demolition, Construction, and Commissioning. Consistent with applicable worker safety regulations, the project owner shall ensure that lighting of on-site demolition and construction areas and construction worker parking lots minimizes potential night lighting impacts by implementing the following measures:

A. All fixed-position lighting shall be hooded and shielded to direct light downward and toward the construction area to be illuminated to prevent illumination of the night sky and minimize light trespass (i.e., direct light extending beyond the boundaries of the parking lots and construction sites, including any security-related boundaries).

B. Lighting of any tall construction equipment (e.g., scaffolding, derrick cranes, etc.) shall be directed toward areas requiring illumination and shielded to the maximum extent practicable.

C. Task-specific lighting shall be used to the maximum extent practicable.

D. Wherever and whenever feasible, lighting shall be kept off when not in use and motion sensors shall be installed and used to the maximum extent practicable.

E. The compliance project manager (CPM) shall be notified of any demolition- and construction-related lighting complaints. Complaints shall be documented using a form in the format shown in Attachment 1, and completed forms shall record resolution of each complaint. A copy of each completed complaint form shall be provided to the CPM. Records of lighting complaints shall also be kept in the compliance file at the project site.

<u>Verification:</u> Within seven calendar days after the first use of construction lighting for major RBEP construction milestones, the project owner shall notify the CPM that the lighting is ready for inspection. Verification is to be repeated for these five construction milestones:

1. Demolition of RBGS Units 1-4;
2. Construction of the new RBEP power block;
3. Demolition of RBGS Units 5-8 and auxiliary boiler No. 17;
4. Construction of the new control building and relocation of the Wyland Whaling Wall; and,
5. Demolition of remaining buildings and structures.

If the CPM determines that modifications to the lighting are needed for any construction milestone, within 14 calendar days of receiving that notification, the project owner shall correct the lighting and notify the CPM that modifications have been completed.

Within 48 hours of receiving a lighting complaint for any construction activity, the project owner shall provide to the CPM a copy of the complaint report and resolution form, including a schedule for implementing corrective measures to resolve the complaint.

The project owner shall report any lighting complaints and document their resolution in the Monthly Compliance Report for the project, accompanied by copies of completed complaint report and resolution forms for that month.

VIS-3 Lighting Management Plan – Project Operation. The project owner shall prepare and implement a comprehensive Lighting Management Plan.

A. The comprehensive Lighting Management Plan shall be submitted to the CPM, the Planning Director of the City of Redondo Beach, and the Executive Director of the Coastal Commission for simultaneous review and comment. Any comments on the plan from the city and the Coastal Commission shall be provided to the CPM. The project owner shall not purchase or order any lighting fixtures or apparatus until written approval of the final plan is received from the CPM. Modifications to the Lighting Management Plan are prohibited without the CPM's approval. Installation of lighting must be completed by the start of commercial operation of the new power block.

B. Consistent with applicable worker safety regulations, the project owner shall ensure the design, installation, and maintenance of all permanent exterior lighting such that light sources are not directly visible from areas beyond the project site, glare is avoided, and night lighting impacts are minimized or avoided to the maximum extent feasible. All lighting fixtures shall be selected to achieve high energy efficiency for the RBEP facility. The project owner shall meet these requirements for permanent project lighting:

1. The Lighting Management Plan shall include three printed sets of full-size plans (24” x 36”, minimum), three sets of 11” x 17” reductions, a digital copy in PDF format, and contain the following information.

2. The Lighting Management Plan shall be prepared with the direct involvement of a certified lighting professional trained to integrate efficient technologies and designs into lighting systems.

3. Exterior lights shall be hooded and shielded and directed downward or toward the area to be illuminated to prevent obtrusive spill light (i.e., light trespass) beyond the project site.

4. Exterior lighting shall be designed to minimize backscatter to the night sky to the maximum extent feasible.

5. Energy efficient lighting products and systems shall be used for all permanent new lighting installations. Smart bi-level exterior lighting using high efficiency directional LED fixtures shall be used as appropriate for exterior installations. The lighting system shall work in conjunction with occupancy sensors, photo sensors, wireless controls, and/or other scheduling or controls technologies to provide adequate light for security and maximize energy savings.

6. Lighting fixtures shall be kept in good working order and continuously maintained according to the original design standards.

7. The Lighting Management Plan shall be consistent with all applicable laws, ordinances, regulations, and standards.

C. The compliance project manager (CPM) shall be notified of any complaints about permanent lighting at the project site. Complaints shall be documented using a form in the format shown in Attachment 1, and completed forms shall record resolution of each complaint. A copy of each completed complaint form shall be provided to the CPM. Records of lighting complaints shall also be kept in the compliance file at the project site.

Verification: At least 90 calendar days before ordering any permanent lighting equipment for the RBEP, the project owner shall submit the comprehensive Lighting Management Plan to the CPM, the Planning Director of the City of Redondo Beach, and the Executive Director of the Coastal Commission for simultaneous review and comment. The project owner shall provide the CPM with a copy of the transmittal letters submitted to the city and the Coastal Commission requesting those agencies’ respective reviews of the Lighting Management Plan. The CPM shall deem the Lighting Management Plan acceptable to any of those agencies that do not provide their review comments to the CPM within 45 calendar days of receipt of said plan.

If the CPM determines that the plan requires revision, the project owner shall provide a plan with the specified revision(s) for review and approval by the CPM. A copy of the revised plan shall be provided to the Planning Director of the City of Redondo Beach and the Executive Director of the Coastal Commission. No work to implement the plan (e.g., purchasing of fixtures) shall begin until final plan approval is received from the CPM.

Prior to the start of commercial operation of the RBEP, the project owner shall notify the CPM that installation of permanent lighting for the RBEP has been completed and that the lighting is ready for inspection. If the CPM notifies the project owner that modifications to the lighting system are required, within 30 days of receiving that notification, the project owner shall implement all specified changes and notify the CPM that the modified lighting system(s) is ready for inspection.

Within 48 hours of receiving a complaint about permanent project lighting, the project owner shall provide to the CPM a copy of the complaint report and resolution form, including a schedule for implementing corrective measures to resolve the complaint.

The project owner shall report any complaints about permanent lighting and document their resolution in the Annual Compliance Report for the project, accompanied by copies of completed complaint report and resolution forms for that year.

VIS-4 Surface Treatment of Project Structures and Buildings. The project owner shall prepare and implement a Surface Treatment Plan addressing treatment of the surfaces of all project structures and buildings visible to the public such that proposed colors and finishes: (1) minimize visual intrusion and reduce contrast by blending with the existing visual environment, (2) avoid creating new sources of substantial glint and glare, and (3) are consistent with all applicable laws, ordinances, regulations, and standards.

A. The Surface Treatment Plan shall be submitted to the compliance project manager (CPM), the Planning Director of the City of Redondo Beach, for simultaneous review and comment. Any comments on the plan from the city shall be provided to the CPM. Modifications to the Surface Treatment Plan are prohibited without the CPM's approval. The Surface Treatment Plan shall provide the following:

1. A discussion of all considered surface treatments and the rationale for choosing the proposed surface treatment colors and finishes;

2. An assessment of each considered surface treatment's effectiveness in avoiding or minimizing impacts to visual resources, ensuring compatibility between the energy facility site and its surroundings, and enhancing design and visual quality of the site and its surroundings;

3. Three printed sets (11" x 17"), and a digital copy in PDF format of elevation drawings depicting at life-size scale the major project structures and buildings, and specifying for each structure and building: (1) the proposed color and finish; and (2) the height, length, and width or diameter;

4. Two sets of color brochures, color chips, and or physical samples showing each proposed color and finish. Digital files showing proposed colors may not be submitted in place of original samples. Colors must be identified by vendor, name, and number, or according to a universal designation system;

5. Three printed sets (11' x 17") and a digital copy in PDF format of color visual simulations at life-size scale showing the surface treatment proposed for the project structures. The visual simulations for key observation point (KOP) 7, KOP 8, and KOP 9 shall be used to prepare images showing the proposed surface treatment plan;

6. A detailed schedule for completing the surface treatments;

7. A procedure to ensure proper surface treatment maintenance for the life of the project.

B. The monopoles for the on-site 230-kV transmission line shall be constructed using self-weathering steel to blend with the environment to the greatest extent feasible, and the finish shall appear as a matte patina. No galvanizing process shall be used that produces a reflective or shiny metallic finish. Unpainted exposed lagging and surfaces of steel structures that are visible to the public shall be embossed or otherwise treated to reduce glare.

Verification: At least 90 calendar days before submitting instructions for colors and other surface treatments to manufacturers or vendors of project structures, and/or ordering prefabricated project structures, the project owner shall submit the Surface Treatment Plan to the CPM, the Planning Director of the City of Redondo Beach, and the Executive Director of the Coastal Commission for simultaneous review and comment. The project owner shall provide the CPM with a copy of the transmittal letters submitted to the city and the Coastal Commission requesting those agencies' respective reviews of the Surface Treatment Plan. The CPM shall deem the Surface Treatment Plan acceptable to any of those agencies that do not provide their review comments to the CPM within 45 calendar days of receipt of said plan.

If the CPM determines that the plan requires revision, the project owner shall provide a plan with the specified revision(s) for review and approval by the CPM. A copy of the revised plan shall be provided to the city's Planning Director and the Executive Director of the Coastal Commission. No work to implement the Surface Treatment Plan shall begin until final plan approval is received from the CPM.

Prior to the start of commercial operation of the RBEP, the project owner shall notify the CPM that surface treatments of all publicly visible structures and buildings identified in the Surface Treatment Plan have been completed and that the facilities are ready for inspection. The project owner shall obtain written confirmation from the CPM that the project complies with the Surface Treatment Plan.

The project owner shall provide a status report regarding surface treatment maintenance in the Annual Compliance Report for the project. At a minimum, the report shall specify:

1. The condition of the surfaces and finishes of all structures at the power plant site,
2. All major maintenance activities that occurred during the reporting year, and
3. A schedule for major maintenance activities for the next year.

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VISUAL RESOURCES APPENDIX-1

VISUAL RESOURCES APPENDIX-1
VISUAL RESOURCES TERMS, DEFINITIONS, AND ANALYSIS METHOD

This appendix is divided into two main sections. The first section defines key terms and describes the method used by Energy Commission staff (staff) to evaluate effects of a project on visual resources. The second section describes the process to evaluate effects of publicly visible water vapor plumes on visual resources.

Staff conducted a preliminary analysis of the proposed project's exhaust gas characteristics and ambient air conditions and determined that conditions would be unlikely to cause formation of visible plumes above the project's exhaust stacks. Therefore, the section of this appendix pertaining to visible plumes is not applicable to the proposed project.

KEY TERMS AND ANALYSIS METHOD

VISUAL SPHERE OF INFLUENCE AND DISTANCE ZONES

The *visual sphere of influence* (VSOI) depicts the area within which the proposed project could cause significant impacts on visual resources. The extent of the VSOI will vary depending on the project setting, topography, and the presence or absence of natural or built screening, and it must be determined on a case-by-case basis. For projects in urban settings, visibility of a project site may be limited to specific vantage points in the VSOI. For projects in relatively open areas, a project site may be visible throughout most of the VSOI.

A VSOI boundary may be refined to account for local viewing conditions and topographic screening based on computer *viewshed* analysis and mapping, which is a useful way to determine project visibility and to communicate that information to others. A viewshed is the surface area visible from a given viewpoint or series of viewpoints. It is also the area from which that viewpoint or series of viewpoints may be seen. At a basic level, a viewshed is a plan view or map of areas with an unobstructed sightline to a single observer viewpoint (Federal Highway Administration 1990).

The VSOI may be mapped up to a distance of approximately five miles from a project site. At the limits of the VSOI, distant background features may blend together such that they would not be especially discernible to the viewer.

Visual resource management guidelines and methods established by federal agencies are often adapted and used by staff to evaluate the impacts of a project on visual resources. The visual management system of the U.S. Forest Service uses distance zones to describe parts of a characteristic landscape that is subject to inventory and evaluation (Bacon 1979). The Federal Highway Administration (FHWA) uses similar descriptions for distance zones (FHWA 1990). Staff includes a discussion of distance zones to describe views of the project site from parts of the VSOI, which are described as follows:

- **Foreground**. This zone will usually be limited to areas within one-quarter to one-half mile of the observer, but must be determined on a case-by-case basis as should any distance zoning. The limit of this zone is based on distances at which details can be perceived. For example, the viewer may see the texture and form of individual plants or tree boughs. Intensity of color and its value will be at a maximum level.
- **Middleground**. This zone may extend from the foreground zone to three to five miles from the observer. Texture is generally characterized by masses of trees in stands of uniform tree cover. Parts of the landscape may be seen to join together; hills become a range or trees appear as a forest. Individual tree forms are usually only discernible in very open or sparse stands.
- **Background**. This zone may extend from the middleground zone to infinity. The surfaces of land forms lose detail distinctions, and the emphasis is on the outline or edge of the land forms. The texture in stands of uniform tree cover is generally very weak or nonexistent. In open or sparse timber stands, texture is seen as groups or patterns of trees. Atmospheric haze may diminish colors, soften features, and reduce contrast in background views.

Visual elements closer to the viewer will be in the foreground or middleground. Visual elements at the limits of the project VSOI will generally be those that appear in the background.

VISUAL ABSORPTION CAPABILITY

Visual absorption capability (VAC) provides an additional perspective on the landscape and its capacity to visually withstand or absorb changes from a project. VAC is an estimate or measure of the capacity of a landscape to absorb visual alterations without significantly affecting visual character (Bacon 1979). High VAC may be associated with varied, undulating landforms and varied vegetation canopy. Low VAC may be associated with a uniform landscape, an even tree canopy, and steep slopes. (As the upward slope increases, a greater area of land becomes directly visible and any intervening vegetation loses the potential to screen the activity.)

SELECTION OF KEY OBSERVATION POINTS

Sensitive viewing areas are identified and inventoried in the VSOI for a project where project structures and facilities could be visible to the public. A list of sensitive viewing areas could include several types of uses:

- residential;
- recreational, including wildlife areas, parks, visitor centers, hiking trails, and other recreation areas;
- travel routes, including major roads or highways and designated scenic roads; and
- tourist destinations, including historic landmarks and other protected natural and built features in the landscape.

Refinement of the visual analysis for a project involves identifying critical viewpoints, or key observation points (KOPs). KOPs are selected to represent the most critical viewpoints from off-site locations where a project would be visible to the public.

Because it is infeasible to analyze all viewpoints, KOPs are selected that would most clearly display the visual effects of the proposed project. A KOP may also represent a primary viewer group(s) (e.g., motorists on a highway in the project area) that could potentially be affected by a project.

Following selection of the KOPs, photographs are taken of the project site to show existing conditions from the KOPs. The existing condition (baseline) photographs taken from the selected KOPs are used to prepare representative visual simulations of the proposed project or specific project feature. The simulations portray the relative scale and extent of the project. The photograph of the existing condition and the visual simulation (proposed condition) are reviewed for each KOP to determine the potential effects of a project on visual resources.

PROCESS TO EVALUATE KEY OBSERVATION POINTS

VISUAL SENSITIVITY (EXISTING CONDITION)

Steps to evaluate the overall visual sensitivity for each KOP involve consideration of several key factors: *visual quality, viewer concern, visibility, number of viewers,* and *duration of view*. In a project analysis, the rating scale ranges from low to high for each factor. These factors are also used to convey the overall scenic value of the view from each representative KOP. The five factors are described below. (Diagram 1 [below] illustrates the process to evaluate the KOPs and determine impact significance.)

Visual Quality

Visual quality is an expression of the visual impression or appeal of a given landscape and the associated public value attributed to the visual resource. The visual quality of an area is composed of visual or scenic resources, which are those physical features that make up the visible landscape, including land, water, vegetation, and the built environment (e.g., buildings, roadways, irrigation canals, and other structures). Scenic resources that compose scenic views and sites are generally valued for their aesthetic appearance. Using staff's visual resources analysis method, visual quality is generally rated from low to high.

Memorable or visually powerful landscapes are generally rated high when the landscape components combine in striking or distinctive visual patterns. Landscapes with high visual quality are visually coherent and harmonious when each element is considered as part of the whole. The landscapes are free from encroaching elements and thus retain their visual integrity. Landscapes rated low are often dominated by visually discordant built elements. **Table 1** describes a set of ratings associated with an assessment of visual quality.

Table 1
Landscape Scenic Quality Scale

Rating	Description
Outstanding Visual Quality	This rating describes landscapes with exceptionally high visual quality. These landscapes are often significant regionally and/or nationally, and they usually contain exceptional natural or cultural features that contribute to this rating. They might be described as “picture-postcard” landscapes. People are attracted to these landscapes to view them. These landscapes are often managed in a manner to ensure preservation of the inherent qualities of the landscape.
High Visual Quality	Landscapes with high visual quality may contain cultural or natural features in the landscape that attest to their value. These landscapes often contain visually interesting spaces and elements that are arranged in ways that make them particularly pleasant places to be. Areas with high visual quality often provide recreational opportunities where the visual experience is important. These landscapes are often managed to emphasize preservation of the inherent qualities of the landscape.
Moderately High Visual Quality	These landscapes have above average scenic value but do not possess all of the qualities associated with places that are rated high. The scenic value of these landscapes may be lower due to the less interesting arrangement of landscape elements. These landscapes may have recreational potential, and visual quality is an important management concern.
Moderate Visual Quality	These landscapes have average scenic value and are not especially memorable. They usually lack noteworthy cultural or natural features. These landscapes may have considerable recreational potential and visual quality is a management consideration.
Moderately Low Visual Quality	These landscapes have below average scenic value. They may contain visually discordant built elements, but the landscape is not dominated by these features. They often provide little visual interest and lack spaces that people will perceive as inviting. Recreational activities may occur in areas with below average scenic value, but the visual experience for recreationists is less important in these areas. Management concerns for visual quality may be limited to minimizing the adverse visual impacts of resource management activities or projects.
Low Visual Quality	Landscapes with low scenic value may be dominated by visually discordant built elements. They do not include places that people will find inviting, and lack attributes that make areas with higher quality views memorable and visually interesting. These landscapes often have little recreational potential. Management concerns for visual quality may either address rehabilitation of visually discordant built elements or are limited to minimizing the adverse visual impacts of resource management activities or projects.
Source: Adapted from Buhyoff et al., 1994	

Viewer Concern

Viewer concern represents the estimated reaction of a viewer or viewer group to visible changes in the view. Viewer concern will vary depending on the characteristics and preferences of the viewer group. An assessment of viewer concern can be made based on the extent of the public’s concern for a particular landscape or for scenic quality in general. Existing discordant elements in the landscape may temper viewer concern.

Viewer concern for homeowners or other local residents is expected to be high for views near their homes. Viewers engaging in recreational activities and enjoying scenic surroundings are generally expected to be highly concerned about potential degradation of the existing visual quality and character of their views.

Viewer activity is an identifying characteristic of viewer groups (FHWA 1990). Commuting in heavy traffic can distract an observer from many aspects of the visual environment; therefore, viewer concern tends to be lower for views seen by people driving to and from work or as part of their work. Employees, managers, and patrons of businesses may have extended and repeated views of their surroundings on a daily basis. This viewer group may have lower expectations for visual elements in the VSOI than residents and recreationists.

The viewer concern of motorists generally depends on when and where travel occurs, the angle of view, the view distance, and the frequency of travel of the motorist in a particular area. As the observer's speed increases, the sharpness of lateral vision declines, and the observer tends to focus along the line of travel. It is assumed that motorists on freeway systems during periods of free flow travel have a low to moderate viewer concern. Daily commuters using inner city freeways in heavy traffic are primarily focused on traffic and roadway conditions along the travel corridor. Commuters traveling at normal freeway speeds are generally more aware of views from the freeway. Motorists driving for pleasure are expected to have a higher concern for view. Motorists who are local residents and/or business owners may have a higher viewer concern due to their personal investment in the area and greater familiarity with the local environment.

In urban and semi-rural settings, individual viewers are likely to include employees and managers working in offices and commercial and industrial businesses. In rural and semi-rural areas, individual viewers may include people employed in agricultural, industrial, and commercial businesses. For viewers whose focus is on their work and daily pursuits, viewer concern is generally expected to be low to moderate. However, this rating will vary depending on the existing visual quality of the landscape and built environment.

Scenic roadways, cultural features, or other areas identified in adopted land use planning documents are subject to protection. The scenic qualities of protected resources are recognized for their value to the public, and the expectation of viewers is that views of protected resources will be preserved.

Visibility

An assessment of visibility addresses how well the project site or feature can be seen from a particular location. The degree of visibility generally depends on the angle or direction of view; extent of visual screening provided by built and/or natural elements; topography; and the distance between the object (i.e., the project site) and existing homes, streets, or parks. In this sense, visibility is determined by considering any and all obstructions that may be in the sightline, including trees and other vegetation, buildings, hills, and transmission poles or towers.

Number of Viewers

This is an estimate of the number of viewers who may see the project site or feature. The estimate is based on the number of residences, the average traffic volume on local roads and highways, and the number of recreational users per day (e.g., the number of people participating in any recreational activity during a 24-hour period). Traffic volume is based on data such as average daily vehicle trips (ADT) or annual average daily vehicle trips (AADT).

For recreational users, the number of viewers is closely tied to visual quality and viewer concern. For recreationists engaged in activities where visual quality is on the higher end of the scale, the number of viewers is carefully considered in the visual assessment. For example, a recreational area in an area with a high visual quality rating may receive a higher rating overall regardless of the number of viewers. For example, a visual change at a national park is generally more important than a visual change near a large sports stadium.

Table 2 shows ratings based on estimated numbers of viewers. Variations in viewer preferences and existing visual quality will influence these ratings.

Table 2
Approximate Number of Viewers By Viewer Category and Corresponding Rating

Residential (number of residences	Recreationists (number of people per day)	Motorists (number of motor vehicles per day)	Rating
Over 100	Over 200	Over 10,000	High
50–100	100–200	5,000–10,000	Moderate to High
20–50	50–100	2,500–5,000	Moderate
5–20	25–50	500–2,500	Low to Moderate
2–5	10–25	125–500	Low
Source: Energy Commission staff			

Duration of View

Duration of view is the estimated length of time a project site is viewed by a person or group of people. The importance of view duration varies depending on the activities of the viewers. Duration of view is generally less of a concern when the viewer only briefly glimpses the visible feature or site. However, if the site is subject to viewing for a longer period, as from a scenic overlook, then duration of view is a factor of greater importance. Residential viewers typically have the longest duration of view. A resident with a direct view of a project site might have views lasting for extended periods depending on the orientation of the residence and the extent of visual screening.

For motorists, the duration of view depends on the speed of travel, view distance, and angle of observation. For a motorist traveling at 60 miles per hour on a highway with a direct view of a project site, and where the initial point of visibility is approximately one mile away, the viewer might see the site for a continuous 60-second period.

The duration of view for recreationists will vary depending on whether the recreational activity is *active* or *passive*. Active recreation involves direct participation in a sport or play activity, which typically requires the use of an organized space (e.g., off-road bike trails or a team sports field). A view of a proposed project by people observing or engaging in active recreation is estimated to be of short duration. People engaging in recreational activities under these conditions are likely to be focused on the sport rather than the aesthetics of the environment.

Passive recreation often involves low impact activities or observation and does not require use of an organized play or sports area. Viewers are more closely associated with the surrounding physical environment where the activity takes place. Typical activities include climbing, hiking, wildlife observation, fishing, and picnicking. A view of a proposed project by an individual engaged in passive recreation is estimated to be of longer duration than for someone participating in active recreation.

Table 3 provides a baseline to determine the ratings associated with view duration. As with number of viewers, variations in viewer preferences and existing visual quality will influence the relative importance of the ratings for duration of view.

Table 3
Approximate Duration of View and Corresponding Rating

Approximate Duration of View	Rating
Longer than 2 minutes	High (extended period of time)
1–2 minutes	Moderate to High
20–60 seconds	Moderate (mid-length period of time)
10–20 seconds	Low to Moderate
Less than 10 seconds	Low (brief period of time)
Source: Energy Commission staff	

Overall Viewer Exposure

Overall viewer exposure is based on *visibility*, *number of viewers*, and *duration of view*. These three factors are generally given equal weight in determining overall viewer exposure. However, additional weight is given to any factor with an extreme value. For example, if a project’s visibility is very limited because it would be almost entirely screened from public view, staff gives a lower value to overall viewer exposure.

Overall Visual Sensitivity

Overall visual sensitivity is based on *visual quality*, *viewer concern*, and *overall viewer exposure*. These three factors are generally given equal weight in determining the level of overall visual sensitivity.

VISUAL CHANGE (PROPOSED CONDITION)

The visual change for each KOP is described using the terms *contrast*, *dominance*, and *view blockage*. The scale for rating the visual change ranges from low to high for each factor. The three factors used to evaluate visual change are described below.

Contrast

The degree to which a project could affect the visual quality of a landscape generally depends on the visual contrast created between a project and the existing landscape (U.S. Bureau of Land Management 1986 and 2012). The basic design elements of form, line, color, and texture are used for this comparison and to describe the visual contrast created by a project:

- **Form**. Contrast in form results from changes in the shape and mass of landforms or structures. The degree of change depends on how dissimilar the introduced forms are to those that exist in the landscape.
- **Line**. Contrasts in line results from changes in edge types and interruption or introduction of edges, bands, and silhouette lines. New lines may differ in their subelements (e.g., boldness, complexity, and orientation) from existing lines.
- **Color**. Changes in value, or a gradation or variety of a color (hue) tend to create the greatest contrast. Other factors such as saturation of a color, reflectivity, color temperature, may also increase the contrast.
- **Texture**. Noticeable contrast in texture usually stems from differences in the grain, density, and internal contrast. Other factors such as irregularity and directional patterns of texture may affect the rating.

Projects designed to repeat forms, lines, colors, and textures as those present in the existing landscape will generally be less noticeable. (See also the discussion above under “Visual Absorption Capability.”) **Table 4** provides a baseline for the degree of contrast rating.

Table 4
Degree of Contrast and Corresponding Rating

Criteria	Rating
The element contrast demands attention, will not be overlooked, and is dominant in the landscape.	High (strong)
	Moderate to High
The element contrast begins to attract attention and begins to dominate the characteristic landscape.	Moderate
The element contrast can be seen but does not attract attention.	Low to Moderate (weak)
	Low
The element contrast is not visible or perceived.	None
Source: Adapted from U.S. Bureau of Land Management 1986	

Dominance

Dominance is a measure of (a) the proportion of the total field of view that the proposed feature occupies, (b) a proposed feature's apparent size relative to other visible landscape features, and (c) the conspicuousness of the proposed feature due to its location in the view. Also, forms that are bold, regular, solid, or vertical will tend to dominate the landscape.

A proposed feature's level of dominance may be lower in a panoramic setting than in an enclosed setting with a focus on the feature itself. A feature's level of dominance is higher if it is (a) near the center of the view, (b) elevated relative to the viewer, or (c) has the sky as a backdrop. As the distance between a viewer and a feature increases, the feature's apparent size decreases and its dominance decreases as a consequence. The level of dominance is rated from low (subordinate) to high (dominant).

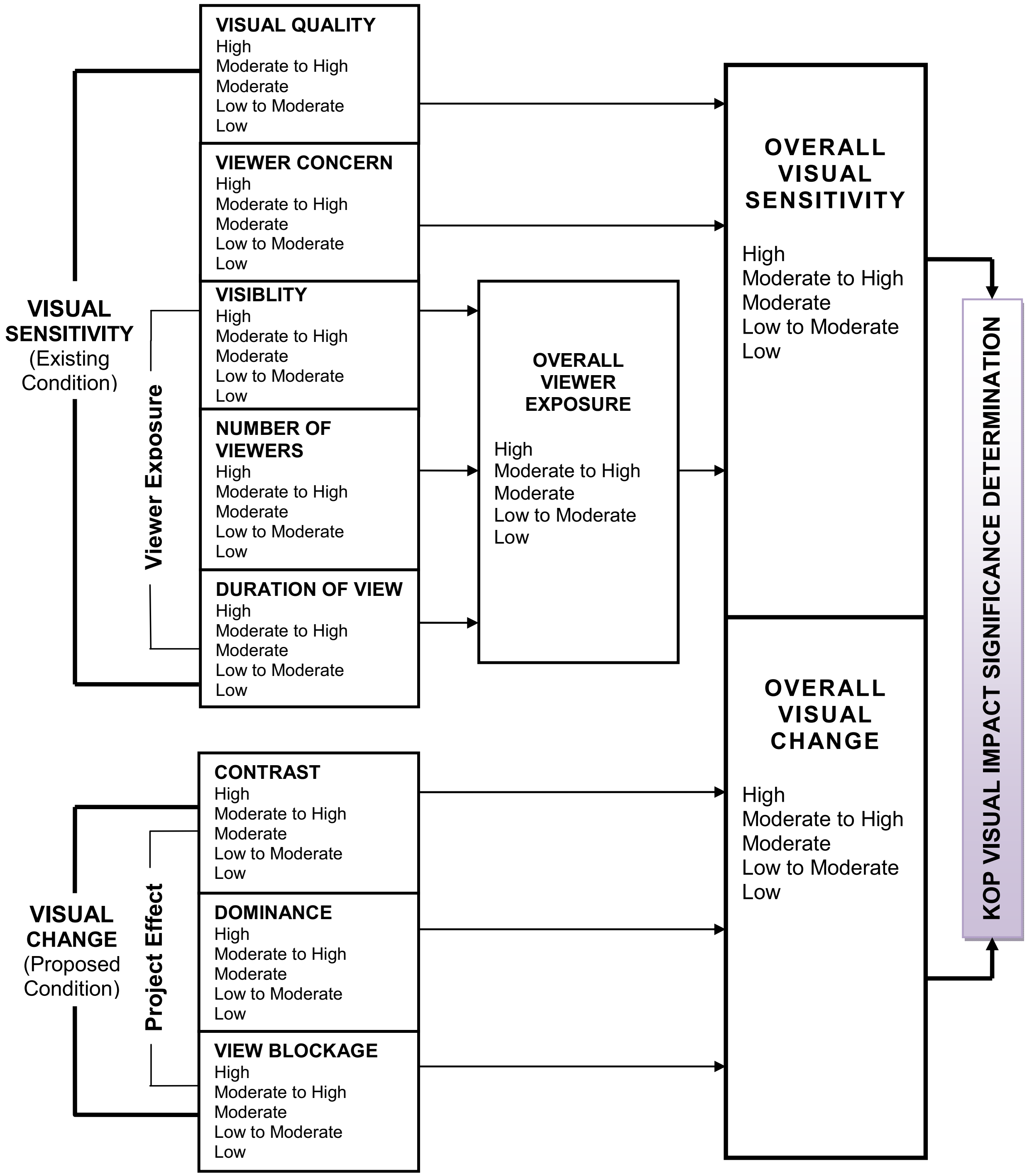
View Blockage

View blockage is the extent to which an existing publicly visible landscape feature (built or natural elements) would be blocked from view by the proposed project. The view is also disrupted when the continuity of the view is interrupted. Higher quality landscape features can be disrupted by the introduction of lower quality features into the view. The degree of view blockage is rated from low to high.

Overall Visual Change

Overall visual change is based on *contrast*, *dominance*, and *view blockage*. These factors are given equal weight in an assessment of overall visual change. Overall visual change is rated from low to high.

VISUAL RESOURCES Diagram 1- Key Observation Point Evaluation



VISUAL IMPACT SIGNIFICANCE DETERMINATION

Visual impact significance is based on the ratings for *overall visual sensitivity* and *overall visual change*. The ratings for overall visual sensitivity and overall visual change are combined to determine significance of the visual impact for each KOP (**Table 5**).

Table 5
KOP Visual Impact Significance Determination

Overall Visual Sensitivity	**Overall Visual Change**				
	High	**Moderate to High**	**Moderate**	**Low to Moderate**	**Low**
High	Significant	Significant	Significant	Less Than Significant	Less Than Significant
Moderate to High	Significant	Significant	Potentially Significant	Less Than Significant	Less Than Significant
Moderate	Significant	Potentially Significant	Less Than Significant	Less Than Significant	Less Than Significant
Low to Moderate	Less Than Significant	Less Than Significant	Less Than Significant	Less Than Significant	No Impact
Low	Less Than Significant	Less Than Significant	Less Than Significant	No Impact	No Impact

Notes:

"Significant effect on the environment" means a substantial, or potentially substantial, adverse change in any of the physical conditions within the area affected by the project, including land, air, water, minerals, flora, fauna, ambient noise, and objects of historic or aesthetic significance (Cal. Code Regs., tit. 14, § 15382). Implementation of mitigation measures may or may not avoid the impact or reduce it to a less-than-significant level.

CEQA does not require mitigation for less-than-significant impacts.

PUBLICLY VISIBLE WATER VAPOR PLUMES

When a thermal power generation facility with a cooling tower[3] is operated at times when the ambient temperature is low and relative humidity is high, the warm moisture (water vapor) that is discharged from the cooling tower condenses as it mixes with cooler ambient air, resulting in creation of a visible plume. The publicly visible plume could substantially degrade the existing visual character or quality of the project site and its surroundings, potentially causing a significant impact to visual resources.

Computer modeling is used to estimate the frequency and size of the vapor plume(s) for a power plant project. If the plume modeling analysis results in a conclusion that plume frequency is greater than 20 percent, staff prepares an analysis of the vapor plume's potential effects on visual resources in the VSOI for the project.

[3] Other types of thermal power generation facilities are also sources of visible water vapor plumes, including combined cycle gas turbine exhausts and geothermal steam exhausts. These facilities are evaluated in the same manner as cooling tower plumes.

Staff established a 20th percentile plume frequency during *seasonal* (November through April) *daylight clear* hours (i.e., no rain/fog high visual contrast hours) as a reasonable worst-case scenario. It is during high visual contrast viewing hours ("clear sky") conditions that water vapor plumes show the greatest contrast with the sky. Water vapor plumes emitted during rain and fog conditions and under some cloud conditions (e.g., marine layer) or at nighttime would not introduce substantial visual contrast into the environment. Staff has included in the *clear* category:

a) all hours with sky cover equal to or less than 10 percent, and

b) half of the hours with total sky cover of 20–90 percent.

The rationale for including these two components in this category is as follows:

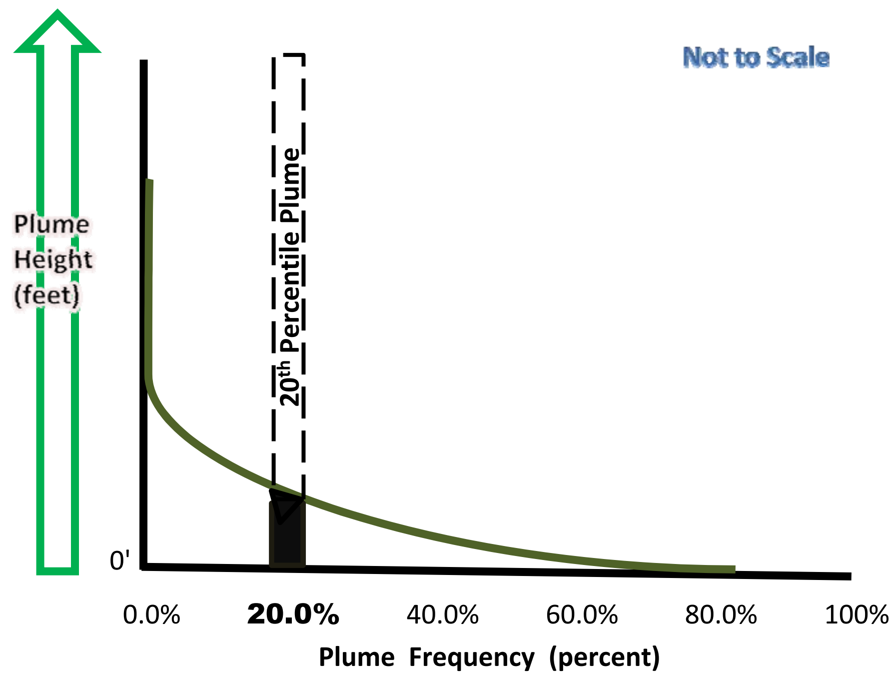
a) Visible plumes typically contrast most with sky under clear conditions, and when total sky cover is equal to or less than 10 percent, clouds either do not exist or they make up such a small proportion of the sky that conditions appear to be virtually clear.

b) For a substantial portion of the time when total sky cover is 20–90 percent, the opacity of sky cover is relatively low (equal to or less than 50 percent), so this sky cover does not always substantially reduce contrast with visible plumes; staff has estimated that approximately half of the hours meeting the latter sky cover criteria can be considered high visual contrast hours and are included in the "clear sky" definition.

Plume frequency is calculated on the six-month portion of the year when the ambient conditions are such that visible water vapor plumes are most likely to occur. This maximum six-month "seasonal" period for plume formation generally occurs between November and April when temperatures are cool or cold, and relative humidity is high.

Staff uses the Combustion Stack Visible Plume (CSVP) model to estimate plume frequency and plume size. If the CSVP modeling conducted for the proposed project's cooling tower predicts a *seasonal daylight clear* hour plume frequency of 20 percent or greater, staff evaluates the *20th percentile plume* in the visual resources analysis. (Discussions of visible water vapor plumes are presented in the Visual Resources section of staff assessments.) Staff considers the 20th percentile plume to be the reasonable worst-case plume dimension for the purpose of analysis. Publicly visible plumes that occur more than 20 percent of the time would be more frequent but smaller in size than those that occur less than 20 percent of the time. This approach recognizes that the largest plumes would occur very rarely, while the most frequent plumes and even the average plumes would be much smaller in size. For example, using a scale of 0 to 100, a one percentile plume would be extremely large, very noticeable to a wide area, but would occur very infrequently. A 100th percentile plume would be nonexistent (see Diagram 2 below). If the modeled publicly visible plume is predicted to occur less than 20 percent of seasonal daylight clear hours, the impact to the existing visual character or quality of the project site and its surroundings is generally considered less than significant, and it is not considered further in the visual resources analysis.

Visual Resources Diagram 2 – Visible Plume Height/Frequency Curve



A plume frequency of 20% represents staff's threshold for conducting a detailed plume analysis.

In the evaluation of the visual effects of the modeled 20th percentile plume, staff addresses the *overall visual sensitivity* for the existing condition and the potential *overall visual change* created by the plume's degree of contrast, level of dominance, and view blockage from the selected KOPs (see Visual Resources Diagram 1).

PUBLICLY VISIBLE WATER VAPOR PLUME ABATEMENT METHODS

Staff has identified four methods to lower a plume's frequency or eliminate the plume completely.

Increase Cooling Tower Air Flow

Increasing the cooling tower air flow will lower the exhaust temperature and reduce plume frequency but would not eliminate the potential for visible water vapor plumes under all conditions. This method focuses on the design of the cooling tower fan flow capacity versus the amount of heat rejected in the cooling tower. Any specific cooling tower design needs to be fully modeled to determine the effective final plume frequency reductions.

Wet/Dry Cooling Tower

This type of cooling tower reduces plume formation by adding heat or heated ambient air to the saturated wet cooling section exhaust to reduce its saturation level. The saturated exhaust can be heated using a separate dry module above the wet cooling tower. Alternatively, outside air can be pulled into separate areas where a dry section heats the air to reduce humidity and a wet section creates warm, humid exhaust. The heated ambient air and humid exhaust are mixed to reduce the humidity of the combined exhaust steam to avoid creating a plume when meeting ambient air.

The amount of plume reduction that can be accomplished by this type of system can vary from a relatively moderate reduction to a significant reduction in visible plume frequency. The specific wet/dry design would be based on the desired degree of plume reduction.

Wet Surface Air Cooler

The basic operating principle of a wet surface air cooler (WSAC) is rejection of heat by evaporation. The WSAC technology is similar to a wet/dry cooling tower. Where this system is different is that it could eliminate the need for a heat exchanger. The cooling fluid(s) used for the intercooler and any auxiliary cooling systems could be piped directly into the WSAC, which can operate as a non-contact heat rejection system with the use of water sprayed over the cooling pipes to increase the heat rejection when necessary. The expected hot temperature of the cooling fluid would increase the efficiency of this type of system. There may still be the potential for plumes to form under high cooling load periods during certain ambient conditions, but the WSAC could be designed, such as for wet/dry operation depending on cooling load, to maintain a minimal plume frequency well below 20 percent during “clear hours.”

Air Cooled Condenser (Dry Cooling)

The use of an air cooled condenser (ACC) would eliminate the formation of a publicly visible water vapor plume. Air cooled condensers condense exhaust steam from the steam turbine and return condensate to the boiler to perform this function. Steam enters the air cooled condenser above the heat exchangers, flows downward through the heat exchanger tubes, where it condenses and is captured in pipes at the base of the heat exchangers. The condensate is then returned to the boiler water system. Mechanical fans force air over the heat exchangers.

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VISUAL RESOURCES APPENDIX-2

Visual Resources Appendix-2 – Key Observation Point Evaluation Matrix and Visual Impact Determination Conclusions

KOP	Visual Sensitivity (Existing Condition)							Visual Change (Proposed Condition)				Visual Impact Determination
			Viewer Exposure									
	Visual Quality	Viewer Concern	Visibility	Number of Viewers	Duration of View	Overall Viewer Exposure[1]	Overall Visual Sensitivity[2]	Contrast	Dominance	View Blockage	Overall Visual Change[3]	Overall Visual Sensitivity + Overall Visual Change[4]
1 – View from Moonstone Park/King Harbor Marina	Low	Moderate to High	High	High	Moderate to High	High	Moderate	Low	Low	Low	Low	Less Than Significant
2 – View from Seaside Lagoon	Low	Moderate to High	High	High	High	High	Moderate	Low	Low	Low	Low	Less Than Significant
3 – View from Redondo Beach Pier	Moderate to High	High	High	High	Moderate to High	High	High	Low	Low	Low	Low	Less Than Significant
4 – View from Hermosa Beach Pier	Moderate to High	High	High	High	Moderate	Moderate to High	Moderate to High	Moderate	Low to Moderate	Low	Low to Moderate	Less Than Significant
5 – View from Herondo Street at Valley	Low to Moderate	High	High	High	Moderate to High	High	Moderate to High	Moderate to High	Moderate	Low to Moderate	Moderate	Potentially Significant

Visual Resources Appendix-2 – Key Observation Point Evaluation Matrix and Visual Impact Determination Conclusions

KOP	Visual Sensitivity (Existing Condition)							Visual Change (Proposed Condition)				Visual Impact Determination
			Viewer Exposure									
	Visual Quality	Viewer Concern	Visibility	Number of Viewers	Duration of View	Overall Viewer Exposure[1]	Overall Visual Sensitivity[2]	Contrast	Dominance	View Blockage	Overall Visual Change[3]	Overall Visual Sensitivity + Overall Visual Change[4]
Drive												
6 – View from King Harbor Entrance at PCH and Herondo/ Anita Street	Low	Moderate to High	High	High	Moderate to High	Moderate to High	Moderate	Moderate	Moderate	Moderate	Moderate	Less Than Significant
7 – View from Anita Street at N. Paulina Avenue	Low to Moderate	High	High	High	High	High	Moderate to High	Low to Moderate	Moderate	Low	Low to Moderate	Less Than Significant
8 – View from N. Francisca Avenue at N. Catalina Avenue	Moderate	High	Moderate	Moderate	Moderate	Moderate	Moderate to High	High	Moderate	Low to Moderate	Moderate	Potentially Significant

Visual Resources Appendix-2 – Key Observation Point Evaluation Matrix and Visual Impact Determination Conclusions

KOP	Visual Sensitivity (Existing Condition)							Visual Change (Proposed Condition)				Visual Impact Determination
			Viewer Exposure									
	Visual Quality	Viewer Concern	Visibility	Number of Viewers	Duration of View	Overall Viewer Exposure[1]	Overall Visual Sensitivity[2]	Contrast	Dominance	View Blockage	Overall Visual Change[3]	Overall Visual Sensitivity + Overall Visual Change[4]
9 – View from N. Catalina Avenue at Beryl Street	Moderate	High	Moderate to High	High	Moderate to High	Moderate to High	Moderate to High	Moderate to High	Moderate to High	Low to Moderate	Moderate	Potentially Significant

Notes: High = 5 Moderate to High = 4 Moderate = 3 Low to Moderate = 2 Low = 1

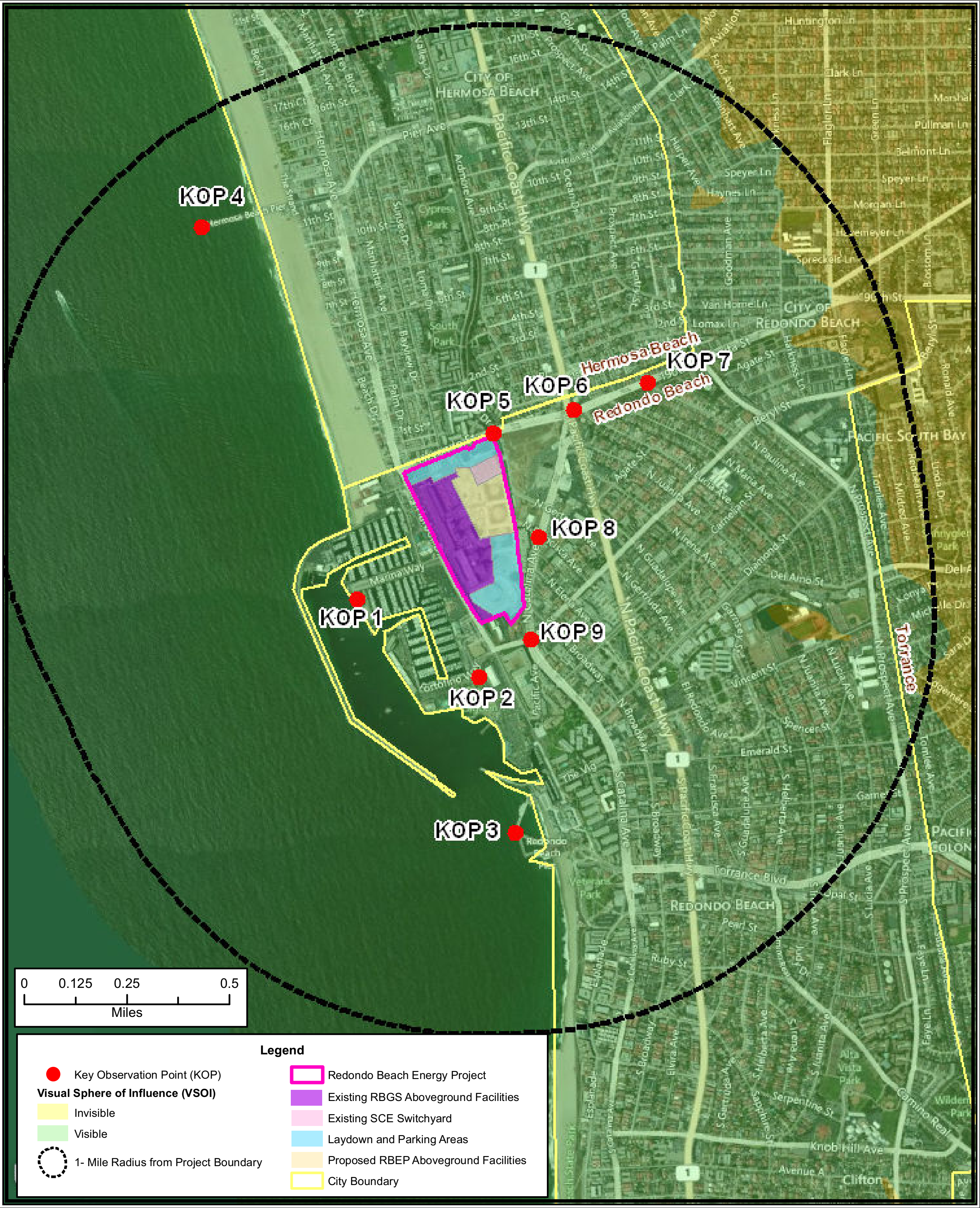
[1] Visibility + Number of Viewers + Duration of View ÷ 3 = Overall Viewer Exposure
[2] Visual Quality + Viewer Concern + Overall Viewer Exposure ÷ 3 = Overall Visual Sensitivity
[3] Contrast + Dominance + View Blockage ÷ 3 = Overall Visual Change
[4] Overall Visual Sensitivity + Overall Visual Change = Visual Impact Determination (see Table 5 in Appendix VR-1)

VISUAL RESOURCES ATTACHMENT-1

Facility Name: Redondo Beach Energy Project	Complaint Log No:
Complaint's name and address:	Phone No:
Date and time complaint received: Complaint filed: ☐ By Telephone ☐ In Writing (attach letter) ☐ In Person Date of first occurrence:	
Description of the complaint (lighting, duration, etc.):	
Findings of investigation by AES personnel: Indicate if complaint relates to a violation of an Energy Commission condition: ☐ Yes ☐ No Date complainant contacted to discuss findings:	
Description of corrective measures taken or other complaint resolution: Indicate if complainant agrees with proposed resolution: In not, explain: Additional relevant information:	
If corrective action necessary, date completed: Date of first response to complainant: (attach copy) Date of final response to complainant: (attach copy)	
This information is certified to be correct: Plant or project manager's signature:	Date:

VISUAL RESOURCES - FIGURE 1a

Redondo Beach Energy Project - Visual Sphere of Influence and Key Observation Point Locations



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

Source: CH2MHILL Figure 5.13-1b (10.29.2012), BING Aerial

VISUAL RESOURCES - FIGURE 1b

Redondo Beach Energy Project - Project Site Area Topography and Key Observation Point Locations

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

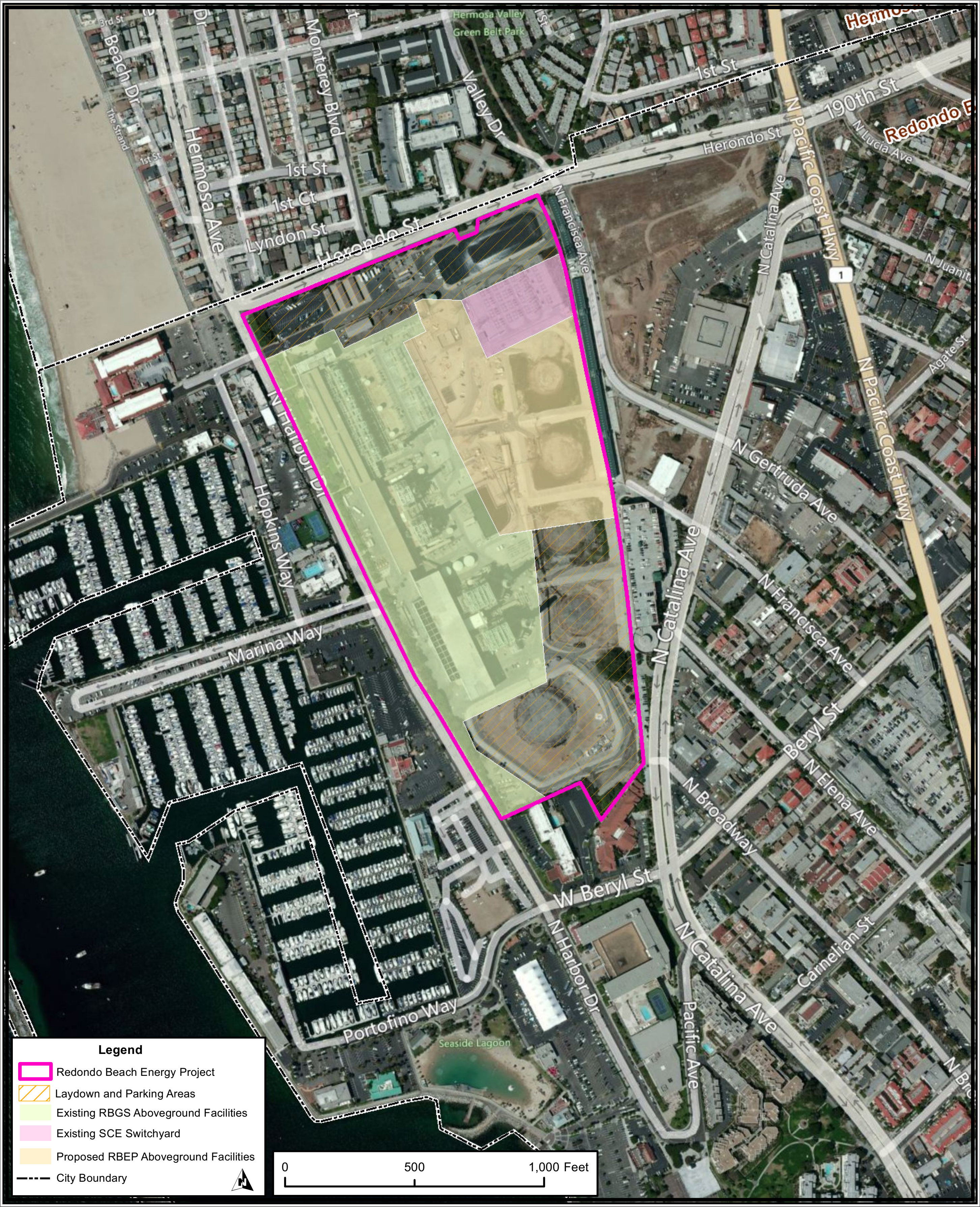
Source: CH2MHILL Figure 5.13-1b (10.29.2012), BING Aerial, ESRI

VISUAL RESOURCES - FIGURE 1c
Redondo Beach Energy Project - Build a Better Redondo KOPs

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION
SOURCE: Building a Better Redondo et al.

VISUAL RESOURCES - FIGURE 2

Redondo Beach Energy Project - Proposed Site Layout - Existing and Proposed Features



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

Source: CH2MHILL Figure 2.1-1, BING Aerial

VISUAL RESOURCES - FIGURE 3a

Redondo Beach Energy Project - KOP 1 - View from Moonstone Park - Existing View

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: CH2MHILL Figure 5.13-2 A

VISUAL RESOURCES - FIGURE 3b

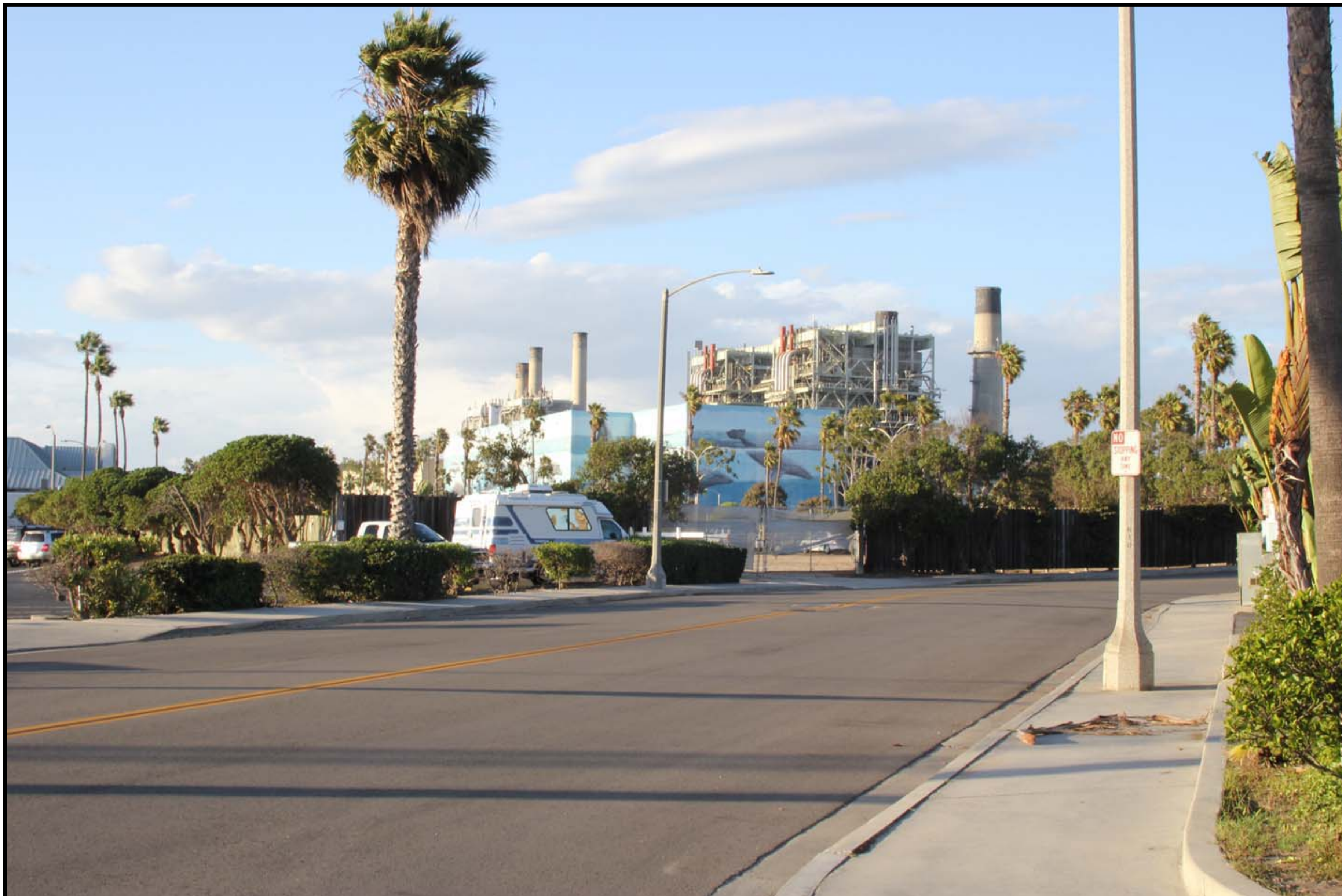
Redondo Beach Energy Project - KOP 1 - View from Moonstone Park - Simulated View

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: CH2MHILL Figure 5.13-2 B

VISUAL RESOURCES - FIGURE 4a

Redondo Beach Energy Project - KOP 2 - View from Seaside Lagoon - Existing View

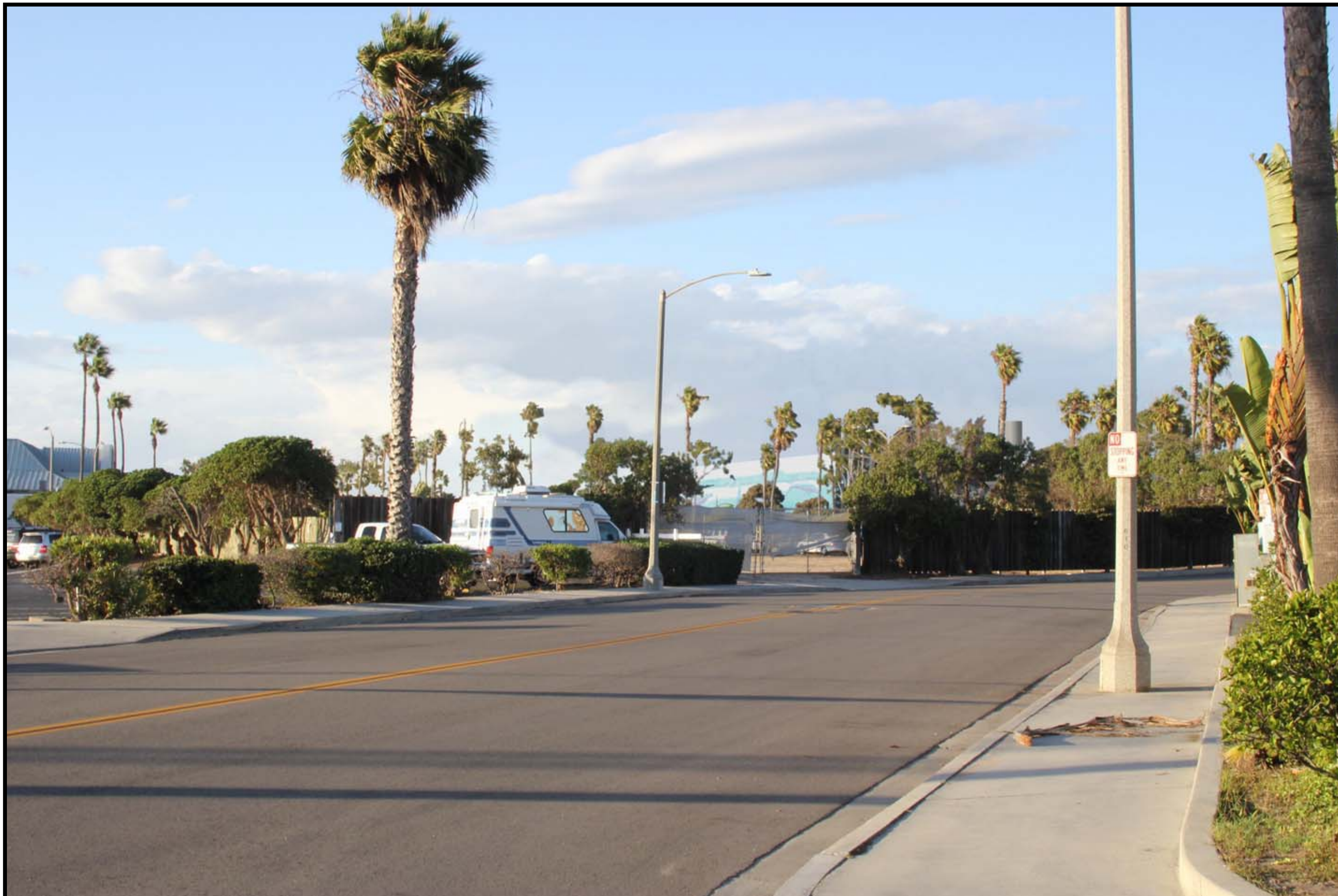


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: CH2MHILL Figure 5.13-3 A

VISUAL RESOURCES - FIGURE 4b

Redondo Beach Energy Project - KOP 2 - View from Seaside Lagoon - Simulated View



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: CH2MHILL Figure 5.13-3 B

VISUAL RESOURCES - FIGURE 5a

Redondo Beach Energy Project - KOP 3 - View from Redondo Beach Pier - Existing View

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: CH2MHILL Figure 5.13-4 A

VISUAL RESOURCES - FIGURE 5b

Redondo Beach Energy Project - KOP 3 - View from Redondo Beach Pier - Simulated View

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: CH2MHILL Figure 5.13-4 B

VISUAL RESOURCES - FIGURE 6a

Redondo Beach Energy Project - KOP 4 - View from Hermosa Beach Pier - Existing View

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: CH2MHILL Figure WSQ-1 A

VISUAL RESOURCES - FIGURE 6b

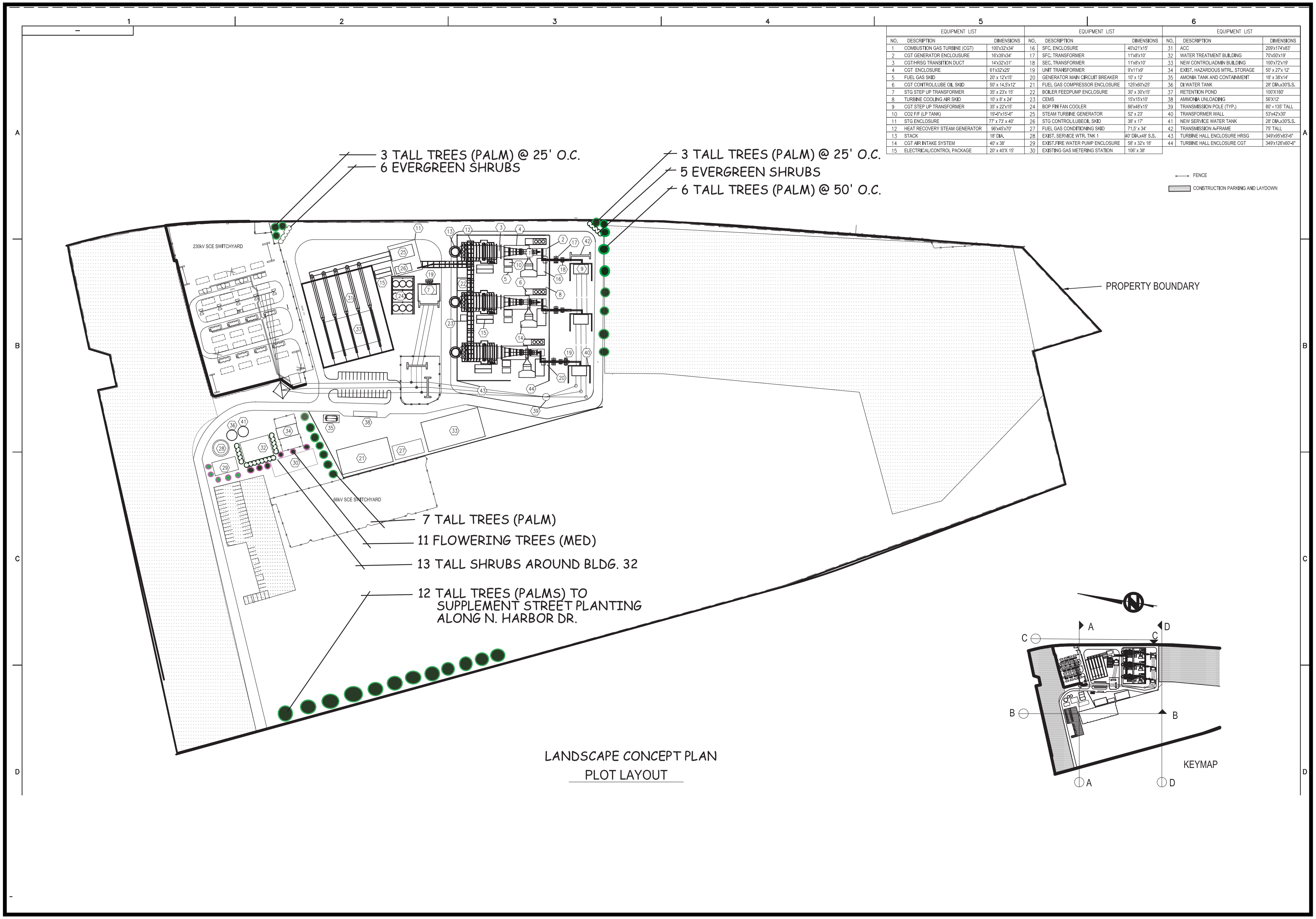
Redondo Beach Energy Project - KOP 4 - View from Hermosa Beach Pier - Simulated View

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: CH2MHILL Figure WSQ-1 B

VISUAL RESOURCES - FIGURE 6c

Redondo Beach Energy Project - Proposed Landscape Concept Plan



EQUIPMENT LIST

NO.	DESCRIPTION	DIMENSIONS	NO.	DESCRIPTION	DIMENSIONS	NO.	DESCRIPTION	DIMENSIONS
1	COMBUSTION GAS TURBINE (CGT)	100'x32'x34'	16	SFC. ENCLOSURE	40'x21'x15'	31	ACC	209'x174'x83'
2	CGT GENERATOR ENCLOUSURE	16'x39'x34'	17	SFC. TRANSFORMER	11'x8'x10'	32	WATER TREATMENT BUILDING	70'x50'x19'
3	CGT/HRSG TRANSITION DUCT	14'x32'x31'	18	SEC. TRANSFORMER	11'x8'x10'	33	NEW CONTROL/ADMIN BUILDING	100'x72'x19'
4	CGT ENCLOSURE	61'x32'x25'	19	UNIT TRANSFORMER	9'x11'x9'	34	EXIST. HAZARDOUS MTRL. STORAGE	50' x 27'x 12'
5	FUEL GAS SKID	20' x 12'x15'	20	GENERATOR MAIN CIRCUIT BREAKER	10' x 12'	35	AMONIA TANK AND CONTAINMENT	18' x 38'x14'
6	CGT CONTROL/LUBE OIL SKID	50' x 14.5'x12'	21	FUEL GAS COMPRESSOR ENCLOSURE	125'x60'x25'	36	DI WATER TANK	28' DIA.x30'S.S.
7	STG STEP UP TRANSFORMER	35' x 23'x 15'	22	BOILER FEEDPUMP ENCLOSURE	30' x 30'x15'	37	RETENTION POND	100'X180'
8	TURBINE COOLING AIR SKID	10' x 8' x 24'	23	CEMS	15'x15'x10'	38	AMMONIA UNLOADING	56'X12'
9	CGT STEP UP TRANSFORMER	35' x 22'x15'	24	BOP FIN FAN COOLER	86'x48'x15'	39	TRANSMISSION POLE (TYP.)	80' - 135' TALL
10	CO2 F/F (LP TANK)	19'-6"x15'-6"	25	STEAM TURBINE GENERATOR	52' x 23'	40	TRANSFORMER WALL	53'x42'x30'
11	STG ENCLOSURE	77' x 73' x 40'	26	STG CONTROL/LUBEOIL SKID	38' x 17'	41	NEW SERVICE WATER TANK	28' DIA.x30'S.S.
12	HEAT RECOVERY STEAM GENERATOR	96'x45'x70'	27	FUEL GAS CONDITIONING SKID	71.5' x 34'	42	TRANSMISSION A-FRAME	75' TALL
13	STACK	18' DIA.	28	EXIST. SERVICE WTR. TNK 1	40' DIA.x48' S.S.	43	TURBINE HALL ENCLOSURE HRSG	349'x95'x83'-6"
14	CGT AIR INTAKE SYSTEM	40' x 38'	29	EXIST.FIRE WATER PUMP ENCLOSURE	58' x 32'x 18'	44	TURBINE HALL ENCLOSURE CGT	349'x126'x60'-6"
15	ELECTRICAL/CONTROL PACKAGE	20' x 40'X 15'	30	EXISTING GAS METERING STATION	106' x 38'			

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: RBEP Appendix 5.13B - Figure 11-13-12

VISUAL RESOURCES - FIGURE 7a

Redondo Beach Energy Project - KOP 5 - View from north side of Herondo Street - Existing View

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: CH2MHILL Figure DR 44-1 A

VISUAL RESOURCES - FIGURE 7b

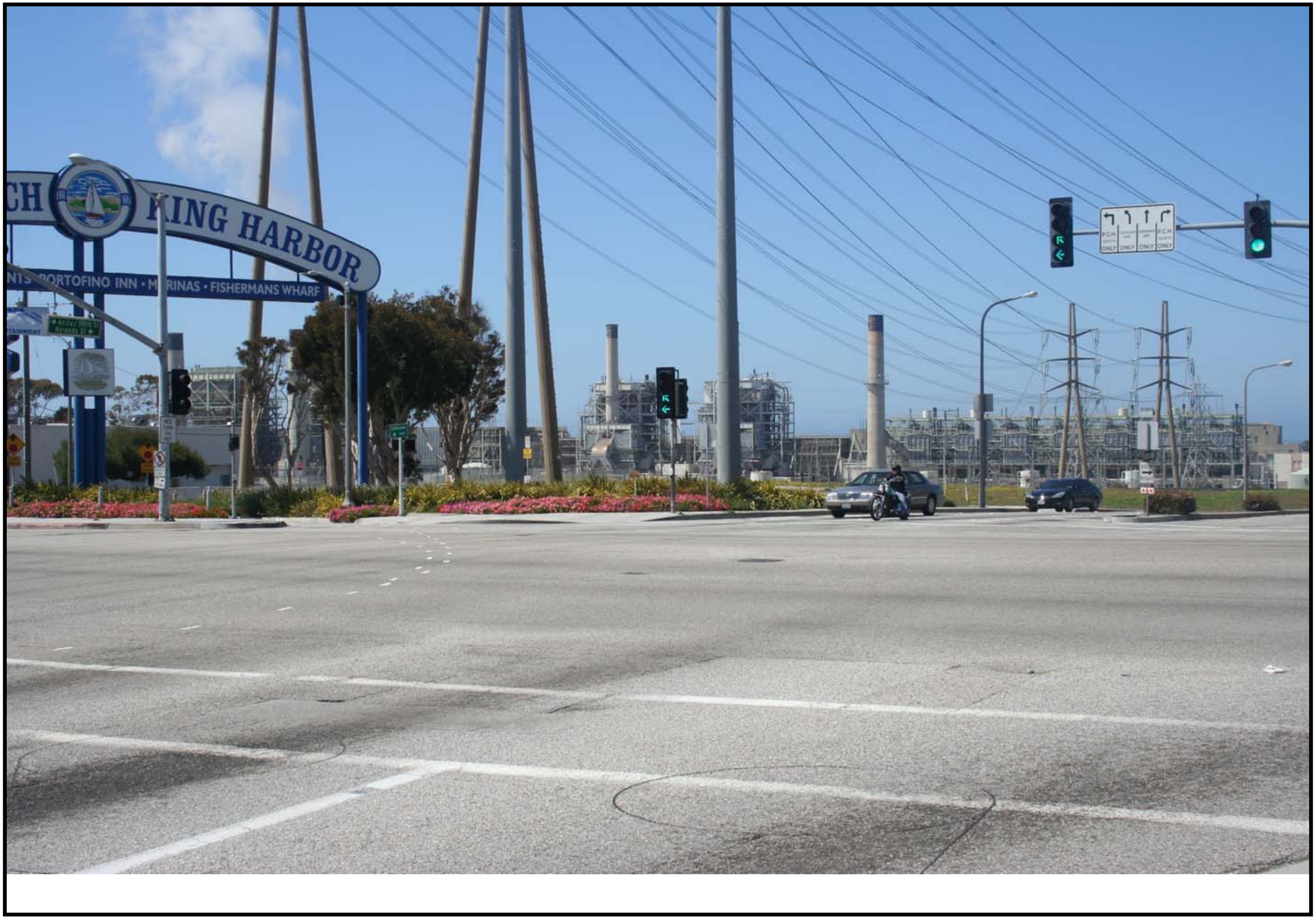
Redondo Beach Energy Project - KOP 5 - View from north side of Herondo Street - Simulated View

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: CH2MHILL Figure DR 44-1 B

VISUAL RESOURCES - FIGURE 8a

Redondo Beach Energy Project - KOP 6 - View from Pacific Coast Highway and Herondo / Anita Streets - Existing View

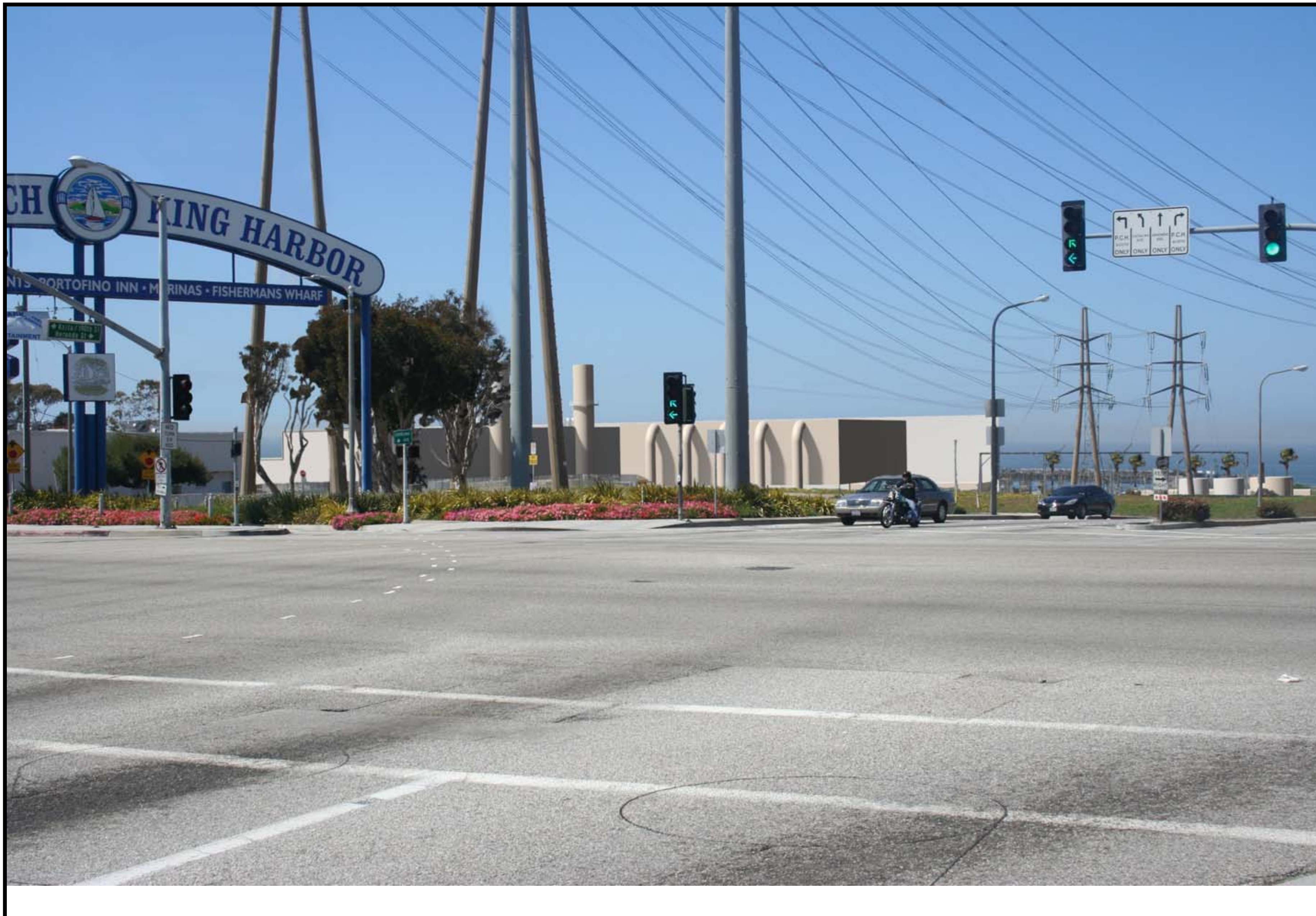


CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: CH2MHILL Figure 5.13-5R A

VISUAL RESOURCES - FIGURE 8b

Redondo Beach Energy Project - KOP 6 - View from Pacific Coast Highway and Herondo / Anita Streets - Simulated View



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: CH2MHILL Figure 5.13-5R B

VISUAL RESOURCES - FIGURE 9a

Redondo Beach Energy Project - KOP 7 - View from north side of Anita Street at N. Paulina Avenue - Existing View

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: CH2MHILL Figure DR 45-1R A

VISUAL RESOURCES - FIGURE 9b

Redondo Beach Energy Project - KOP 7 - View from north side of Anita Street at N. Paulina Avenue - Simulated View

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: CH2MHILL Figure DR 45-1R B

VISUAL RESOURCES - FIGURE 10a

Redondo Beach Energy Project - KOP 8 - View from east side of N. Catalina Avenue at N. Francisca Avenue - Existing View

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: CH2MHILL Figure DR 46-1 A

VISUAL RESOURCES - FIGURE 10b

Redondo Beach Energy Project - KOP 8 - View from east side of N. Catalina Avenue at N. Francisca Avenue - Simulated View

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: CH2MHILL Figure DR 46-1 B

VISUAL RESOURCES - FIGURE 11a

Redondo Beach Energy Project - KOP 9 - View from east side of N. Catalina Avenue at Beryl Street - Existing View

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: CH2MHILL Figure DR 47-1 A

VISUAL RESOURCES - FIGURE 11b

Redondo Beach Energy Project - KOP 9 - View from east side of N. Catalina Avenue at Beryl Street - Simulated View

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: CH2MHILL Figure DR 47-1 B

VISUAL RESOURCES - FIGURE 12

Redondo Beach Energy Project - Cumulative Impacts

CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: Google Aerial Imagery

Engineering Assessment

FACILITY DESIGN

Edward Brady and Shahab Khoshmashrab

SUMMARY OF CONCLUSIONS

The California Energy Commission staff concludes that the design, construction, and eventual closure of the project and its linear facilities would comply with applicable engineering laws, ordinances, regulations and standards. The proposed conditions of certification, below, would ensure compliance with these laws, ordinances, regulations and standards (LORS).

INTRODUCTION

Facility design encompasses the civil, structural, mechanical, and electrical engineering design of the Redondo Beach Energy Project (RBEP). The purpose of this analysis is to:

- verify that the laws, ordinances, regulations and standards (LORS) that apply to the engineering design and construction of the project have been identified;
- verify that both the project and its ancillary facilities are sufficiently described, including proposed design criteria and analysis methods, in order to provide reasonable assurance that the project will be designed and constructed in accordance with all applicable engineering LORS, in a manner that also ensures the public health and safety;
- determine whether special design features should be considered during final design to address conditions unique to the site which could influence public health and safety; and
- describe the design review and construction inspection process and establish the conditions of certification used to monitor and ensure compliance with the engineering LORS, in addition to any special design requirements.

Subjects discussed in this analysis include:

- identification of the engineering LORS that apply to facility design;
- evaluation of the applicant's proposed design criteria, including identification of criteria essential to public health and safety;
- proposed modifications and additions to the application for certification (AFC) necessary for compliance with applicable engineering LORS; and
- conditions of certification proposed by staff to ensure that the project will be designed and constructed to ensure public health and safety and comply with all applicable engineering LORS.

LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

Lists of LORS applicable to each engineering discipline (civil, structural, mechanical, and electrical) are described in the AFC (RBEP 2012A, AFC Appendix 2D). Key LORS are listed in **Facility Design Table 1**, below.

Facility Design Table 1
Key Engineering Laws, Ordinances, Regulations and Standards (LORS)

Applicable LORS	Description
Federal	Title 29 Code of Federal Regulations (CFR), Part 1910, Occupational Safety and Health standards
State	2013 (or the latest edition in effect) California Building Standards Code (CBSC) (also known as Title 24, California Code of Regulations)
Local	City of Redondo Beach Municipal Code
General	American National Standards Institute (ANSI) American Society of Mechanical Engineers (ASME) American Welding Society (AWS) American Society for Testing and Materials (ASTM)

The following conditions of certification require the project to comply with the California Building Standards Code and city of Redondo Beach regulations and ordinances to ensure that the project would be built to applicable engineering codes and ensure public health and safety.

For the project to be built in a manner that would ensure public health and safety, the LORS listed above in **Facility Design Table 1** under the "**General**" heading, must also be met by the project. The LORS listed under this heading are only some of the key engineering standards applicable to the project; for a comprehensive list of engineering LORS, please see **Facility Design Appendix A**.

SETTING

RBEP would be built on the existing site of the AES Redondo Beach Generating Station, an existing and operating power plant in the city of Redondo Beach. For more information on the site and its related project description, please see the **PROJECT DESCRIPTION** section of this document. Additional engineering design details are contained in **Facility Design Appendix A**.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

The purpose of this analysis is to ensure that the project would be built to applicable engineering codes, ensure public health and safety, and verify that applicable engineering LORS have been identified. This analysis also evaluates the applicant's proposed design criteria, describes the design review and construction inspection process, and establishes conditions of certification that would monitor and ensure compliance with engineering LORS and any other special design requirements. These conditions allow both the California Energy Commission (Energy Commission) compliance project manager (CPM) and the applicant to adopt a compliance monitoring program that will verify compliance with these LORS.

SITE PREPARATION AND DEVELOPMENT

The applicant proposes the use of accepted industry standards, design practices, and construction methods in preparing and developing the site (see RBEP 2012a, Appendix 2D, for a representative list of applicable industry standards). Staff concludes that the proposed design criteria for grading, flood protection, erosion control, and site drainage would comply with all applicable site preparation LORS. To ensure compliance, staff proposes the conditions of certification listed below.

MAJOR STRUCTURES, SYSTEMS, AND EQUIPMENT

Major structures, systems, and equipment are structures and their associated components or equipment that are necessary for power production, costly or time consuming to repair or replace, are used for the storage, containment, or handling of hazardous or toxic materials, or could become potential health and safety hazards if not constructed according to applicable engineering LORS.

RBEP will be designed and constructed to the 2013 California Building Standards Code (CBSC), also known as Title 24, California Code of Regulations, which encompasses the California Building Code (CBC), California Building Standards Administrative Code, California Electrical Code, California Mechanical Code, California Plumbing Code, California Energy Code, California Fire Code, California Code for Building Conservation, California Reference Standards Code, and other applicable codes and standards in effect when the design and construction of the project actually begin. If the initial designs are submitted to the chief building official (CBO) for review and approval after the update to the 2013 CBSC takes effect, the 2013 CBSC provisions shall be replaced with the updated provisions.

Certain structures in a power plant may be required, under the CBC, to undergo dynamic lateral force (structural) analysis; others may be designed using the simpler static analysis procedure. In order to ensure that structures are analyzed according to their appropriate lateral force procedure, staff has included condition of certification **STRUC-1**, below, which, in part, requires the project CBO's review and approval of the owner's proposed lateral force procedures before construction begins.

PROJECT QUALITY PROCEDURES

The applicant describes a quality program intended to inspire confidence that its systems and components will be designed, fabricated, stored, transported, installed, and tested in accordance with all appropriate power plant technical codes and standards (RBEP 2012a, AFC Appendix 2D). Compliance with design requirements will be verified through specific inspections and audits. Implementation of this quality assurance and quality control program will ensure that RBEP is actually designed, procured, fabricated, and installed as described in this analysis.

COMPLIANCE MONITORING

Under Division II, Section 104 of the 2013 CBC, the CBO is authorized and directed to enforce all provisions of the CBC. The Energy Commission itself serves as the building official, and has the responsibility to enforce the code, for all of the energy facilities it certifies. In addition, the Energy Commission has the power to interpret the CBC and adopt and enforce both rules and supplemental regulations that clarify application of the CBC's provisions.

The Energy Commission's design review and construction inspection process conforms to CBC requirements and ensures that all facility design conditions of certification are met. As provided by Section 103 of the 2013 CBC, the Energy Commission appoints experts to perform design review and construction inspections and act as delegate CBOs on behalf of the Energy Commission. These delegates may include the local building official and/or independent consultants hired to provide technical expertise that is not provided by the local official alone. The applicant, through permit fees provided by the CBC, pays the cost of these reviews and inspections. While building permits in addition to Energy Commission certification are not required for this project, the applicant pays in lieu of CBC permit fees to cover the costs of these reviews and inspections.

Engineering and compliance staff will invite a third-party engineering consultant to act as CBO for this project. When an entity has been assigned CBO duties, Energy Commission staff will complete a memorandum of understanding (MOU) with that entity to outline both its roles and responsibilities and those of its subcontractors and delegates.

Staff has developed proposed conditions of certification **GEN-1** through **GEN-8**, **STRUC-1** through **STRUC-4**, **CIVIL-1** through **CIVIL-4**, **MECH-1** through **MECH-3**, and **ELEC-1**, to ensure protection of public health and safety and compliance with engineering design LORS. Some of these conditions address the roles, responsibilities, and qualifications of the engineers who will design and build the proposed project (conditions of certification **GEN-4** and **GEN-5**). These engineers must be registered in California and sign and stamp every submittal of design plans, calculations, and specifications submitted to the CBO. These conditions require that every element of the project's construction (subject to CBO review and approval) be approved by the CBO before it is performed. They also require that qualified special inspectors perform or oversee special inspections required by all applicable LORS (Condition of Certification **GEN-6**).

While the Energy Commission and delegate CBO have the authority to allow some flexibility in scheduling construction activities, these conditions are written so that no element of construction (of permanent facilities subject to CBO review and approval) which could be difficult to reverse or correct can proceed without prior CBO approval. Elements of construction that are not difficult to reverse may proceed without approval of the plans. The applicant bears the responsibility to fully modify construction elements in order to comply with all design changes resulting from the CBO's subsequent plan review and approval, and inspection processes.

FACILITY CLOSURE

Facility closure is defined in the **COMPLIANCE CONDITIONS AND COMPLIANCE MONITORING PLAN** section of this document as a facility shutdown with no intent to restart operation. It may also be the cumulative result of unsuccessful efforts to re-start over an increasingly lengthy period of non-operation[1], condemned by inadequate means and/or lack of a viable plan. Facility closures can occur due to a variety of factors, including, but not limited to, irreparable damage and/or functional or economic obsolescence.

In order to ensure that facility closure would be completed in a manner that is environmentally sound, safe, and protects the public health and safety, the project owner must submit a closure plan to the Energy Commission for review and approval prior to the commencement of closing the facility, as required in Condition of Certification **COM-15** (Facility Closure Planning) in **COMPLIANCE CONDITIONS AND COMPLIANCE MONITORING PLAN**.

Though future conditions that could affect facility closure are largely unknown at this time, the requirements in **COMPLIANCE CONDITIONS AND COMPLIANCE MONITORING PLAN** are adequate protection, even in the unlikely event that the project is abandoned.

CONCLUSIONS AND RECOMMENDATIONS

1. The laws, ordinances, regulations and standards (LORS) identified above apply to the project.

2. Staff has evaluated the proposed engineering LORS, design criteria, and design methods in the record, and concludes that the design, construction, and eventual closure of the project will likely comply with applicable engineering LORS.

3. The proposed conditions of certification will ensure that RBEP is designed and constructed in accordance with applicable engineering LORS. This will be accomplished through design review, plan checking, and field inspections that will be performed by the CBO. Staff will audit the CBO to ensure satisfactory performance.

4. Though future conditions that could affect facility closure are largely unknown at this time, it can reasonably be concluded that if the project owner submits a facility closure plan in accordance with **COM-15** as provided in the **COMPLIANCE CONDITIONS AND COMPLIANCE MONITORING PLAN** portion of this document prior to facility closure, facility closure procedures will comply with all applicable engineering LORS.

[1] Non-operation is defined in the **COMPLIANCE CONDITIONS AND COMPLIANCE MONITORING PLAN** as a time-limited event and can encompass part or all of a facility. Non-operation can be a planned event, usually for minor equipment maintenance or repair, or unplanned, usually the result of unanticipated events or emergencies.

Energy Commission staff recommends that:

1. The following conditions of certification be adopted to ensure that the project is designed and constructed in a manner that protects the public health and safety and complies with all applicable engineering LORS;

2. The project be designed and built to the 2013 CBSC (or successor standards, if in effect when initial project engineering designs are submitted to the CBO for review); and

3. The CBO reviews the final designs, checks plans, and performs field inspections during construction. Energy Commission staff shall audit and monitor the CBO to ensure satisfactory performance.

CONDITIONS OF CERTIFICATION

GEN-1 The project owner shall design, construct, and inspect the project in accordance with the 2013 California Building Standards Code (CBSC), also known as Title 24, California Code of Regulations, which encompasses the California Building Code (CBC), California Building Standards Administrative Code, California Electrical Code, California Mechanical Code, California Plumbing Code, California Energy Code, California Fire Code, California Code for Building Conservation, California Reference Standards Code, and all other applicable engineering LORS in effect at the time initial design plans are submitted to the chief building official (CBO) for review and approval (the CBSC in effect is the edition that has been adopted by the California Building Standards Commission and published at least 180 days previously). The project owner shall ensure that all the provisions of the above applicable codes are enforced during the construction, addition, alteration, moving, demolition, repair, or maintenance of the completed facility. All transmission facilities (lines, switchyards, switching stations and substations) are covered in the conditions of certification in the **TRANSMISSION SYSTEM ENGINEERING** section of this document.

In the event that the initial engineering designs are submitted to the CBO when the successor to the 2013 CBSC is in effect, the 2013 CBSC provisions shall be replaced with the applicable successor provisions. Where, in any specific case, different sections of the code specify different materials, methods of construction or other requirements, the most restrictive shall govern. Where there is a conflict between a general requirement and a specific requirement, the specific requirement shall govern.

The project owner shall ensure that all contracts with contractors, subcontractors, and suppliers clearly specify that all work performed and materials supplied comply with the codes listed above.

Verification: Within 30 days following receipt of the certificate of occupancy, the project owner shall submit to the compliance project manager (CPM) a statement of verification, signed by the responsible design engineer, attesting that all designs, construction, installation, and inspection requirements of the applicable LORS and the Energy Commission's decision have been met in the area of facility design. The project owner shall provide the CPM a copy of the certificate of occupancy within 30 days of receipt from the CBO.

Once the certificate of occupancy has been issued, the project owner shall inform the CPM at least 30 days prior to any construction, addition, alteration, moving, demolition, or repair to be performed on any portion(s) of the completed facility that requires CBO approval for compliance with the above codes. The CPM will then determine if the CBO needs to approve the work. Any such work that requires CPM approval or changes to the **Facility Design** conditions of certification must have CPM approval prior to making those changes.

GEN-2 Before submitting the initial engineering designs for CBO review, the project owner shall furnish the CPM and the CBO with a schedule of facility design submittals, and master drawings and master specifications list. The master drawings and master specifications list shall contain a list of proposed submittal packages of designs, calculations, and specifications for major structures, systems, and equipment. Major structures, systems, and equipment are structures and their associated components or equipment that are necessary for power production, costly or time consuming to repair or replace, are used for the storage, containment, or handling of hazardous or toxic materials, or could become potential health and safety hazards if not constructed according to applicable engineering LORS. The schedule shall contain the date of each submittal to the CBO. To facilitate audits by Energy Commission staff, the project owner shall provide specific packages to the CPM upon request.

Verification: At least 60 days (or a project owner- and CBO-approved alternative time frame) prior to the start of rough grading, the project owner shall submit to the CBO and to the CPM the schedule, and the master drawings and master specifications list of documents to be submitted to the CBO for the CBO's review and approval. These documents shall be the pertinent design documents for the major structures, systems, and equipment defined above in Condition of Certification **GEN-2**. Major structures and equipment shall be added to or deleted from the list only with CPM approval. The project owner shall provide schedule updates in the monthly compliance report.

GEN-3 The project owner shall make payments to the CBO for design review, plan checks, and construction inspections, based upon a reasonable fee schedule to be negotiated between the project owner and the CBO. These fees may be consistent with the fees listed in the 2013 CBC, adjusted for inflation and other appropriate adjustments; may be based on the value of the facilities reviewed; may be based on hourly rates; or may be otherwise agreed upon by the project owner and the CBO.

Verification: The project owner shall make the required payments to the CBO in accordance with the agreement between the project owner and the CBO. The project owner shall send a copy of the CBO's receipt of payment to the CPM in the next monthly compliance report indicating that applicable fees have been paid.

GEN-4 Prior to the start of rough grading, the project owner shall assign a California-registered architect, or a structural or civil engineer, as the resident engineer (RE) in charge of the project. All transmission facilities (lines, switchyards, switching stations, and substations) are addressed in the conditions of certification in the **TRANSMISSION SYSTEM ENGINEERING** section of this document.

The RE may delegate responsibility for portions of the project to other registered engineers. Registered mechanical and electrical engineers may be delegated responsibility for mechanical and electrical portions of the project, respectively. A project may be divided into parts, provided that each part is clearly defined as a distinct unit. Separate assignments of general responsibility may be made for each designated part.

The RE shall:

1. Monitor progress of construction work requiring CBO design review and inspection to ensure compliance with LORS;

2. Ensure that construction of all facilities subject to CBO design review and inspection conforms in every material respect to applicable LORS, these conditions of certification, approved plans, and specifications;

3. Prepare documents to initiate changes in approved drawings and specifications when either directed by the project owner or as required by the conditions of the project;

4. Be responsible for providing project inspectors and testing agencies with complete and up-to-date sets of stamped drawings, plans, specifications, and any other required documents;

5. Be responsible for the timely submittal of construction progress reports to the CBO from the project inspectors, the contractor, and other engineers who have been delegated responsibility for portions of the project; and

6. Be responsible for notifying the CBO of corrective action or the disposition of items noted on laboratory reports or other tests when they do not conform to approved plans and specifications.

The RE (or his delegate) must be located at the project site, or be available at the project site within a reasonable period of time, during any hours in which construction takes place.

The RE shall have the authority to halt construction and to require changes or remedial work if the work does not meet requirements.

If the RE or the delegated engineers are reassigned or replaced, the project owner shall submit the name, qualifications, and registration number of the newly assigned engineer to the CBO for review and approval. The project owner shall notify the CPM of the CBO's approval of the new engineer.

Verification: At least 30 days (or project owner- and CBO-approved alternative time frame) prior to the start of rough grading, the project owner shall submit to the CBO, for review and approval, the resume and registration number of the RE and any other delegated engineers assigned to the project. The project owner shall notify the CPM of the CBO's approvals of the RE and other delegated engineer(s) within five days of the approval.

If the RE or the delegated engineer(s) is subsequently reassigned or replaced, the project owner has five days to submit the resume and registration number of the newly assigned engineer to the CBO for review and approval. The project owner shall notify the CPM of the CBO's approval of the new engineer within five days of the approval.

GEN-5 Prior to the start of rough grading, the project owner shall assign at least one of each of the following California registered engineers to the project to be a responsible engineer: a civil engineer; a soils, geotechnical, or civil engineer experienced and knowledgeable in the practice of soils engineering; and an engineering geologist. Prior to the start of construction, the project owner shall assign at least one of each of the following California registered engineers to the project: a design engineer who is either a structural engineer or a civil engineer fully competent and proficient in the design of power plant structures and equipment supports; a mechanical engineer; and an electrical engineer. (California Business and Professions Code section 6704 et seq., and sections 6730, 6731 and 6736 require state registration to practice as a civil engineer or structural engineer in California). All transmission facilities (lines, switchyards, switching stations, and substations) are handled in the conditions of certification in the **TRANSMISSION SYSTEM ENGINEERING** section of this document.

The tasks performed by the civil, mechanical, electrical, or design engineers may be divided between two or more engineers, as long as each engineer is responsible for a particular segment of the project (for example, proposed earthwork, civil structures, power plant structures, equipment support). No segment of the project shall have more than one responsible engineer. The transmission line may be the responsibility of a separate California registered electrical engineer.

The project owner shall submit, to the CBO for review and approval, the names, qualifications, and registration numbers of all responsible engineers assigned to the project.

If any one of the designated responsible engineers is subsequently reassigned or replaced, the project owner shall submit the name, qualifications and registration number of the newly assigned responsible engineer to the CBO for review and approval. The project owner shall notify the CPM of the CBO's approval of the new engineer.

A. The civil engineer shall:

   1. Review the foundation investigations, geotechnical, or soils reports prepared by the soils engineer, the geotechnical engineer, or by a civil engineer experienced and knowledgeable in the practice of soils engineering;

   2. Design (or be responsible for the design of), stamp, and sign all plans, calculations, and specifications for proposed site work, civil works, and related facilities requiring design review and inspection by the CBO. At a minimum, these include: grading, site preparation, excavation, compaction, construction of secondary containment, foundations, erosion and sedimentation control structures, drainage facilities, underground utilities, culverts, site access roads, and sanitary sewer systems; and

   3. Provide consultation to the RE during the construction phase of the project and recommend changes in the design of the civil works facilities and changes to the construction procedures.

B. The soils engineer, geotechnical engineer, or civil engineer experienced and knowledgeable in the practice of soils engineering, shall:

   1. Review all the engineering geology reports;

   2. Prepare the foundation investigations, geotechnical, or soils reports containing field exploration reports, laboratory tests, and engineering analysis detailing the nature and extent of the soils that could be susceptible to liquefaction, rapid settlement, or collapse when saturated under load;

   3. Be present, as required, during site grading and earthwork to provide consultation and monitor compliance with requirements set forth in the 2013 CBC (depending on the site conditions, this may be the responsibility of either the soils engineer, the engineering geologist, or both); and

   4. Recommend field changes to the civil engineer and RE.

This engineer shall be authorized to halt earthwork and to require changes if site conditions are unsafe or do not conform to the predicted conditions used as the basis for design of earthwork or foundations.

C. The engineering geologist shall:

   1. Review all the engineering geology reports and prepare a final soils grading report; and

   2. Be present, as required, during site grading and earthwork to provide consultation and monitor compliance with the requirements set forth in the 2013 CBC (depending on the site conditions, this may be the responsibility of either the soils engineer, the engineering geologist, or both).

D. The design engineer shall:

   1. Be directly responsible for the design of the proposed structures and equipment supports;

   2. Provide consultation to the RE during design and construction of the project;

   3. Monitor construction progress to ensure compliance with engineering LORS;

   4. Evaluate and recommend necessary changes in design; and

   5. Prepare and sign all major building plans, specifications, and calculations.

E. The mechanical engineer shall be responsible for, and sign and stamp a statement with, each mechanical submittal to the CBO, stating that the proposed final design plans, specifications, and calculations conform to all of the mechanical engineering design requirements set forth in the Energy Commission's decision.

F. The electrical engineer shall:

   1. Be responsible for the electrical design of the project; and

   2. Sign and stamp electrical design drawings, plans, specifications, and calculations.

Verification: At least 30 days (or project owner- and CBO-approved alternative time frame) prior to the start of rough grading, the project owner shall submit to the CBO for review and approval, resumes and registration numbers of the responsible civil engineer, soils (geotechnical) engineer, and engineering geologist assigned to the project.

At least 30 days (or project owner- and CBO-approved alternative time frame) prior to the start of construction, the project owner shall submit to the CBO for review and approval, resumes and registration numbers of the responsible design engineer, mechanical engineer, and electrical engineer assigned to the project.

The project owner shall notify the CPM of the CBO's approvals of the responsible engineers within five days of the approval.

If the designated responsible engineer is subsequently reassigned or replaced, the project owner has five days in which to submit the resume and registration number of the newly assigned engineer to the CBO for review and approval. The project owner shall notify the CPM of the CBO’s approval of the new engineer within five days of the approval.

GEN-6 Prior to the start of an activity requiring special inspection, including prefabricated assemblies, the project owner shall assign to the project, qualified and certified special inspector(s) who shall be responsible for the special inspections required by the 2013 CBC. All transmission facilities (lines, switchyards, switching stations, and substations) are handled in conditions of certification in the **TRANSMISSION SYSTEM ENGINEERING** section of this document.

A certified weld inspector, certified by the American Welding Society (AWS), and/or American Society of Mechanical Engineers (ASME), as applicable, shall inspect welding performed on-site requiring special inspection (including structural, piping, tanks and pressure vessels).

The special inspector shall:

1. Be a qualified person who shall demonstrate competence, to the satisfaction of the CBO, for inspection of the particular type of construction requiring special or continuous inspection;

2. Inspect the work assigned for conformance with the approved design drawings and specifications;

3. Furnish inspection reports to the CBO and RE. All discrepancies shall be brought to the immediate attention of the RE for correction, then, if uncorrected, to the CBO and the CPM for corrective action; and

4. Submit a final signed report to the RE, CBO, and CPM, stating whether the work requiring special inspection was, to the best of the inspector’s knowledge, in conformance with the approved plans, specifications, and other provisions of the applicable edition of the CBC.

<u>Verification:</u> At least 15 days (or project owner- and CBO-approved alternative time frame) prior to the start of an activity requiring special inspection, the project owner shall submit to the CBO for review and approval, with a copy to the CPM, the name(s) and qualifications of the certified weld inspector(s), or other certified special inspector(s) assigned to the project to perform one or more of the duties set forth above. The project owner shall also submit to the CPM a copy of the CBO’s approval of the qualifications of all special inspectors in the next monthly compliance report.

If the special inspector is subsequently reassigned or replaced, the project owner has five days in which to submit the name and qualifications of the newly assigned special inspector to the CBO for approval. The project owner shall notify the CPM of the CBO's approval of the newly assigned inspector within five days of the approval.

GEN-7 If any discrepancy in design and/or construction is discovered in any engineering work that has undergone CBO design review and approval, the project owner shall document the discrepancy and recommend required corrective actions. The discrepancy documentation shall be submitted to the CBO for review and approval. The discrepancy documentation shall reference this condition of certification and, if appropriate, applicable sections of the CBC and/or other LORS.

Verification: The project owner shall transmit a copy of the CBO's approval of any corrective action taken to resolve a discrepancy to the CPM in the next monthly compliance report. If any corrective action is disapproved, the project owner shall advise the CPM, within five days, of the reason for disapproval and the revised corrective action to obtain CBO's approval.

GEN-8 The project owner shall obtain the CBO's final approval of all completed work that has undergone CBO design review and approval. The project owner shall request the CBO to inspect the completed structure and review the submitted documents. The project owner shall notify the CPM after obtaining the CBO's final approval. The project owner shall retain one set of approved engineering plans, specifications, and calculations (including all approved changes) at the project site or at another accessible location during the operating life of the project. Electronic copies of the approved plans, specifications, calculations, and marked-up as-builts shall be provided to the CBO for retention by the CPM.

Verification: Within 15 days of the completion of any work, the project owner shall submit to the CBO, with a copy to the CPM, in the next monthly compliance report, (a) a written notice that the completed work is ready for final inspection, and (b) a signed statement that the work conforms to the final approved plans. After storing the final approved engineering plans, specifications, and calculations described above, the project owner shall submit to the CPM a letter stating both that the above documents have been stored and the storage location of those documents.

Within 90 days of the completion of construction, the project owner shall provide to the CBO three sets of electronic copies of the above documents at the project owner's expense. These are to be provided in the form of "read only" (Adobe .pdf 6.0 or newer version) files, with restricted (password-protected) printing privileges, on archive quality compact discs.

CIVIL-1 The project owner shall submit to the CBO for review and approval the following:

1. Design of the proposed drainage structures and the grading plan;
2. An erosion and sedimentation control plan;

3. A construction storm water pollution prevention plan (SWPPP);

4. Related calculations and specifications, signed and stamped by the responsible civil engineer; and

5. Soils, geotechnical, or foundation investigations reports required by the 2013 CBC.

Verification: At least 15 days (or project owner- and CBO-approved alternative time frame) prior to the start of site grading, the project owner shall submit the documents described above to the CBO for design review and approval. In the next monthly compliance report following the CBO's approval, the project owner shall submit a written statement certifying that the documents have been approved by the CBO.

CIVIL-2 The resident engineer shall, if appropriate, stop all earthwork and construction in the affected areas when the responsible soils engineer, geotechnical engineer, or the civil engineer experienced and knowledgeable in the practice of soils engineering, identifies unforeseen adverse soil or geologic conditions. The project owner shall submit modified plans, specifications, and calculations to the CBO based on these new conditions. The project owner shall obtain approval from the CBO before resuming earthwork and construction in the affected area.

Verification: The project owner shall notify the CPM within 24 hours, or on the Monday morning following an incident occurring late Friday or on Saturday, when earthwork and construction is stopped as a result of unforeseen adverse geologic/soil conditions. Within 24 hours of the CBO's approval to resume earthwork and construction in the affected areas, the project owner shall provide to the CPM a copy of the CBO's approval.

CIVIL-3 The project owner shall perform inspections in accordance with the 2013 CBC. All plant site-grading operations, for which a grading permit is required, shall be subject to inspection by the CBO.

If, in the course of inspection, it is discovered that the work is not being performed in accordance with the approved plans, the discrepancies shall be reported immediately to the resident engineer, the CBO, and the CPM. The project owner shall prepare a written report, with copies to the CBO and the CPM, detailing all discrepancies, non-compliance items, and the proposed corrective action.

Verification: Within five days of the discovery of any discrepancies, the resident engineer shall transmit to the CBO and the CPM a non-conformance report (NCR), and the proposed corrective action, for review and approval. Within five days of resolution of the NCR, the project owner shall submit the details of the corrective action to the CBO and the CPM. A list of NCRs for the reporting month shall also be included in the following monthly compliance report.

CIVIL-4 After completion of finished grading and erosion and sedimentation control and drainage work, the project owner shall obtain the CBO's approval of the final grading plans (including final changes) for the erosion and sedimentation control work. The civil engineer shall state that the work within his/her area of responsibility was done in accordance with the final approved plans.

Verification: Within 30 days (or project owner- and CBO-approved alternative time frame) of the completion of the erosion and sediment control mitigation and drainage work, the project owner shall submit to the CBO, for review and approval, the final grading plans (including final changes) and the responsible civil engineer's signed statement that the installation of the facilities and all erosion control measures were completed in accordance with the final approved combined grading plans, and that the facilities are adequate for their intended purposes. The project owner shall submit a copy of the CBO's approval to the CPM in the next monthly compliance report.

STRUC-1 Prior to the start of any increment of construction, the project owner shall submit plans, calculations and other supporting documentation to the CBO for design review and acceptance for all project structures and equipment identified in the CBO-approved master drawing and master specifications lists. The design plans and calculations shall include the lateral force procedures and details as well as vertical calculations.

Construction of any structure or component shall not begin until the CBO has approved the lateral force procedures to be employed in designing that structure or component. The project owner shall:

1. Obtain approval from the CBO of lateral force procedures proposed for project structures;

2. Obtain approval from the CBO for the final design plans, specifications, calculations, soils reports, and applicable quality control procedures. If there are conflicting requirements, the more stringent shall govern (for example, highest loads, or lowest allowable stresses shall govern). All plans, calculations, and specifications for foundations that support structures shall be filed concurrently with the structure plans, calculations, and specifications;

3. Submit to the CBO the required number of copies of the structural plans, specifications, calculations, and other required documents of the designated major structures prior to the start of on-site fabrication and installation of each structure, equipment support, or foundation;

4. Ensure that the final plans, calculations, and specifications clearly reflect the inclusion of approved criteria, assumptions, and methods used to develop the design. The final designs, plans, calculations, and specifications shall be signed and stamped by the responsible design engineer; and

5. Submit to the CBO the responsible design engineer's signed statement that the final design plans conform to applicable LORS.

Verification: At least 60 days (or project owner- and CBO-approved alternative time frame) prior to the start of any increment of construction of any structure or component listed in the CBO-approved master drawing and master specifications list, the project owner shall submit to the CBO the above final design plans, specifications and calculations, with a copy of the transmittal letter to the CPM.

The project owner shall submit to the CPM, in the next monthly compliance report, a copy of a statement from the CBO that the proposed structural plans, specifications, and calculations have been approved and comply with the requirements set forth in applicable engineering LORS.

STRUC-2 The project owner shall submit to the CBO the required number of sets of the following documents related to work that has undergone CBO design review and approval:

1. Concrete cylinder strength test reports (including date of testing, date sample taken, design concrete strength, tested cylinder strength, age of test, type and size of sample, location and quantity of concrete placement from which sample was taken, and mix design designation and parameters);

2. Concrete pour sign-off sheets;

3. Bolt torque inspection reports (including location of test, date, bolt size, and recorded torques);

4. Field weld inspection reports (including type of weld, location of weld, inspection of non-destructive testing (NDT) procedure and results, welder qualifications, certifications, qualified procedure description or number (ref: AWS); and

5. Reports covering other structural activities requiring special inspections shall be in accordance with the 2013 CBC.

Verification: If a discrepancy is discovered in any of the above data, the project owner shall, within five days, prepare and submit an NCR describing the nature of the discrepancies and the proposed corrective action to the CBO, with a copy of the transmittal letter to the CPM. The NCR shall reference the condition(s) of certification and the applicable CBC chapter and section. Within five days of resolution of the NCR, the project owner shall submit a copy of the corrective action to the CBO and the CPM.

The project owner shall transmit a copy of the CBO's approval or disapproval of the corrective action to the CPM within 15 days. If disapproved, the project owner shall advise the CPM, within five days, the reason for disapproval, and the revised corrective action to obtain CBO's approval.

STRUC-3 The project owner shall submit to the CBO design changes to the final plans required by the 2013 CBC, including the revised drawings, specifications, calculations, and a complete description of, and supporting rationale for, the proposed changes, and shall give to the CBO prior notice of the intended filing.

Verification: On a schedule suitable to the CBO, the project owner shall notify the CBO of the intended filing of design changes, and shall submit the required number of sets of revised drawings and the required number of copies of the other above-mentioned documents to the CBO, with a copy of the transmittal letter to the CPM. The project owner shall notify the CPM, via the monthly compliance report, when the CBO has approved the revised plans.

STRUC-4 Tanks and vessels containing quantities of toxic or hazardous materials exceeding amounts specified in the 2013 CBC shall, at a minimum, be designed to comply with the requirements of that chapter.

Verification: At least 30 days (or project owner- and CBO-approved alternate time frame) prior to the start of installation of the tanks or vessels containing the above specified quantities of toxic or hazardous materials, the project owner shall submit to the CBO for design review and approval final design plans, specifications, and calculations, including a copy of the signed and stamped engineer's certification.

The project owner shall send copies of the CBO approvals of plan checks to the CPM in the following monthly compliance report. The project owner shall also transmit a copy of the CBO's inspection approvals to the CPM in the monthly compliance report following completion of any inspection.

MECH-1 The project owner shall submit, for CBO design review and approval, the proposed final design, specifications and calculations for each plant major piping and plumbing system listed in the CBO-approved master drawing and master specifications list. The submittal shall also include the applicable QA/QC procedures. Upon completion of construction of any such major piping or plumbing system, the project owner shall request the CBO's inspection approval of that construction.

The responsible mechanical engineer shall stamp and sign all plans, drawings, and calculations for the major piping and plumbing systems, subject to CBO design review and approval, and submit a signed statement to the CBO when the proposed piping and plumbing systems have been designed, fabricated, and installed in accordance with all of the applicable laws, ordinances, regulations and industry standards, which may include, but are not limited to:

- American National Standards Institute (ANSI) B31.1 (Power Piping Code);
- ANSI B31.2 (Fuel Gas Piping Code);
- ANSI B31.3 (Chemical Plant and Petroleum Refinery Piping Code);
- ANSI B31.8 (Gas Transmission and Distribution Piping Code);
- National Association of Corrosion Engineers Protection Requirements (NACE R.P.) 0169-83;
- NACE R.P. 0187-87;
- NFPA 56 (Refer to Hazardous Materials section of this document for adoption);

- Title 24, California Code of Regulations, Parts 1 and 2 (California Building Code);
- Title 24, California Electric Code of Regulations, Part 3 (California Electrical Code);
- Title 24, California Mechanical Code of Regulations, Part 4 (California Mechanical Code; and
- Title 24, California Code of Regulations, Part 5 (California Plumbing Code);
- Title 24, California Code of Regulations, Part 6 (California Energy Code, for building energy conservation systems and temperature control and ventilation systems).

The CBO may deputize inspectors to carry out the functions of the code enforcement agency (CBC Division II, Section 103.3).

Verification: At least 30 days (or project owner- and CBO-approved alternative time frame) prior to the start of any increment of major piping or plumbing construction listed in the CBO-approved master drawing and master specifications list, the project owner shall submit to the CBO for design review and approval the final plans, specifications, and calculations, including a copy of the signed and stamped statement from the responsible mechanical engineer certifying compliance with applicable LORS, and shall send the CPM a copy of the transmittal letter in the next monthly compliance report.

The project owner shall transmit to the CPM, in the monthly compliance report following completion of any inspection, a copy of the transmittal letter conveying the CBO's inspection approvals.

MECH-2 For all pressure vessels installed in the plant, the project owner shall submit to the CBO and California Occupational Safety and Health Administration (Cal-OSHA), prior to operation, the code certification papers and other documents required by applicable LORS. Upon completion of the installation of any pressure vessel, the project owner shall request the appropriate CBO and/or Cal-OSHA inspection of that installation.

The project owner shall:

1. Ensure that all boilers and fired and unfired pressure vessels are designed, fabricated, and installed in accordance with the appropriate section of the American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code, or other applicable code. Vendor certification, with identification of applicable code, shall be submitted for prefabricated vessels and tanks; and

2. Have the responsible design engineer submit a statement to the CBO that the proposed final design plans, specifications, and calculations conform to all of the requirements set forth in the appropriate ASME Boiler and Pressure Vessel Code or other applicable codes.

Verification: At least 30 days (or project owner- and CBO-approved alternative time frame) prior to the start of on-site fabrication or installation of any pressure vessel, the project owner shall submit to the CBO for design review and approval, the above listed documents, including a copy of the signed and stamped engineer's certification, with a copy of the transmittal letter to the CPM.

The project owner shall transmit to the CPM, in the monthly compliance report following completion of any inspection, a copy of the transmittal letter conveying the CBO's and/or Cal-OSHA inspection approvals.

MECH-3 The project owner shall submit to the CBO for design review and approval the design plans, specifications, calculations, and quality control procedures for any heating, ventilating, air conditioning (HVAC) or refrigeration system. Packaged HVAC systems, where used, shall be identified with the appropriate manufacturer's data sheets.

The project owner shall design and install all HVAC and refrigeration systems within buildings and related structures in accordance with the CBC and other applicable codes. Upon completion of any increment of construction, the project owner shall request the CBO's inspection and approval of that construction. The final plans, specifications and calculations shall include approved criteria, assumptions, and methods used to develop the design. In addition, the responsible mechanical engineer shall sign and stamp all plans, drawings and calculations and submit a signed statement to the CBO that the proposed final design plans, specifications and calculations conform with the applicable LORS.

Verification: At least 30 days (or project owner- and CBO-approved alternative time frame) prior to the start of construction of any HVAC or refrigeration system, the project owner shall submit to the CBO the required HVAC and refrigeration calculations, plans, and specifications, including a copy of the signed and stamped statement from the responsible mechanical engineer certifying compliance with the CBC and other applicable codes, with a copy of the transmittal letter to the CPM.

ELEC-1 Prior to the start of any increment of electrical construction for all electrical equipment and systems 110 Volts or higher (see a representative list, below) the project owner shall submit, for CBO design review and approval, the proposed final design, specifications, and calculations. Upon approval, the above listed plans, together with design changes and design change notices, shall remain on the site or at another accessible location for the operating life of the project. The project owner shall request that the CBO inspect the installation to ensure compliance with the requirements of applicable LORS. All transmission facilities (lines, switchyards, switching stations, and substations) are handled in conditions of certification in the **TRANSMISSION SYSTEM ENGINEERING** section of this document.

A. Final plant design plans shall include:

1. one-line diagram for the 13.8 kV, 4.16 kV and 480 V systems;

2. system grounding drawings;
3. lightning protection system; and
4. hazardous area classification plan (CBC Part 3, Articles 500-510).

B. Final plant calculations must establish:

1. short-circuit ratings of plant equipment;
2. ampacity of feeder cables;
3. voltage drop in feeder cables;
4. system grounding requirements;
5. coordination study calculations for fuses, circuit breakers and protective relay settings for the 13.8 kV, 4.16 kV and 480 V systems;
6. lighting energy calculations; and
7. 110 volt system design calculations and submittals showing feeder sizing, transformer and panel load confirmation, fixture schedules and layout plans.

C. The following activities shall be reported to the CPM in the monthly compliance report:

1. Receipt or delay of major electrical equipment;
2. Testing or energization of major electrical equipment; and
3. A signed statement by the registered electrical engineer certifying that the proposed final design plans and specifications conform to requirements set forth in the Energy Commission decision.

Verification: At least 30 days (or project owner- and CBO-approved alternative time frame) prior to the start of each increment of electrical construction, the project owner shall submit to the CBO for design review and approval the above listed documents. The project owner shall include in this submittal a copy of the signed and stamped statement from the responsible electrical engineer attesting compliance with the applicable LORS, and shall send the CPM a copy of the transmittal letter in the next monthly compliance report.

REFERENCES

RBEP 2012a – Applicant/AES Southland Development (TN 68597). Application for Certification for the Redondo Beach Energy Project Volumes 1 and 2, dated November 20, 2012. Submitted to CEC/Robert Oglesby on November 21, 2012.

FACILITY DESIGN APPENDIX A

ENGINEERING LAWS, ORDINANCES, REGULATIONS, AND STANDARDS (LORS)

This appendix lists the LORS that would be used in the engineering design and construction of the Redondo Beach Energy Project (RBEP).

1. **Civil Engineering LORS:**

American Association of State Highway and Transportation Officials (AASHTO)—Standards and Specifications

American Concrete Institute (ACI) − Standards and Recommended Practices

American Institute of Steel Construction (AISC) − Standards and Specifications

American National Standards Institute (ANSI) − Standards

American Society of Testing and Materials (ASTM) − Standards, Specifications, and Recommended Practices

American Water Works Association (AWWA) − Standards and Specifications

American Welding Society (AWS) − Codes and Standards

Asphalt Institute (AI) − Asphalt Handbook

State of California Department of Transportation (CALTRANS) Standard Specification

California Energy Commission (CEC) − Recommended Seismic Design Criteria for Non-Nuclear Generating Facilities in California, 1989

Concrete Reinforcing Steel Institute (CRSI) − Standards

Factory Mutual (FM) − Standards

National Fire Protection Association (NFPA) − Standards

California Building Code (CBC) 2013

Steel Structures Painting Council (SSPC) − Standards and Specifications

American Society of Civil Engineers (ASCE) – Standards and Recommended Practices

International Building Code (IBC) 2012 Edition with Los Angeles County Amendments

United States Geological Survey (USGS)

2. **Structural Engineering LORS:**

   California Building Code, 2013 Edition with Los Angeles County Amendments

   American Concrete Institute (ACI)

   American Society of Civil Engineers (ASCE)

   American Society of Mechanical Engineers (ASME)

   American Welding Society (AWS)

   Code of Federal Regulations, Title 29—Labor, Chapter XVII, Occupational Safety and Health Administration (OSHA)

   National Association of Architectural Metal Manufacturers (NAAMM)—Metal Bar Grating Manual

   Hoist Manufacturers Institute (HMI), Standard Specifications for Electric Wire Rope Hoists (HMI 100)

   IEEE 980 – Guide for Containment and Control of Oil Spills in Substations

   National Electric Safety Code (NESC), C2-2007

   National Fire Protection Association (NFPA Standards)

   OSHA Williams-Steiger Occupational Safety and Health Act of 1970

   Steel Deck Institute (SDI)—Design Manual for Floor Decks and Roof Decks

3. **Mechanical Engineering LORS:**

   California Building Standards Code, 2013 Edition with Los Angeles County Amendments

   American Society of Mechanical Engineers (ASME) Boiler and Pressure Vessel Code

   ASME/ANSI B31.1 Power Piping Code

   ASME Performance Test Codes

   ASME Standard TDP-1

   American National Standards Institute (ANSI) B16.5, B16.34, and B133.8

   American Boiler Manufacturers Association (ABMA)

   American Gear Manufacturers Association (AGMA)

   Air Moving and Conditioning Association (AMCA)

American Society for Testing and Materials (ASTM)

American Society of Heating, Refrigerating, and Air Conditioning Engineers (ASHRAE)

American Welding Society (AWS)

Cooling Tower Institute (CTI)

Heat Exchange Institute (HEI)

Manufacturing Standardization Society (MSS) of the Valve and Fitting Industry

National Fire Protection Association (NFPA)

Hydraulic Institute Standards (HIS)

Tubular Exchanger Manufacturer's Association (TEMA)

4. Electrical Engineering LORS:

American National Standards Institute (ANSI)

American Society for Testing and Materials (ASTM)

Anti-Friction Bearing Manufacturers Association (AFBMA)

California Building Standards Code

California Electrical Code

Insulated Cable Engineers Association (ICEA)

Institute of Electrical and Electronics Engineers (IEEE)

Illuminating Engineering Society (IES)

National Association of Corrosion Engineers (NACE)

National Electrical Code (NEC)

National Electrical Manufacturers Association (NEMA)

National Electrical Safety Code (NESC)

National Fire Protection Association (NFPA)

Underwriters Laboratories, Inc. (UL)

GEOLOGY AND PALEONTOLOGY

Casey Weaver, CEG

SUMMARY OF CONCLUSIONS

The proposed Redondo Beach Energy Project (RBEP) site is located in a geologically active area along the coast of Redondo Beach in Southern California.

The site is not underlain by an active fault or subject to surface fault rupture. The site's most proximal known active fault is a segment of the Palos Verdes fault which is located approximately three miles southwest of the proposed project site. Numerous other active faults are located in both the onshore and offshore vicinity of the project site.

Because of its geologic setting, the site could be subject to very strong levels of earthquake-related ground shaking. The significant effects of strong ground shaking on the RBEP structures must be mitigated through structural designs required by the most recent edition of the California Building Code (currently CBC 2013). CBC 2013 requires that structures be designed to resist seismic stresses from anticipated maximum ground acceleration.

In addition to strong seismic shaking, the project may be subject to soil failure caused by liquefaction and/or dynamic compaction. A design-level geotechnical investigation required for the project by the CBC 2013, and proposed Conditions of Certification **GEO-1** and, **Facility Design** Conditions of Certification **GEN-1**, **GEN-5** and **CIVIL-1**, would present standard engineering design requirements for mitigation of strong seismic shaking, liquefaction and potential excessive settlement due to dynamic compaction.

While not likely to occur during the project design life, the site is subject to inundation by tsunami. U.S. Building codes generally have not addressed the subject of designing structures in tsunami zones (Reynolds 2013). FEMA's Coastal Construction Manual (FEMA P55), developed to provide design and construction guidance for structures built in coastal areas, addresses seismic loads for coastal structures and provides information on tsunami and associated loads (FEMA 2013).

Based on the sea level rise projections developed by the Sea-Level Rise Task Force of the Coastal and Ocean Working Group of the California Climate Action Team, sea level is predicted to rise a maximum of 17 inches above the 2014 level by the year 2050 (CO-CAT 2013). Analysis of the effects of sea-level rise on the project is presented in the **SOIL AND WATER RESOURCES** section of this document.

Petroleum is the only economic geologic resource in the project vicinity. Other than petroleum, there are no known viable mineralogic or geologic resources at the proposed RBEP site.

The near surface of the project site is highly disturbed and partially covered by artificial fill, blacktop and onsite structures. Native soils beneath the fill have a potential to contain fossils. The underlying San Pedro formation has yielded numerous fossils within the Los Angeles Basin as reported by the applicant's paleontologist during the paleontological archive and literature reviews. Further, monitoring of excavations for the Redondo Beach Generating Station (RBGS) recovered the tooth of an extinct llama at a depth of 30 feet beneath the site (AES 2012).

While significant paleontological resources are not anticipated to be discovered during construction of the proposed project, potential impacts to paleontological resources due to construction activities would be mitigated through worker training and monitoring by qualified paleontologists, as required by proposed Conditions of Certification **PAL-1** through **PAL-8**.

Based on this information, California Energy Commission (Energy Commission) staff concludes that the potential adverse cumulative impacts to project facilities from geologic hazards during its design life are less than significant. Similarly, staff concludes the potential adverse cumulative impacts to potential geologic, mineralogic, and paleontologic resources from the construction, operation, and closure of the proposed project, if any, are less than significant. It is staff's opinion that the proposed RBEP can be designed and constructed in accordance with all applicable laws, ordinances, regulations, and standards (LORS), and in a manner that both protects environmental quality and assures public safety.

INTRODUCTION

In this section, Energy Commission staff (staff) discusses the potential impacts of geologic hazards on the proposed RBEP facility as well as the RBEP's potential impact on geologic, mineralogic, and paleontologic resources. Staff's objective is to identify resources that could be significantly adversely affected, evaluate the potential of the project construction and operation to significantly impact the resources and provide mitigation measures as necessary to ensure that there would be no significant adverse impacts to geological and paleontological resources during the project construction, operation, and closure and to ensure that operation of the plant would not expose occupants to high-probability geologic hazards. A brief geological and paleontological overview is provided. The section concludes with staff's proposed Conditions of Certification that, if implemented, would reduce any project impacts to geologic hazards and geologic, mineralogic, and paleontologic resources to less than significant levels.

LAWS, ORDINANCES, REGULATIONS AND STANDARDS (LORS)

Applicable laws, ordinances, regulations and standards (LORS) are listed in the Application for Certification (AFC) (AES 2012). The following briefly describes the current LORS for both geologic hazards and resources and mineralogic and paleontologic resources.

Geology and Paleontology Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable LORS	Description
Federal	
Federal	The site is not located on Federal Land and there are no federal regulations directly applicable to the geological or paleontological conditions at the project site
State	
California Building Code (2013)	The California Building Code (CBC 2013) includes a series of standards that are used in project investigation, design, and construction (including seismicity, grading and erosion control). The CBC has adopted provisions in the International Building Code (IBC, 2012).
Alquist-Priolo Earthquake Fault Zoning Act, Public Resources Code (PRC), sections 2621–2630	Mitigates against surface fault rupture of known active faults beneath occupied structures. Requires disclosure to potential buyers of existing real estate and a 50-foot setback for new occupied buildings.
Seismic Hazards Mapping Act, PRC sections 2690–2699	Maps identify areas (zones) that are subject to the effects of strong ground shaking, such as liquefaction, landslides, tsunamis, and seiches. Requires a geotechnical report be prepared that defines and delineates any seismic hazard prior to approval of a project located in a seismic hazard zone.
California Building Code	Requires buildings and other construction to be designed to protect the public from geological hazards.
Local	
City of Redondo Beach General Plan	The Environmental Hazards Element of the City General Plan is intended to protect the public from the effects of natural geologic hazards. According to the City General Plan, new construction must comply with the Uniform Building Code to withstand geologic hazards including ground shaking and liquefaction.
City of Redondo Beach Municipal Code (City of Redondo Beach, 2012), Title 9, Building Regulations	Requires compliance with 2010 California Building Code
Standards	
Society for Vertebrate Paleontology (SVP), 2010	The “Measures for Assessment and Mitigation of Adverse Impacts to Non-Renewable Paleontological Resources: Standard Procedures” is a set of procedures and standards for assessing and mitigating impacts to vertebrate paleontological resources developed by the SVP, a national organization of professional scientists. The measures were adopted in October 1995, and revised in 2010 following adoption of the Paleontological Resources Preservation Act (PRPA) of 2009.
Bureau of Land Management (BLM) Instructional Memorandum 2008-009	Provides up-to-date methodologies for assessing paleontological sensitivity and management guidelines for paleontological resources on lands managed by the Bureau of Land Management. While not required on non-BLM lands, the methodologies are useful for all paleontological studies, regardless of land ownership.

SETTING

The site is located in the city of Redondo Beach near the southern border of the city of Hermosa Beach and west of the city of Torrance (**Geology and Paleontology- Figure 1**). The proposed project is located within the existing coastal-adjacent approximately 50-acre Redondo Beach Generating Station (RBGS) power plant site, situated approximately 500 feet east of the King Harbor Marina. Topography of the site ranges from approximately three feet to 20 feet above sea level. The site vicinity is a coastal urban and suburban environment with a variety of commercial, residential, and industrial land uses **(Geology and Paleontology- Figure 2)**.

REGIONAL SETTING

Formation of the western coast of North America began in late Triassic during the inception of the Mid-Atlantic rise (DeCourten 2008). Lateral crustal spreading from the mid-Atlantic rise separated the European and African continents from the North American and South American continents. This motion caused the continental North American crustal plate to migrate westward. At this time, the east Pacific rise was also active forming new oceanic crust that was spreading west forming the Pacific plate and east forming the Farallon plate. As the North American plate migrated westward, the eastern edge of the Farallon plate was overridden and subducted beneath the advancing North American plate (Atwater 1998). This crustal subduction continued into the Miocoene (Yeats 2010). As the Farallon plate disappeared into the subduction zone, the East Pacific Rise reached the western edge of the continent and the northern end of the Peninsular Ranges became deformed (Yeats 2010). This deformation caused the Channel Islands-San Nicolas Island crustal block and the Santa Monica Mountains crustal block to move west from the Peninsular Ranges, leaving behind a rift which became the Los Angeles basin (Yeats 2010). The Los Angeles Basin then became filled with late Cenozoic marine sediments which overlie diversely oriented Mesozoic basement rocks.

In early Miocene, plate motion slowly shifted from subduction along the western margin of the North American Continent to transform faulting. As the area was subjected to simple right-lateral shear in late Miocene and early Pliocene time, the pre-existing faults in the Mesozoic basement rocks (formed during the earlier subduction period), propagated upward into the Cenozoic marine sediments as transform fault systems. The orientation of these “new” transform fault systems was controlled by the orientation of the older faults. Localization of shear within these faults caused the older, diversely oriented normal and reverse faults to become inactive as shear stresses reoccupied these pre-existing structures producing the shear (strike–slip) system of today (Yeats 2010).

The project site is located in the northwestern corner of the Los Angeles Basin in the transition zone between the Transverse Range and the Peninsular Range Structural Provinces of Southern California (**Geology and Paleontology- Figure 3**). Geologically, the Los Angeles Basin and vicinity are divided into four structural blocks related to uplifted zones and synclinal depressions, and are bounded by faults. The project site lies near the northern end of the Southwestern Block, between the Palos Verdes and Newport-Inglewood faults (Norris 1990). Activity on these faults formed the Wilmington-

Torrance Anticline, over which the plant resides. The Wilmington-Torrance Anticline consists of deformed Miocene to Pliocene marine deposits (AES 2012).

After the anticline's formation, erosional processes subdued the surface expression of these folds forming a pronounced planar surface upon which subsequent sedimentation deposited approximately 1,800 feet of Late Pliocene and Pleistocene terrestrial and marine sands, gravels and clays that were in turn buried by Late Pleistocene to Holocene beach deposits, consisting primarily of fine sands and silts (Poland 1959).

PROJECT SITE DESCRIPTION

The project site is located approximately 0.25 miles east of the shore of the Pacific Ocean, approximately three miles north of the Palos Verdes Hills, and approximately 15 miles south of the southernmost extent of the Transverse Ranges. The site is located near the northernmost city limit of the city of Redondo, just east of the King Harbor boat marina. The city of Hermosa Beach is immediately to the north and the city of Torrance is to the east.

The scope of the RBEP project as discussed in the Application for Certification (AFC) is to dismantle the existing power plant, and install new equipment to provide 496 MW of electricity using more efficient generating units. A detailed explanation of the proposed development is provided in the Project Description section of this document.

Elevations across the project site range between approximately eight feet above sea level in the former fuel tank area to approximately 19 feet above sea level in the power block area. Depth to groundwater ranges between approximately three to five feet below ground surface (bgs) in the former fuel tank area to approximately ten to 13 feet bgs in the power block area (Hamilton 1999).

Natural groundwater flow in the area has been altered because of the operation of groundwater dewatering systems. The municipal water district operates saltwater intrusion prevention groundwater injection wells in the vicinity of the site (Hamilton 1999). The resulting rise in the ground water table due to the injection well program has created a need for the plant operator to use dewatering wells to lower the water level beneath the site. The groundwater dewatering systems are designed to remove perched groundwater from the fuel tank and fuel pump station areas (Hamilton 1999).

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

This section assesses two types of impacts. The first is the potential impacts the proposed facility could have on existing geologic, mineralogic, and paleontologic resources in the area. The second is the potential geologic hazards, which could adversely affect the proper functioning of the proposed facility and create life/safety concerns.

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

The California Environmental Quality Act (CEQA) guidelines, Appendix G, provide a checklist of questions that lead agencies typically address when assessing impacts related to geologic and mineralogic resources, and effects of geologic hazards.

- Section (V) (c) includes guidelines that determine if a project will either directly or indirectly destroy a unique paleontological resource or site, or a unique geological feature.
- Sections (VI) (a), (b), (c), (d), and (e) focus on whether or not the project would expose persons or structures to geologic hazards.
- Sections (XI) (a) and (b) concern the project's effects on mineral resources.

To assess potential impacts on unique geologic features and effects on mineral resources, staff has reviewed geologic and mineral resource maps for the surrounding area, as well as site-specific information provided by the applicant, to determine if geologic and mineralogic resources exist in the area.

To assess potential impacts on paleontological resources, staff reviewed various documents and the paleontological resources section 5.8 of the AFC (AES 2012). To develop section 5.8, the applicant reviewed published and available unpublished geological and paleontological literature 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 reviewed included geological maps, satellite photography, technical and scientific reports, and available electronic databases. Subsurface investigations have recently been performed in the project area (Ninyo 2011), and were included in the applicant's analysis.

A paleontological resources record review was conducted for the project using the online database maintained by the University of California, Museum of Paleontology at Berkeley (UCMP) and the PaleoBiology Database. In addition to these online resources, the Los Angeles County Museum of Natural History (LACM) performed a review of their vertebrate paleontology archives (AES 2012).

If paleontological resources are present or likely to be present, conditions of certification which outline required procedures to mitigate adverse affects to paleontological resources are proposed to be included as part of this project's approval.

The California Building Standards Code (CBSC) and CBC 2013 provide geotechnical and geological investigation and design guidelines, which engineers must follow when designing a facility. As a result, the criterion used to assess the significance of a geologic hazard includes evaluating each hazard's potential impact on the design, construction, and operation of the proposed facility. Geologic hazards include faulting and seismicity, liquefaction, dynamic compaction, hydrocompaction, subsidence, expansive soils, landslides, tsunamis, seiches, and others as may be dictated by site-specific conditions.

DIRECT/INDIRECT IMPACTS AND MITIGATION

An assessment of the potential impacts to geologic, mineralogic, and paleontologic resources, and from geologic hazards is provided below. The assessment of impacts is followed by a summary of potential impacts that may occur during construction and operation of the project and provides recommended conditions of certification that would ensure potential impacts are mitigated to a level that is less than significant. The recommended conditions of certification would allow the Energy Commission's compliance project manager (CPM) and the applicant to adopt a compliance monitoring scheme ensuring ongoing compliance with LORS applicable to geologic hazards and the protection of geologic, mineralogic, and paleontologic resources.

Geologic and Mineralogic Resources

The project is located above the Torrance Oil Field (**Geology and Paleontology - Figure 4)**. Hundreds of plugged oil wells are located within the Torrance Oil Field to the east and southeast of the site (DOGGR 2012). A cluster of 57 abandoned wells are located near the south east corner of the King Harbor Marina approximately 500 feet southwest of the site. Based on existing information, no active or abandoned oil wells occur on the site (DOGGR 2012). The project location is designated as Mineral Resources Zone-3, an area of undetermined mineral resources potential (CDMG 1999). No mineral resources are known to have been identified at the present site and there are no significant sand or gravel mines in the area.

At the RBEP site, the geologic units at the surface and in the subsurface are widespread alluvial, aeolian and nearshore marine deposits that occur throughout the Redondo Beach area (**Geology and Paleontology - Figure 5)**. These geologic units are not unique in terms of recreational, commercial, or scientific value.

Based on the information above, it is staff's opinion that the project would have no effect on oil and gas production or on other geologic resources of commercial value or on the availability of such resources and would not have any significant adverse direct or indirect impacts to potential geologic and mineralogic resources.

Paleontological Resources

Review of existing records and reports indicate that the project site is a former marsh and low lying area that was filled and regraded to provide the present relatively flat surface configuration (CH2MHILL 1997). Fill and three lithologic units consisting of younger dune sand deposits, marsh deposits, and older dune sand deposits are present beneath the site to the depths explored in the preliminary geotechnical evaluation (Ninyo 2011).

The fill was described as generally consisting of loose to medium dense, silty sand and sand that extended to depths ranging from approximately one to eight feet (Ninyo 2011). Younger dune sand deposits primarily consisting of loose to dense sand, silty sand, and clayey sand were encountered below the fill to the depths ranging from approximately 15 to 33 feet. Organic marsh deposits were encountered in borings drilled in the central and southern parts of the site. The marsh deposits were interlayered within the younger dune sand deposits and were composed of soft sandy clay, firm clayey silt approximately three to five feet thick. Older dune sand deposits primarily consisting of very dense sand and silty sand were encountered below the younger dune deposits and marsh deposits to the depths explored of approximately 51½ feet.

These deposits are interpreted by staff to represent Holocene near shore and dune deposits, early Holocene marsh/wetland deposits and Pleistocene marine and alluvial deposits likely belonging to the Palos Verdes Formation.

Within the Palos Verdes Formation is a unit referred to as the Palos Verdes Sand. The Palos Verdes Sand is a fossiliferous layer of marine gray sands and gravels (BonTerra 2010). This unit was deposited between 95,000 and 130,000 years before present and has produced a large number of fish fossils, as well as the remains of terrestrial and aquatic birds and mammals (BonTerra 2010). Although primarily known for its fossil mollusks, the Palos Verdes Sand has yielded remains of sharks, bony fish, birds, and marine mammals (BonTerra 2010). In addition to the marine fossils, a number of large, extinct, Ice Age land mammals such as mammoth, mastodon, bison, horse, and camel have been found (BonTerra 2010). The Palos Verdes Sand represents a time when coastal waters off Southern California were several degrees warmer than today (BonTerra 2010).

Beneath the Palos Verdes Formation lies the San Pedro Formation. The San Pedro Formation represents the oldest known Cenozoic sedimentary unit of Pleistocene age in the Los Angeles Coastal Region. This formation was described for outcrops in the vicinity of nearby San Pedro Harbor and then applied to extensive beds of unconsolidated sand containing abundant mollusk shells, of Pleistocene age, outcropping as far south as San Diego and as far north as Santa Monica. The fossiliferous sand unit within the San Pedro Formation is referred to as the San Pedro Sand (BonTerra 2010). The San Pedro Sand consists of gray to dark gray to reddish-yellow (rust)-stained siltstone and clayey siltstone with friable, interbedded fine to gravelly coarse grained sandstones. Based on sedimentary structures and variable lithologies, this rock unit represents a wide range of depositional environments. These environments range from nearshore, shallow marine to lagoonal, to back-bay tidal flat (BonTerra 2010).

In the San Pedro area, the San Pedro Sand has yielded crustaceans, marine mollusks (clams and snails), bony fish and sharks, amphibians, and birds (BonTerra 2010). Large late Pleistocene extinct mammals found there include *Bison*, *Mammuthus* (mammoth), *Paramylodon* (sloth), *Equus* (horse), and *Capromeryx* (very small antelope). In addition to the large extinct mammals, extant pond turtle, rabbits, rodents, and marine mammals also occur. Recent amino acid dating of marine mollusks from the San Pedro Sand in the Palos Verdes Hills has yielded dates of 330,000 years before present (Ponti 1989).

Beneath the Pleistocene San Pedro Sand is the Pliocene Pico Formation. The Pico Formation is composed of marine sands, silts, and clays, and extends nearly 1,000 feet below the base of the San Pedro Sand (BonTerra 2010). The uppermost portion of this unit is composed of silts and clays, with local lenses of gravel, while the lowermost portion of this unit is composed of sands and gravels. This unit, and those underlying it, was not analyzed in detail, because it lies well below the depth of any anticipated construction activity.

The La Brea Tar Pit fossil mammal assemblage of upper Pleistocene age is derived from the Palos Verdes Sand. This assemblage includes a wide variety of carnivores (dogs and cats), small to large ungulate herbivores (deer, antelope, camel, horse, pig), sloth, and a myriad of small mammals including rabbits, rodents, insectivores and a variety of birds and lower vertebrates (frogs, lizards and snakes).

Many of the fossil specimens represent the best preserved specimens of particular taxa found to date. Mammalian assemblages collected from both the San Pedro Sands and Palos Verdes Sands in the vicinity of the project area contain fossil remains of most of the Rancho La Brea terrestrial vertebrate groups. Also included at some of these sites are aquatic mammalian taxa including otter, whale, and dolphin as well as shark and teleost (bony) fish taxa, and birds.

One paleontological site was identified within a five-mile radius of the RBEP site (AES 2012). This find was the tooth of an extinct llama discovered during construction associated with the RBGS (AES 2012). Other notable finds in the site vicinity include a fossil proboscidian (elephant family) bone that was found during construction in the middle of the Los Angeles International Airport and at other sites a baby mammoth jaw, horse, mammoth, bison, rabbit, rodent, and fish material were recovered (AES 2012).

Even though the site is developed and paved and mantled with artificial fill, excavations are proposed for project construction. If the excavations extend through the fill, native soils may be encountered. There is a low potential for significant fossils to be encountered in the excavations. However, the possibility of encountering fossils remains. Therefore, staff considers monitoring of construction activities in accordance with the proposed conditions of certification is necessary.

Proposed Conditions of Certification **PAL-1** to **PAL-8** are designed to mitigate any potential paleontological resource impacts, as discussed above, to a less than significant level. Essentially, these conditions would require a worker education program in conjunction with monitoring of proposed earthwork activities by qualified professional paleontologists (paleontologic resource specialist; PRS).

Earthwork would be halted in the immediate area of the find at any time potential fossils are recognized by either the paleontological monitor or the worker. When properly implemented, the conditions of certification would yield a net gain to the science of paleontology since fossils that would not otherwise have been discovered can be collected, identified, studied, and properly curated. A paleontological resource specialist would be retained for the proposed project by the applicant to produce a monitoring and mitigation plan, conduct the worker training, and provide on-site monitoring. During monitoring, the PRS can petition the CPM for a change in the monitoring protocol. Most commonly, this would be a request for lesser monitoring after sufficient monitoring has been performed to ascertain that there is little chance of finding significant fossils. In other cases, the PRS can propose increased monitoring due to unexpected fossil discoveries or in response to repeated out-of-compliance incidents by the earthwork contractor.

GEOLOGICAL HAZARDS

The AFC and the Preliminary Geotechnical Evaluation (Ninyo 2011) provides documentation of potential geologic hazards at the proposed RBEP plant site. Staff reviewed information presented in the documents and conducted independent research regarding the site's susceptibility to geologic hazards. Staff believes that the possibility of geologic hazards affecting plant operations, during its practical design life (40 years), would be low. However, the potential and probability for the site to be affected by geologic hazards such as strong seismic shaking, liquefaction and dynamic compaction, would need to be addressed in a project geotechnical report per CBC 2013 requirements. Recommendations from the geotechnical report must be incorporated in project design.

Staff's independent research included the review of available geologic maps, reports, and related data of the proposed RBEP plant site. Geological information from the California Geological Survey (CGS), California Division of Mines and Geology (CDMG), and other governmental organizations was reviewed. Staff's analysis of this information is provided below.

Faulting and Seismicity

In southern California, tectonic deformation between the Pacific and North American plates is accommodated primarily by a zone of transform strike slip faults oriented with a predominant northwest trend; however, within this complex zone of shear, areas of tectonic compression also occurs which has formed numerous folds (anticlines and synclines), reverse faults and blind thrust faults.

Major active and potentially active faults in the region are shown on **Geology and Paleontology - Figure 6**. Most of the tectonic deformation in southern California occurs along strike slip faults associated with the on land portion of the San Andreas fault system. In addition to the on land faults, the tectonic shear is shared with faults in the offshore inner Continental Borderland region (Grant 2004).

In 2002, Grant and Rockwell postulated that an active 300-km-long Coastal Fault zone extends between the Los Angeles basin and coastal Baja California (Grant 2002). This Coastal Fault zone includes those faults contained within the inner Continental Borderland which become contiguous with the Agua Blanca fault in Baja California (Grant 2004). The Agua Blanca fault is considered to have a slip rate between five and seven millimeters/year (Rockwell 2012). That slip is believed to be transferred to the offshore faults within the inner Continental Borderland (Rockwell 2012). The geometry and slip rate of faults in the inner Continental Borderland are poorly constrained relative to onshore faults, yet they may pose significant seismic risk because they are close to populated areas, and several offshore faults appear to displace seafloor sediments (Legg, 1991).

Active faults in southern California associated with shear between the north American and Pacific plates include (from east to west), the San Andreas fault zone, the San Jacinto fault zone, the Elsinore fault zone, the Whittier fault zone, the Newport-Inglewood fault zone, the Palos Verdes fault zone, the San Diego Trough fault zone and the San Clemente fault zone. Faults specific to the inner Continental Borderland include the Newport-Inglewood fault zone, the Palos Verdes fault zone, the San Diego Trough fault zone and the San Clemente fault zone (Legg 2002).

In addition to the strike slip faults discussed above, compressive forces have formed folds (anticlines and synclines), reverse faults and blind thrust faults (Blind thrusts). Blind thrusts underlie regions undergoing contraction in the Los Angeles Basin and are expressed at the surface only as active folds. The Compton-Los Alamitos fault and the San Joaquin Blind thrust are examples of this style of deformation. Seismic hazards posed by active thrusts are assessed in the Los Angeles Basin by a number of means, all of which are aimed at placing constraints on fault slip rates, earthquake recurrence and fault geometry and segmentation (Mueller 2005). Research into the relationship between fault slip, fault geometry and fold growth thus provides insight into the occurrence of earthquakes produced on these structures. Large earthquakes originating on blind thrusts within Southern California have occurred in the past century, illuminating their geometry and potential for seismic hazard and include the Mw5.9 1987 Whittier Narrows earthquake and the Mw6.8 1994 Northridge earthquake. It is likely that in 1769, a M7+ earthquake occurred on the San Joaquin Blind thrust which uplifted coastal Orange County approximately ten feet (Grant 2004).

An in depth study of the active faults in the Los Angeles Basin Metropolitan Region was completed by the Southern California Earthquake Center in 2001 (SCEC 2001). Active faults with a potential to affect the RBEP site are listed and described below and their locations presented on (**Geology and Paleontology - Figure 6)**:

San Andreas Fault Zone

The San Andreas is the "master" fault of an intricate fault system that defines the boundary between the Pacific and North American crustal plates in California (Schulz 1992). The entire San Andreas fault system is more than 800 miles long and extends to depths of at least ten miles within the Earth. In detail, the fault is a complex zone of crushed and broken rock from a few 100 feet to a mile wide. Many smaller faults branch from and join the San Andreas fault zone.

Over much of its length, a linear trough reveals the presence of the San Andreas fault; from the air, the linear arrangement of lakes, bays, and valleys in this trough is striking. Viewed from the ground, however, the features are more subtle. For example, many people driving near Crystal Springs Reservoir, near San Francisco, or along Tomales Bay, or through Cajon or Tejon Passes may not realize that they are within the San Andreas fault zone. On the ground, the fault can be recognized by carefully inspecting the landscape. The fault zone is marked by distinctive landforms that include long straight escarpments, narrow ridges, and small undrained ponds formed by the settling of small blocks within the zone. Many stream channels characteristically jog sharply to the right where they cross the fault.

At least 350 miles of offset has occurred along the San Andreas fault since it came into being about 15-20 million years ago (Schulz 1992). Surveying demonstrates the strain (displacement) occurs along the fault at the rate of approximately two inches per year.

San Jacinto Fault Zone

The San Jacinto fault zone is one of the major branches of the San Andreas fault system in southern California (Sharp 1965).

The San Jacinto fault zone is a complex zone of splaying and overlapping strike-slip fault segments, steps and bends, and associated zones of contractional and extensional deformation (Dorsey 2002). Offsets on basement piercing points and Pleistocene strata indicate that about 25 km of slip has accumulated on the San Jacinto fault during the past 1.5 to 2.0 Million years ago (Ma) (Dorsey 2002). Based on GPS studies and offsets of dated Quaternary deposits, the rate of slip on the San Jacinto system is generally agreed to be ~10-12 millimeters per year (mm/yr). This represents 20-25 percent of the present-day Pacific-North American relative plate motion (Dorsey 2002).

The straightness, continuity, and high seismicity of the San Jacinto fault zone suggest that it may be currently the most important member of the San Andreas fault system in southern California (Sharp 1965).

Elsinore Fault Zone

The Elsinore fault zone parallels the San Jacinto and is part of the same right-lateral crustal plate strain system as the San Andreas and the San Jacinto (ECI 2000).The Elsinore branches into the Whittier fault near Santa Ana Canyon, where it borders the Puente Hills to the southwest and the Chino fault to the northeast. The most apparent displacements on the Whittier-Elsinore have been vertical, as evidenced by the steep scarp (an earthquake-built cliff) along the Santa Ana Mountains.

Whittier Fault Zone

The Whittier fault zone is exposed for a distance of about 25 miles along the south slopes of the Puente Hills from the Whittier Narrows on the northwest to the Santa Ana River near its southwest end (Yerkes 1965). In the vicinity of the Santa Ana River, it joins with the northern end of the Elsinore Fault Zone. Recent deformation along the Whittier Fault Zone is indicated by steeply tilted and locally overturned strata of late Pleistocene age (Yerkes 1965). Trenching along the fault has uncovered evidence of recent offsets, including faulted Holocene alluvium dated at 1,400 to 2,200 years before present (Gath 1988).

Transverse Ranges Southern Boundary Fault System

Transverse Ranges Southern Boundary fault system is a west-trending system of reverse, oblique-slip, and strike-slip faults that extends for more than 200 km along the southern edge of the Transverse Ranges (Dolan 1997a, 2000a). The Transverse Ranges Southern Boundary Fault System in the Los Angeles Region as discussed below includes the Santa Monica fault, The Hollywood fault and the Raymond fault. To the west of the Los Angeles region, The Anacapa-Dume, Malibu Coast, Santa Cruz

Island, and Santa Rosa Island faults are also part of this system, but are not included in this analysis.

Santa Monica fault

The Santa Monica fault extends east from the coastline in Pacific Palisades through Santa Monica and West Los Angeles and merges with the Hollywood fault at the West Beverly Hills Lineament in Beverly Hills, west of the crossing of Santa Monica Boulevard and Wilshire Boulevard, where its strike is northeast (SCEC 2001).

Onshore, the fault offsets the ground surface two-3.5 km south of the Santa Monica Mountains range front (Dolan 2000a). Accordingly, the fault traverses alluvium that allows the Quaternary history of the fault to be characterized based on geomorphology, stratigraphy, and seismic reflection characteristics (Dolan 1997a; Dolan 2000a).

The Southern California Earthquake Data Center states the type of faulting is left-reverse, extends a length of 24 km and has a probable magnitude between 6.0 and 7.0 (SCEDC 2013). According to Dolan and Pratt (Dolan 1997), uplift of an alluvial-fan surface north of the fault requires a reverse-slip rate of ~0.5 mm/yr.

Hollywood fault

The Hollywood fault extends East-Northeast from the end of the Santa Monica fault for a distance of 14 km through Beverly Hills, West Hollywood, and Hollywood to the Los Angeles River and Interstate 5. The Hollywood fault is separated from the Santa Monica fault where the fault makes a left step of 1.2 km, possibly attributed to offset by the northwest continuation of the Newport-Inglewood fault.

In Hollywood, where the fault was studied in detail by James Dolan (Dolan 1997b; Dolan 2000b), the active fault is close to the Santa Monica Mountains range front. Farther west, however, near the intersection of Sunset and La Cienega boulevards in the city of West Hollywood, the active fault lies near the base of a pronounced south-facing alluvial apron along the mountain front (Dolan 1997b; Lindvall 2001).

Based on a number of independent geological investigations and recent work by the California Geological Survey (CGS), which lead to the publication of 2010 Fault Activity Map of California (CGS 2010a), CGS has commenced a detailed study of the Hollywood fault and its associated splay faults for possible zoning as “Active” pursuant to the Alquist-Priolo Act (CGS 2007a). This ongoing investigation and resulting maps and report are scheduled for completion by the end of 2013 or the beginning of 2014 (Parrish 2013). While the report in preparation will update existing information, the Southern California Earthquake Data Center states the type of faulting of the Hollywood fault is left-reverse, extends a length of 15 km and has a probable magnitude between 5.8 and 6.5 with a slip rate between 0.33 and 0.75 mm/yr. (SCEDC 2013).

Raymond fault

A sharp gravity gradient connects the western end of the Raymond fault across the Los Angeles River floodplain with the eastern end of the Hollywood fault, but this connection is not confirmed by geological evidence except for local air-photo lineations. The Raymond fault extends 25 km from the Los Angeles River east of Griffith Park east to east-northeast across the San Gabriel Valley through South Pasadena, Pasadena, San Marino, Arcadia, and Monrovia to a junction with the Sierra Madre fault at the foot of the San Gabriel Mountains. The fault is defined by aligned left-deflected drainages, shutter ridges, sagponds, and pressure ridges in right-stepping restraining bends which indicate that the Raymond fault is predominantly a left-slip fault (SCEC 2001). The 1988 Pasadena earthquake of ML 4.9 probably occurred on the Raymond fault based on the fault-plane solution of the mainshock and the distribution of aftershocks (Jones 1990). Interpretation of aftershock epicenters indicates that the plane of the fault dips 80° north.

The Southern California Earthquake Data Center states the type of faulting of the Raymond fault is left-lateral strike slip with only minor reverse component, extends a length of 25 km and has a probable magnitude between 6.0 and 7.0 with a slip rate between 0.10 and 0.22 mm/yr. (SCEDC 2013).

Compton-Los Alamitos Fault Zone

The Compton blind thrust fault is active and has generated at least six large-magnitude earthquakes (M_w 7.0–7.4) during the past 14,000 years (Leon 2009). Deformed Holocene strata record recent activity on the Compton thrust and are marked by discrete sequences that thicken repeatedly across a series of buried fold scarps. Minimum uplift in each of the scarp-forming events, which occurred at 0.7–1.75 thousand years ago (ka) (event 1), 0.7–3.4 ka or 1.9–3.4 ka (event 2), 5.6–7.2 ka (event 3), 5.4–8.4 ka (event 4), 10.3–12.5 ka (event 5), and 10.3–13.7 ka (event 6), ranged from ~0.6 to ~1.9 m,, indicating minimum thrust displacements of ≥1.3 to 4.2 m. Such large displacements are consistent with the occurrence of large-magnitude earthquakes ($M_w \geq 7$). This large, concealed fault underlies the Los Angeles metropolitan area and thus poses one of the largest deterministic seismic risks in the United States (Leon 2009).

San Joaquin Hills Blind Thrust

The late Quaternary uplift rate of the San Joaquin Hills is approximately twice as high as uplift rates parallel to the Newport-Inglewood Fault Zone (NIFZ) along the coast to the south (Grant 2002). Several observations suggest that the San Joaquin Hills are underlain by a fault that is distinct from the NIFZ, although they may be linked kinematically. There are several Quaternary anticlines along the NIFZ north of the San Joaquin Hills (Grant 2002). However, the San Joaquin Hills anticline is longer and has the greatest topographic expression. Other topographically prominent anticlines, such as Signal Hill, are located within the structurally complex NIFZ and are associated with step-overs (Barrows, 1974).

Geomorphic studies along the coastline in the vicinity of the San Joaquin Hills have discovered emergent shorelines along the open coast and an elevated marsh bench in Newport Back Bay. The surface of the marsh bench is approximately five feet above the current marsh elevation (Grant 2002). Radiocarbon dating and interpretation of the introduction of exotic pollens contained within the elevated marsh bench indicates that the marsh bench was uplifted between the years 1635 and 1797 (Grant 2002).

On July 28, 1769 a strong temblor was described by explorer Gaspar de Portola while he was in the central Los Angeles basin area (Townley 1939). The mainshock was described as violent, and at least two dozen earthquakes followed it over the course of several days. It is likely that the 1769 San Joaquin Hills earthquake occurred on the San Joaquin Blind Thrust and was responsible for the uplift of the elevated marsh bench in Newport Bay and the emergent shorelines along the open coastline (Grant 2002). The San Joaquin earthquake may be the largest known earthquake that has originated within the greater Los Angeles region in the last few centuries (Grant 2002).

Newport-Inglewood Fault Zone

The Newport-Inglewood Fault Zone (NIFZ) is approximately 1.5-2.5 km wide, trends N45-60W, is mainly a right-lateral tectonic structure that extends from the Santa Monica Mountains on the north to offshore connection with the Rose Canyon fault at San Diego on the south (Shlemon 2008). Known active fault traces in the NIFZ zone of deformation have been mapped in Alquist-Priolo Special Studies Zones (CGS 2007a).

The Newport–Inglewood fault zone was first identified as a significant threat to southern California residents in 1933 when it generated the M6.3 Long Beach earthquake, killing 115 people and providing motivation for passage of the first seismic safety legislation in the United States (Grant 2004).

Ongoing studies indicate the NIFZ is capable of generating earthquakes with magnitudes up to 7.4 Mw (Toppozada 1989) or 7.5Mw (Petersen 2008). The higher magnitude indicated by Petersen uses a fault length of 208 km as described by Shlemon (2008). At its closest approach, the active trace of the NIFZ lies approximately six miles northeast of the project site (**Geology and Paleontology - Figure 6)**.

Palos Verdes Fault Zone

The Palos Verdes Fault Zone (PVFZ)extends southwestward from the northern part of Santa Monica Bay to the area southwest of Lasuen Knoll, offshore from Dana Point (Fisher 2004).The structure of the PVFZ changes markedly southeastward across the San Pedro Shelf and slope. Under the northern part of the shelf, this fault zone includes several strands, but the main strand dips west and is probably an oblique-slip fault (Fisher 2004). Under the slope, this fault zone consists of several fault strands having normal separation, most of which dip moderately east. To the southeast near Lasuen Knoll, the PVFZ locally is a low angle fault that dips east, but elsewhere near this knoll the fault appears to dip steeply. Fresh sea-floor scarps near Lasuen Knoll indicate recent fault movement (Fisher 2004).

Analysis of wave-cut terraces and offset stream courses indicates total fault-slip rate to be around three mm/yr. (Fisher 2004). The main style of movement along the PVFZ has been strike slip and multibeam bathymetric data show recent scarps along this fault near Lasuen Knoll indicating the fault's recent activity. At its closest approach, the trace of the PVFZ lies approximately three miles south of the project site (**Geology and Paleontology - Figure 6)**.

San Diego Trough Fault Zone

The San Diego Trough Fault Zone (SDTFZ) runs roughly from the Mexican border northward toward Catalina Island. The SDTFZ is part of a 90-km-wide zone of faults within the inner Continental Borderland that accommodates motion between the Pacific and North American plates (Ryan 2012). New seismic reflection data shows that the fault zone steps across a five-km-wide stepover and continues for an additional 60 km north of its previously mapped extent. At the latitude of Santa Catalina Island, the SDTFZ bends 20° to the west and may be linked via a complex zone of folds with the PVFZ. If this is the case, this fault zone would be one of the longest in the California Borderland, and could produce some of the largest earthquakes in the region (Poppick 2013). The 1986 epicenter of the Oceanside earthquake (a magnitude 5.4 quake that caused nearly one million dollars in damage, 29 injuries, and one death) and the associated 1986 earthquake swarm is located within the SDTFZ (Poppick 2013). In a cooperative program between the U.S. Geological Survey (USGS) and the Monterey Bay Aquarium Research Institute (MBARI), the coseismic offset of a submarine channel that intersects the fault zone near the SDTFZ– PVFV junction was measured and dated. This research indicated an estimated horizontal slip rate of about 1.5±0.3 mm/yr over the past 12,270 yr (Ryan 2012).

San Clemente Fault Zone

The San Clemente Fault Zone (SCFZ) is the westernmost of the group of right lateral faults traversing the California Inner Continental Borderland (Legg 1989). The main trace of the San Clemente fault cuts a straight path directly across the rugged topography of the region, displaying evidence of a steeply dipping (near vertical) fault surface. Modern tectonic activity along the SCFZ is demonstrated by numerous earthquakes with epicenters located along the fault's trend. The average strike of the SCFZ is parallel to the Pacific-North American relative plate motion vector at this location and is a part of the broad Pacific-North American transform plate boundary (Legg 1989).

Fault Rupture

All of the faults discussed above have the potential to generate strong seismic shaking at the project site. However, none have the potential to cause fault offset of the ground surface at the project site.

The Alquist-Priolo Earthquake Fault Zoning Act of 1994 (formerly known as the Alquist-Priolo Special Studies Zone Act of 1972) stipulates that no structure for human occupancy may be built within an Earthquake Fault Zone until geologic investigations demonstrate that the site is free of fault traces that are likely to rupture with surface displacement (CGS 2007a). Earthquake Fault Zones include faults considered to have been active during Holocene time and to have a relatively high potential for surface rupture (CGS 2008). An Earthquake Fault Zone has not been mapped on the project site.

Fault rupture almost always follows pre-existing faults, which are zones of weakness (CGS 2007). No active faults are shown on published maps as crossing the boundary of new construction on the proposed RBEP power plant site or associated linear facilities. Therefore, it is highly unlikely that the site would experience surface fault rupture during the project's design life.

Seismic Shaking

Preliminary estimates of ground motion based on probabilistic seismic hazard analyses have been calculated for the project site using the USGS Earthquake Hazards application called the U.S. Seismic "DesignMaps" Web Application (**Geology and Paleontology Table 2**). This application produces seismic hazard curves, uniform hazard response spectra, and seismic design values. The values provided by this application are based upon data from the 2008 USGS National Seismic Hazard Mapping Project. These design parameters are for use with the 2012 International Building Code, the 2010 ASCE-7 Standard, the 2009 NEHRP Provisions, and their respective predecessors.

These parameters are project-specific and, based on RBEP's location, were calculated using latitude and longitude inputs of 33.852 degrees north and -118.394 degrees west, respectively. Other inputs for this application are the site "type" which is based on the underlying geologic materials and the "Structure Risk Category". The assumed site class for RBEP is "E", which is applicable to soft clay soil. These parameters can be updated as appropriate following the results presented in a project-specific geotechnical investigation report performed for the site. The assumed "Structure Risk Category" is "III", which is based on its inherent risk to people and the need for the structure to function following a damaging event. Risk categories range from I (non essential) to IV (critical). Examples of risk category I include agriculture facilities, minor storage facilities, etc., while examples of category IV include fire stations, hospitals, nuclear power facilities, etc.

Geology and Paleontology Table 2
Planning Level 2010 CBC Seismic Design Parameters Maximum Considered Earthquake, ASCE 7 Standard

Parameter	Value
Assumed Site Class	E
Structure Risk Category	III - Substantial
SS – Mapped Spectral Acceleration, Short (0.2 Second) Period	1.636 g
S1 – Mapped Spectral Acceleration, Long (1.0 Second) Period	0.626 g
Fa – Site Coefficient, Short (0.2 Second) Period	0.900
Fv – Site Coefficient, Long (1.0 Second) Period	2.400
SDS – Design Spectral Response Acceleration, Short (0.2 Second) Period	0.981 g
SD1 – Design Spectral Response Acceleration, Long (1.0 Second) Period	1.002 g
SMS – Spectral Response Acceleration, Short (0.2 Second) Period	1.472 g
SM1 – Spectral Response Acceleration, Long (1.0 Second) Period	1.503 g

ASCE = American Society of Civil Engineers
Values from USGS 2010b

The ground acceleration values presented are typical for the area. Other developments in the adjacent area will also be designed to accommodate strong seismic shaking. The potential for and mitigation of the effects of strong seismic shaking during an earthquake must be addressed in a project-specific geotechnical report, per CBC 2013 requirements, and proposed Condition of Certification **GEO-1** and Conditions of Certification **Facility Design GEN-1**, **GEN-5** and **CIVIL-1**. Compliance with these conditions of certification would ensure the project is built to current seismic standards and potential impacts would be mitigated to insignificant levels in accordance with current standards of engineering practice.

Liquefaction

Liquefaction is the phenomenon in which uniformly sized, loosely deposited, saturated, granular soils with low clay contents undergo rapid loss of shear strength through the development of excess pore pressure during strong earthquake induced groundshaking of sufficient duration to cause the soil to behave as a fluid for a short period of time. Liquefaction generally occurs in saturated or near-saturated cohesionless soils at depths shallower than 50 feet below the ground surface. If the liquefying layer is near the surface, the effect for any structure supported on it is much like that of quicksand, resulting in sinking or tilting. If the layer is deeper in the subsurface, it can provide a sliding surface for materials above it, resulting in lateral motion (spreading or lurching) toward any nearby ‘free face’ (shore bluff, river embankment, excavation wall) (Ninyo 2011).

The proposed project site is mapped adjacent to a Liquefaction Investigation Zone on the State of California Seismic Hazard Zone Map for the Redondo Beach Quadrangle (CDMG 1999). A Liquefaction Investigation Zone is an area “where historic occurrence of liquefaction, or local geological, geotechnical and groundwater conditions indicate a potential for permanent ground displacement such that mitigation as defined in Public Resources Codes Section 2693(c) [Seismic Hazards Mapping Act] would be required” (CDMG 1999).

Groundwater was observed in exploratory borings drilled on site at elevations between one foot above and six feet below mean sea level (MSL) (Ninyo 2011). These measured elevations were considered “not stabilized” and it is expected that stabilized groundwater surface occurs at an elevation of approximately two feet above to one foot below MSL (Ninyo 2011). The presence of shallow groundwater raises concerns about liquefaction potential, settlement rates, and the likely need for construction dewatering.

Based on site observations, laboratory testing and computer modeling, and using the expected ground acceleration from the design basis earthquake, it was determined that scattered saturated sandy alluvial layers between depths of approximately two and 38 feet are potentially liquefiable (Ninyo 2011). Groundwater levels must be confirmed and the liquefaction potential on the proposed RBEP site must be addressed in a project-specific geotechnical report, per CBC 2013 requirements and proposed Condition of Certification **GEO-1**, and Conditions of Certification **Facility Design GEN-1**, **GEN-5** and **CIVIL-1**.

Lateral Spreading

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 spreading generally takes place in the direction of a free-face (i.e., retaining wall, slope, channel). An empirical model is typically used to predict the amount of horizontal ground displacement within a site (Ninyo 2011). For sites located in proximity to a free-face, the amount of lateral ground displacement is strongly correlated with the distance of the site from the free-face. Other factors such as earthquake magnitude, distance from the earthquake epicenter, thickness of the liquefiable layers, and the fines content and particle sizes of the liquefiable layers also affect the amount of lateral ground displacement. Based on the relative density of the potentially liquefiable soil layers, Ninyo and Moore concluded in their Preliminary Geotechnical Evaluation that "the lateral spread hazard is not significant" (Ninyo 2011). However, the susceptibility of the underlying beds to lateral spread beneath the proposed RBEP site must be addressed in a project-specific geotechnical report, per CBC 2013 requirements and proposed Condition of Certification **GEO-1** and Conditions of Certification **Facility Design GEN-1, GEN-5** and **CIVIL-1**.

Dynamic Compaction

Dynamic compaction of soils results when relatively unconsolidated granular materials experience vibration associated with seismic events. The vibration causes a decrease in soil volume, as the soil grains tend to rearrange into a more dense state (an increase in soil density). The decrease in volume can result in settlement of overlying structural improvements.

In order to estimate the amount of post-earthquake settlement of site soils, Ninyo & Moore used seismically induced cyclic stress ratios and corrected blow counts (N-values) to calculate the potential volumetric strain of the soil (Ninyo 2011). Their analysis indicated that seismically induced settlement at the project site would be approximately two inches or less.

The potential for and mitigation of the effects of dynamic compaction of proposed site soils during an earthquake must be addressed in a project-specific geotechnical report, per CBC 2013 requirements and proposed Conditions of Certification **GEO-1**, and Conditions of Certification **Facility Design GEN-1**, **GEN-5** and **CIVIL-1**. Common mitigation methods would include deep foundations (driven piles; drilled shafts) for severe conditions, geogrid reinforced fill pads for moderate severity and over-excavation and replacement for areas of minimal hazard.

Compressible Soils

Compressible soils are generally those soils that undergo consolidation when exposed to new loading, such as fill placement or building construction. Buildings, structures and other improvements may be subject to excessive settlement-related distress when built above compressible soils. Settlement of sufficient magnitude to cause significant structural damage is normally associated with rapidly deposited alluvial soils and/or the presence of undocumented fill or soft clay soils. The site is underlain by both fill soils and clayey marsh deposits. These materials are considered to be potentially compressible when subjected to loads exerted by heavy structures.

The potential for and mitigation of the effects of consolidation of site soils must be addressed in a project-specific geotechnical report, per CBC 2013 requirements and proposed Condition of Certification **GEO-1**, and Conditions of Certification **Facility Design GEN-1**, **GEN-5** and **CIVIL-1**. Typical mitigation measures would include over-excavation/replacement, mat foundations or deep foundations, depending on severity and foundation loads.

Expansive Soils

Soil expansion occurs when clay-rich soils with an affinity for water exist in-place at a moisture content below their plastic limit. The addition of moisture from irrigation, precipitation, capillary tension, water line breaks, etc. causes the clay soils to absorb water molecules into their structure, which in turn causes an increase in the overall volume of the soil. This increase in volume can correspond to excessive movement (heave) of overlying structural improvements.

As mentioned above, some clayey soils have been encountered beneath the site (Ninyo 2011). The potential for and mitigation of the effects of expansive soils on the proposed site must be addressed in a project-specific geotechnical report, per CBC 2013 requirements and proposed Conditions of Certification **GEO-1**, and Conditions of Certification **Facility Design GEN-1**, **GEN-5** and **CIVIL-1**. Mitigation would normally be accomplished by over-excavation and replacement of the expansive soils. For deep-seated conditions, deep foundations are commonly used. Lime-treated (chemical modification) is often used to mitigate expansive clays in pavement areas.

Corrosive Soils

The project site is located in a geologic environment that could potentially contain soils that are corrosive to concrete and metals. Corrosive soils are defined as having earth materials with more than 500 ppm chlorides, a sulfate concentration of 0.20 percent (i.e., 2,000 ppm) or more, a pH of less than 5.5, or an electrical resistivity of less than 1,000 ohm-centimeters.

Corrosive soil conditions may exacerbate the corrosion hazard to buried conduits, foundations, and other buried concrete or metal improvements. Corrosive soil could cause premature deterioration of underground structures or foundations. Constructing project improvements on corrosive soils could have a significant impact to the project.

Laboratory testing of soils collected during the geotechnical evaluation indicate that soils in the project area may be classified as non-corrosive (Ninyo 2011). However, the potential for and mitigation of the effects of corrosive soils on the project site must be addressed in a project-specific geotechnical report, per CBC 2013 requirements and proposed Conditions of Certification **GEO-1**, and Conditions of Certification **Facility Design GEN-1**, **GEN-5** and **CIVIL-1**. Mitigation of corrosive soil conditions may involve the use of concrete resistant to sulfate exposure. Corrosion protection for metals may be needed for underground foundations or structures in areas where corrosive groundwater or soil could potentially cause deterioration. Typical mitigation techniques include epoxy and metallic protective coatings, the use of alternative (corrosion resistant) materials, and selection of the appropriate type of cement and water/cement ratio.

Landslides

Landslides occur when masses of rock, earth, or debris move down a slope, including rock falls, deep failure of slopes, and shallow debris flows. Landslides are influenced by human activity (mining and construction of buildings, railroads, and highways) and natural factors (geology, precipitation, and topography). Frequently, they accompany other natural hazards. Although landslides sometimes occur during earthquake activity, earthquakes are rarely their primary cause.

The most common cause of a landslide is an increase in the down slope gravitational stress applied to slope materials (oversteepening). This may be produced either by natural processes or human activities. Undercutting of a valley wall by stream erosion is a common way in which slopes may be naturally oversteepened. Other ways include excessive rainfall or irrigation on a cliff or slope.

The site is relatively flat and located substantial distances from steep terrain. Therefore, the site is not subject to landslide hazards.

Tsunamis and Seiches

Tsunamis are large-scale seismic-sea waves caused by offshore earthquakes, submarine landslides and/or volcanic activity. Seiches are waves generated within enclosed water bodies such as bays, lakes or reservoirs caused by seismic shaking, rapid tectonic uplift, basin bottom displacement and/or land sliding.

A tsunami can be categorized as local, regional, or Pacific-wide. Those terms describe the potential destruction relative to the tsunami source area.

Local (near-source) tsunamis occur soon after the generating event and allow little time for warning and evacuations. Their impact may be large, but in a limited area. For example, in 1958, waves from a local tsunami in Lituya, Alaska ran up 485 meters, but destruction was focused on a small area.

Regional (intermediate) tsunamis are by far the most common. Destruction may be limited because the energy released was not sufficient to generate a destructive Pacific-wide tsunami, or because the source area limited the destructive potential of the tsunami. These events can occur within 15 minutes to two hours after the generating event. Areas affected by the tsunamis may not have felt the generating event.

Pacific-wide (distant source) tsunamis are much less frequent, but have a far greater destructive potential. The waves are not only larger initially, but they subject distant coastal areas to their destructive impact as they cross the Pacific basin. For example, the Chilean tsunami of May 22, 1960, spread death and destruction across the Pacific from Chile to Hawaii, Japan, and the Philippines. These events may have long lead times (up to six hours), but the breadth of the destruction is wide (OES 1998).

All of coastal California is at risk from tsunamis (CSSC 2005). Eighty-two possible or confirmed tsunamis have been observed or recorded in California during historic times. Most of these events were small and only detected by tide gauges. Eleven were large enough to cause damage and four events caused deaths (CSSC 2005). Two tsunami events caused major damage.

Tsunamis that damaged California's coast have come from all around the Pacific basin including South America and Alaska. However, damaging tsunamis can also be caused by local offshore faults or coastal and submarine landslides. These local sources have the potential to cause locally greater wave heights and do pose a threat to the state. The largest historic local-source tsunami on the west coast was caused by the 1927 Point Arguello, California, earthquake that produced waves of about seven feet in the nearby coastal area (CSSC 2005).

Studies have been conducted to evaluate the potential generation of tsunamis from earthquakes originating in the inner Continental Borderland (Legg 2002). These studies indicate that the Catalina fault is the most likely source of local tsunami generation. The Catalina fault is the northern continuation of the San Diego Trough fault zone discussed above (Ryan 2012). Near Catalina, the fault changes orientation to a more westerly trend forming a restraining bend. At this bend, crustal compression occurs and subsequent deformation creates uplift. Depending on the amount of underwater crustal uplift that takes place, a tsunami could be generated. Additionally, amplification of the wave form can occur due to ocean floor bathymetry causing wave refraction and constructive interference or wave amplification (Legg 2002). Areas considered susceptible to tsunami wave amplification include the coast from Los Angeles and Long Beach harbors to Newport Beach. Legg further states "*proximity to the coastal zone of urban Los Angeles and Orange Counties, orientation so as to direct tsunami energy towards the southern California coast and size of seafloor uplift (exceeding 1,300 square kilometers and almost 2,000 meters of seafloor relief) suggests that the Santa Catalina Island restraining bend represents the most serious local tsunami threat to coastal southern California*" (Legg 2002). Based on detailed earthquake modeling using variable earthquake scenarios, Legg determined the maximum runup of a tsunami in the project area caused by an earthquake on the Catalina Island restraining bend would have a height between 1.5 to 2.2 meters (Five to 7.2 feet) (Legg 2002).

In addition to tsunamis generated by earthquake rupture of the seafloor, the possibility that major tsunamis could be generated by massive submarine slumps was recognized a century ago (Synolakis 2002). In more recent years, a variety of studies has supported the scenario of the generation of a major tsunami by a large submarine mass failure, itself induced or triggered by a large earthquake in a coastal area. In addition to the classical documented cases of Grand Banks in 1929, Kalapana, Hawaii in 1975 and the ongoing speculation about the great 1946 Aleutian tsunami, careful analyses of run-up patterns along shorelines often reveal a peaked distribution, with very intense and localized maxima, generally attributed to a local submarine mass failure, against the background of a more regular wave amplitude reflecting the coseismic dislocation (Synolakis 2002). This would be the case, in particular, for localities in Prince William Sound during the great 1964 Alaska earthquake, at Riangkroko during the 1992 Flores, Indonesia event, and during the recent Izmit, Turkey earthquake (Yal¸ciner *et al.* 1999). This scenario can also explain minor tsunamis during strike–slip earthquakes on nearby on-land faults, for example, following the 1989 Loma Prieta earthquake (Ma *et al* .1991). It is clear that the exact timing of failure in this framework is variable, but delays of a few minutes to a few tens of minutes could easily be attributed to the complex nucleation of a failure plane in metastable sediment, or to a mild secondary trigger (aftershock) tipping a precarious balance (Murty 1979).

Characteristics of tsunamis generated by the two kinds of sources can be compared in very general terms by considering the vertical deformation of the sea floor caused by either event. Catastrophic earthquakes can result in coherent surface rupture over long distances (Kanamori 1975) with vertical displacement usually reaching several meters (Plafker 1965). Tsunamis generated by seafloor displacement caused by earthquakes typically have long wavelengths and long periods and have a high potential for transoceanic travel and subsequent impact to distant shores. Conversely, the linear dimension of an underwater landslide rarely exceeds 100 km (Piper 1987). However the areal dimension of the sliding mass could easily reach hundreds of square meters (Piper 1987). Tsunamis caused by submarine mass failures are more geographically contained, although they may give rise to higher amplitudes in the local field (Plafker 1969).

Current research has demonstrated that modeling of landslide tsunami hazards requires information and data from seismology, marine geology, geotechnical engineering and hydrodynamics (Bardet 2003). The outcomes of hydrodynamic simulations were found to depend largely on the assumptions made on the geological and geotechnical processes governing mass failures. These discoveries raised fundamental issues in the modeling of tsunamis, especially about the prediction of future mass failure events.

Thirty years of surveys have shown that the slopes of the southern California Borderland contain a large number of landslide deposits (Lee 2009). The submarine landslide most likely to affect the RBEP site is the Palos Verdes debris avalanche. The Palos Verdes debris avalanche occurs on one of the steepest slopes in the Los Angeles offshore region (Lee 2009). Should it catastrophically reactivate, the Palos Verdes debris avalanche would likely cause a tsunami run-up of up to three meters (ten feet) over a 30 kilometer (18 mile) long stretch of low-lying coastline (Lee 2009).

The California Geological Survey (CGS) has published tsunami inundation maps for the entire California coastline (CGS 2009). Initial tsunami modeling was performed by the University of Southern California (USC) Tsunami Research Center funded through the California Emergency Management Agency (CalEMA) by the National Tsunami Hazard Mitigation Program. A suite of tsunami source events was selected for modeling, representing realistic local and distant earthquakes and hypothetical extreme undersea, near-shore landslides. Local tsunami sources that were considered include offshore reverse-thrust faults, restraining bends on strike-slip fault zones and large submarine landslides capable of significant seafloor displacement and tsunami generation. Distant tsunami sources that were considered include great subduction zone events that are known to have occurred historically (1960 Chile and 1964 Alaska earthquakes) and others which can occur around the Pacific Ocean “Ring of Fire.”

As a disclaimer, the map states that it is not a legal document and does not meet disclosure requirements for real estate transactions nor for any other regulatory purpose (CGS 2009). However, the inundation map has been compiled with best currently available scientific information. The inundation line represents the maximum considered tsunami run-up from a number of extreme, yet realistic, tsunami sources. The map indicates that the areas in the site vicinity that are situated at elevations less than seven feet above sea level could be inundated by a tsunami (**Geology and Paleontology - Figure 7**).

Based on modeling a dozen distant and local "worst case" sources, and modeling at MHW (Mean High Water) conditions, CGS determined that the maximum flood elevations from the modeling in the area of the project are about 11 feet above MSL (Mean Sea Level) (CGS 2009). The two sources that could produce this maximum flood level are a magnitude 7.6 earthquake from the Catalina 7 local scenario and a magnitude 9.2 earthquake from the Alaska-Aleutians 3 scenario. Again, the worst-case scenario is that tsunami flood elevations could reach 11 feet MSL near the site but it would take quite large events to produce such flooding (CEC 2013). Therefore, at 17-feet above mean seal level, it is unlikely that the project would be affected by tsunami during its design life.

U.S. Building codes generally have not addressed the subject of designing structures in tsunami zones. The Federal Emergency Management Agency's (FEMA), Coastal Construction Manual (FEMA P- 55) (FEMA 2013), developed to provide design and construction guidance for residential structures built in coastal areas, addresses seismic loads for coastal structures and provides information on tsunami and associated loads (CSSC 2005). FEMA P-55 cites ASCE Standard ASCE 7-10, *Minimum Design Loads for Buildings and Other Structures* as the reference to be consulted during design of structures. ASCE 7-10 is codified in CBC 2013.

A seiche is a standing wave in an enclosed or partially enclosed body of water. The effect is caused by resonances in a body of water that has been disturbed by one or more of a number of factors, most often meteorological effects (wind and atmospheric pressure variations), seismic activity or by tsunamis. Seiches and seiche-related phenomena have been observed on lakes, reservoirs, swimming pools, bays, harbors and seas. The key requirement for formation of a seiche is that the body of water be at least partially bounded, allowing the formation of the standing wave. The King Harbor Marina is located approximately 500 feet west of the site. While the harbor is largely enclosed and a seiche could possibly form within the basin, its rather diminutive size and the elevated surface of the project site would isolate the project from any perceived inundation and the likelihood of a seiche or a tsunami impacting the site is considered low.

The potential for and mitigation of the effects of tsunami or seiche caused inundation on the proposed site must be addressed in a project-specific geotechnical report, per CBC 2013 requirements and proposed Conditions of Certification **GEO-1**, and Conditions of Certification **Facility Design GEN-1**, **GEN-5** and **CIVIL-1**. Mitigation of tsunami run-up hazards includes structural and civil engineering evaluation, strengthening of seafront structures and providing emergency warning systems. Structural reinforcement at the site can be included for tsunami protection, as deemed appropriate at the detailed design stage by the project structural engineer.

OPERATION IMPACTS AND MITIGATION

Operation of the proposed plant facilities would not have any adverse impact on geologic, mineralogic, or paleontologic resources. Once the plant is constructed and operating, there would be no further disturbances that could affect these resources.

Potential geologic hazards, including strong ground shaking, ground subsidence, liquefaction, settlement due to compressible soils, hydrocompaction, or dynamic compaction, corrosive soils and the possible presence of expansive clay soils can be effectively mitigated through facility design such that these potential hazards would not affect future operation of the facility. Compliance with Condition of Certification **GEO-1**, and Conditions of Certification **GEN-1, GEN-5** and **CIVIL-1** in the **FACILITY DESIGN** section would ensure the project is constructed to current seismic building standards and potential impacts would be mitigated in accordance with current standards of engineering practice.

CUMULATIVE IMPACTS AND MITIGATION

No geologic and mineralogic resources have been identified in the project area. The site has not been identified as containing a significant mineral deposit that should be protected. Development of this project is not expected to lead to a significantly cumulative effect on geologic and mineralogic resources within the project area.

Significant paleontological resources have been documented in the general area of the proposed project but not in sediments which could be encountered beneath the site. If significant paleontological resources are uncovered during construction, they would be protected and preserved in accordance with Conditions of Certification **PAL-1** to **PAL-7**. These conditions would also mitigate any potential cumulative impacts.

The proposed RBEP would be situated in an active geologic environment. Strong ground shaking potential must be mitigated through foundation and structural design as required by the CBC 2013. The potential for lateral spreading and liquefaction must be addressed and mitigated through appropriate facility design. Compressible soils and soils that may be subject to settlement due to dynamic compaction, must be addressed and mitigated in accordance with a design-level geotechnical investigation as required by the CBC 2013, and proposed Conditions of Certification **GEO-1**, and **Facility Design** Conditions of Certification **GEN-1**, **GEN-5** and **CIVIL-1.**

FACILITY CLOSURE

Future facility closure activities would not be expected to impact geologic or mineralogic resources since no such resources are known to exist at either the project location or along its proposed linears. In addition, the decommissioning and closure of the proposed project would not negatively affect geologic, mineralogic, or paleontologic resources since the majority of the ground disturbed during plant decommissioning and closure would have been already disturbed, and mitigated as required, during construction and operation of the project.

CONCLUSIONS

Because of its geologic setting, the site could be subject to very strong levels of earthquake-related ground shaking. The significant effects of strong ground shaking on the RBEP structures must be mitigated through structural designs required by the most recent edition of the California Building Code (currently CBC 2013). CBC 2013 requires that structures be designed to resist seismic stresses from anticipated maximum ground acceleration.

In addition to strong seismic shaking, the project may be subject to soil failure caused by liquefaction and/or dynamic compaction. A design-level geotechnical investigation required for the project by the CBC 2013, and proposed Conditions of Certification **GEO-1** and, and proposed **Facility Design** Conditions of Certification **GEN-1**, **GEN-5** and **CIVIL-1**, would present standard engineering design requirements for mitigation of strong seismic shaking, liquefaction and potential excessive settlement due to dynamic compaction.

While not likely to occur during the project design life, the site is subject to inundation by tsunami. U.S. Building codes generally have not addressed the subject of designing structures in tsunami zones (Reynolds 2013). FEMA's Coastal Construction Manual (FEMA 2013), developed to provide design and construction guidance for structures built in coastal areas, addresses seismic loads for coastal structures and provides information on tsunami and associated loads (CSSC 2005).

Based on the sea level rise projections developed by the Sea-Level Rise Task Force of the Coastal and Ocean Working Group of the California Climate Action Team, sea level is predicted to rise a maximum of 17 inches above 2014 level by the year 2050 (CO-CAT 2013). Analysis of the effects of sea-level rise on the project is presented in the **SOIL AND WATER RESOURCES** section of this document.

Petroleum is the only economic geologic resource in the project vicinity. Other than petroleum, there are no known viable mineralogical or geologic resources at the proposed RBEP site.

The near surface of the project site is highly disturbed and partially covered by artificial fill, blacktop and onsite structures. Native soils beneath the fill have a potential to contain fossils. The underlying San Pedro formation has yielded numerous fossils within the Los Angeles Basin as reported by the applicant's paleontologist during the paleontological archive and literature reviews. Further, monitoring of excavations for the Redondo Beach Generating Station recovered the tooth of an extinct llama at a depth of 30 feet beneath the site (AES 2012).

While significant paleontological resources are not anticipated to be discovered during construction of the proposed project, potential impacts to paleontological resources due to construction activities would be mitigated through worker training and monitoring by qualified paleontologists, as required by proposed Conditions of Certification **PAL-1** through **PAL-8**.

Based on this information, Energy Commission staff concludes that the potential adverse cumulative impacts to project facilities from geologic hazards during its design life are less than significant. Similarly, staff concludes the potential adverse cumulative impacts to potential geologic, mineralogic, and paleontologic resources from the construction, operation, and closure of the proposed project, if any, are less than significant. It is staff's opinion that the proposed RBEP can be designed and constructed in accordance with all applicable laws, ordinances, regulations, and standards (LORS), and in a manner that both protects environmental quality and assures public safety.

PROPOSED CONDITIONS OF CERTIFICATION

General Conditions of Certification with respect to engineering geology are proposed under Conditions of Certification **GEN-1, GEN-5**, and **CIVIL-1** in the **FACILITY DESIGN** section and in **GEO-1** of this section. Proposed paleontological Conditions of Certification follow in **PAL-1** through **PAL-8**. It is staff's opinion that the likelihood of encountering paleontologic resources could be high in areas where native Pleistocene age deposits occur. Staff would consider reducing monitoring intensity, at the recommendation of the project PRS, following examination of sufficient, representative excavations that fully describe site stratigraphy.

GEO-1 A Soils Engineering Report as required by Section 1803 of the California Building Code (CBC2013) shall specifically include laboratory test data, associated geotechnical engineering analyses, and a thorough discussion of seismicity; liquefaction; dynamic compaction; compressible soils; corrosive soils; and tsunami. In accordance with CBC 2013, the report must also include recommendations for ground improvement and/or foundation systems necessary to mitigate these potential geologic hazards, if present.

Verification: The project owner shall include in the application for a grading permit a copy of the Soils Engineering Report which addresses the potential for strong seismic shaking; liquefaction; dynamic compaction; settlement due to compressible soils; corrosive soils: and tsunami, and a summary of how the results of the analyses were incorporated into the project foundation and grading plan design for review and comment by the Chief Building Official (CBO). A copy of the Soils Engineering Report, application for grading permit and any comments by the CBO are to be provided to the CPM at least 30 days prior to grading.

PAL-1 The project owner shall provide the compliance project manager (CPM) with the resume and qualifications of its paleontological resource specialist (PRS) for review and approval. If the approved PRS is replaced prior to completion of project mitigation and submittal of the paleontological resources report (PRR), the project owner shall obtain CPM approval of the replacement PRS. The project owner shall keep resumes on file for qualified paleontological resources monitors (PRMs). If a PRM is replaced, the resume of the replacement PRM shall also be provided to the CPM for review and approval.

The PRS resume shall include the names and phone numbers of references. The resume shall also demonstrate to the satisfaction of the CPM the appropriate education and experience to accomplish the required paleontological resource tasks.

As determined by the CPM, the PRS shall meet the minimum qualifications for a Qualified Professional Paleontologist as defined in the Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources by the Society of Vertebrate Paleontology (SVP 2010). The experience of the PRS shall include the following:

1. Institutional affiliations, appropriate credentials, and college degree;
2. Ability to recognize and collect fossils in the field;
3. Local geological and biostratigraphic expertise;
4. Proficiency in identifying vertebrate and invertebrate fossils; and
5. At least three years of paleontological resource mitigation and field experience in California and at least one year of experience leading paleontological resource mitigation and field activities.

The project owner shall ensure that the PRS obtains qualified paleontological resource monitors to monitor as he or she deems necessary on the project. Paleontologic resource monitors (PRMs) shall have the equivalent or combination of the following qualifications approved by the CPM:

- BS or BA degree in geology or paleontology and one year of experience monitoring in California; or
- AS or AA in geology, paleontology, or biology and four years' experience monitoring in California; or

- Enrollment in upper division classes pursuing a degree in the fields of geology or paleontology and two years of monitoring experience in California.

<u>Verification:</u>

1. At least 60 days prior to the start of ground disturbance, the project owner shall submit a resume and statement of availability of its designated PRS for on-site work to the CPM, whose approval must be obtained prior to initiation of ground disturbing activities.

2. At least 20 days prior to ground disturbance, the PRS or project owner shall provide a letter with resumes naming anticipated PRMs for the project. The letter shall state that the identified monitors meet the minimum qualifications for paleontological resource monitoring as required by this condition of certification. If additional monitors are obtained during the project, the PRS shall provide additional letters and resumes to the CPM. The letter shall be provided to the CPM for approval no later than one week prior to the monitor’s beginning on-site duties.

3. Prior to any change in the PRS, the project owner shall submit the resume of the proposed new PRS to the CPM for review and approval.

PAL-2 The project owner shall provide to the PRS and the CPM for approval, maps and drawings showing the footprint of the power plant, construction laydown areas, and all related facilities. Maps shall identify all areas of the project where ground disturbance is anticipated. If the PRS requests enlargements or strip maps for linear facility routes, the project owner shall provide copies to the PRS and CPM. The site grading plan and the plan and profile drawings for the utility lines would be acceptable for this purpose. The plan drawings must show the location, depth, and extent of all ground disturbances and be at a scale between 1 inch = 40 feet and 1 inch = 100 feet. If the footprint of the project or its linear facilities change, the project owner shall provide maps and drawings reflecting those changes to the PRS and CPM.

If construction of the project proceeds in phases, maps and drawings may be submitted prior to the start of each phase. A letter identifying the proposed schedule of each project phase shall be provided to the PRS and CPM. Before work commences on affected phases, the project owner shall notify the PRS and CPM of any construction phase scheduling changes.

At a minimum, the project owner shall ensure that the PRS or PRM consults weekly with the project superintendent or construction field manager to confirm area(s) to be worked the following week, until ground disturbance is completed.

<u>Verification:</u>

1. At least 30 days prior to the start of ground disturbance, the project owner shall provide the maps and drawings to the PRS and CPM.

2. If there are changes to the footprint of the project, revised maps and drawings shall be provided to the PRS and CPM at least 15 days prior to the start of ground disturbance.

3. If there are changes to the scheduling of the construction phases, the project owner shall submit a letter to the CPM within five days of identifying the changes.

PAL-3 The project owner shall ensure that the PRS prepares a Paleontological Resources Monitoring and Mitigation Plan (PRMMP) and submits the PRMMP to the CPM for review and approval. Approval of the PRMMP by the CPM shall occur prior to any ground disturbance. The PRMMP shall function as the formal guide for monitoring, collecting, and sampling activities, and may be modified with CPM approval. The PRMMP shall be used as the basis of discussion when on-site decisions or changes are proposed. Copies of the PRMMP shall include all updates and reside with the PRS, each monitor, the project owner's on-site manager, and the CPM.

The PRMMP shall be developed in accordance with the guidelines of the Society of Vertebrate Paleontology (SVP 2010) and shall include, but not be limited, to the following:

1. Procedures for and assurance that the performance and sequence of project-related tasks, such as any literature searches, pre-construction surveys, worker environmental training, fieldwork, flagging or staking, construction monitoring, mapping and data recovery, fossil preparation and collection, identification and inventory, preparation of final reports, and transmittal of materials for curation will be performed according to PRMMP procedures;

2. Identification of the person(s) expected to assist with each of the tasks required by the PRMMP and these conditions of certification;

3. A thorough discussion of the anticipated geologic units expected to be encountered, the location and depth of the units relative to the project when known, and the known sensitivity of those units based on the occurrence of fossils either in that unit or in correlative units;

4. An explanation of why sampling is needed, a description of the sampling methodology, and how much sampling is expected to take place in which geologic units. Include descriptions of different sampling procedures that shall be used for fine-grained and coarse-grained units;

5. A discussion of the locations of where the monitoring of project construction activities is deemed necessary, and a proposed plan for monitoring and sampling at these locations;

6. A discussion of procedures to be followed: (a) in the event of a significant fossil discovery, (b) stopping construction, (c) resuming construction, and (d) how notifications will be performed;

7. A discussion of equipment and supplies necessary for collection of fossil materials and any specialized equipment needed to prepare, remove, load, transport, and analyze large-sized fossils or extensive fossil deposits;

8. Procedures for inventory, preparation, and delivery for curation into a retrievable storage collection in a public repository or museum, which meet the Society of Vertebrate Paleontology’s standards and requirements for the curation of paleontological resources;

9. Identification of the institution that has agreed to receive data and fossil materials collected, requirements or specifications for materials delivered for curation, and how they will be met, and the name and phone number of the contact person at the institution; and

10. A copy of the paleontological conditions of certification.

Verification: At least 30 days prior to ground disturbance, the project owner shall provide a copy of the PRMMP to the CPM. Approval of the PRMMP by the CPM shall occur prior to any ground disturbance. The PRMMP shall include an affidavit of authorship by the PRS, and acceptance of the PRMMP by the project owner evidenced by a signature.

PAL-4 Prior to ground disturbance the project owner and the PRS shall prepare a CPM-approved Worker Environmental Awareness Program (WEAP).

The WEAP shall address the possibility of encountering paleontological resources in the field, the sensitivity and importance of these resources, and legal obligations to preserve and protect those resources. The purpose of the WEAP is to train project workers to recognize paleontologic resources and identify procedures they must follow to ensure there are no impacts to sensitive paleontologic resources. The WEAP shall include:

1. A discussion of applicable laws and penalties under the law;

2. Good quality photographs or physical examples of vertebrate fossils for project sites containing units of high paleontologic sensitivity;

3. Information that the PRS or PRM has the authority to stop or redirect construction in the event of a discovery or unanticipated impact to a paleontological resource;

4. Instruction that employees are to stop or redirect work in the vicinity of a find and to contact their supervisor and the PRS or PRM;

5. An informational brochure that identifies reporting procedures in the event of a discovery;

6. A WEAP certification of completion form signed by each worker indicating that he/she has received the training; and

7. A sticker that shall be placed on hard hats indicating that environmental training has been completed.

The project owner shall also submit the training script and, if the project owner is planning to use a video for training, a copy of the training video, with the set of reporting procedures for workers to follow that will be used to present the WEAP and qualify workers to conduct ground disturbing activities that could impact paleontologic resources.

Verification:

1. At least 30 days prior to ground disturbance, the project owner shall submit to the CPM for review and comment the draft WEAP, including the brochure and sticker. The submittal shall also include a draft training script and, if the project owner is planning to use a video for training, a copy of the training video with the set of reporting procedures for workers to follow.

2. At least 15 days prior to ground disturbance, the project owner shall submit to the CPM for approval the final WEAP and training script.

PAL-5 No worker shall excavate or perform any ground disturbance activity prior to receiving CPM-approved WEAP training by the PRS, unless specifically approved by the CPM.

Prior to project kick-off and ground disturbance the following workers shall be WEAP trained by the PRS in-person: project managers, construction supervisors, foremen, and all general workers involved with or who operate ground-disturbing equipment or tools. Following project kick-off, a CPM-approved video or in-person training may be used for new employees. The training program may be combined with other training programs prepared for cultural and biological resources, hazardous materials, or other areas of interest or concern. A WEAP certification of completion form shall be used to document who has received the required training.

Verification:

1. In the Monthly Compliance Report (MCR), the project owner shall provide copies of the WEAP certification of completion forms with the names of those trained and the trainer or type of training (in-person and/or video) offered that month. An example of a suitable WEAP certification complete form is provided below. The MCR shall also include a running total of all persons who have completed the training to date.

2. If the project owner requests an alternate paleontological WEAP trainer, the resume and qualifications of the trainer shall be submitted to the CPM for review and approval prior to installation of an alternate trainer. Alternate trainers shall not conduct WEAP training prior to CPM authorization.

PAL-6 The project owner shall ensure that the PRS and PRM(s) monitor, consistent with the PRMMP, all construction-related grading, excavation, trenching, and augering in areas where potential fossil-bearing materials have been identified, both at the site and along any constructed linear facilities associated with the project. In the event that the PRS determines full-time monitoring is not necessary in locations that were identified as potentially fossil-bearing in the PRMMP, the project owner shall notify and seek the concurrence of the CPM.

The project owner shall ensure that the PRS and PRM(s) have the authority to stop or redirect construction if paleontological resources are encountered. The project owner shall ensure that there is no interference with monitoring activities unless directed by the PRS. Monitoring activities shall be conducted as follows:

1. Any change of monitoring from the accepted schedule in the PRMMP shall be proposed in a letter or email from the PRS and the project owner to the CPM prior to the change in monitoring and be included in the monthly compliance report. The letter or email shall include the justification for the change in monitoring and be submitted to the CPM for review and approval.

2. The project owner shall ensure that the PRM(s) keep a daily monitoring log of paleontological resource activities. The PRS may informally discuss paleontological resource monitoring and mitigation activities with the CPM at any time.

3. The project owner shall ensure that the PRS notifies the CPM within 24 hours of the occurrence of any incidents of non-compliance with any paleontological resources conditions of certification. The PRS shall recommend corrective action to resolve the issues or achieve compliance with the conditions of certification.

4. For any significant paleontological resources encountered, either the project owner or the PRS shall notify the CPM within 24 hours, or Monday morning in the case of a weekend event, when construction has been stopped because of a paleontological find.

The project owner shall ensure that the PRS prepares a summary of monitoring and other paleontological activities that will be included in each MCR. The summary will include the name(s) of PRS or PRM(s) active during the month, general descriptions of training and monitored construction activities, and general locations of excavations, grading, and other activities. A section of the report shall include the geologic units or subunits, encountered descriptions of samplings within each unit, and a list of identified fossils. A final section of the report will address any issues or concerns about the project relating to paleontologic monitoring, including any incidents of non-compliance or any changes to the monitoring plan that have been approved by the CPM. If no monitoring took place during the month, the report shall include an explanation in the summary as to why monitoring was not conducted.

Verification: The project owner shall ensure that the PRS submits the summary of monitoring and paleontological activities in the MCR. When feasible, the CPM shall be notified ten days in advance of any proposed changes in monitoring different from that identified in the PRMMP. If there is any unforeseen change in monitoring, the notice shall be given as soon as possible prior to implementation of the change.

PAL-7 The project owner shall ensure preparation of a Paleontological Resources Report (PRR) by the designated PRS. The PRR shall be prepared following completion of ground-disturbing activities. The PRR shall include an analysis of the collected fossil materials and related information, and shall be submitted to the CPM for approval.

The report shall include, but not be limited to, a description and inventory of recovered fossil materials; a map showing the location of paleontological resources encountered; and the PRS' description of sensitivity and significance of those resources.

Verification: Within 90 days after completion of ground-disturbing activities, including landscaping, the project owner shall submit the PRR under confidential cover to the CPM.

PAL-8 The project owner, through the designated PRS, shall ensure that all components of the PRMMP are adequately performed, including collection of fossil material, preparation of fossil material for analysis, analysis of fossils, identification and inventory of fossils, preparation of fossils for curation, and delivery for curation of all significant paleontological resource materials encountered and collected during project construction. The project owner shall pay all curation fees charged by the museum for fossil material collected and curated as a result of paleontological mitigation. The project owner shall also provide the curator with documentation showing the project owner irrevocably and unconditionally donates, gives, and assigns permanent, absolute, and unconditional ownership of the fossil material.

Verification: Within 60 days after the submittal of the PRR, the project owner shall submit documentation to the CPM showing fees have been paid for curation and the owner relinquishes control and ownership of all fossil material.

Certification of Completion
Worker Environmental Awareness Program
REDONDO BEACH ENERGY PROJECT (12-AFC-03)

This is to certify these individuals have completed a mandatory California Energy Commission-approved Worker Environmental Awareness Program (WEAP). The WEAP includes pertinent information on cultural, paleontological, and biological resources for all personnel (that is, construction supervisors, crews, and plant operators) working on site or at related facilities. By signing below, the participant indicates that he/she understands and shall abide by the guidelines set forth in the program materials. Include this completed form in the Monthly Compliance Report.

No.	Employee Name	Title/Company	Signature
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Cultural Trainer: ______________ Signature: ___________________ Date: ___/___/____

PaleoTrainer: _______________ Signature: ___________________ Date: ___/___/____

Biological Trainer: ______________Signature:________________ Date: ___/___/__

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GEOLOGY AND PALEONTOLOGY - FIGURE 1

Redondo Beach Energy Project - Regional Vicinity Map

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: April 2013 Petition to Amend, 00-AFC-14, Fig. 1-1, CH2MHILL

GEOLOGY AND PALEONTOLOGY - FIGURE 2
Redondo Beach Energy Project - Local Setting

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION
Source: Google Image - CEC Staff

GEOLOGY AND PALEONTOLOGY - FIGURE 3

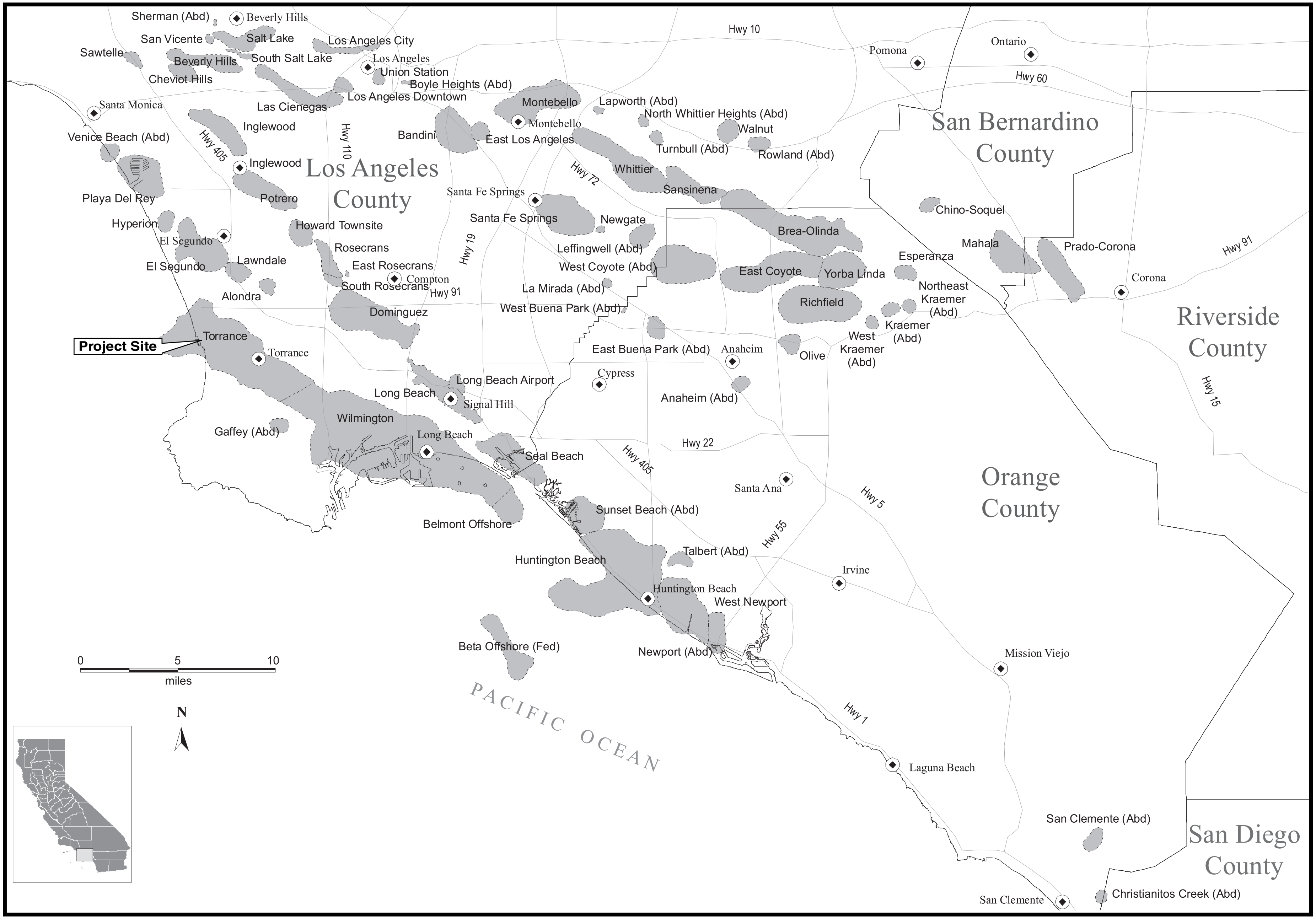
Redondo Beach Energy Project - Geomorphic Provinces

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: California Department of Conservation, California Geological Survey, 2002.

GEOLOGY AND PALEONTOLOGY - FIGURE 4

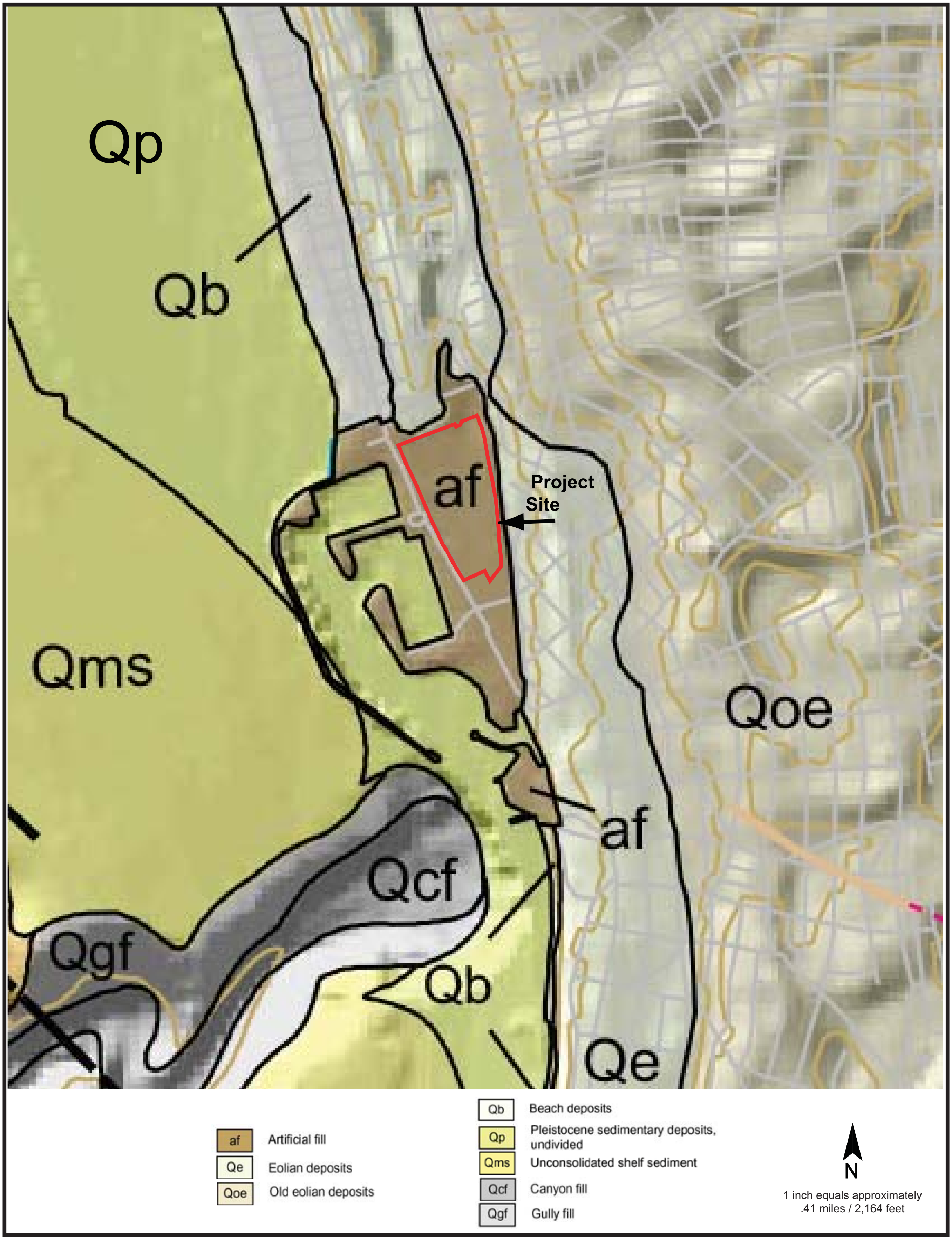
Redondo Beach Energy Project - Los Angeles Basin area oil fields



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: Urban Development of Oil Fields in the Los Angeles Basin Area, 1983 to 2001 (Gamache 2003)

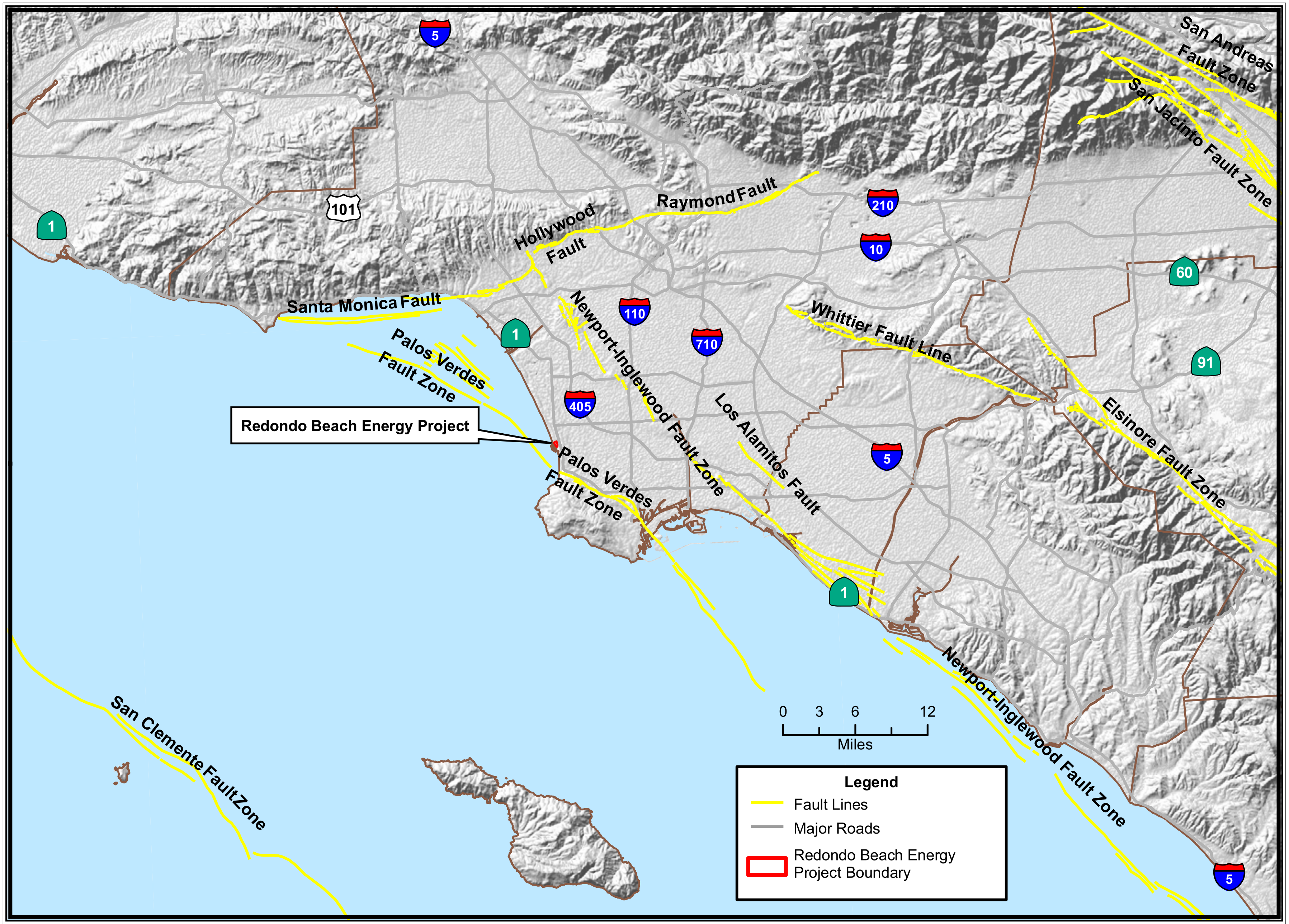
GEOLOGY AND PALEONTOLOGY - FIGURE 5
Redondo Beach Energy Project - Geology



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION
SOURCE: Dept. of Conservation 2003 Preliminary Geologic Map of the Long Beach 30' x 60' Quadrangle, Southern California

GEOLOGY AND PALEONTOLOGY- FIGURE 6

Redondo Beach Energy Project - Fault Locations



CALIFORNIA ENERGY COMMISSION, SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: Source: Dept of Conservation, California Geological Survey Seismic Hazard Assessment & Geologic Mapping Programs

GEOLOGY AND PALEONTOLOGY - FIGURE 7
Redondo Beach Energy Project - Tsunami Inundation

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION
Source: Google Image - Earthquake and Tsunami Program, California Governor's Office of Emergency Services

POWER PLANT EFFICIENCY

Edward Brady and Shahab Khoshmashrab

SUMMARY OF CONCLUSIONS

The Redondo Beach Energy Project (RBEP) would generate 511 megawatts (MW) (nominal gross output)[1] of electricity at an overall project fuel efficiency of 46 percent lower heating value (LHV[2]). While it would consume substantial amounts of energy, it would do so in the most efficient manner practicable to satisfy the project's objectives of producing base load electricity and ancillary load-following services. It would not create significant adverse effects on energy supplies or resources, would not require additional sources of energy supply, and would not consume energy in a wasteful or inefficient manner. Also, it would not create cumulative adverse impacts on natural gas supplies. No energy standards apply to this project. Staff therefore concludes that this project would create no significant adverse impacts on energy resources.

INTRODUCTION

One of the responsibilities of the California Energy Commission (Energy Commission) is to make findings on whether the energy use by a power plant, including the proposed RBEP power plant, would result in significant adverse impacts on the environment, as defined in the California Environmental Quality Act (CEQA). If the Energy Commission finds that RBEP's energy consumption creates a significant adverse impact, it must further determine if feasible mitigation measures could eliminate or minimize that impact. In this analysis, staff addresses the inefficient and unnecessary consumption of energy.

In order to fully evaluate the project in this regard, this analysis:

- Examines whether the facility would likely present any adverse impacts upon energy resources;
- Examines whether these adverse impacts are significant; and if so,
- Examines whether feasible mitigation measures or alternatives could eliminate those adverse impacts or reduce them to a level of insignificance.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

No federal, state, or local/county laws, ordinances, regulations, and standards (LORS) apply to the efficiency of this project.

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[1] At ambient average temperature conditions of 63.3 °F dry bulb and 58.5 °F wet bulb (RBEP 2012a, AFC § 1.1).

[2] LHV is Low Heating Value, or a measurement of the energy content of a fuel correcting for post-combustion water vapor.

SETTING

The applicant proposes to build and operate RBEP, a 511 MW (nominal gross output) combined cycle power plant, employing the Mitsubishi Heavy Industries (MHI) 501D (M501D) gas turbine generators (also referred to as combustion turbine generators, or CTGs) in a combined cycle configuration, to serve California's energy needs and provide operating flexibility (that is, the ability to start up, shut down, turn down, and provide load following, when needed) (RBEP 2012a, AFC §§ 1.1, 1.2). The project's combined-cycle equipment would consist of one generator trains, consisting of three M501D CTGs with evaporative inlet air cooling, three single-pressure heat recovery steam generators (HRSGs) with natural-gas-fired duct burning, and one single-pressure condensing steam turbine generator (STG) arranged in a three-on-one combined cycle train (that is, three CTGs and three HRSGs coupled with one STG) (RBEP 2012a, AFC §§ 1.1, 2.1, 2.1.5).

Natural gas at 145 psig[3] pressure would be delivered to RBEP via an existing Southern California Gas (SoCalGas) 20-inch-diameter pipeline (RBEP 2012a, AFC §§ 1.1, 1.2, 2.1, 2.6.3).

ASSESSMENT OF IMPACTS

METHOD AND THRESHOLD FOR DETERMINING THE SIGNIFICANCE OF ENERGY RESOURCES

CEQA guidelines state that the environmental analysis "…shall describe feasible measures which could minimize significant adverse impacts, including where relevant, inefficient and unnecessary consumption of energy" (Title 14 CCR §15126.4[a][1]). Appendix F of the guidelines further suggests consideration of such factors as the project's energy requirements and energy use efficiency; its effects on local and regional energy supplies and energy resources; its requirements for additional energy supply capacity; its compliance with existing energy standards; and any alternatives that could reduce the wasteful, inefficient, and unnecessary consumption of energy (Title 14, CCR §15000 et seq., Appendix F).

The inefficient and unnecessary consumption of energy, in the form of non-renewable fuels such as natural gas and oil, constitutes an adverse environmental impact. An adverse impact can be considered significant if it results in:

- Adverse effects on local and regional energy supplies and energy resources;
- A requirement for additional energy supply capacity;
- Noncompliance with existing energy standards; or
- The wasteful, inefficient, and unnecessary consumption of fuel or energy.

[3] psig (pounds per square inch gage pressure): Pressure referenced to standard atmospheric conditions at 0 psig, in contrast to psia (pounds per square inch absolute) with perfect vacuum as point of reference and 14.7 psia at atmospheric conditions.

PROJECT ENERGY REQUIREMENTS AND ENERGY USE EFFICIENCY

Any power plant large enough to fall under Energy Commission siting jurisdiction (50 MW or greater), by definition, consumes large amounts of energy. At ambient average temperature conditions, RBEP would burn natural gas at a nominal rate of approximately 3,661 million British thermal units (MMBtu) per hour, LHV (RBEP 2012a, AFC §§ 2.1.7, 4.0). This is a substantial rate of energy consumption that could potentially impact energy supplies (See ADVERSE EFFECTS ON ENERGY SUPPLIES AND RESOURCES below for further discussion). Under expected project conditions, electricity would be generated at a full load efficiency of approximately 46 percent LHV (RBEP 2012a, AFC § 2.7, Figures 2.1-4a and 2.1-4b). This efficiency level compares favorably with the average fuel efficiency of a typical base load/load following combined cycle plant.

ADVERSE EFFECTS ON ENERGY SUPPLIES AND RESOURCES

Fossil Fuel Resources

The applicant has described its source of natural gas to operate the project (RBEP 2012a, AFC §§ 1.1, 1.2, 2.1, 2.6.3). Natural gas at 145 psig pressure would be delivered to the RBEP site via an existing SoCalGas (Southern California Gas Company) 20-inch-diameter pipeline.

SoCalGas has confirmed its system's adequate capacity to supply the project; a will-serve letter is included in AFC Appendix 2E. SoCalGas's natural gas system represents a resource of considerable capacity and offers access to adequate supplies of natural gas. This natural gas comes from resources in the Southwest, Canada, and the Rocky Mountains. Staff concludes that there would be adequate natural gas supply and pipeline capacity to meet the project's needs.

ADDITIONAL ENERGY SUPPLY REQUIREMENTS

The AFC states that SoCalGas has confirmed its system's adequate capacity to supply the project (RBEP 2012a, AFC Appendix 2E). This natural gas supply is a reliable source of fossil fuel for this project. Because RBEP would replace electric power generation facilities of equivalent output capacity but of lower efficiencies, the project would not increase the existing natural gas demand.

Natural gas fuel would be supplied to the project by SoCalGas via the existing pipeline point of connection. RBEP would not require additional capacity since regional supplies are currently plentiful.

COMPLIANCE WITH ENERGY STANDARDS

No standards apply to the efficiency of RBEP or other non-cogeneration projects.

ALTERNATIVES TO REDUCE WASTEFUL, INEFFICIENT, AND UNNECESSARY ENERGY CONSUMPTION

RBEP could create significant adverse impacts on energy resources if alternatives were not employed that could reduce the project's fuel use. The evaluation of alternatives to the project (that could reduce wasteful, inefficient, or unnecessary energy consumption) first requires the examination of the project's energy consumption. Project fuel efficiency, and therefore its rate of energy consumption, is determined by both the configuration of the power producing system and the selection of equipment used to generate its power.

Project Configuration

RBEP would be a combined-cycle power plant. The power block would generate electric power by utilizing three CTGs (gas turbines) and a STG (steam turbine generator) operating on heat energy recovered from the gas turbine exhaust (RBEP 2012a, AFC §§ 2.1.4, 2.1.5). By recovering this heat, which would otherwise be lost up the exhaust stacks, the efficiency of any combined-cycle power plant is increased considerably from that of either gas turbines or a steam turbine operating alone. This configuration is well suited to the large, steady loads met by a base load plant that generates energy efficiently over long periods of time.

The applicant proposes to install evaporative inlet air coolers, single-pressure HRSGs, a steam turbine unit, and power cycle cooling systems (air-cooled condensers). Staff believes these features provide meaningful efficiency enhancements to RBEP. The three-on-one combustion turbine/HRSG configuration is also highly efficient during unit turndown since one gas turbine can be shut down, leaving the other two fully loaded. This allows the efficient operation of two gas turbines instead of the operation of three gas turbines operating at a less efficient part load to generate the same number of MWs.

The RBEP's design would incorporate AES' proprietary rapid start technology, which would allow the combustion turbine to reach base load more quickly as well as increase the ramping rate for both loading and unloading the power train while operating in a load following mode of operation. AES's approach is designed to start quickly, and while in startup phase, operate at an efficiency rating comparable to a typical simple-cycle plant. Within a relatively short period of time, the steam turbine generator would begin producing power. The plant would then operate at near a typical combined-cycle efficiency rating.[4]

[4] For further discussion of fast-start, combined-cycle gas turbine systems, refer to "Gas Turbine Combined Cycle Fast Start: The Physics Behind the Concept," Power Engineering, June 2013 edition pp. 40-49.

Equipment Selection

The M501D gas turbine is the basic building block for the three-on-one combined-cycle system. The M501D provides a combination of efficiency and operating history comparable to the industry competition. The applicant would provide a three-on-one power block, with an ISO[5] rated capacity[6] of 506.2 MW and 51.8 percent combined-cycle efficiency. The stand-alone simple cycle capacity for the M501D CTG is 113.95 MW at 34.9 percent efficiency (9,780 Btu/kWh[7] LHV).[8] RBEP would employ AES' rapid start technology which would effectively reduce the time required for startup and shutdown of the turbine generators having similar thermal efficiency.

One alternative CTG with similar capacity, efficiency and rapid startup features is the General Electric (GE) LMS100 aeroderivative CTG with an ISO rating of 98.2 MW at 45 percent (7,580 Btu/kWh LHV) in a simple-cycle configuration.[9] Where the simple-cycle efficiency of the M501D is lower than the LMS100 (34.9 percent vs. 45 percent, respectively), the M501D gas turbine nominal capacity exceeds GE by 15.75 MW (113.95 MW vs. 98.2 MW). Used in a three-on-one configuration, this capacity difference would be magnified three times to about 9 percent (15.75 x 3)/506.2 = 0.093).

Selecting between these machines is also based on commercial availability. The M501D model has over two decades of operational history and has been commercially available since 1980. (Also see analysis below under NATURAL GAS-BURNING TECHNOLOGIES.)

Efficiency of Alternatives to the Project

RBEP's objectives include the generation of base-load electricity and load-following all hours of the day to serve energy requirements from the California Independent Systems Operator (CAISO) (RBEP 2012a, AFC §§ 1.2, 2.1, 6.1).

Alternative Generating Technologies

Alternative generating technologies for RBEP are considered in the AFC (RBEP 2012a, AFC §§ 1.1, 6.7). For purposes of this analysis, solar technology, other fossil fuels, nuclear, biomass, hydroelectric, wind, and geothermal technologies are all considered. Due to regulatory prohibitions, nuclear technology was rejected. Biomass, hydroelectric, geothermal, wind, and solar technologies were ruled out due to the limitations on the availability of these energy resources in the project area and/or their unavailability all hours of the day. Given the project objectives, location, and the commercial availability of the above technologies, staff believes that the applicant's selection of a natural gas-burning technology is reasonable.

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[5] ISO (International Organization for Standardization): In this case, ISO Standard 27.040 for measurement of gas and steam turbine capacity. This rating is slightly lower than the 511 MW output indicated elsewhere in this analysis; the 511 MW figure is based on site ambient conditions.

[6] p.28, "2013 GTW Combined Cycle Specs," Gas Turbine World 2013 Handbook, January-February 2013.

[7] Kilo Watt hours

[8] ibid., p.18, "Simple Cycle OEM Ratings"

[9] ibid., p.15, "Simple Cycle OEM Ratings"

Natural Gas-Burning Technologies

Fuel consumption is one of the most important economic factors in selecting an electric generator; fuel typically accounts for over two-thirds of the total operating costs of a fossil fuel-fired power plant. Under a competitive power market system, where operating costs are critical in determining the competitiveness and profitability of a power plant, the plant owner is strongly motivated to purchase fuel-efficient machinery.

A modern base load combined-cycle power plant typically offers a higher efficiency range than a combined-cycle plant intended to provide operating flexibility (i.e.; quick start and load following capabilities), such as RBEP. Despite this efficiency advantage, a base load plant would not meet the project objective of providing operating flexibility.

A possible alternative to a small 501D class turbine is to upsize to a larger industrial-duty next generation G-class (e.g., Siemens-Westinghouse 501G) which would use partial steam cooling to allow slightly higher temperatures, yielding proportionately greater efficiency. In actual operation, one would expect to see the difference in efficiency diminish, since larger-capacity G-class turbines run at less than optimum (full) output more frequently than smaller-capacity 501D turbines. (Gas turbine efficiency drops rapidly at less than full load.) Given the minor efficiency improvement promised by the G-class turbine, and since this machine would have to operate at less than optimum base load efficiency in order to meet the project load capacity requirements, staff believes the applicant's decision to purchase the M501 series machines is reasonable.

Another possible alternative to the 501 class advanced gas turbine is an H-class next generation machine with a claimed fuel efficiency of 60 percent LHV at ISO conditions. This high efficiency is achieved through a higher pressure ratio and firing temperature, made possible by cooling the initial turbine stages with steam instead of air. However, because of its large size, this machine does not offer the operating flexibility that the M501 model offers. Therefore, staff agrees with the applicant's decision to use the smaller, more flexible M501 model.

Inlet Air Cooling

Other alternatives include gas turbine inlet air cooling methods. The two most common techniques are evaporative coolers or foggers, and chillers. Both increase power output by cooling gas turbine inlet air. A mechanical chiller offers greater power output than the evaporative cooler on hot, humid days; however, it consumes electric power to operate its refrigeration process, slightly reducing its overall net power output and overall efficiency. An absorption chiller uses less electricity but necessitates the use of a substantial amount of ammonia. An evaporative cooler or fogger boosts power output most efficiently on dry days; it uses less electricity than a mechanical chiller, possibly producing a slightly higher operating efficiency. Efficiency differences between these alternatives are relatively minor.

Given the climate at the project site and the relative lack of clear superiority of one system over another, staff believes that the applicant's choice of an evaporative gas turbine inlet air cooling system would have no significant adverse energy impacts.

Alternative Heat Rejection System

The applicant proposes to employ a dry cooling system (air-cooled condenser) as the means for rejecting power cycle heat from the steam turbine. An alternative heat rejection system would utilize a wet cooling system (evaporative cooling tower).

The local climate in the project area is characterized by relatively moderate coastal temperatures and variable relative humidity. In low temperature and high relative humidity, the air-cooled condenser performs slightly better than the evaporative cooling tower. In high temperatures and low relative humidity, the evaporative cooling tower performs marginally better than the air-cooled condenser. However, due to limitation of using existing water supplies, the applicant has chosen to use dry cooling. (For further discussion of water supply, see the **SOIL AND WATER RESOURCES** section of this document). This is acceptable to staff, given that only a slight efficiency improvement would be provided by the wet cooling alternative when considering the range of historical relative humidity and ambient air temperatures at the project site.[10]

Staff concludes that the selected project configuration (rapid-response combined-cycle) and generating equipment (M501D gas turbines and associated cooling systems) represent the most efficient feasible combination for satisfying the project's objectives. The three-on-one combustion turbine/HRSG configuration also allows for high efficiency during unit turndown, shutting one combustion turbine down, leaving the others fully loaded. This offers an efficiency advantage over the larger machines during unit turndown. There are no alternatives that would significantly reduce energy consumption while satisfying the project's objectives of producing base load electricity and ancillary load-following services.

Staff, therefore, concludes that RBEP would not create a significant adverse impact on energy resources.

CUMULATIVE IMPACTS

No nearby projects have been identified that could potentially combine with the RBEP project to create cumulative impacts on natural gas resources. Note that the SoCalGas natural gas supply system draws from extensive supplies originating in the Southwest, Canada, and the Rocky Mountains. Staff believes the SoCalGas system is adequate to supply RBEP without adversely impacting its other customers.

Staff believes that the project would not create indirect energy impacts that would have otherwise occurred without this project. Older, less efficient power plants consume more natural gas than new, more efficient plants such as RBEP. Natural gas is burned by the most competitive power plants on the spot market, and the most efficient plants run the most frequently provided that they meet their objectives. The high efficiency of the proposed RBEP should allow it to compete favorably and replace less efficient power generating plants.

[10] http://www.usa.com/redondo-beach-ca-weather.htm#HistoricalTemperature
http://www.usa.com/redondo-beach-ca-weather.htm#HistoricalHumidity

The project would therefore not impact the cumulative amount of natural gas consumed for power generation.

NOTEWORTHY PUBLIC BENEFITS

In a fuel-efficient manner, RBEP would optimize quick-start and load following capabilities to provide system efficiency and flexibility. By offering these capabilities and replacing the existing older and less efficient electric generating facilities, projects such as RBEP would benefit California's electricity consumers.

CONCLUSIONS AND RECOMMENDATIONS

RBEP would generate 511 MW (gross output at ambient conditions) of electricity at an overall project fuel efficiency of 46 percent LHV. While it would consume substantial amounts of energy, it would do so in the most efficient manner practicable to satisfy the project's objectives of producing base load electricity and ancillary load-following services. It would not create significant adverse effects on energy supplies or resources, would not require additional sources of energy supply, and would not consume energy in a wasteful or inefficient manner. Also, it would not create cumulative adverse impacts on natural gas supplies. No energy standards apply to this project. Staff therefore concludes that this project would create no significant adverse impacts on energy resources.

PROPOSED CONDITIONS OF CERTIFICATION

No conditions of certification are proposed.

REFERENCES

RBEP 2012a — Applicant/AES Southland Development (TN 68597). Application for Certification for the Redondo Beach Energy Project Volumes 1 and 2, dated November 20, 2012. Submitted to CEC/Robert Oglesby on November 21, 2012.

POWER PLANT RELIABILITY

Edward Brady and Shahab Khoshmashrab

SUMMARY OF CONCLUSIONS

The applicant predicts an equivalent availability factor[1] of 97 percent for the Redondo Beach Energy Project (RBEP), which is comparable to the industry norm.

In the **SOIL AND WATER RESOURCES** section of this PSA, the California Energy Commission (Energy Commission) staff (staff) recommends that recycled water be used for industrial purposes during plant operations rather than the applicant's proposed potable water. Based on this recommendation, the use of recycled water would be consistent with the Energy Commission Water Policy, while the use of potable water would not. Recycled water would, thus, be the only reliable source for RBEP.

Based on a review of the Application for Certification (AFC) and upon the implementation of staff's recommended source of water supply, staff concludes that RBEP would be built and would operate in a manner consistent with industry norms for reliable operation, and the equivalent availability factor of 97 percent would be achievable.

INTRODUCTION

In this analysis, staff addresses the potential reliability issues of RBEP to determine if the power plant is likely to be built in accordance with typical industry norms for reliable power generation. Staff uses these norms as a benchmark because they ensure that the resulting project would not be likely to degrade the overall reliability of the electric system it serves (see **SETTING**, below).

The scope of this power plant reliability analysis covers these benchmarks:

- equipment availability and plant maintainability;
- fuel and water availability; and,
- power plant reliability in relation to natural hazards.

While the applicant has predicted an equivalent availability factor of 97 percent for the RBEP project (see below), staff uses the above benchmarks as appropriate industry norms to evaluate the project's reliability and determine if this availability factor is achievable.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

No specific federal, state, or local/county laws, ordinances, regulations, or standards (LORS) apply to the reliability of this project.

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[1] Equivalent availability factor is the percentage of time a power plant is available to generate electrical power, and reflects the probability of planned and unplanned (forced) outages.

SETTING

In the restructured competitive electric power industry, the responsibility for maintaining system reliability falls largely to the state's control area operators, such as the California Independent System Operator (CAISO), which purchase, dispatch, and sell electricity throughout the state. How the CAISO and other control area operators ensure system reliability is an evolving process; new protocols are being developed and put in place to ensure sufficient reliability in the competitive market system. "Must-run" power purchase agreements and "participating generator" agreements are two mechanisms that ensure an adequate supply of reliable power.

The CAISO also requires that power plants selling ancillary services, as well as those holding reliability must-run contracts, fulfill certain requirements, including:

- filing periodic reports on plant reliability;
- reporting all outages and their causes; and
- scheduling all planned maintenance outages with the CAISO.

The CAISO's mechanisms to ensure adequate power plant reliability have apparently been developed with the assumption that individual power plants competing to sell power into the system will exhibit reliability levels similar to those of power plants of past decades. Staff recommends that power plant owners continue to build and operate their projects to the industry's current level of reliability.

The 511 megawatt (MW) (nominal gross output) RBEP project with operating flexibility (that is, the ability to start up, shut down, turn down, and provide load following, when needed) would allow the system operator to adapt the plant's output to changing conditions in the energy and ancillary services markets.

The project is expected to achieve an equivalent availability factor of 97 percent (RBEP 2012a, AFC § 2.6.1). The project would be designed to operate up to 100 percent of base load capacity, but the project's annual capacity factor is expected to be in the range of 15-25 percent, as it is expected that RBEP would be operated mainly in load following mode, as opposed to base load mode (RBEP 2012a, AFC § 2.7). Please note that capacity factor is a measure of how much electricity a power plant is expected to actually produce during the year as compared to the maximum power it could produce at continuous full power operation during the same period of time. For example, a capacity factor of 25 percent means that the plant would be expected to operate 2,190 hours in a year (8,760 hours), while the plant is designed to operate 8,760 hours annually.

ASSESSMENT OF IMPACTS

METHOD FOR DETERMINING RELIABILITY

The Energy Commission must make findings as to how the project is designed, sited, and operated in order to ensure its safe and reliable operation (California Code of Regulations, Title 20, § 1752[b(2)]). Staff concludes that a project is acceptable if it does not degrade the reliability of the utility system to which it is connected. This will be the case if a project is at least as reliable as other power plants on that system.

The equivalent availability factor of a power plant is the percentage of time it is available to generate electrical power; both planned and unplanned outages subtract from this availability. Measures of power plant reliability are based upon both the plant's actual ability to generate power when it is considered to be available, and upon starting failures and unplanned (or forced) outages. For practical purposes, reliability can be considered a combination of these two industry measures, making a reliable power plant one that is available when called upon to operate. Power plant systems must be able to operate for extended periods without shutting down for maintenance or repairs. Achieving this reliability requires adequate levels of equipment availability, plant maintainability with scheduled maintenance outages, fuel and water availability, and resistance to natural hazards. Staff examines these factors for the RBEP project and compares them to industry norms. If they compare favorably for this project, staff will then conclude that RBEP would be as reliable as other power plants on the electric system and would not degrade system reliability. Please see the analysis below.

EQUIPMENT AVAILABILITY

Equipment availability would be ensured by adopting appropriate quality assurance/quality control (QA/QC) programs during the design, procurement, construction, and operation of the plant and by providing for the adequate maintenance and repair of the equipment and systems discussed below.

Quality Control Program

The applicant describes a quality assurance/quality control (QA/QC) program (RBEP 2012a, AFC § 2.6.6) that is typical of the power industry. Equipment would be purchased from qualified suppliers based on technical and commercial evaluations. Suppliers' personnel, production capability, past performance, QA/QC programs and quality history would be evaluated. The project owner would perform receipt inspections, test components, and administer independent testing contracts. Also, a plant operation and maintenance program would be implemented during initial plant startup (RBEP 2012a, AFC § 2.6.6.2). Staff expects that implementation of these programs would result in standard reliability of design and construction.

PLANT MAINTAINABILITY

Equipment Redundancy

A generating facility must be capable of being maintained while operating. A typical approach to this is to provide redundant examples of those pieces of equipment that are most likely to require service or repair.

The applicant plans to provide an appropriate redundancy of function for the project (RBEP 2012a, AFC § 2.6.2, Table 2.6-1). Because the project consists of three combustion turbine generators (CTGs), also referred to as gas turbines, and three heat recovery steam generators (HRSGs), the failure of a single CTG/HRSG train cannot disable more than one CTG/HRSG train, which allows the plant to continue to generate, but at reduced output. Plant ancillary systems are also designed with adequate redundancy to ensure their continued operation if equipment fails. Staff concludes that this project's proposed equipment redundancy would be sufficient for its reliable operation.

Maintenance Program

Equipment manufacturers provide maintenance recommendations for their products and the applicant would base the project's maintenance program on those recommendations (RBEP 2012a, AFC § 2.6.1). Because power plant equipment is costly to repair or replace, and the length of time it takes for major repairs or replacements can sometimes result in lengthy plant shutdowns, power plant owners are strongly motivated to follow equipment manufacturers' maintenance recommendations to avoid such issues. The maintenance program would encompass both preventive and predictive maintenance techniques. When maintenance is needed, maintenance outages would probably be planned for periods of low electricity demand. Staff concludes that the project would be adequately maintained to ensure an acceptable level of reliability.

FUEL AND WATER AVAILABILITY

The long-term availability of fuel and of water for cooling or process use is necessary to ensure the reliability of any power plant. The need for reliable sources of fuel and water is obvious; lacking long-term availability of either source, the service life of the plant could be curtailed, threatening both the power supply and the economic viability of the plant.

Fuel Availability

Natural gas would be delivered to the RBEP project via an existing 20-inch diameter Southern California Gas Company (SoCalGas) line (RBEP 2012a, AFC §§ 1.1, 1.2, 2.1, 2.6.3). SoCalGas has confirmed its system's adequate capacity to supply the project; a will-serve letter is included in AFC Appendix 2E. SoCalGas's natural gas system represents a resource of considerable capacity and offers access to adequate supplies of gas. This natural gas comes from resources in the Southwest, Canada, and the Rocky Mountains. Staff concludes that there would be adequate natural gas supply and pipeline capacity to meet the project's needs.

Water Supply Reliability

The RBEP project proposes to use potable water from the city of Redondo Beach for power plant cooling, process water, fire protection and potable water. A will-serve letter from the city is provided in AFC Appendix 2E. However, in the **SOIL AND WATER RESOURCES** section of this PSA, staff concludes that recycled water supplied by the West Basin Municipal Water District (WBMWD) is readily available, and thus, staff recommends that it be used for industrial purposes during plant operations rather than the currently proposed potable water. This section further concludes that the use of recycled water is consistent with the Energy Commission Water Policy, while the use of potable water is not. Recycled water would, thus, be the only reliable source for RBEP. Therefore, at this time, staff cannot conclude that the applicant's proposed source of water supply represents a reliable source for the project. For further discussion of water supply, see the **SOIL AND WATER RESOURCES** section of this PSA.

POWER PLANT RELIABILITY IN RELATION TO NATURAL HAZARDS

Natural forces can threaten the reliable operation of a power plant. Seismic shaking (earthquakes), flooding, and tsunami could present credible threats to the project's reliable operation.

Seismic Shaking

The site lies within a seismically active area (RBEP 2012a, AFC § 2.5.2); see the **GEOLOGY AND PALEONTOLOGY** section of this document. The project would be designed and constructed to the latest appropriate engineering LORS. A design-level geotechnical investigation is required for the project by the 2013 California Building Code (CBC 2013), and standard engineering design requirements would be applied to mitigate strong seismic shaking, liquefaction and potential excessive settlement due to dynamic compaction. To ensure this, staff has proposed Condition of Certification **GEO-1** (in the **GEOLOGY AND PALEONTOLOGY** section of this PSA), and Conditions of Certification **GEN-1**, **GEN-5**, and **CIVIL-1** (in the **FACILITY DESIGN** section of this PSA).

Compliance with current seismic design LORS represents an upgrading of performance during seismic shaking compared to older facilities since these LORS have been continually upgraded. Because it would be built to the latest seismic design LORS, this project would likely perform at least as well as, and perhaps better than, existing plants in the electric power system. In light of the general historical performance of California power plants and the electrical system in seismic events, and constructing the project to comply with the latest applicable engineering LORS, staff has no special concerns with the power plant's functional reliability during seismic events.

Flooding

According to the Federal Emergency Management Agency (FEMA), the project site is outside the 100-year floodplain (RBEP 2012a, AFC § 5.15.1.3). A storm water prevention plan, and an erosion and sediment control plan would be implemented (see Condition of Certification **CIVIL-1** in the **FACILITY DESIGN** section of this PSA). In light of this, staff believes there are no special concerns with power plant functional reliability due to flooding.

Tsunami

While not likely to occur during the project design life, the site is subject to inundation by tsunami. U.S. building codes generally have not addressed the subject of designing structures in tsunami zones (Reynolds 2013). The FEMA's Coastal Construction Manual (FEMA 2013), developed to provide design and construction guidance for structures built in coastal areas, addresses seismic loads for coastal structures and provides information on tsunami and associated loads. This manual cites ASCE Standard ASCE 7-10, *Minimum Design Loads for Buildings and Other Structures* as the reference to be consulted during design of structures. ASCE 7-10 is codified in CBC 2013. RBEP would be designed and constructed to this code (see **GEN-1** in **FACILITY DESIGN** section of this PSA).

For further discussion, see the **GEOLOGY AND PALEONTOLOGY** section of this PSA.

COMPARISON WITH EXISTING FACILITIES

Industry statistics for equivalent availability factors are maintained by the North American Electric Reliability Corporation (NERC). NERC regularly polls North American utility companies on their project reliability through its Generating Availability Data System, and periodically summarizes and publishes those statistics on the Internet [http://www.nerc.com]. The NERC reported the following generating unit statistic for the years 2005 through 2009 (NERC 2010):

For combined cycle units (all MW sizes):

Availability Factor = 89.54 percent

The project's gas turbine models have been on the market for over two decades and are expected to exhibit high availability. The applicant's expectation of an annual equivalent availability factor of 97 percent (RBEP 2012a, AFC § 2.6.1) appears reasonable when compared with NERC figures for similar plants throughout North America (89.54 percent). In fact, these machines can well be expected to outperform the fleet of various, mostly older gas turbines that make up NERC statistics. Additionally, because the plant would consist of three independent CTG/HRSG generating trains, maintenance can be scheduled during times of the year when the full plant output is not required to meet market demand, which is typical of industry standard maintenance procedures. The applicant's estimate of plant availability, therefore, is realistic. Stated procedures for assuring the design, procurement, and construction of a reliable power plant are consistent with industry norms, and staff believes they would ultimately produce an adequately reliable plant.

NOTEWORTHY PROJECT BENEFITS

This project would enhance power supply reliability in the California electricity market by helping to meet the state's growing energy demand and providing operating flexibility (that is, the ability to start up, shut down, turn down, and provide load following, when needed). The fact that the project consists of three CTG/HRSG generating trains, configured as independent equipment trains, provides inherent reliability. A single equipment failure cannot disable more than one train, thereby allowing the plant to continue to generate, though at reduced output.

CONCLUSION

The applicant predicts an equivalent availability factor of 97 percent for RBEP, which is comparable to the industry norm.

In the **SOIL AND WATER RESOURCES** section of this PSA, staff recommends that recycled water be used for industrial purposes during plant operations rather than the applicant's proposed potable water. Based on this recommendation, the use of recycled water would be consistent with the Energy Commission Water Policy, while the use of potable water would not. Recycled water would, thus, be the only reliable source for RBEP.

Based on a review of the AFC and upon the implementation of staff's recommended source of water supply, staff concludes that RBEP would be built and would operate in a manner consistent with industry norms for reliable operation, and the equivalent availability factor of 97 percent would be achievable.

PROPOSED CONDITIONS OF CERTIFICATION

No conditions of certification are proposed.

REFERENCES

CBC 2013 — California Code of Regulations, Title 24, California Building Standards Code [CBSC], Part 2, California Building Code (CBC), 2013.

FEMA 2013 — Federal Emergency Management Agency, FEMA P-55, Coastal Construction Manual: Principles and Practices of Planning, Siting, Designing, Constructing, and Maintaining Residential Buildings in Coastal Areas (4th edition), Nov 13, 2013.

NERC (North American Electric Reliability Council) 2010 — 2005–2009 Generating Availability Report.

RBEP 2012a — Applicant/AES Southland Development (TN 68597). Application for Certification for the Redondo Beach Energy Project Volumes 1 and 2, dated November 20, 2012. Submitted to CEC/Robert Oglesby on November 21, 2012.

Reynolds 2013 — Reynolds, David, Engineers Design Tsunami-Resistant Port in California, ASCE Civil Engineering Magazine, January 15, 2013.

TRANSMISSION SYSTEM ENGINEERING

Sudath Edirisuriya and Mark Hesters

SUMMARY OF CONCLUSIONS

The proposed Redondo Beach Energy Project (RBEP) interconnection facilities including the step-up transformers, a single 230 kV overhead generation tie line, and termination at the existing Southern California Edison (SCE) Redondo Beach Switching Station, are acceptable and would comply with all applicable laws, ordinances, regulations, and standards (LORS). No additional downstream transmission facilities that would require a California Environmental Quality Act (CEQA) review other than those proposed by the applicant are needed for the interconnection of the RBEP.

- The proposed system upgrades of the Participating Transmission Owner (PTO) and Interconnection Customer should be completed prior to interconnect the project into the California Independent System Operator (ISO) grid.
- The Large Generator Interconnection Agreement (LGIA) for replacement of new generator units is currently being evaluated by the California ISO and will be amended if any changes are required.

INTRODUCTION

STAFF ANALYSIS

This Transmission System Engineering (TSE) analysis examines whether or not the facilities associated with the proposed interconnection conform to all applicable LORS required for safe and reliable electric power transmission. Additionally, under CEQA, the Energy Commission must conduct an environmental review of the “whole of the action,” which may include facilities not licensed by the Energy Commission (Cal Code Regs, tit 14, §15378). Therefore, the Energy Commission must identify the system impacts and necessary new or modified transmission facilities that would be required downstream of the proposed interconnection and that represent the “whole of the action.”

Energy Commission staff analyzes studies performed by the interconnecting authority, in this case the California Independent System Operator (California ISO), to determine the impacts on the transmission grid from the proposed interconnection. Staff’s analysis also identifies new or modified facilities downstream of the first point of interconnection that may require mitigation measures. The proposed project would connect to the SCE transmission network and requires analysis by SCE and approval of the California ISO.

ROLE OF SOUTHERN CALIFORNIA EDISON

SCE is responsible for ensuring electric system reliability on its transmission system with the addition of the proposed transmission modifications, and determines both the standards necessary to ensure reliability and whether the proposed transmission modifications conform to existing standards.

ROLE OF CALIFORNIA INDEPENDENT SYSTEM OPERATOR

The California ISO is responsible for dispatching generating units in California, ensuring electric system reliability for all participating transmission owners, and for developing the standards and procedures necessary to maintain system reliability. The California ISO provides an analysis of whether any transmission modifications are needed, and changes required, in its system to add the proposed transmission modifications in its Phase I Interconnection Studies, along with its approval for the facilities. The California ISO analysis reviews SCE's studies to ensure the adequacy of the proposed RBEP transmission interconnection and determines if the proposed transmission modifications of the SCE transmission system will impact overall system reliability. According to the California ISO Tariff, it determines the need for transmission additions or upgrades downstream from the interconnection point to ensure reliability of the transmission grid. The California ISO has, therefore, performed the Phase I Interconnection Study and provided its analysis, conclusions, and recommendations. If necessary, the California ISO will provide written and verbal testimony on its findings at the Energy Commission hearings.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

- California Public Utilities Commission (CPUC) General Order 95 (GO-95), *Rules for Overhead Electric Line Construction*, formulates uniform requirements for construction of overhead lines. Compliance with this order ensures adequate service and safety to persons engaged in the construction, maintenance, and operation or use, of overhead electric lines and to the public in general.
- California Public Utilities Commission (CPUC) General Order 128 (GO-128), *Rules for Construction of Underground Electric Supply and Communications Systems*, formulates uniform requirements and minimum standards to be used for underground supply systems to ensure adequate service and safety to persons engaged in the construction, maintenance, and operation or use, of underground electric lines and to the public in general.
- The National Electric Safety Code, 1999, provides electrical, mechanical, civil and structural requirements for overhead electric line construction and operation.
- The Western Electricity Coordinating Council (WECC) Planning Standards are merged with the North American Electric Reliability Corporation (NERC) Planning Standards and provide the system performance standards used in assessing the reliability of the interconnected system. These standards require the continuity of service to loads as the first priority and preservation of interconnected operation as a secondary priority. Certain aspects of the NERC/WECC standards are either more stringent or more specific than the NERC standards alone. These standards provide planning for electric systems so as to withstand the more probable forced and maintenance outage system contingencies at projected customer demand and anticipated electricity transfer levels, while continuing to operate reliably within equipment and electric system thermal, voltage and stability limits. These standards include the reliability criteria for system adequacy and security, system modeling data requirements, system protection and control, and system restoration. Analysis of the WECC system is based to a large degree on Section I.A of the standards,

NERC and WECC Planning Standards with Table I and WECC Disturbance-Performance Table and on Section I.D, *NERC and WECC Standards for Voltage Support and Reactive Power*. These standards require that the results of power flow and stability simulations verify defined performance levels. Performance levels are defined by specifying the allowable variations in thermal loading, voltage and frequency, and loss of load that may occur on systems during various disturbances. Performance levels range from no significant adverse effects inside and outside a system area during a minor disturbance (loss of load or a single transmission element out of service) to a level that seeks to prevent system cascading and the subsequent blackout of islanded areas during a major disturbance (such as loss of multiple 500 kV lines along a common right of way, and/or multiple generators). While controlled loss of generation or load or system separation is permitted in certain circumstances, their uncontrolled loss is not permitted (WECC 2006).

- NERC Reliability Standards for the Bulk Electric Systems of North America provide national policies, standards, principles and guidelines to assure the adequacy and security of the electric transmission system. The NERC Reliability Standards provide for system performance levels under normal and contingency conditions. While the NERC Reliability Standards are similar to the NERC/WECC Standards, certain aspects of the NERC/WECC Standards are either more stringent or more specific than the NERC Standards for transmission system contingency performance. The NERC Reliability Standards apply not only to interconnected system operation but also to individual service areas (NERC 2006).
- California ISO Planning Standards provide standards and guidelines to assure the adequacy, security and reliability in the planning of the California ISO transmission grid facilities. The California ISO Planning Standards incorporate, and are similar to, the NERC/WECC and combined standards with regard to power flow and stability simulations, as well as for transmission system contingency performance. However, the California ISO Planning Standards also provide some additional requirements that are not found in the WECC/NERC or NERC Standards. The California ISO Planning Standards apply to all participating transmission owners interconnecting to the California ISO controlled grid and when there are impacts to the grid due to facilities interconnecting to adjacent controlled grids not operated by the California ISO (California ISO 2002a).
- California ISO/FERC Electric Tariff provides guidelines for construction of all transmission additions/upgrades within the California ISO controlled grid. The California ISO determines the need for the proposed project where it will promote economic efficiency or maintain system reliability. The California ISO also determines the cost responsibility of the proposed project and provides an operational review of all facilities that are to be connected to the California ISO grid (California ISO 2007a).

PROJECT DESCRIPTION AND INTERCONNECTION FACILITIES

The Redondo Beach Energy Project (RBEP) would be a natural-gas-fired, combined-cycle generating facility that would be located in the city of Redondo Beach, Los Angeles County, California. The RBEP would consist of one power block with three combustion turbine generators (CTG) and one steam turbine generator (STG). Each CTG is expected to generate 116 megawatts (MW) and the STG is expected to generate 145 MW under average ambient conditions. A total of three CTGs and one STG would generate a maximum output of 493 MW. With the generator auxiliary load of approximately 17.3 MW, the net output of the RBEP to the transmission grid would be 475.7 MW. The RBEP would be interconnected to the existing SCE Redondo Beach Switching Station. The proposed commercial operation date of the RBEP is January 1, 2019.

The combustion turbine generators are each rated at 122.06 Megavolt Ampere (MVA) with a power factor of 0.95, and the steam turbine generators each rated at 153.2 MVA with a power factor of 0.95. Each combustion turbine generator unit (1-3) would be connected through its own 10,000-ampere generator circuit breaker through a short 5,000-ampere isolated phase bus duct to the low side of its dedicated 75/99/123 MVA generator step-up (13.8/230 kV) transformer. The steam turbine generator unit would be connected through its own 10,000-ampere generator circuit breaker via a short 7,000-ampere isolated phase bus duct to the low side of its dedicated 94/124/154 MVA generator step-up (13.8/230 kV) transformer. The high side of each generator's step-up transformer would be connected to the project switchyard through a 600-ampere disconnect switch and overhead conductor.

The auxiliary load, approximately 17.3 MW, would be provided by CTG unit 2 and STG unit 1, through its dedicated 500-ampere isolated phase bus ducts and dedicated back-fed step-down (13.8/4.16 kV) transformers. The high side of the transformers would each be connected through dedicated 600-ampere disconnect switches to the common generator tie bus. A 1033.5 ACSS single overhead 230 kV generator tie line, approximately 522 feet in length, would connect the power block through a 2,000-ampere circuit breaker and a 2,000-ampere motor-operated disconnect switch to the SCE 230 kV Redondo Beach Switching Station. The generator tie line is rated to carry the full load output of the project and is mounted on self-supporting steel structures.

The RBEP power block will be interconnected to the California ISO grid through a breaker and-a-half bay arrangement at the existing SCE 230kV switchyard. SCE will replace the existing breakers with air or gas insulated 230kV breakers, if the breakers are not adequate to withstand the fault current. (RBEP 2012a, section 3.1, section 3.2, section 3.3, Figure 3.1-1A, Figure 3.1-1B, Figure 3.1-2).

As a result of the proposed power plant and pursuant to the Participating Transmission Owner's (PTO) interconnection standards, the following facilities are required to interconnect the project.

PTO'S INTERCONNECTION FACILITIES

1. 230kV generator tie line: Install one span of conductor and optical ground wire (OPGW) between the last generator-owned structure and the substation dead-end rack at the 230kV switchyard.

2. Redondo Beach Substation: The SCE owned 230kV substation is configured in a breaker and a half configuration. To terminate the 230kV generator tie line, the following interconnection facility components are required for a 230kV line position:
   - Three 230 kV coupling capacitor voltage transformers
   - One dead end structure
   - Two line current differential relays with dedicated, diverse digital communication channels

3. In addition, telecommunication facilities, metering services and power system controls are required.

INTERCONNECTION CUSTOMER FACILITIES

1. Redondo Beach Substation –

   The PTO shall remove the following equipment at the 230kV switchyard:
   - Four 230 kV circuit breakers
   - Eight three pole group operated disconnect switches
   - 1,200 feet of 2156 Kcmil AAC conductor from the existing positions 1-4 and associated relays and wiring
   - Twelve coupling capacitor potential devices

   The PTO shall remove the following equipment at the 66 kV switchyard:
   - Two 66 kV three pole group operated disconnect switches
   - Dead end position for position 14
   - 240 feet of 2156 Kcmil AAC conductor for positions 5 and 14

SERVICE RELIABILITY NETWORK UPGRADES

The proposed reliability network upgrades at Redondo Beach Substation include the following:

- Install Metering and Electronics Equipment (MEER) building with a communication room.
- Install one circuit breaker and two disconnect switches for one existing position.
- Install 1,200 feet of 2-2156 Kcmil AAC conductor (existing 3 positions).
- Install fiber optic cables into the new communication room, DC power equipment, and power system controls.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

For the interconnection of a proposed generating unit or transmission facility to the grid, the interconnecting utility (SCE in this case) and the control area operator (California ISO) are responsible for ensuring grid reliability. These entities determine the transmission system impacts of the proposed project and any mitigation measures needed to ensure system conformance with performance levels required by utility reliability criteria, NERC planning standards, WECC reliability criteria, and California ISO reliability criteria. The Phase I Interconnection Studies are used to determine the impacts of the proposed project on the transmission grid. Staff relies on these studies and any review conducted by the California ISO to determine the project's effect on the transmission grid and to identify any necessary downstream facilities or indirect project impacts required to bring the transmission network into compliance with applicable reliability standards.

The Phase I Interconnection Studies analyze the grid with and without the proposed project under conditions specified in the planning standards and reliability criteria. The standards and criteria define the assumptions used in the study and establish the thresholds through which grid reliability is determined. The studies must analyze the impact of the project for the first year of operation and thus are based on a forecast of loads, generation, and transmission. Load forecasts are developed by the interconnecting utility and the California ISO. Generation and transmission forecasts are established by an interconnection queue. The studies are focused on thermal overloads, voltage deviations, system stability (excessive oscillations in generators and transmission system, voltage collapse, loss of loads, or cascading outages), and short circuit duties.

If the Phase I Interconnection Studies show that the interconnection of the project causes the grid to be out of compliance with reliability standards, then the studies will identify mitigation alternatives or ways in which the grid could be brought into compliance with reliability standards. When a project connects to the grid controlled by California ISO, both the studies and mitigation alternatives must be reviewed and approved by the California ISO. If the mitigation identified by California ISO or interconnecting utility includes transmission modifications or additions that require CEQA review as part of the "whole of the action," the Energy Commission must analyze the environmental impacts of these modifications or additions.

CALIFORNIA INDEPENDENT SYSTEM OPERATOR STUDY

The California ISO has completed the Queue Cluster 5 (QC5) Projects Phase I Interconnection Study Report (Phase I Interconnection Study) which includes the RBEP and other proposed generators. The analysis of the interconnection impacts of the RBEP will be based on the Phase I Interconnection Study.

SCOPE OF QUEUE CLUSTER 5 PHASE I INTERCONNECTION STUDY

The January 31, 2013, QC5 Phase I Interconnection Study Report was prepared by the California ISO in coordination with SCE. The Phase I Interconnection Study modeled the RBEP project with a net output of 475.72 MW.

The QC5 study base cases were developed from the WECC base case and PTO's transmission expansion base case series representing peak and off peak load conditions. The QC5 studies were based on a 2016 load forecast peak and off peak conditions and included all generation projects in earlier queued serial group and clusters, the associated network upgrades and special protection systems, as well as all the California ISO approved transmission upgrade projects.

The power flow studies were conducted using 2016 summer peak and 2016 summer off-peak base cases with and without the proposed QC5 generation projects interconnect to the SCE grid at each project's proposed interconnection point. The Power Flow study assessed the QC5 generation projects' impact on thermal loading of the transmission lines and equipment. Short circuit studies were conducted to determine if the QC5 generation projects would overstress existing substation facilities. Transient stability analysis was conducted to determine whether the QC5 generation projects would create instability in the system following certain selected outages. Post-transient voltage stability analysis was conducted to determine whether the generation projects would create voltage deviations in the system following line and equipment outages. Reactive power deficiency analysis was conducted to study the transmission line voltage drops caused by selected outages (RBEP 2013 Section D).

PHASE I INTERCONNECTION STUDY RESULTS FOR QC5 PROJECTS

Power Flow Study Results and Mitigation Measures

The QC5 Phase I Interconnection Study identified no pre-project and no post-project overload criteria violations under the 2016 summer peak and the 2016 summer off-peak load study conditions. Interconnection of the QC5 projects along with the proposed RBEP project will not cause any transmission line overloads under normal and contingency conditions. The power flow study indicated that with all the California ISO approved transmission upgrade projects in place, the transmission system can accommodate the RBEP and the QC5 generation projects under normal and contingency conditions (RBEP 2013b, Appendix A Section G).

Short Circuit Analysis and Mitigation Measures

Short circuit studies were performed to determine the degree to which the addition of the QC5 generation projects increase fault duties at the SCE substations, adjacent utility substations, and the other 66 kV, 115 kV, 230 kV and 500 kV busses within the study area. The fault duties were calculated with and without the QC5 generation projects to identify any equipment overstress conditions. Buses electrically adjacent to QC5 generation projects and their short circuit duties are listed in QC5 Phase I Appendix H of the QC5 Phase I Interconnection Study Report.

Circuit breaker upgrades were required in previous queue or clusters; therefore, no additional breaker upgrades are needed for the interconnection of the QC5 generation projects.

The ground grid evaluation of the SCE substations indicated that the Ellis Substation would require a further review of the substation ground grid duty. The ground grid must possess sufficient thermal capacity to pass the highest fault current for the required time. If the ground grid evaluation shows there is a need for a ground grid upgrade, the upgrade would occur inside the substation and no downstream environment impacts would be anticipated (RBEP 2013b Section H, Appendix A Section D).

Transient Stability Study Results and Mitigation Measures

Transient stability studies were conducted using the 2016 summer peak and 2016 summer off-peak load base cases to ensure that the transmission system remained in operating equilibrium, as well as operating in a coordinated fashion, through abnormal operating conditions after the QC5 generation projects became operational. Disturbance simulations were performed for a study period of ten seconds to determine whether the QC5 generation projects would create any system instability during line and generator outages. The transient stability study result indicated that the QC5 generation projects along with the RBEP would not cause adverse impacts on the stable operation of the transmission system following the selected Category “B” and Category “C” outages (RBEP 2013b Section J, Appendix A Section D).

POST-TRANSIENT VOLTAGE ANALYSIS RESULTS

Post-transient stability analysis was conducted using the 2016 summer peak and 2016 summer off-peak base cases. NERC/WECC planning standards require that with the addition of the QC5 generation projects, the SCE system post-transient voltage deviation shall be within 5 percent of the pre-project level under Category B contingencies and within 10 percent of pre-project levels under Category C contingencies. The post-transient stability analysis indicated that the addition of the QC5 generation projects would not cause any adverse impacts to the SCE system (RBEP 2013b Appendix A Section D).

Reactive Power Deficiency Analysis Results

Reactive power deficiency analysis was performed to determine the system performance according to the NERC/WECC planning criteria. The reactive power deficiency analysis indicated that the addition of the QC5 generation projects, including the RBEP, and with all the Delivery Network Upgrades for the QC5 generation projects, would not contribute to any reactive power margin violations at SCE buses following selected Category “B” and Category “C” contingencies (RBEP 2013b Appendix A Section F).

CUMULATIVE IMPACTS

The TSE analysis focuses on whether or not a proposed project will meet required codes and standards. At all times the transmission grid must remain in compliance with reliability standards, whether one project or many projects interconnect. Potential cumulative impacts on the transmission network are identified through the California ISO and utility generator interconnection process. In cases where a significant number of proposed generation projects could affect a particular portion of the transmission grid, the interconnecting utility or the California ISO can study the cluster of projects in order to identify the most efficient means to interconnect all of the proposed projects.

COMPLIANCE WITH LORS

The proposed interconnecting facilities, which include the RBEP 230 kV switchyard, single 230 kV overhead generator tie-line, and the termination at the SCE Redondo Beach Switching Station, are adequate in accordance with industry standards and good utility practices, and are acceptable to staff. Staff believes that Conditions of Certification **TSE-1** through **TSE-5** will ensure the proposed RBEP complies with applicable LORS.

Staff's proposed conditions of certification **TSE-1** through **TSE-5** would help ensure that construction and operation of the transmission facilities for the proposed RBEP would comply with applicable LORS:

1. Staff proposed Condition of Certification **TSE-1** would ensure that the preliminary equipment is in place for construction of the transmission facilities of the proposed project to comply with applicable LORS.

2. Staff proposed Condition of Certification **TSE-2** would ensure the final design of the proposed transmission facilities comply with applicable LORS.

3. Staff proposed Condition of Certification **TSE-3** would ensure that the proposed project would be properly interconnected to the transmission grid. **TSE-3** also ensures that the generator output would be properly delivered to the transmission system.

4. Staff proposed Condition of Certification **TSE-4** would ensure that the project would synchronize with the existing transmission system and the operation of the facilities would comply with applicable LORS.

5. Staff proposed Condition of Certification **TSE-5** would ensure that the proposed project has been built to required specifications and the operation of the facilities would comply with applicable LORS.

CONCLUSIONS AND RECOMMENDATIONS

The proposed RBEP interconnection facilities including the step-up transformers, a single 230 kV overhead generation tie line, and termination at the existing SCE Redondo Beach Switching Station are acceptable and would comply with all applicable LORS. No additional downstream transmission facilities that would require a CEQA review other than those proposed by the applicant are needed for the interconnection of the RBEP.

- The proposed system upgrades of the PTO and interconnection customer should be completed prior to interconnecting the project into the California ISO grid.
- The Large Generator Interconnection Agreement (LGIA) for replacement of new generator units is currently being evaluated by the California ISO and will be amended if any changes are required.

PROPOSED CONDITIONS OF CERTIFICATION

TSE-1 The project owner shall furnish to the CPM and to the CBO a schedule of transmission facility design submittals, a Master Drawing List, a Master Specifications List, and a Major Equipment and Structure List. The schedule shall contain a description and list of proposed submittal packages for design, calculations, and specifications for major structures and equipment. To facilitate audits by Energy Commission staff, the project owner shall provide designated packages to the CPM when requested.

Verification: Prior to the start of construction of transmission facilities, the project owner shall submit the schedule, a Master Drawing List, and a Master Specifications List to the CBO and to the CPM. The schedule shall contain a description and list of proposed submittal packages for design, calculations, and specifications for major structures and equipment (see list of major equipment in **Table 1**: Major Equipment List below). Additions and deletions shall be made to the table only with CPM and CBO approval. The project owner shall provide schedule updates in the monthly compliance report.

Table 1: Major Equipment List

Breakers
Step-up transformer
Switchyard
Busses
Surge arrestors
Disconnects
Take-off facilities
Electrical control building
Switchyard control building
Transmission pole/tower
Grounding system

TSE-2 For the power plant switchyard, outlet line, and termination, the project owner shall not begin any construction until plans for that increment of construction have been approved by the CBO. These plans, together with design changes and design change notices, shall remain on the site for one year after completion of construction. The project owner shall request that the CBO inspect the installation to ensure compliance with the requirements of applicable LORS. The following activities shall be reported in the monthly compliance report:

a) receipt or delay of major electrical equipment;

b) testing or energization of major electrical equipment; and

c) the number of electrical drawings approved, submitted for approval, and still needed to be submitted.

Verification: Prior to the start of each increment of construction, the project owner shall submit to the CBO for review and approval the final design plans, specifications and calculations for equipment and systems of the power plant switchyard, outlet line, and termination, including a copy of the signed and stamped statement from the responsible electrical engineer verifying compliance with all applicable LORS, and send the CPM a copy of the transmittal letter in the next monthly compliance report.

TSE-3 The project owner shall ensure that the design, construction, and operation of the proposed transmission facilities will conform to all applicable LORS, and the requirements listed below. The project owner shall submit the required number of copies of the design drawings and calculations, as determined by the CBO. Once approved, the project owner shall inform the CPM and CBO of any anticipated changes to the design, and shall submit a detailed description of the proposed change and complete engineering, environmental, and economic rationale for the change to the CPM and CBO for review and approval.

a) The power plant outlet line shall meet or exceed the electrical, mechanical, civil, and structural requirements of CPUC General Order 95 or National Electric Safety Code (NESC); Title 8 of the California Code and Regulations (Title 8); Articles 35, 36 and 37 of the *High Voltage Electric Safety Orders*, California ISO standards, National Electric Code (NEC) and related industry standards.

b) Breakers and busses in the power plant switchyard and other switchyards, where applicable, shall be sized to comply with a short-circuit analysis.

c) Outlet line crossings and line parallels with transmission and distribution facilities shall be coordinated with the transmission line owner and comply with the owner's standards.

d) The project conductors shall be sized to accommodate the full output of the project.

e) Termination facilities shall comply with applicable SCE interconnection standards.

f) The project owner shall provide to the CPM:

i) Special Protection System (SPS) sequencing and timing if applicable,

ii) A letter stating that the mitigation measures or projects selected by the transmission owners for each reliability criteria violation, for which the project is responsible, are acceptable,

iii) A copy of the executed LGIA signed by the California ISO and the project owner and approved by the Federal Energy Regulatory Commission.

Verification: Prior to the start of construction or start of modification of transmission facilities, the project owner shall submit to the CBO for approval:

a) Design drawings, specifications, and calculations conforming with CPUC General Order 95 or National Electric Safety Code; Title 8 of the California Code and Regulations; Articles 35, 36 and 37 of the *High Voltage Electric Safety Orders*, CA ISO standards, National Electric Code and related industry standards, for the poles/towers, foundations, anchor bolts, conductors, grounding systems, and major switchyard equipment;

b) For each element of the transmission facilities identified above, the submittal package to the CBO shall contain the design criteria, a discussion of the calculation method(s), a sample calculation based on "worst case conditions"[1] and a statement signed and sealed by the registered electrical engineer in charge, or other acceptable alternative verification, that the transmission element(s) will conform with CPUC General Order 95 or National Electric Safety Code; Title 8 of the California Code and Regulations; Articles 35, 36 and 37 of the *High Voltage Electric Safety Orders*, California ISO standards, National Electric Code, and related industry standards;

c) Electrical one-line diagrams signed and sealed by the registered professional electrical engineer in charge, a route map, and an engineering description of the equipment and configurations covered by requirements TSE-3 a) through f);

d) Special Protection System sequencing and timing if applicable shall be provided concurrently to the CPM.

e) A letter stating that the mitigation measures or projects selected by the transmission owners for each reliability criteria violation for which the project is responsible are acceptable.

[1] Worst-case conditions for the foundations would include for instance, a dead-end or angle pole.

f) A copy of the executed LGIA signed by the California ISO and the project owner and approved by the Federal Energy Regulatory Commission.

Prior to the start of construction or modification of transmission facilities, the project owner shall inform the CBO and the CPM of any anticipated changes to the design that are different from the design previously submitted and approved and shall submit a detailed description of the proposed change and complete engineering, environmental, and economic rationale for the change to the CPM and CBO for review and approval.

TSE-4 The project owner shall provide the following notice to the California ISO prior to synchronizing the facility with the California transmission system:

1. At least one week prior to synchronizing the facility with the grid for testing, provide the California ISO a letter stating the proposed date of synchronization; and

2. At least one business day prior to synchronizing the facility with the grid for testing, provide telephone notification to the California ISO Outage Coordination Department.

Verification: The project owner shall provide copies of the letter to the CPM which is sent to the California ISO one week prior to initial synchronization with the grid. The project owner shall contact the California ISO Outage Coordination Department, Monday through Friday, between the hours of 07:00 and 15:30 at (916) 351-2300 at least one business day prior to synchronizing the facility with the grid for testing. A report of conversation with the California ISO shall be provided electronically to the CPM one day before synchronizing the facility with the California transmission system for the first time.

TSE-5 The project owner shall be responsible for the inspection of the transmission facilities during and after project construction, and any subsequent CPM and CBO approved changes thereto, to ensure conformance with CPUC GO-95 or NESC, Title 8, California Code of Regulations, Articles 35, 36 and 37 of the "High Voltage Electric Safety Orders", applicable interconnection standards, NEC, and related industry standards. In case of non-conformance, the project owner shall inform the CPM and CBO in writing, within ten days of discovering such non-conformance, and describe the corrective actions to be taken.

Verification: Within 60 days after first synchronization of the project, the project owner shall transmit to the CPM and CBO:

a) "As built" engineering description(s) and one-line drawings of the electrical portion of the facilities signed and sealed by the registered electrical engineer in charge. A statement attesting to conformance with CPUC GO-95 or NESC, Title 8, California Code of Regulations, Articles 35, 36 and 37 of the "High Voltage Electric Safety Orders", and applicable interconnection standards, NEC, related industry standards.

b) An “as built” engineering description of the mechanical, structural, and civil portion of the transmission facilities signed and sealed by the registered engineer in charge or acceptable alternative verification. “As built” drawings of the electrical, mechanical, structural, and civil portion of the transmission facilities shall be maintained at the power plant and made available, if requested, for CPM audit as set forth in the “Compliance Monitoring Plan”.

c) A summary of inspections of the completed transmission facilities, and identification of any nonconforming work and corrective actions taken, signed and sealed by the registered electrical engineer in charge.

REFERENCES

California ISO (California Independent System Operator) 1998a – California ISO Tariff Scheduling Protocol posted April 1998, Amendments 1,4,5,6, and 7 incorporated.

California ISO (California Independent System Operator) 1998b – California ISO Dispatch Protocol posted April 1998.

California ISO (California Independent System Operator) 2002a – California ISO Planning Standards, February 7, 2002.

California ISO (California Independent System Operator) 2007a – California ISO, FERC Electric Tariff, First Replacement Vol. No. 1, March, 2007.

California ISO (California Independent System Operator) 2009a – Large Generator Interconnection Procedures, ongoing.

California Public Utilities Commission (CPUC) General Order 95 (GO-95), *Rules for Overhead Electric Line Construction,* revised January 12, 2012 by Decision No. 12-01-032.

California Public Utilities Commission (CPUC) General Order 128 (GO-128), *Rules for Construction of Underground Electric Supply and Communications Systems.*

RBEP2012a – AES Southland Development, LLC / Stephen O'Kane (TN 68597). *Application for Certification (AFC), Volume I & II, dated, 08/06/2012*. Submitted to CEC/ Dockets on 11/21/2012.

RBEP 2013b – Stoel Rives LLP / Melissa A. Foster (tn 200631). *California Independent System Operator's (CAISO)'s Phase I Interconnection Study Report (Transmission System Engineering) for RBEP, dated 08/12/13.* Submitted to CEC/Dockets on 11/12/2013.

RBEP 2012c – Stoel Rives LLP / Kristen T. Castanos (TN 66490). *Applicant's Data Adequacy Supplement, dated 01/30/2013.* Submitted to CEC/Dockets on 11/12/2013.

NERC (North American Electric Reliability Corporation). 2006. Reliability Standards for the Bulk Electric Systems of North America, May 2006.

WECC (Western Electricity Coordinating Council) 2006 – NERC/WECC Planning Standards, August 2006.

DEFINITION OF TERMS

AAC — All aluminum conductor.

ACSR — Aluminum conductor steel-reinforced.

ACSS — Aluminum conductor steel-supported.

Ampacity — Current-carrying capacity, expressed in amperes, of a conductor at specified ambient conditions, at which damage to the conductor is nonexistent or deemed acceptable based on economic, safety, and reliability considerations.

Ampere — The unit of current flowing in a conductor.

Bundled — Two wires, 18 inches apart.

Bus — Conductors that serve as a common connection for two or more circuits.

Conductor — The part of the transmission line (the wire) that carries the current.

Congestion management

A scheduling protocol, which provides that dispatched generation and transmission loading (imports) will not violate criteria.

Double–contingency condition

Also known as emergency or N-2 condition, a forced outage of two system elements usually (but not exclusively) caused by one single event. Examples of an N-2 contingency include loss of two transmission circuits on a single tower line or loss of two elements connected by a common circuit breaker due to the failure of that common breaker.

Emergency overload

See single–contingency condition. This is also called an N-1 condition.

kcmil — One-thousand circular mil. A unit of the conductor's cross-sectional area divided by 1,273 to obtain the area in square inches.

Kilovolt (kV) — A unit of potential difference, or voltage, between two conductors of a circuit, or between a conductor and the ground.

Loop — An electrical cul-de-sac. A transmission configuration that interrupts an existing circuit, diverts it to another connection, and returns it back to the interrupted circuit, thus forming a loop or cul-de-sac.

Megavar	One megavolt ampere reactive.
Megavars	Mega-volt-ampere-reactive. One million volt-ampere-reactive. Reactive power is generally associated with the reactive nature of motor loads that must be fed by generation units in the system.
Megavolt ampere (MVA)	A unit of apparent power equal to the product of the line voltage in kilovolts, current in amperes, the square root of 3, and divided by 1000.
Megawatt (MW)	A unit of power equivalent to 1,341 horsepower.
N-0 condition	See normal operation/normal overload.
Normal operation/normal overload (N-0)	When all customers receive the power they are entitled to without interruption and at steady voltage, and no element of the transmission system is loaded beyond its continuous rating.
N-1 condition	See single–contingency condition.
N-2 condition	See double–contingency condition.
Outlet	Transmission facilities (e.g., circuit, transformer, circuit breaker) linking generation facilities to the main grid.
Power flow analysis	A power flow analysis is a forward-looking computer simulation of essentially all generation and transmission system facilities that identifies overloaded circuits, transformers, and other equipment and system voltage levels.
Reactive power	Reactive power is generally associated with the reactive nature of motor loads that must be fed by generation units in the system. An adequate supply of reactive power is required to maintain voltage levels in the system.
Remedial action scheme (RAS)	A remedial action scheme is an automatic control provision, which, for instance, will trip a selected generating unit upon a circuit overload.
SF6	Sulfur hexafluoride is an insulating medium.

Single–contingency condition

Also known as emergency or N-1 condition, occurs when one major transmission element (e.g., circuit, transformer, circuit breaker) or one generator is out of service.

Solid dielectric cable

Copper or aluminum conductors that are insulated by solid polyethylene-type insulation and covered by a metallic shield and outer polyethylene jacket.

Special protection scheme/system (SPS)

An SPS detects a transmission outage (either a single or credible multiple contingency) or an overloaded transmission facility and then trips or runs back generation output to avoid potential overloaded facilities or other criteria violations.

Switchyard — A power plant switchyard is an integral part of a power plant and is used as an outlet for one or more electric generators.

Thermal rating — See ampacity.

TSE — Transmission System Engineering.

Tap — A transmission configuration creating an interconnection through a sort single circuit to a small- or medium-sized load or generator. The new single circuit line is inserted into an existing circuit by using breakers at existing terminals of the circuit, rather than installing breakers at the interconnection in a new switchyard.

Undercrossing — A transmission configuration where a transmission line crosses below the conductors of another transmission line, generally at 90 degrees.

Underbuild — A transmission or distribution configuration where a transmission or distribution circuit is attached to a transmission tower or pole below (under) the principle transmission line conductors.

WASTE MANAGEMENT

Ellie Townsend-Hough

SUMMARY OF CONCLUSIONS

Management of the waste generated during demolition[1] construction and operation of the Redondo Beach Energy Project (RBEP) would not result in any significant adverse impacts and would comply with applicable waste management laws, ordinances, regulations, and standards if the measures proposed in the Application for Certification (AFC) and staff's proposed conditions of certification are implemented.

There are a number of Recognized Environmental Conditions (RECs) that could require site remediation at the existing Redondo Beach Generating Station (RBGS). The applicant should factor into the construction schedule the regulatory requirements and mandates from jurisdictional agencies, and extent of required remediation. The RBEP applicant would be required to identify which areas on the proposed RBEP site would require remediation prior to construction of RBEP.

INTRODUCTION

This Preliminary Staff Assessment (PSA) presents an analysis of issues associated with wastes generated from the proposed demolition, construction and operation of the Redondo Beach Energy Project (RBEP). It evaluates the proposed waste management plans and mitigation measures designed to reduce the risks and environmental impacts associated with handling, storing, and disposing of project-related hazardous and non-hazardous wastes. The technical scope of this analysis encompasses solid wastes existing on site and those to be generated during demolition, and facility construction and operation. Management and discharge of wastewater is addressed in the **SOIL AND WATER RESOURCES** section of this document. Additional information related to waste management may also be covered in the **WORKER SAFETY & FIRE PROTECTION** and **HAZARDOUS MATERIALS MANAGEMENT** sections of this document.

The Energy Commission staff's objectives in conducting this waste management analysis are to ensure that:

- the management of project wastes would be in compliance with all applicable laws, ordinances, regulations, and standards (LORS). Compliance with LORS ensures that wastes generated during the construction and operation of the proposed project would be managed in an environmentally safe manner.
- the disposal of project wastes would not result in significant adverse impacts to existing waste disposal facilities, or result in other waste-related significant adverse effects on the environment.

[1] For purposes of this section, unless otherwise specified, "demolition refers to activities associated with the removal of Units 1through 8 and auxiliary boiler number 17 from the existing Redondo Beach Generating Station.

- upon project completion, the site is managed in such a way that project wastes and waste constituents would not pose a significant risk to humans or the environment.

LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

The following federal, state, and local environmental laws, ordinances, regulations, and standards (LORS) have been established to ensure the safe and proper management of both solid and hazardous wastes in order to protect human health and the environment. Project compliance with the various LORS is a major component of staff's determination regarding the significance and acceptability of the RBEP with respect to management of waste.

Waste Management Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable LORS	Description
Federal	
Title 42, United States Code, §§ 6901, et seq. Solid Waste Disposal Act of 1965 (as amended and revised by the Resource Conservation and Recovery Act of 1976, et al.)	The Solid Waste Disposal Act, as amended and revised by the Resource Conservation and Recovery Act (RCRA) et al., establishes requirements for the management of solid wastes (including hazardous wastes), landfills, underground storage tanks, and certain medical wastes. The statute also addresses program administration, implementation, and delegation to states, enforcement provisions, and responsibilities, as well as research, training, and grant funding provisions. RCRA Subtitle C establishes provisions for the generation, storage, treatment, and disposal of hazardous waste, including requirements addressing: • generator record keeping practices that identify quantities of hazardous wastes generated and their disposition; • waste labeling practices and use of appropriate containers; • use of a manifest when transporting wastes; • submission of periodic reports to the United States Environmental Protection Agency (U.S. EPA) or other authorized agency; and • corrective action to remediate releases of hazardous waste and contamination associated with RCRA-regulated facilities. RCRA Subtitle D establishes provisions for the design and operation of solid waste landfills. RCRA is administered at the federal level by U.S. EPA and its ten regional offices. The Pacific Southwest regional office (Region 9) implements U.S. EPA programs in California, Nevada, Arizona, and Hawaii.
Title 42, United States Code, §§ 9601, et seq. Comprehensive Environmental Response, Compensation and Liability Act	The Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), also known as Superfund, establishes authority and funding mechanisms for cleanup of uncontrolled or abandoned hazardous waste sites, as well as cleanup of accidents, spills, or emergency releases of pollutants and contaminants into the environment. Among other things, the statute addresses: • reporting requirements for releases of hazardous substances; • requirements for remedial action at closed or abandoned hazardous waste sites and brownfields; • liability of persons responsible for releases of hazardous substances or waste; and • requirements for property owners/potential buyers to conduct "all appropriate inquiries" into previous ownership and uses of the property to: 1) determine if hazardous substances have been or may have been released at the site and, 2) establish that the owner/buyer did not cause or contribute to the release. A Phase I Environmental Site Assessment is commonly used to satisfy CERCLA "all appropriate inquiries" requirements.

Title 40, Code of Federal Regulations (CFR), Subchapter I – Solid Wastes	These regulations were established by U.S. EPA to implement the provisions of the Solid Waste Disposal Act and RCRA (described above). Among other things, the regulations establish the criteria for classification of solid waste disposal facilities (landfills), hazardous waste characteristic criteria and regulatory thresholds, hazardous waste generator requirements, and requirements for management of used oil and universal wastes. • Part 246 addresses source separation for materials recovery guidelines. • Part 257 addresses the criteria for classification of solid waste disposal facilities and practices. • Part 258 addresses the criteria for municipal solid waste landfills. • Parts 260 through 279 address management of hazardous wastes, used oil, and universal wastes (i.e., batteries, mercury-containing equipment, and lamps). U.S. EPA implements the regulations at the federal level. However, California is an authorized state so the regulations are implemented by state agencies and authorized local agencies in lieu of U.S. EPA.
Title 49, CFR, Parts 172 and 173 Hazardous Materials Regulations	U.S. Department of Transportation established standards for transport of hazardous materials and hazardous wastes. The standards include requirements for labeling, packaging, and shipping of hazardous materials and hazardous wastes, as well as training requirements for personnel completing shipping papers and manifests. Section 172.205 specifically addresses use and preparation of hazardous waste manifests in accordance with Title 40, CFR, section 262.20.
State	
California Health and Safety Code, Chapter 6.5, §§ 25100, et seq. Hazardous Waste Control Act of 1972, as amended	This California law creates the framework under which hazardous wastes must be managed in California. The law provides for the development of a state hazardous waste program that administers and implements the provisions of the federal RCRA program. It also provides for the designation of California-only hazardous wastes and development of standards (regulations) that are equal to or, in some cases, more stringent than federal requirements. The California Environmental Protection Agency (Cal/EPA), Department of Toxic Substances Control (DTSC) administers and implements the provisions of the law at the state level. Certified Unified Program Agencies (CUPAs) implement some elements of the law at the local level.
Title 22, California Code of Regulations (CCR), Division 4.5 Environmental Health Standards for the Management of Hazardous Waste	These regulations establish requirements for the management and disposal of hazardous waste in accordance with the provisions of the California Hazardous Waste Control Act and federal RCRA. As with the federal requirements, waste generators must determine if their wastes are hazardous according to specified characteristics or lists of wastes. Hazardous waste generators must obtain identification numbers, prepare manifests before transporting the waste off site, and use only permitted treatment, storage, and disposal facilities. Generator standards also include requirements for record keeping, reporting, packaging, and labeling. Additionally, while not a federal requirement, California requires that hazardous waste be transported by registered hazardous waste transporters. The standards addressed by Title 22, CFR include: • Identification and Listing of Hazardous Waste (Chapter 11, §§ 66261.1, et seq.) • Standards Applicable to Generators of Hazardous Waste (Chapter 12, §§ 66262.10, et seq.) • Standards Applicable to Transporters of Hazardous Waste (Chapter 13, §§ 66263.10, et seq.) • Standards for Universal Waste Management (Chapter 23, §§ 66273.1, et seq.) • *Standards for the Management of Used Oil (Chapter 29, §§ 66279.1, et seq.)* • *Requirements* for Units and Facilities Deemed to Have a Permit by Rule (Chapter 45, §§ 67450.1, et seq.) The Title 22 regulations are established and enforced at the state level by DTSC. Some generator standards are also enforced at the local level by CUPAs.

California Health and Safety Code, Chapter 6.11 §§ 25404–25404.9 Unified Hazardous Waste and Hazardous Materials Management Regulatory Program (Unified Program)	The Unified Program consolidates, coordinates, and makes consistent the administrative requirements, permits, inspections, and enforcement activities of the six environmental and emergency response programs listed below. • Aboveground Storage Tank Program • Business Plan Program • California Accidental Release Prevention (CalARP) Program • Hazardous Material Management Plan / Hazardous Material Inventory Statement Program • Hazardous Waste Generator / Tiered Permitting Program • Underground Storage Tank Program The state agencies responsible for these programs set the standards for their programs while local governments implement the standards. The local agencies implementing the Unified Program are known as Certified Unified Program Agencies (CUPAs). The County of Los Angeles Fire Department Health Hazardous Materials Division and the Redondo Beach Fire Department are the area CUPA. Note: The Waste Management analysis only considers application of the Hazardous Waste Generator/Tiered Permitting element of the Unified Program. Other elements of the Unified Program may be addressed in the **HAZARDOUS MATERIALS MANAGEMENT** and/or **WORKER SAFTEY & FIRE PROTECTION** analysis sections.
Title 27, CCR, Division 1, Subdivision 4, Chapter 1, §§ 15100, et seq. Unified Hazardous Waste and Hazardous Materials Management Regulatory Program	While these regulations primarily address certification and implementation of the program by the local CUPAs, the regulations do contain specific reporting requirements for businesses. • Article 9 – Unified Program Standardized Forms and Formats (§§ 15400–15410). • Article 10 – Business Reporting to CUPAs (§§ 15600–15620).
Public Resources Code, Division 30, §§ 40000, et seq. California Integrated Waste Management Act of 1989.	The California Integrated Waste Management Act of 1989 (as amended) establishes mandates and standards for management of solid waste. Among other things, the law includes provisions addressing solid waste source reduction and recycling, standards for design and construction of municipal landfills, and programs for county waste management plans and local implementation of solid waste requirements. The act was amended in 2011 (AB 341) to include a legislative declaration of a state policy goal that not less than 75 percent of solid waste generated be source reduced, recycled, or composted by the year 2020. The 2011 amendments expand recycling to businesses and apartment buildings; require the state to develop programs to recycle three-quarters of generated waste; and require commercial and public entities that generate more than four cubic yards of commercial solid waste per week, and multifamily residential dwellings of five units or more, to arrange for recycling services beginning July 1, 2012.
Title 14, CCR, Division 7, § 17200, et seq. California Integrated Waste Management Board	These regulations further implement the provisions of the California Integrated Waste Management Act and set forth minimum standards for solid waste handling and disposal. The regulations include standards for solid waste management, as well as enforcement and program administration provisions. • Chapter 3 – Minimum Standards for Solid Waste Handling and Disposal. • Chapter 3.5 – Standards for Handling and Disposal of Asbestos Containing Waste. • Chapter 7 – Special Waste Standards. • Chapter 8 – Used Oil Recycling Program. • Chapter 8.2 – Electronic Waste Recovery and Recycling.
California Health and Safety Code, Division 20, Chapter 6.5, Article 11.9, §25244.12, et seq. Hazardous Waste Source Reduction and Management Review Act of 1989 (also known as SB 14).	This law was enacted to expand the state's hazardous waste source reduction activities. Among other things, it establishes hazardous waste source reduction review, planning, and reporting requirements for businesses that routinely generate more than 12,000 kilograms (~ 26,400 pounds) of hazardous waste in a designated reporting year. The review and planning elements are required to be done on a four year cycle, with a summary progress report due to DTSC every fourth year.

Title 22, CCR, § 67100.1 et seq. Hazardous Waste Source Reduction and Management Review.	These regulations further clarify and implement the provisions of the Hazardous Waste Source Reduction and Management Review Act of 1989 (noted above). The regulations establish the specific review elements and reporting requirements to be completed by generators subject to the act.
California Health and Safety Code Section 101480 101490	These regulations authorize a local officer, such as the director of the County of Los Angeles Fire Department Health Hazardous Materials Division and the Redondo Beach Fire Department to enter into voluntary agreements for the oversight of remedial action at sites contaminated by wastes.
Title 22, CCR, Chapter 32, §67383.1 – 67383.5	This chapter establishes minimum standards for the management of all underground and aboveground tank systems that held hazardous waste or hazardous materials, and are to be disposed, reclaimed or closed in place.
Title 8, CCR §1529 and §5208	These regulations require the proper removal of asbestos containing materials in all construction work and are enforced by California Occupational Safety and Health Administration (Cal-OSHA).
Title 14, Chapter 9 Division 7 –(AB 939)	AB 939 established the organization, structure, and mission of California Integrated Waste Management Board (CIWMB) in 1989. AB 939 not only mandated local jurisdictions to meet numerical diversion goals of 25% by 1995 and 50% by 2000, but also established an integrated framework for program implementation, solid waste planning, and solid waste facility and landfill compliance. Other elements included encouraging resource conservation and considering the effects of waste management operations. The diversion goals and program requirements are implemented through a disposal based reporting system by local jurisdictions under CIWMB regulatory oversight. Facility compliance requirements are implemented under a different approach primarily through local government enforcement agencies. Cal Recycle, formerly known as the CIWMB, is the state's leading authority on recycling, waste reduction, and product reuse officially known as the Department of Resources Recycling and Recovery.
Cal OSHA's Lead in Construction Standard is contained in Title 8, Section 1532.1 of the California Code of Regulations	The regulations address all of the following areas: permissible exposure limits (PELs); exposure assessment; compliance methods; respiratory protection; protective clothing and equipment; housekeeping; medical surveillance; medical removal protection (MRP); employee information, training, and certification; signage; record keeping; monitoring; and agency notification.
Title 17, CCR, Division 1, Chapter 8, Section 35001	Requirements for lead hazard evaluation and abatement activities, accreditation of training providers, and certification of individuals engaged in lead-based paint activities.
Local	
South Coast Air Quality Management District (SCAQMD) Rule 1403	This rule establishes survey requirements, notification and work practice requirements to prevent asbestos emissions from emanating during renovation and demolition activities. SCAQMD Rule 1403 incorporates the requirements of the federal asbestos requirements found in National Emissions Standard for Hazardous Air Pollutants (NESHAP) in code of Federal Regulations (CFR) Title 40, Part 61, Subpart M.
Redondo Beach Fire Department City Specifications Underground Storage Tanks (city Spec 418). Aboveground Storage Tanks (City Spec 425), Soil Cleanup Standards (City Specs 431-92)	The Redondo Beach Fire Department administers the Hazardous Waste, Underground Storage Tank, and Aboveground Petroleum Storage Tank programs
Los Angeles County Integrated Waste Management Plan	The plan provides guidance for local management of solid waste and household hazardous waste (incorporates the county's Source Reduction and Recycling Elements, which detail means of reducing commercial and industrial sources of solid waste).

County of Los Angeles Department Health Hazardous Materials Division, Hazardous Waste Inspection Program	Hazardous Material Division is the Certified Unified Program Agency (CUPA) for Los Angeles County that regulates and conducts inspections of businesses that handle hazardous materials, hazardous wastes, and/or have underground storage tanks. Hazardous Material Division programs include assistance with oversight on property re-development (i.e., brownfields) and voluntary or private oversight cleanup assistance.
Redondo Municipal Code, Title 5, Chapter 2, Article 7	Its purpose is to increase the diversion of construction and demolition debris from disposal facilities and will assist the City of Redondo Beach in meeting the State of California's waste reduction mandate.
City of Redondo Beach General Plan Policy Section 3.3	This section presents the respective programs which are carried out by the City to implement the Solid Waste Management and Recyling Section goals, objectives, and policies of the Redondo Beach General Plan.
City of Redondo Beach General Plan Policy Section 4.4	This section presents the respective programs which are carried out by the City to implement the Toxic and Material Waste goals, objectives, and policies of the Redondo Beach General Plan.

SETTING

PROPOSED PROJECT

The proposed project site would be constructed within the RBGS site on approximately 50-acres at 1100 North Harbor Drive, in the city of Redondo Beach, Los Angeles County, California. The sites parcel numbers are, 7503-013-014, 7503-013-015, 7503-013-819 and 7503-013-820 (RBEP 2012a page 1-4). RBGS is a disturbed industrial brownfield site. The site is in an area that includes commercial/industrial, recreational and residential uses in the city of Redondo Beach. The site is bordered to the north by multi-family residences the south by the Best Western Sunrise Hotel, to the west by King Harbor Marina, and the Pacific Ocean, and to the east by a U. S. Post Office and commercial properties (RBEP 2012a, Appendix 5.14A page 7).

RBGS currently has eight units on site, Units 1 through 8 and auxiliary boiler no. 17 (See **Figure Waste 1**). Units 5, 6, 7, and 8 are operating. Non-operational Units 1, 2, 3 and 4 would be demolished first. The steam turbines, generators, boilers and duct work would be removed in 2016. The western housing for Units 1 through 4, and the administration would stay in place until 2020; the remaining structures would be used for blocking the view between the construction site of the new power block and Harbor Drive. The new power block would consist of a 3-on-1 natural-gas fired, combined-cycle electrical generating facility with a net generating capacity of 496 megawatts (MW). The construction of the new power plant would begin in 2017 and end late in 2019. Demolition of Units 5 through 8 would begin the start of 2019. All of the construction and demolition activities for this project would be completed by the end of 2020.

In summary the waste management aspects of the AFC include:

- Demolition of retired Units1, 2, 3, and 4;
- Demolition of operating Units 5,6,7,8,and auxiliary boiler number 17;
- Construction of one new power block;
- Demolition of existing administration building and ancillary facilities; and,
- Construction of a new administration building and ancillary facilities, (RBEP 2012a, page 2-2).

The demolition of RBGS Units and the construction of the new power block would produce a variety of mixed wastes, such as soil, wood, metal, and concrete, etc. and will be included in the Cumulative Impact analysis. Waste would be recycled where practical and non-recyclable waste would be deposited in a Class III landfill. The hazardous waste generated during this phase of the project would consist of asbestos debris, heavy metal dust, used oils, universal wastes, solvents, and empty hazardous waste material containers (RBEP 2012a, § 5.14.4). Universal wastes are hazardous wastes that contain mercury, lead, cadmium, copper, and other substances hazardous to human and environmental health. Examples of universal wastes are batteries, fluorescent tubes, and some electronic devices.

Operation and maintenance of the plant and associated facilities would generate a variety of wastes, including a small quantity of hazardous wastes. To control air emissions, the project's turbine units would use selective catalytic reduction and oxidation catalyst equipment and chemicals, which generate both solid and hazardous waste.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

This waste management analysis addresses: a) existing project site conditions and the potential for contamination associated with prior activities on or near the project site, and b) the impacts from the generation and management of wastes during project construction and operation.

A. For any site in California proposed for the construction of a power plant, the applicant must provide documentation about the nature of any potential or existing releases of hazardous substances or contamination at the site. If potential or existing releases or contamination at the site are identified, the significance of the release or contamination would be determined by site-specific factors, including, but not limited to: the amount and concentration of contaminants or contamination; the proposed use of the area where the contaminants/contamination is found; and any potential pathways for workers, the public, sensitive species or environmental areas could be exposed to the contaminants. Any unmitigated contamination or releases of hazardous substances that pose a risk to human health or environmental receptors would be considered significant by Energy Commission staff.

   As a first step in documenting existing site conditions, the Energy Commission's power plant site certification regulations require that a Phase I Environmental Site Assessment (ESA) be prepared[2] and submitted as part of an application for certification. The Phase I ESA is conducted to identify any conditions indicative of releases and threatened releases of hazardous substances at the site and to identify any areas known to be contaminated (or a source of contamination) or near the site.

[2] Title 20, California Code of Regulations, section 1704(c) and Appendix B, section (g)(12)(A). Note that the Phase I ESA must be prepared according to American Society for Testing and Materials protocol or an equivalent method agreed upon by the applicant and the Energy Commission staff.

In general, the Phase I ESA uses a qualified environmental professional to conduct inquiries into past uses and ownership of the property, research hazardous substance releases and hazardous waste disposal at the site and within a certain distance of the site, and visually inspect the property, making observations about the potential for contamination and possible areas of concern. After conducting all necessary file reviews, interviews, and site observations, the environmental professional then provides findings about the environmental conditions at the site. In addition, since the Phase I ESA does not include sampling or testing, the environmental professional may also give an opinion about the potential need for any additional investigation. Additional investigation may be needed, for example, if there were significant gaps in the information available about the site, an ongoing release is suspected, or to confirm an existing environmental condition.

If additional investigation is needed to identify the extent of possible contamination, a Phase II ESA may be required. The Phase II ESA usually includes sampling and testing of potentially contaminated media to verify the level of contamination and the potential for remediation at the site.

In conducting its assessment of a proposed project, Energy Commission staff will review the project's Phase I ESA and work with the appropriate oversight agencies as necessary to determine if additional site characterization work is needed and if any mitigation is necessary at the site to ensure protection of human health and the environment from any hazardous substance releases or contamination identified.

B. Regarding the management of project-related wastes generated during construction and operation of the proposed project, staff reviewed the applicant's proposed solid and hazardous waste management methods and determined if the methods proposed are consistent with the LORS identified for waste disposal and recycling. The federal, state, and local LORS represent a comprehensive regulatory system designed to protect human health and the environment from impacts associated with management of both non-hazardous and hazardous wastes. Absent any unusual circumstances, staff considers project compliance with LORS to be sufficient to ensure that no significant impacts would occur as a result of project waste management.

   Staff then reviewed the capacity available at off-site treatment and disposal sites and determines whether or not the proposed power plant's waste would have a significant impact on the volume of waste a facility is permitted to accept. Staff used a waste volume threshold equal to 10 percent of a disposal facility's remaining permitted capacity to determine if the impact from disposal of project wastes at a particular facility would be significant.

DIRECT/INDIRECT IMPACTS AND MITIGATION

Existing Site Contamination

The existing natural-gas fired Redondo Beach Generating Station is located on a brownfield site which has been occupied by a power plant since 1906. Southern California Edison (SCE) purchased the site in 1917 from the Pacific Light and Power Company. Units 1 through 4 came on line between 1948 and 1949, Units 5 and 6 came on line in 1956, and Units 7 and 8 came on line in 1968 (RBEP 2012a, page 1-2). The site was originally fueled by fuel oil. Five aboveground storage tanks that held fuel oil have been removed however; the aboveground and underground fuel oil pipelines remain on the site. Several petroleum spills have occurred on site through the years and it reasonable to assume that contamination exists and would be exposed as existing equipment is removed (RBEP 2012a Appendix 5.14A). AES purchased RBGS in 1998 and is currently responsible for the remediation of contaminated areas on the proposed project site (SCE 2000).

The most recent Phase I Environmental Site Assessment (ESA) is dated November 2012, was prepared by CH2MHILL for the Redondo Beach Energy Project. The ESA encompassed 50 acres located on four parcels which included the project site. The RBEP would be built on two of the four parcels. The ESA was completed in accordance with the American Society for Testing and Materials Standard Practice E 1527-05 for ESAs. The Phase I ESA identified a number of Recognized Environmental Conditions. A Recognized Environmental Condition (REC) is the presence or likely presence of any hazardous substances or petroleum products on a property under the conditions that indicate an existing release, past release, or a material threat of a release of any hazardous substance or petroleum products into structures on the property or into the ground, groundwater, or surface water of the property. The Phase I ESA is included as Appendix 5.14A of the project Application for Certification (AFC) (RBEP 2012a, Appendix 5.14A). The RECs and Historical RECs located on the RBGS site are identified in **Waste Management Table 2**.

The applicant would come in contact with many of the RECs listed in **Waste Management Table 2** during demolition and construction. Prior to any earthwork, the RBEP owners should specify which areas identified in **Waste Management Table 2** would require remediation prior to the beginning of construction. Once these areas have been identified the applicant would be required to comply with condition of certification **WASTE-1**, which would require completion of Phase II investigations to evaluate the extent of contamination and identify the necessary remedial actions. If a site is considered contaminated, a Phase II environmental site assessment may be conducted, ASTM test E1903, a more detailed investigation involving chemical analysis for hazardous substances and/or petroleum hydrocarbons is performed. It would also require the applicant to coordinate with the appropriate regulatory authority that would otherwise regulate the activity if not for the in-lieu authority of the Energy Commission. The condition would then require monitoring and reporting on the progress of remediation of the various areas of contamination located on the RBEP site.

Waste Management Table 2
Recognized Environmental Conditions

Areas of Concern	Type of Contamination	Regulating Agency
Five Aboveground Storage Tanks (AST) basins- Aboveground & underground pipelines onsite	Metals, VOCs	Redondo Beach Fire Department
Retention Basins	Soil & Groundwater contamination including metals, dioxins, sulfide, VOCs, hydrazine, polychlorinated biphenyl (PCBs), and 1,4-dioxane	DTSC Envirostor 6001195 Corrective Action
Several spills (displacement oil tank, oil/gas separator, valve pit/oily waste sump (units 7 & 8), primary fuel oil pumping area and fuel oil pipe line, etc)	Petroleum hydrocarbons	DTSC
Contaminated groundwater below the site	Impacted with metals, dioxins, sulfide, VOCs, hydrazine, and 1,4-dioxane	DTSC
Transformers	Contained polychlorinated biphenyl (PCBs) in the past	DTSC
Number of Underground Storage Tanks (USTs)	One 20,000-gallon UST containing ammonia. Three former USTs leaked diesel fuel and heavier petroleum products.	Redondo Beach Fire Department,
Possible 30 additional USTs on site	16 USTs contain product	DTSC
Asbestos	Site buildings were constructed prior to 1980.	South Coast Air Quality Management District
Lead	Site buildings were constructed prior to 1980.	DTSC

In 1996, Southern California Edison Company (SCE) implemented a Water Quality Monitoring Program in response to a Final Judgment pursuant to a Stipulation, handed down by the Superior Court in California. The Stipulation determined that SCE has stored hazardous wastes in non-permitted wastewater retention basins at many of their electrical generating stations in southern California. The RBGS is one of the facilities cited in the agreement. Edison agreed to close these basins according to Chapter 15 of Title 22, California Code of Regulations.

SCE developed a Closure Plan for the Department of Toxic Substances Control (DTSC). The purpose of the Closure Plan is to allow DTSC and public review of the proposed plans, standards, and contingencies for remediating the RBGS retention basin site. The Closure Plan included areas where historical boiler cleaning operations may have led to contamination. Those areas include the retention basin, pipelines, drains, and sumps that conveyed chemicals and wastewater to the retention basin (SCE 2010, page 14). AES Southland Development purchased the RBGS from SCE in 1998. AES inherited and took responsibility for the areas of contamination including the retention basin on the site.

Staff proposes Condition of Certification **WASTE-1,** which would ensure the applicant adequately characterizes the site and completes remediation in accordance with the Energy Commission's conditions of certification as well as applicable LORS. Condition of Certification **WASTE-1** would also require that any additional work must be conducted under the oversight of the Energy Commission Compliance Project Manager (CPM), the Department of Toxic Substances Control (DTSC), and the Redondo Beach Fire Department.

WASTE-2 requires that the project owner submit the South Coast Air Quality Management District's (SCAQMD) Asbestos Notification Form for review and approval prior to removal and disposal of asbestos. All friable asbestos (Class I) collected during demolition activities would be disposed of as hazardous waste.

Furthermore, staff proposes Conditions of Certification **WASTE-3** and **WASTE-4** be adopted to address any soil contamination contingency that may be encountered during project construction. **WASTE-3** would require that an experienced and qualified Professional Engineer or Professional Geologist be available for consultation in the event contaminated soil not previously identified is encountered. If contaminated soil is identified, **WASTE-4** would require that the Professional Engineer or Professional Geologist inspect the site, determine what is required to characterize the nature and extent of contamination, and provide a report to the CPM with findings and recommended actions. **WASTE–4** also addresses identification and investigation of any previously unidentified soil or groundwater contamination that may be encountered.

Demolition and Construction Impacts and Mitigation

Site preparation, demolition, and construction of the proposed power plant and associated facilities would last approximately 60 months and generate both nonhazardous and hazardous wastes in solid and liquid forms (RBEP 2012a, page 5.14-1). Before demolition and construction can begin, the project owner would be required to develop and implement a Demolition and Construction Waste Management Plan, per proposed Condition of Certification **WASTE-5**.

Nonhazardous Wastes

Nonhazardous waste would be generated from the demolition of RBGS units and the construction of RBEP power block. Roughly 37,436 tons of demolition nonhazardous waste and 171 tons of construction nonhazardous waste would be generated as part of the RBEP project (RBEP 2012a, page 5.14-12). Demolition and construction waste would consist of wood, glass, plastic, paper, scrap metals, concrete, and asphalt. All non-hazardous wastes would be recycled to the extent possible and non-recyclable wastes would be collected by a licensed hauler and disposed in a solid waste disposal facility, in accordance with Title 14, California Code of Regulations, section 17200 et seq.

The California Department of Resources Recycling and Recovery (now CalRecycle formerly California Integrated Waste Management Board (CIWMB)) is responsible for recycling, waste reduction, and product reuse programs in California. CalRecycle also promotes innovation in technology to encourage economic and environmental sustainability. The 2008 California Green Building Standards Code Requires all construction projects to develop a recycling plan to divert and/or recycle at least 50 percent of waste generated during construction, (CalGreen Building Standards Code Section 708 construction Waste Reduction, Disposal and Recycling). It is estimated that 1,050 tons of recyclable concrete would be generated from partial removal of existing foundations and that 31,500 tons of metal would be recycled from demolition of the units (RBEP 2012a, 5.14-5).

Adoption of Condition of Certification **WASTE-5** would facilitate proper management of project demolition and construction wastes since the city of Redondo Beach maintains a Construction and Demolition (C&D) ordinance, Title 5, Chapter 2, Article 7. The city of Redondo Beach requires a Waste Management Plan and a completed South Coast Air Quality Management District approved Form 1403. Staff proposes Condition of Certification **WASTE-5** requiring the project owner to develop and implement a Construction Waste Management Plan and submit copies of C&D paperwork to the city of Redondo Beach and the CPM. These conditions would require the applicant to identify type, volume, and waste disposal and recycling methods to be used during construction of the facility. Staff believes that compliance with proposed Conditions of Certification **WASTE-5** would assist the applicant's compliance with the CalGreen Building Code requirements.

Nonhazardous liquid wastes would also be generated during construction, including sanitary wastes, dust suppression and stormwater drainage, and equipment wash and test water. Sanitary wastes would be collected in portable, self-contained chemical toilets and pumped periodically for disposal at an appropriate facility. Potentially contaminated equipment wash and/or test water would be contained at designated areas, tested to determine if hazardous, and either discharged to the storm water retention basin (if nonhazardous) or transported to an appropriate treatment/disposal facility. Please see the **SOIL AND WATER RESOURCES** section of this document for more information on the management of project wastewater.

Hazardous Wastes

The RBEP would produce hazardous waste during demolition and construction. The project owner or contractor could obtain an additional or temporary hazardous waste generator identification number for the site prior to starting demolition. New, additional or temporary identification numbers shall be reported to the CPM pursuant to proposed Condition of Certification **WASTE-6.** Although the hazardous waste generator number is determined based on site location, both the construction contractor and the project owner/operator could be considered the generator of hazardous wastes at the site. The majority of the hazardous waste will be recycled.

It is anticipated that 2,106 tons of hazardous waste would be generated during demolition and seven tons during construction. The waste generated would include: asbestos waste, electrical equipment, used oils, universal wastes and lead-acid storage batteries (RBEP 2012a Tables 5.14-2 and Table 14.2). Demolition of Units 1 through 8 would generate 2,100 tons of asbestos that would be disposed of in a permitted facility (RBEP 2012a, Table 5.14-1). The SCAQMD Rule 1403 requires the owner or operator of a demolition or renovation to submit an Asbestos Demolition or Renovation Operation Plan at least ten working days before any asbestos stripping or removal work begins. Condition of Certification **WASTE-2** requires that the project owner submit the SCAQMD Asbestos Notification Form for review and approval prior to removal and disposal of asbestos. This program ensures there would be no release of asbestos that could impact public health and safety. The generation of hazardous wastes anticipated during construction includes empty hazardous material containers, solvents, waste paint, oil absorbents, used oil, oily rags, batteries, and cleaning wastes. The amount of waste generated would be minor if handled in the manner identified in the AFC.

Wastes would be accumulated on site for less than 90 days and then properly manifested, transported, and disposed at a permitted hazardous waste management facility by licensed hazardous waste collection and disposal companies. Staff reviewed the disposal methods described in AFC section 5.14.1.2 and concluded that all wastes would be disposed in accordance with all applicable LORS. Should any construction waste management-related enforcement action be taken or initiated by a regulatory agency, the project owner would be required by proposed Condition of Certification **WASTE-7** to notify the Energy Commission's CPM whenever the owner becomes aware of any such action.

In the event that construction excavation, grading, or trenching activities for the proposed project encounter potentially contaminated soils and/or specific handling, disposal, and other precautions that may be necessary pursuant to hazardous waste management LORS, staff finds that proposed Conditions of Certification **WASTE-3** and **WASTE-4** would be adequate to address any soil contamination contingency that may be encountered during construction of the project and would ensure compliance with LORS. Absent any unusual circumstances, staff considers project compliance with LORS to be sufficient to ensure that no significant impacts would occur as a result of project waste management activities.

Operation Impacts and Mitigation

The proposed RBEP would generate non-hazardous and hazardous wastes in both solid and liquid forms under normal operating conditions of the project (RBEP 2012a Table 5.14-3). The AFC gives a summary of the operation waste streams, expected waste volumes and generation frequency, and management methods proposed. Before operations can begin, the project owner would be required to develop and implement an Operation Waste Management Plan pursuant to proposed Condition of Certification **WASTE-8**.

Non-Hazardous Solid Wastes

The generation of as much as 57 tons per year of non-hazardous solid wastes is expected during project operation. Routine maintenance wastes that would be generated include used air filters, spent deionization resins, sand and filter media, as well as domestic and office wastes (such as office paper, newsprint, aluminum cans, plastic, and glass(RBEP 2012a, page 5.14-12). All non-hazardous wastes would be recycled to the extent possible, and non-recyclable wastes would be regularly transported off site to a local solid waste disposal facility (RBEP 2012a, § 5.14.1.2.3).

Non-Hazardous Liquid Wastes

Non-hazardous liquid wastes would be generated during facility operation and are discussed in the **SOIL AND WATER RESOURCES** section of this document.

Hazardous Wastes

Eighteen tons per year of hazardous waste generation would be expected during routine project operation includes used hydraulic fluids, oils, greases, oily filters and rags, spent selective catalytic reduction catalysts, cleaning solutions and solvents, and batteries (RBEP 2012a, Page 5.15-9). In addition, spills and unauthorized releases of hazardous materials or hazardous wastes may generate contaminated soils or materials that may require corrective action and management as hazardous waste. Proper hazardous material handling and good housekeeping practices would help keep spill wastes to a minimum. However, to ensure proper cleanup and management of any contaminated soils or waste materials generated from hazardous materials spills, staff proposes Condition of Certification **WASTE-9** requiring the project owner/operator to report, clean up, and remediate as necessary, any hazardous materials spills or releases in accordance with all applicable federal, state, and local requirements. More information on hazardous material management, spill reporting, containment, and spill control and countermeasures plan provisions for the project are provided in the **HAZARDOUS MATERIAL MANAGEMENT** section of the PSA.

The amount of hazardous wastes generated during the operation of RBEP would be minor, 18 tons per year, with source reduction and recycling of wastes implemented whenever possible (RBEP 2012a, Table 5.14-3). The hazardous wastes would be temporarily stored on site, transported off site by licensed hazardous waste haulers, and recycled or disposed at authorized disposal facilities in accordance with established standards applicable to generators of hazardous waste (Title 22, CCR, §§ 66262.10 et seq.). Should any operations waste management-related enforcement action be taken or initiated by a regulatory agency, the project owner would be required by proposed Condition of Certification **WASTE-7** to notify the CPM whenever the owner becomes aware of any such action.

Impact on Existing Waste Disposal Facilities

Non-Hazardous Wastes

The RBEP facility would generate nonhazardous solid waste that would add to the total waste generated in Los Angeles County, California. The proposed project would generate solid waste during demolition, construction, and operation (See Waste Management Table 3). Nonhazardous waste would be disposed in a California Class III landfill (RBEP 2012a Section 5.14).

Waste Management Table 3
Estimated Project Waste

	Demolition[3]	Construction[3]	Operation[3]
Solid Waste	37,436 tons	171 tons	57 tons per year
	(82,640 cubic yards)	(1,140 cubic yards)	260 cubic yards)
Hazardous Waste	2,106 tons	7 tons	18 tons per year
	(14,040 cubic yards)	(46.7 cubic yards)	(120 cubic yards)
Recycle: 1,050 tons, concrete and 31,500 tons of metals, (RBEP, page 5.14-5)			

CalRecycle is the state agency responsible for implementing the California Integrated Waste Management Act (Act). In accordance with the Act, the county is required to submit an Integrated Waste Management Plan (IWMP) in accordance with state waste diversion mandates for jurisdictions (AB 939, Statutes of 1989). The Source Reduction and Recycling Element (SRRE), a Household Hazardous Waste Element (HHWE) and a Non-Disposal Facility Element (NDFE) are all elements that comprise the IWMP. For enforcement purposes, jurisdictions are evaluated on the effectiveness of their SRRE.

Once a California jurisdiction adopts an SRRE, it must implement the SRRE to the best of its ability. The jurisdiction can update the SRRE through CalRecycle's electronic annual reporting system at any time as diversion programs need to be modified (e.g., a new program to address commercial waste and the expansion of educational programs.)

To help CalRecycle determine whether a jurisdiction is taking the appropriate steps to implement its SRRE, the jurisdiction submits an annual report to CalRecycle. The annual report includes the jurisdiction's program information and per capita disposal information (Note: The per capita disposal data is derived from the statewide disposal reporting system). CalRecycle requires the county to report to the disposal reporting system all waste disposed in the county pursuant to Title 14, CCR, Sections 18800-18814.11. The disposal data is compiled for each jurisdiction to measure whether the jurisdiction has met its 50 percent equivalent diversion requirement.

CalRecycle reviews each jurisdiction's annual report information and conducts site visits to verify program implementation. Depending on the particular review cycle of the jurisdiction, CalRecycle staff review the jurisdiction's progress toward implementation of its SRRE, as well as its overall achievement of the 50 percent diversion requirement.

[3] The volume estimates (cubic yards) for solid/non-hazardous waste are staff generated numbers based on a conversion factor of approximately 906 pounds per cubic yard (taking into account amount of ferrous metal and cement) and 300 pounds per cubic yard for construction waste (RBEP Tables 5.14-1, 5.14-2 and Table 5.14-3). See http://www.calrecycle.ca.gov/lgcentral/library/dsg/apndxi.htm

Los Angeles County is required to submit an annual report that is reviewed by CalRecycle at a minimum every four years to determine if it is meeting the 50 percent diversion requirement and implementing its programs. Condition of Certification **WASTE-5** would require the project owner to submit a construction waste management plan for approval by the Energy Commission compliance project manager (CPM) that demonstrates that they met the construction waste diversion requirements of 50 percent pursuant to the CalGreen Building Codes. Pursuant to recommended Condition of Certification **WASTE-8,** the applicant would also be required to submit to the CPM for approval, and to the city of Redondo Beach an Operation Waste Management Plan (OWMP), discussing how the project would divert to the maximum extent feasible the recyclable materials that would be generated during construction and operation of the facility. The CPM and city would determine if the plan is diverting recyclables to the maximum extent feasible. If the OWMP is approved, as a condition prior to issuance of the project's building permit the applicant would be required to divert all materials from the solid waste stream that could reasonably be diverted for alternate uses.

Waste Management Table 4 presents details of three non-hazardous (Class III) waste disposal facilities that could potentially take the non-hazardous construction and operation wastes that would be generated but could not be diverted by the RBEP. The remaining capacity for the three Los Angeles County landfills combined described in the AFC is approximately 25.2 million cubic yards. The total amount of non-hazardous waste generated from project construction and operation after the material has been diverted to the maximum extent feasible would contribute less than 1 percent of the available landfill capacity. Staff concludes that disposal of the solid wastes generated by RBEP could occur without significantly impacting the capacity or remaining life of any of these facilities.

Hazardous Wastes

Waste Management Table 4 displays information on Class III landfills in the vicinity of the project and Class I landfills available in California. The Kettleman Hills facility also accepts Class II and Class III wastes. Kettleman Hills and Buttonwillow landfills have a combined approximately 15 million cubic yards of remaining hazardous waste disposal capacity, with up to 30 years of maximum remaining operating lifetime (RBEP 2012a, Section 5.14.2.3).

Waste Management Table 4
Recycling/Disposal Facilities

Landfill	Location	Permitted Capacity	Remaining Capacity	Estimated Closure Date
	City	Cubic yards	Cubic yards	
Class III -Nonhazardous				
Savage Canyon Sanitary Landfill	Whittier, CA	15 million	5.9 million[1]	12/31/2048
Schooll Canyon Sanitary Landfill	Glendale, CA	59 million	7.0 million[1]	04/01/2030
Calabasas Sanitary Landfill	Agoura, CA	69 million	12.3 million[1]	09/30/2025
Class I -Hazardous Waste				
Chemical Waste Management-Kettleman (Class I, II, III)	Kettleman, CA	10.7 million	5 million	2044
Clean Harbors Buttonwillow (Class I)	Kern, CA	13.7 million	10 million	2040

Source: RBEP 2012a Table 5.14-4
[1] 2012 Los Angeles Countywide Integrated Waste Management Plan

Hazardous wastes generated during construction and operation would be recycled to the extent possible and practical. Those wastes that cannot be recycled would be transported off site to a permitted treatment, storage, or disposal facility. Approximately 2,106 tons (14,040 cubic yards) of demolition hazardous waste, seven tons (46.7 cubic yards) of construction hazardous waste and 18 tons per year (120 cubic yards) of hazardous waste would be generated from the RBEP facility. The total amount of hazardous wastes generated by the RBEP project would consume less than 1 percent of the 15 million cubic yards of remaining permitted capacity. Therefore, impacts from disposal of RBEP generated hazardous wastes would have a less than significant impact on the remaining capacity at Class I landfills.

The existing available capacity for the three Class III landfills listed in the AFC that may be used to manage nonhazardous project wastes exceeds 25.2 million cubic yards. The total amount of nonhazardous wastes generated from construction and operation of the proposed RBEP project would consume less than 1 percent of the remaining landfill capacity. Therefore, disposal of project generated non-hazardous wastes would have a less than significant impact on Class III landfill capacity.

In addition, the two Class I disposal facilities that could be used for hazardous wastes generated by the construction and operation of the RBEP project have a combined remaining capacity in excess of 15 million cubic yards. The total amount of hazardous wastes generated by the RBEP project would consume less than 1 percent of the remaining permitted capacity. Therefore, impacts from disposal of RBEP generated hazardous wastes would also have a less than significant impact on the remaining capacity at Class I landfills.

CUMULATIVE IMPACTS AND MITIGATION

The CEQA Guidelines (Section 15355) define cumulative effects as “two or more individual effects which, when considered together, are considerable or which compound or increase other environmental impacts.”

Long-term cumulative impacts are not anticipated with the implementation of RBEP and the listed in the **EXECUTIVE SUMMARY** Cumulative Project list because each project is required to comply with CEQA guideline requirements for evaluating potential cumulative impacts, and/or obtain approval from the city/county prior to permitting and construction by demonstrating conformance to existing CalRecycle (Title 24). As proposed, the amount of non-hazardous and hazardous wastes generated during construction and operation of the RBEP would add to the total quantity of waste generated in the State of California, Los Angeles County, and city of Redondo Beach. Los Angeles County has 167.5 million cubic yards of solid waste capacity and 15 million cubic yards of hazardous capacity available for disposal.

Waste recycling would be employed wherever practical, and sufficient capacity is available at several treatment and disposal facilities to handle the volumes of wastes that would be generated by the project. In comparison, the total solid waste disposal in Los Angeles County in 2012 was 6,393,202 tons[4]. RBEP’s contribution would be less than 1 percent of the county’s waste generation.

COMPLIANCE WITH LORS

Energy Commission staff concludes that the proposed RBEP would comply with all applicable LORS regulating the management of hazardous and non-hazardous wastes during both facility construction and operation. The applicant is required to recycle and/or dispose hazardous and non-hazardous wastes at facilities licensed or otherwise approved to accept the wastes. Because hazardous wastes would be produced during both project construction and operation, the RBEP would be required to obtain a hazardous waste generator identification number from U.S. EPA. The RBEP would also be required to properly store, package, and label all hazardous waste; use only approved transporters; prepare hazardous waste manifests; keep detailed records; and appropriately train employees, in accordance with state and federal hazardous waste management requirements.

In the **SOCIOECONOMICS** section of this staff assessment, staff presents census information that shows that there are minority populations within one mile and six miles of the project. Since staff has added conditions of certification that would reduce the risk associated with contaminated soils, non-hazardous or hazardous waste to a less than significant level, staff concludes that there would be no significant impact from construction or operation of the power plant on minority populations. Therefore, there are no environmental justice issues for Waste Management.

[4] http://www.calrecycle.ca.gov/SWFacilities/Landfills/Tonnages/.

CONCLUSIONS

Consistent with the three main objectives for staff's waste management analysis (as noted in the **INTRODUCTION** section of this analysis), staff provides the following conclusions:

1) After review of the applicant's proposed waste management procedures, staff concludes that project wastes would be managed in compliance with all applicable waste management LORS. Staff notes that demolition, construction and operation wastes would be characterized and managed as either hazardous or non-hazardous waste. All non-hazardous wastes would be recycled to the extent feasible, and non-recyclable wastes would be collected by a licensed hauler and disposed of at a permitted solid waste disposal facility. Hazardous wastes would be accumulated onsite in accordance with accumulation time limits (90,180, 270, or 365 days depending on waste type and volumes generated), and then properly manifested, transported to, and disposed of at a permitted hazardous waste management facility by licensed hazardous waste collection and disposal companies.

   However, to help ensure and facilitate ongoing project compliance with LORS, staff proposes Conditions of Certification **WASTE-1** through **9**. These conditions would require the project owner to do all of the following:

   - Once the RBEP project owner identifies which areas of contamination would be remediated, staff proposed condition would ensure the project site is investigated and any contamination identified is remediated as necessary, with appropriate professional and regulatory agency oversight (**WASTE-1**, **2**, **3**, and **4**).
   - Prepare Construction Waste Management and Operation Waste Management Plans detailing the types and volumes of wastes to be generated and how wastes would be managed, recycled, and/or disposed of after generation (**WASTE-5** and **8**).
   - Obtain a new or temporary hazardous waste generator identification number (**WASTE-6**).
   - Report any waste management-related LORS enforcement actions and how violations would be corrected (**WASTE-7**).
   - Ensure that all spills or releases of hazardous substances would be reported and cleaned-up in accordance with all applicable federal, state, and local requirements (**WASTE-9)**.

2) Existing conditions at the RBEP project site include areas where prior site uses and/or demolition activities may have resulted in releases of hazardous substances or soil contamination. To ensure that the project site would be investigated and remediated as necessary and to reduce any impacts from prior or future hazardous substance or hazardous waste releases at the site to a level of insignificance, staff proposes Conditions of Certification **WASTE-1**, **2**, **3**, **4**, **7**, and **9.** These conditions would require the project owner to ensure that the project site is investigated and remediated as necessary; demonstrate that project wastes are managed properly; and ensure that any future spills or releases of hazardous substances or wastes are properly reported, cleaned-up, and remediated as necessary. Therefore, staff

concludes that construction and operation of the proposed RBEP project would not result in contamination or releases of hazardous substances that would pose a substantial risk to human health or the environment.

3) Regarding impacts of project wastes on existing waste disposal facilities, staff uses a waste volume threshold equal to 10 percent of a disposal facility's remaining capacity to determine if the impact from disposal of project wastes at a particular facility would be significant. The existing available capacity for the three Class III landfills that may be used to manage nonhazardous project wastes exceeds 25.2 million cubic yards. The total amount of nonhazardous wastes generated from demolition of RBGS, and construction and operation of RBEP would contribute less than 1 percent of the remaining landfill capacity. Therefore, disposal of project generated non-hazardous wastes would have a less than significant impact on Class III landfill capacity.

   In addition, the two Class I disposal facilities that could be used for hazardous wastes generated by the construction and operation of RBEP have a combined remaining capacity in excess of 15 million cubic yards. The total amount of hazardous wastes generated by the RBEP project would contribute less than 1 percent of the remaining permitted capacity. Therefore, impacts from disposal of RBEP generated hazardous wastes would also have a less than significant impact on the remaining capacity at Class I landfills.

Staff concludes that management of the waste generated during demolition, construction and operation of the RBEP project would not result in any significant adverse impacts, and would comply with applicable LORS, if the waste management practices and mitigation measures proposed in the RBEP project AFC and staff's proposed conditions of certification are implemented.

PROPOSED CONDITIONS OF CERTIFICATION

WASTE-1 Before demolition of the existing Units 1 through 8 and any other support building or equipment, the project owner shall prepare a Remedial Investigation Workplan (RI Workplan). This plan shall include a detailed site characterization plan with soil sampling and analysis to determine the extent and nature of contamination existing beneath these structures. The RI Workplan shall be provided to the Chatsworth Field Office of the California Department of Toxic Substances Control (DTSC), and the City of Redondo Beach Fire Department, and other local agencies, if applicable, for review and comment, and to the CPM for review and approval. If contaminated soil is found to exist, the project owner shall contact representatives of the above-named agencies for further guidance and possible oversight. In no event shall the project owner proceed with site preparation or construction activities at any location on the site where hazardous waste contamination is found to be present until that location is either remediated or shown to pose an insignificant risk to humans and the environment as demonstrated to the satisfaction of DTSC and the CPM.

Verification: At least 60 days prior to commencement of Units 1 through 8 demolition or structure demolition, respectively, the project owner shall provide the RI Workplan to the Chatsworth Field Office of the California Department of Toxic Substances Control, the City of Redondo Fire Department, other agencies, if applicable, and the CPM. Within 30 days of completion of the sampling and analysis and prior to the initiation of any construction activities, the project owner shall provide the results of the sampling and analysis to the Chatsworth Field Office of the California Department of Toxic Substances Control, the City of Redondo Beach Fire Department, other agencies, if applicable, and the CPM for review and guidance on possible remediation.

WASTE-2 Prior to demolition of existing structures associated with Units 1 through 8 the project owner shall complete and submit a copy of a SCAQMD Asbestos Demolition Notification Form to the CPM and the SCAQMD for approval. After receiving approval, the project owner shall remove all Asbestos Containing Material (ACM) from the site prior to demolition.

Verification: No less than 60 days prior to commencement of structure demolition, the project owner shall provide the Asbestos Demolition Notification Form to the CPM for review and approval. The project owner shall inform the CPM via the monthly compliance report, of the data when all ACM is removed from the site.

WASTE-3 The project owner shall provide the resume of an experienced and qualified professional engineer or professional geologist, who shall be available for consultation during site characterization (if needed), demolition, excavation, and grading activities, to the CPM for review and approval. The resume shall show experience in remedial investigation and feasibility studies.

The professional engineer or professional geologist shall be given full authority by the project owner to oversee any earth moving activities that have the potential to disturb contaminated soil.

Verification: At least 30 days prior to the start of site mobilization, the project owner shall submit the resume to the CPM for review and approval.

WASTE-4 If potentially contaminated soil is identified during site characterization, demolition, excavation, or grading at either the proposed site or linear facilities, as evidenced by discoloration, odor, detection by handheld instruments, or other signs, the professional engineer or professional geologist shall inspect the site, determine the need for sampling to confirm the nature and extent of contamination, and provide a written report to the project owner, representatives of Department of Toxic Substances Control, and the CPM stating the recommended course of action.

Depending on the nature and extent of contamination, the professional engineer or professional geologist shall have the authority to temporarily suspend construction activity at that location for the protection of workers or the public. If, in the opinion of the professional engineer or professional geologist, significant remediation may be required, the project owner shall contact the CPM and representatives of the Department of Toxic Substances Control for guidance and possible oversight.

Verification: The project owner shall submit any final reports filed by the professional engineer or professional geologist to the CPM within five days of their receipt. The project owner shall notify the CPM within 24 hours of any orders issued to halt construction.

WASTE-5 The project owner shall prepare a Construction Waste Management Plan for all wastes generated during construction of the facility and shall submit the plan to the CPM for review and approval. The plan shall contain, at a minimum, the following:

- a description of all construction waste streams, including projections of frequency, amounts generated, and hazard classifications;
- management methods to be used for each waste stream, including temporary on-site storage, housekeeping and best management practices to be employed, treatment methods and companies providing treatment services, waste testing methods to assure correct classification, methods of transportation, disposal requirements and sites, and recycling and waste minimization/source reduction plans.
- a method for collecting weigh tickets or other methods for verifying the volume of transported and or location of waste disposal; and,
- a method for reporting to demonstrate project compliance with construction waste diversion requirements of 50 percent pursuant to the CalGreen Code and City of Redondo Beach's Construction & Demolition Ordinance.

Verification: The project owner shall submit the Construction Waste Management Plan to the CPM for approval no less than 30 days prior to the initiation of construction activities at the site.

The project owner shall also document in each monthly compliance report (MCR) the actual volume of wastes generated and the waste management methods used during the year; provide a comparison of the actual waste generation and management methods used to those proposed in the original Construction Waste Management Plan; and update the Construction Waste Management Plan, as necessary, to address current waste generation and management practices.

WASTE-6 The project owner shall report new or temporary hazardous waste generator identification numbers from the United States Environmental Protection Agency prior to generating any hazardous waste during demolition, construction and operations.

Verification: The project owner shall keep a copy of the identification number(s) on file at the project site and provide documentation of the hazardous waste generation and notification and receipt of the number to the CPM in the next scheduled Monthly Compliance Report after receipt of the number. Submittal of the notification and issued number documentation to the CPM is only needed once unless there is a change in ownership, operation, waste generation, or waste characteristics that requires a new notification to USEPA. Documentation of any new or revised hazardous waste generation notifications or changes in identification number shall be provided to the CPM in the next scheduled compliance report.

WASTE-7 Upon becoming aware of any impending waste management-related enforcement action by any local, state, or federal authority, the project owner shall notify the CPM of any such action taken or proposed to be taken against the project itself, or against any waste hauler or disposal facility or treatment operator with which the owner contracts.

Verification: The project owner shall notify the CPM in writing within ten days of becoming aware of an impending enforcement action. The CPM shall notify the project owner of any changes that will be required in the way project-related wastes are managed.

WASTE-8 The project owner shall prepare an Operation Waste Management Plan for all wastes generated during operation of the facility and shall submit the plan to the CPM for review and approval. The plan shall contain, at a minimum, the following:

- a detailed description of all operation and maintenance waste streams, including projections of amounts to be generated, frequency of generation, and waste hazard classifications;
- management methods to be used for each waste stream, including temporary on-site storage, housekeeping and best management practices to be employed, treatment methods and companies providing treatment services, waste testing methods to assure correct classification, methods of transportation, disposal requirements and sites, and recycling and waste minimization/source reduction plans;
- information and summary records of conversations with the local Certified Unified Program Agency and the Department of Toxic Substances Control regarding any waste management requirements necessary for project activities. Copies of all required waste management permits, notices, and/or authorizations shall be included in the plan and updated as necessary;
- a detailed description of how facility wastes will be managed and any contingency plans to be employed, in the event of an unplanned closure or planned temporary facility closure; and
- a detailed description of how facility wastes will be managed and disposed upon closure of the facility.

Verification: The project owner shall submit the Operation Waste Management Plan to the CPM for approval no less than 30 days prior to the start of project operation. The project owner shall submit any required revisions to the CPM within 20 days of notification from the CPM that revisions are necessary.

The project owner shall also document in each Annual Compliance Report the actual volume of wastes generated and the waste management methods used during the year; provide a comparison of the actual waste generation and management methods used to those proposed in the original Operation Waste Management Plan; and update the

Operation Waste Management Plan as necessary to address current waste generation and management practices.

WASTE-9 The project owner shall ensure that all spills or releases of hazardous substances, materials, or waste are reported, cleaned up, and remediated as necessary, in accordance with all applicable federal, state, and local requirements.

Verification: The project owner shall document all unauthorized releases and spills of hazardous substances, materials, or wastes that occur on the project property or related pipeline and transmission corridors. The documentation shall include, at a minimum, the following information: location of release; date and time of release; reason for release; volume released; amount of contaminated soil/material generated; how release was managed and material cleaned up; if the release was reported; to whom the release was reported; release corrective action and cleanup requirements placed by regulating agencies; level of cleanup achieved and actions taken to prevent a similar release or spill; and disposition of any hazardous wastes and/or contaminated soils and materials that may have been generated by the release. Copies of the unauthorized spill documentation shall be provided to the CPM within 30 days of the date the release was discovered.

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RBEP 2013q– Applicant/CH2MHill, Sarah Madams (TN 201211). Data Response Set 1A-Response to CEC Staff Data Request 12, dated November 14, 2013. Submitted to CEC/Docket Unit/Patricia Kelly on November 14, 2013.

RBEP 2013r– Applicant/CH2MHill, Sarah Madams (TN 201383). Data Response Set 1A (Response to Data Requests 8, 10, 13, and 20-24), dated December 6, 2013. Submitted to CEC/Docket Unit/Patricia Kelly on December 6, 2013.

RBEP 2013s– Applicant/CH2MHill, Sarah Madams (TN 201389). Data Responses, Set 1A (Response to Data Request 9), dated December 9, 2013. Submitted to CEC/Docket Unit/Patricia Kelly on December 9, 2013.

RBEP 2013t– Applicant/CH2MHill, Sarah Madams (TN 201423). Data Responses, Set 1B (Responses to Data Requests 48-66), dated December 12, 2013. Submitted to CEC/Docket Unit/Patricia Kelly on December 12, 2013.

RBEP 2014d– Applicant/CH2MHill, Sarah Madams (TN 201547). Data Responses, Set 1B (Responses to Data Requests 50-51), dated January 13, 2014. Submitted to CEC/Docket Unit/Patricia Kelly on January 13, 2014.

RBEP 2014f– Applicant/CH2MHill, Sarah Madams (TN 201584). Data Responses, Set 2 (Responses to Data Requests 67-70), dated January 21, 2014. Submitted to CEC/Docket Unit/Patricia Kelly on January 21, 2014.

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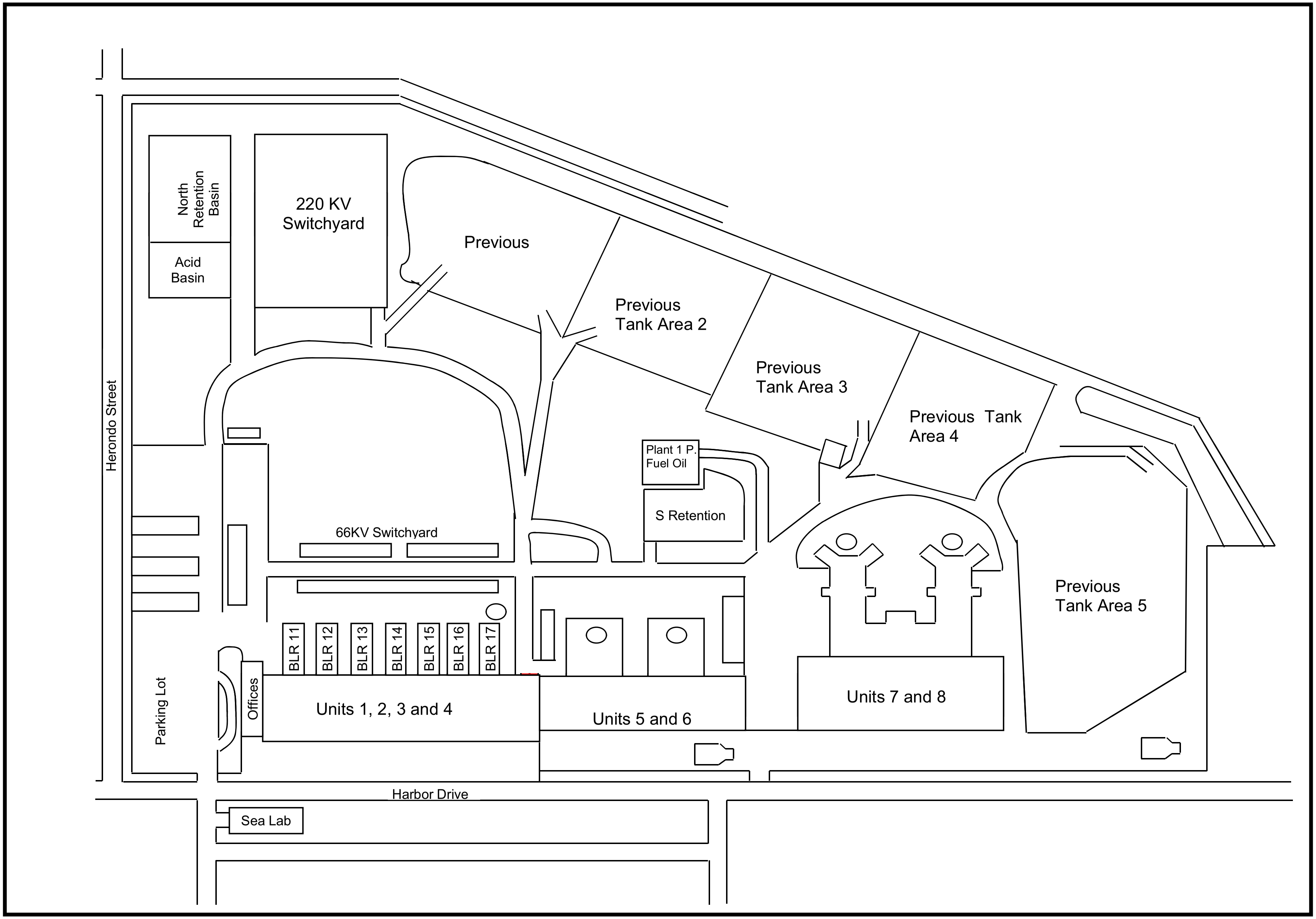
WASTE MANAGEMENT - FIGURE 1

Redondo Beach Energy Project - Facility Site Map of AES Redondo Beach



CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: Appendix 5 14A Phase 1 ESA 496 REVISED

WORKER SAFETY AND FIRE PROTECTION

Ellie Townsend-Hough

SUMMARY OF CONCLUSIONS

Staff concludes that if the applicant for the proposed Redondo Beach Energy Project (RBEP) provides a Project Construction Safety and Health Program and a Project Operations and Maintenance Safety and Health Program, as required by Conditions of Certification **WORKER SAFETY-1** and **-2,** and fulfills the requirements of Conditions of Certification **WORKER SAFETY-3** through **-5**, the project would incorporate sufficient measures to ensure adequate levels of industrial safety and fire protection and comply with applicable laws, ordinances, regulations, and standards. Staff's proposed conditions of certification provide assurance that the Construction Safety and Health Program and the Operations and Maintenance Safety and Health Program proposed by the applicant would be reviewed by the appropriate agencies before implementation. Staff's proposed conditions also require verification that the proposed plans adequately assure worker safety and fire protection and comply with applicable laws, ordinances, regulations, and standards.

The Redondo Beach Fire Department has stated that its ability to respond to emergency calls will not be significantly impacted by the construction and operation of the RBEP. Therefore, staff agrees with the applicant that mitigation is not required.

INTRODUCTION

Worker safety and fire protection is regulated through laws, ordinances, regulations, and standards (LORS), at the federal, state, and local levels. Industrial workers at the facility operate equipment and handle hazardous materials daily and may face hazards that can result in accidents and serious injury. Protection measures are employed to eliminate or reduce these hazards or to minimize the risk through special training, protective equipment, and procedural controls.

The purpose of this Preliminary Staff Assessment (PSA) is to assess the worker safety and fire protection measures proposed by the RBEP and to determine whether the applicant has proposed adequate measures to:

- comply with applicable safety LORS;
- protect the workers during construction and operation of the facility;
- protect against fire; and
- provide adequate emergency response procedures.

LAWS, ORDINANCES, REGULATION, AND STANDARDS

Worker Safety and Fire Protection Table 1
Laws, Ordinances, Regulations, and Standards (LORS)

Applicable LORS	Description
Federal	
Title 29, U.S. Code (USC) section 651 et seq (Occupational Safety and Health Act of 1970)	This act mandates safety requirements in the workplace with the purpose of "[assuring] so far as possible every working man and woman in the nation safe and healthful working conditions and to preserve our human resources" (29 USC § 651).
Title 29, Code of Federal Regulation (CFR), sections 1910.1 to 1910.1500 (Occupational Safety and Health Administration Safety and Health Regulations)	These sections define the procedures for promulgating regulations and conducting inspections to implement and enforce safety and health procedures to protect workers, particularly in the industrial sector.
Title 29, CFR sections 1952.170 to 1952.175	These sections provide federal approval of California's plan for enforcement of its own Safety and Health requirements, in lieu of most of the federal requirements found in 29 CFR sections 1910.1 to 1910.1500.
State	
Title 8, California Code of Regulations (Cal Code Regs.) all applicable sections (Cal/OSHA regulations)	These sections require that all employers follow these regulations as they pertain to the work involved. This includes regulations pertaining to safety matters during construction, commissioning, and operations of power plants, as well as safety around electrical components, fire safety, and hazardous materials use, storage, and handling.
Title 24, Cal Code Regs., section 3, et seq.	This section incorporates the current addition of the Uniform Building Code.
Health and Safety Code section 25500, et seq.	This section presents Risk Management Plan requirements for threshold quantity of listed acutely hazardous materials at a facility.
Health and Safety Code sections 25500 to 25541	These sections require a Hazardous Material Business Plan detailing emergency response plans for hazardous materials emergency at a facility.
Local (or locally enforced)	
California Fire Code 2013	The fire code contains general provisions for fire safety, including requirements for proper storage and handling of hazardous materials and listing of the information needed by emergency response personnel. Enforced by the Redondo Beach Fire Department.
City of Redondo Beach Municipal Code, Chapter 17.56	City of Redondo Beach Fire Code: The City of Redondo Beach has adopted the California Fire Code and has adopted several ordinances which amend it.
City of Redondo Beach Municipal Code Section 17.58	Develop and implement safety management plans as required by CA Health and Safety Code (H&SC) Sections 25500-25520. Administered by the Redondo Beach Fire Department.
City of Redondo Beach Fire Department City Specifications	Various Redondo Beach Fire Department City Specifications (numbered 401 through 434) may be found at: http://www.Redondobeachca.gov/government/departments/Fire/fire_prevention_code_enforcement/fire_dept_city_specifications.cfm
City of Redondo General Plan Section 4.5	This portion of the document inventories, describes, and analyses local fire hazards and their potential impacts (including specific goals, objectives, policies, and implementation programs).
Applicable Standards	
NFPA 56 (adopted 2012)	NFPA 56 is the Standard for Fire and Explosion Prevention During Cleaning and Purging of Flammable Gas Piping Systems.
National Fire Protection Association (NFPA) standards	These standards provide specifications and requirements for fire safety, including the design, installation, and maintenance of fire protection equipment including NFPA 850 (*Recommended Practice for Fire Protection for Electric Generating Plants and High voltage Direct Current Converter Stations*). Enforced by the Redondo Beach Fire Department.

SETTING

The proposed project would be constructed within the RBGS site on approximately 50 acres at 1100 North Harbor Drive, in Redondo Beach, Los Angeles County, California. The sites parcel numbers are, 7503-013-014, 7503-013-015, 7503-013-819and 7503-013-820 (RBEP 2012a, page 1-4). RBGS is a disturbed industrial brownfield site. The site is in an area that includes commercial/industrial, recreational and residential uses in the city of Redondo Beach. The site is bordered to the north by multi-family residences, to the south by the Best Western Sunrise Hotel, to the west by King Harbor Marina and the Pacific Ocean, and to the east by a U. S. Post Office and commercial properties (RBEP 2012a, Appendix 5.14A page 7).

There are a total of three fire stations within the city of Redondo Beach (**Worker Safety and Fire Protection Table 2**). Staffing for the stations include one supervisory Division Chief and 19 people per day across the three stations. Sixty-two firefighters at a minimum are trained to at least emergency medical technician (EMT) Level 1 status. Stations 1 and 2 have paramedic rescue units and 40 trained paramedics[1]. All personnel are trained to be first responder level in hazmat. The Redondo Beach Fire Department does not have a hazmat response team. The RBFD is staffed and equipped to handle fires and emergencies for the RBEP, but would rely on mutual aid response for large-scale incidents (Metzger 2014).

Worker Safety and Fire Protection Table 2
Redondo Beach Fire Stations

Fire Station	Address	Distance from RBEP	Estimated Response Time
Fire Station #1	401 S. Broadway, Redondo Beach, CA 90277	1 mile	3 minutes
Fire Station #2	2400 Grant Ave., Redondo Beach, CA 90278	2.5 miles	5 minutes
Fire Station #3/ Harbor Patrol	280 Marina Way, Redondo Beach, CA 90277	0.25 mile	<2 minutes

In addition to construction and operations worker safety issues, the potential exists for exposure to contaminated soil during site preparation. The Phase I Environmental Site Assessment conducted for this site in 2012 concluded that the areas beneath existing structures may have environmental conditions that would require remediation and that this should be assessed during the time these structures are removed. Generation on the site was originally fueled by petroleum fuel oil. Five aboveground storage tanks that held fuel oil have been removed; however, the aboveground and underground fuel oil pipelines remain on the site. Several petroleum spills have occurred on site through the years and it is reasonable to assume that contamination exists and would be exposed as existing equipment is removed (RBEP 2012a Appendix 5.14A). AES purchased

[1] The differences between EMTs and paramedics are the level and scope of training. EMTs receive 120 to 150 hours of training while a paramedic will get 1,200 to 1,800 hours of training. California does not allow the basic EMT level to give shots or start intravenous lifelines.

RBGS in 1998 and is currently responsible for the remediation of contaminated areas on the proposed project site. To address the possibility that soil contamination would be encountered during construction of the RBEP, proposed Conditions of Certification **WASTE-3** and **WASTE-4** require a registered professional engineer or geologist to be available during soil excavation and grading to ensure proper handling and disposal of contaminated soil. See the staff assessment section on **WASTE MANAGEMENT** for a more detailed analysis of this topic.

ASSESSMENT OF IMPACTS AND DISCUSSION OF MITIGATION

METHOD AND THRESHOLD FOR DETERMINING SIGNIFICANCE

Two issues are assessed in **WORKER SAFETY & FIRE PROTECTION:**

1. The potential for impacts on the safety of workers during demolition, construction, and operations activities, and

2. Fire prevention/protection, emergency medical response, and hazardous materials spill response during demolition, construction, and operations.

Worker safety issues are thoroughly addressed by Cal/OSHA regulations. If all LORS are followed, workers will be adequately protected. Thus, the standard for staff's review and determination of significant impacts on workers is whether or not the applicant has demonstrated adequate knowledge about, and dedication to, implementing all pertinent and relevant Cal/OSHA standards.

Regarding fire prevention matters, staff reviews and evaluates the on-site fire-fighting systems proposed by the applicant and the time needed for off-site local fire departments to respond to a fire, medical, or hazardous material emergency at the proposed power plant site. If on-site systems do not follow established codes and industry standards, staff recommends additional measures. Staff reviews and evaluates the local fire department capabilities and response time in each area and interviews the local fire officials to determine if they believe that their departments are adequately trained, staffed, and equipped to respond to the needs of a power plant. Staff then determines if the presence of the power plant would cause a significant impact on a local fire department and its ability to respond to incidents elsewhere that might occur at the same time as an event at the power plant. If it does, staff will recommend that the applicant mitigate this impact by providing increased resources to the fire department.

Staff has also established a procedure when a local fire department has identified either a significant incremental project impact to the local agency or a significant incremental cumulative impact to a local agency. Staff first conducts an initial review of the position and either agrees or disagrees with the fire department's determination that a significant impact would exist if the proposed power plant is built and operated. A process then starts whereby the project applicant can either accept the determination made by staff or refute the determination by providing a Fire Needs Assessment and a Risk Assessment. The Fire Needs Assessment would address fire response and equipment/staffing/location needs while the Risk Assessment would be used to establish that while an impact to the fire department may indeed exist, whether the risk (chances) of that impact occurring and causing injury or death is less than significant.

DIRECT/INDIRECT IMPACTS AND MITIGATION

Worker Safety

Industrial environments are potentially dangerous during construction and operation of facilities. Workers at the proposed RBEP would be exposed to loud noises, moving equipment, trenches, and confined space entry and egress problems. The workers may experience falls, trips, burns, lacerations, and numerous other injuries. They have the potential to be exposed to falling equipment or structures, chemical spills, hazardous waste, fires, explosions, and electrical sparks and electrocution. It is important for the RBEP to have well-defined policies and procedures, training, and hazard recognition and control at its facility to minimize such hazards and protect workers. If the facility complies with all LORS, workers will be adequately protected from health and safety hazards.

A Safety and Health Program would be prepared by the applicant to minimize worker hazards during construction and operation. Staff uses the phrase “Safety and Health Program” to refer to the measures that would be taken to ensure compliance with the applicable LORS during the construction and operational phases of the project.

Construction Safety and Health Program

RBEP encompasses construction and operation of a natural gas-fired facility. Workers would be exposed to hazards typical of construction and operation of a gas-fired combined-cycle facility.

Construction Safety Orders are published at Title 8, California Code of Regulations, sections 1502, et seq. These requirements are promulgated by Cal/OSHA and would be applicable to the construction phase of the project. The Construction Safety and Health Program would include the following:

- Construction Injury and Illness Prevention Program (Cal. Code Regs., tit. 8, § 1509)
- Construction Fire Prevention Plan (Cal. Code Regs., tit. 8, § 1920)
- Personal Protective Equipment Program (Cal. Code Regs., tit. 8, §§ 1514 — 1522)
- Emergency Action Program and Plan

Additional programs under General Industry Safety Orders (Cal. Code Regs., tit. 8, §§ 3200 to 6184), Electrical Safety Orders (Cal. Code Regs., tit. 8, §§2299 to 2974) and Unfired Pressure Vessel Safety Orders (Cal. Code Regs. §§ 450 to 544) would include:

- Electrical Safety Program
- Motor Vehicle and Heavy Equipment Safety Program
- Forklift Operation Program
- Excavation/Trenching Program
- Fall Protection Program

- Scaffolding/Ladder Safety Program
- Articulating Boom Platforms Program
- Crane and Material Handling Program
- Housekeeping and Material Handling and Storage Program
- Respiratory Protection Program
- Employee Exposure Monitoring Program
- Hand and Portable Power Tool Safety Program
- Hearing Conservation Program
- Back Injury Prevention Program
- Hazard Communication Program
- Heat and Cold Stress Monitoring and Control Program
- Pressure Vessel and Pipeline Safety Program
- Hazardous Waste Program
- Hot Work Safety Program
- Permit-Required Confined Space Entry Program

The Application for Certification (AFC) includes adequate outlines of each of the above programs (RBEP 2012a, § 5.16.3.3.1). Prior to the start of construction of RBEP, detailed programs and plans would be provided to the California Energy Commission compliance project manager (CPM) and to the RBFD pursuant to the Condition of Certification **WORKER SAFETY-1**.

Operations and Maintenance Safety and Health Program

Prior to the start of operations at RBEP, the Operations and Maintenance Safety and Health Program would be prepared. This operational safety program would include the following programs and plans:

- Injury and Illness Prevention Program (Cal. Code Regs., tit. 8, § 3203)
- Fire Protection and Prevention Program (Cal. Code Regs., tit. 8, § 3221)
- Personal Protective Equipment Program (Cal. Code Regs., tit. 8, §§ 3401 to 3411)
- Emergency Action Plan (Cal. Code Regs., tit. 8, § 3220)

In addition, the requirements under General Industry Safety Orders (Cal. Code Regs., tit. 8, §§ 3200 to 6184), Electrical Safety Orders (Cal. Code Regs., tit. 8, §§2299 to 2974) and Unfired Pressure Vessel Safety Orders (Cal. Code Regs., tit. 8, §§ 450 to 544) would be applicable to the project. Written safety programs for RBEP, which the applicant would develop, would ensure compliance with the above-mentioned requirements.

The AFC includes adequate outlines of the Injury and Illness Prevention Program, Emergency Action Plan, Fire Prevention Program, and Personal Protective Equipment

Program (RBEP 2012a, § 5.16.3.3.2). Prior to operation of RBEP, all detailed programs and plans would be provided to the CPM and RBFD pursuant to Condition of Certification **WORKER SAFETY-2**.

Safety and Health Program Elements

As mentioned above, the applicant provided the proposed outlines for both a Construction Safety and Health Program and an Operations Safety and Health Program. The measures in these plans are derived from applicable sections of state and federal law. Both safety and health programs would comprise six more specific programs and would require major items detailed in the following paragraphs.

Injury and Illness Prevention Program

The IIPP would include the following components as presented in the AFC (RBEP 2012a, § 5.16.3.3.2):

- identity of person(s) with authority and responsibility for implementing the program;
- safety and health policy of the plan;
- definition of work rules and safe work practices for construction activities;
- system for ensuring that employees comply with safe and healthy work practices;
- system for facilitating employer-employee communications;
- procedures for identifying and evaluating workplace hazards and developing necessary program(s);
- methods for correcting unhealthy/unsafe conditions in a timely manner;
- safety procedures; and
- training and instruction.

Fire Prevention Plan

The California Code of Regulations requires an Operations Fire Prevention Plan (Cal. Code Regs., tit. 8, § 3221). The AFC outlines a proposed Fire Prevention Plan which is acceptable to staff (RBEP 2012a, § 5.16.3.3.2). The plan would accomplish the following:

- determine general program requirements;
- determine fire hazard inventory, including ignition sources and mitigation;
- develop good housekeeping practices and proper materials storage;
- establish employee alarm and/or communication system(s);
- provide portable fire extinguishers at appropriate site locations;
- locate fixed fire-fighting equipment in suitable areas;
- specify fire control requirements and procedures;
- establish proper flammable and combustible liquid storage facilities;
- identify the location and use of flammable and combustible liquids;

- provide proper dispensing and determine disposal requirements for flammable liquids;
- establish and determine training and instruction requirements and programs; and
- identify personnel to contact for information on plan contents.

Staff proposes that the applicant submit a final Fire Prevention Plan to the CPM for review and approval and to the RBFD for review and comment to satisfy proposed Conditions of Certification **WORKER SAFETY-1** and **WORKER SAFETY-2**.

Personal Protective Equipment Program

California regulations require personal protective equipment (PPE) and first aid supplies whenever hazards are present that, due to process, environment, chemicals or mechanical irritants, can cause injury or impair bodily function as a result of absorption, inhalation, or physical contact (Cal. Code Regs., tit. 8, §§ 3380 to 3400). The RBEP operational environment would require PPE.

All safety equipment must meet National Institute of Safety and Health (NIOSH) or American National Standards Institute (ANSI) standards and would carry markings, numbers, or certificates of approval. Respirators must meet NIOSH and Cal/OSHA standards. Each employee must be provided with the following information pertaining to the protective clothing and equipment:

- proper use, maintenance, and storage;
- when to use the protective clothing and equipment;
- benefits and limitations; and
- when and how to replace the protective clothing and equipment.

The PPE Program ensures that employers comply with the applicable requirements for PPE and provides employees with the information and training necessary to protect them from potential workplace hazards.

Emergency Action Plan

California regulations require an Emergency Action Plan (Cal. Code Regs., tit. 8, § 3220). The AFC contains a satisfactory outline for an emergency action plan (RBEP 2012a, § 5.16.3.3.2).

The outline lists plans to accomplish the following:

- establish emergency escape procedures and emergency escape route for the facility;
- determine procedures to be followed by employees who remain to operate critical plant operations before they evacuate;
- provide procedures to account for all employees and visitors after emergency evacuation of the plant has been completed;
- specify rescue and medical duties for assigned employees;

- identify fire and emergency reporting procedures to regulatory agencies;
- develop alarm and communication system for the facility;
- establish a list of personnel to contact for information on the plan contents;
- provide emergency response procedures for ammonia release; and
- determine and establish training and instruction requirements and programs.

Written Safety Program

In addition to the specific plans listed above, additional LORS called *safe work practices* apply to the project. Both the Construction and the Operations Safety Programs would address safe work practices under a variety of programs. The components of these programs include, but are not limited to, the programs found under the heading "Construction Safety and Health Program" in this **WORKER SAFETY & FIRE PROTECTION** section.

Safety Training Programs

Employees would be trained in the safe work practices described in the above-referenced safety programs as required by Condition of Certification **WORKER SAFETY-3**.

Additional Mitigation Measures

Protecting construction workers from injury and disease is among the greatest challenges in occupational safety and health. The following facts are reported by the National Institute for Occupational Safety and Health (NIOSH):

- More than seven million persons work in the construction industry, representing 6 percent of the labor force. Approximately 1.5 million of these workers are self-employed.
- Of approximately 600,000 construction companies, 90 percent employ fewer than 20 workers. Few have formal safety and health programs.
- From 1980 to 1993, an average of 1,079 construction workers were killed on the job each year—more fatal injuries than in any other industry.
- Falls caused 3,859 construction worker fatalities (25.6 percent) between 1980 and 1993.
- Construction injuries account for 15 percent of workers' compensation costs.
- Assuring safety and health in construction is complex, involving short-term work sites, changing hazards, and multiple operations and crews working in close proximity.
- In 1990, Congress directed NIOSH to undertake research and training to reduce diseases and injuries among construction workers in the United States. Under this mandate, NIOSH funds both intramural and extramural research projects.

The hazards associated with the construction industry are thus well documented. These hazards increase in complexity in the multi-employer worksites typical of large, complex, industrial-type projects such as the construction of gas-fired power plants. In order to reduce and/or eliminate these hazards, it has become standard industry practice to hire a Construction Safety Supervisor to ensure a safe and healthful environment for all personnel. That this standard practice has reduced and/or eliminated hazards has been evident in the audits staff recently conducted of power plants under construction. The federal Occupational Safety and Health Administration (OSHA) has also entered into strategic alliances with several professional and trade organizations to promote and recognize safety professionals trained as Construction Safety Supervisors, Construction Health and Safety Officers, and other professional designations. The goal of these partnerships is to encourage construction subcontractors in four areas:

- to improve their safety and health performance;
- to assist them in striving for the elimination of the four hazards (falls, electrical, caught in/between and struck-by hazards), which account for the majority of fatalities and injuries in this industry and have been the focus of targeted OSHA inspections;
- to prevent serious accidents in the construction industry through implementation of enhanced safety and health programs and increased employee training; and
- to recognize those subcontractors with exemplary safety and health programs.

To date, there are no OSHA or Cal/OSHA requirements that an employer hire or provide for a Construction Safety Officer. OSHA and Cal/OSHA regulations do, however, require that safety be provided by an employer and the term *Competent Person* is used in many OSHA and Cal/OSHA standards, documents, and directives. A Competent Person is usually defined by OSHA as an individual who, by way of training and/or experience, is knowledgeable of standards, is capable of identifying workplace hazards relating to the specific operations, is designated by the employer, and has authority to take appropriate action. Therefore, in order to meet the intent of the OSHA standard to provide for a safe workplace during power plant construction, staff proposes Condition of Certification **WORKER SAFETY-3,** which would require the applicant/project owner to designate and provide for a power plant site Construction Safety Supervisor.

As discussed above, the hazards associated with the construction industry are well documented. Accidents, fires, and a worker death have occurred at Energy Commission-certified power plants in the recent past due to the failure to recognize and control safety hazards and the inability to adequately supervise compliance with occupational safety and health regulations. Safety problems have been documented by Energy Commission staff in safety audits conducted in 2005 at several power plants under construction. The findings of the audit staff include, but are not limited to, such safety oversights as:

- lack of posted confined space warning placards/signs;
- confusing and/or inadequate electrical and machinery lockout/tagout permitting and procedures;
- confusing and/or inappropriate procedures for handing over lockout/tagout and confined space permits from the construction team to commissioning team and then to operations;

- dangerous placement of hydraulic elevated platforms under each other;
- inappropriate placement of fire extinguishers near hotwork;
- dangerous placement of numerous power cords in standing water on the site, thus increasing the risk of electrocution;
- construction of an unsafe aqueous ammonia unloading pad;
- inappropriate and unsecure placement of above-ground natural gas pipelines inside the facility, but too close to the perimeter fence; and
- lack of adequate employee- or contractor-written training programs addressing proper procedures to follow in the event of finding suspicious packages or objects either on or off site.

In order to reduce and/or eliminate these hazards, staff proposes that the Energy Commission require a professional Safety Monitor on site to track compliance with Cal/OSHA regulations and periodically audit safety compliance during construction, commissioning, and the hand-over to operational status. These requirements are outlined in Condition of Certification **WORKER SAFETY-4**. A Safety Monitor, hired by the applicant, yet reporting to the Chief Building Official (CBO) and CPM, will serve as an “extra set of eyes” to ensure that safety procedures and practices are fully implemented at all power plants certified by the Energy Commission. During the audits conducted by staff, most site safety professionals welcomed the audit team and actively engaged it in questions about the team’s findings and recommendations. These safety professionals recognized that safety requires continuous vigilance and that the presence of an independent audit team provided a fresh perspective of the site.

Fire Hazards

During construction and operation of the proposed RBEP, there is the potential for both small fires and major structural fires. Electrical sparks, combustion of fuel oil, natural gas, hydraulic fluid, mineral oil, insulating fluid at the power plant switchyard, or flammable liquids, explosions, and over-heated equipment, may cause small fires. Major structural fires in areas without automatic fire detection and suppression systems are unlikely to develop at power plants. Fires and explosions of natural gas or other flammable gasses or liquids are rare. Compliance with all LORS would be adequate to assure protection from all fire hazards.

Staff reviewed the information provided in the AFC to determine if RBFD’s available fire protection services and equipment would adequately protect workers and to determine the project’s impact on fire protection services in the area. The project will rely on both on-site fire protection systems and local fire protection services. The on-site fire protection system provides the first line of defense for small fires. In the event of a major fire, fire support services, including trained firefighters and equipment for a sustained response, would be provided by the RBFD (RBEP 2012a sections 2.1.13, 2.5.3.1, 5.16.3.4).

Construction

During construction, portable fire extinguishers would be placed throughout the site at appropriate intervals and periodically maintained; safety procedures and training would be implemented according to the guidelines of the Construction Fire Protection and Prevention Program (RBEP 2012a, § 5.16.3.2). In addition, the RBEP proposed site is within the area of the existing Redondo Beach Power Station, which has an existing hydrant system that could provide extra protection during construction.

Operation

The information in the AFC indicates that the project intends to meet the fire protection and suppression requirements of the current (2013) California Fire Code, all applicable recommended NFPA standards (including Standard 850 addressing fire protection at electric generating plants), and all Cal/OSHA requirements. Fire suppression elements in the proposed plant would include both fixed and portable fire extinguishing systems. The fire protection water system would comprise the existing hydrant system and any extensions needed for new RBEP structures. Any new fire hydrants would be installed per NFPA requirements. The fire water would be potable city water supplied by the fire protection tank with water pressure maintained by a jockey pump, an electric pump, and a diesel-driven pump (RBEP 2012a, § 2.1.13).

Fixed water fire suppression systems would be installed in areas of risk including the fire pumps, steam turbine areas, turbine lube-oil systems, and step-up transformers. A carbon dioxide or dry chemical fire protection system would be provided for the combustion turbine generators and accessory equipment compartments (RBEP 2012a, § 2.5.3.1).

The fire protection system would have fire detection sensors and monitoring equipment that would trigger alarms and automatically actuate the suppression systems. In addition to the fixed fire protection system, appropriate class of service portable extinguishers and fire hydrants/hose stations would be located throughout the facility at code-approved intervals. These systems are standard requirements by the NFPA, and the California Fire Code, and staff has determined that they will ensure adequate fire protection.

The California Fire Code (Cal. Code Regs., tit. 24, Part 9, chapter 5, section 503.1.2) requires that access to the site be reviewed and approved by the fire department. All power plants licensed by the Energy Commission have more than one access point to the power plant site. This is sound fire safety procedure and allows for fire department vehicles and personnel to access the site should the main gate be blocked. The originally proposed RBEP has only one access point; the primary access to the RBEP site would be provided via an existing entrance off of North Harbor Drive, just south of the intersection of Herondo Street and North Harbor Drive (RBEP 2012a, page 2-2). Redondo Beach Fire Department Fire Chief Robert Metzger agrees with staff that a second access point is necessary to ensure fire department access in the event of blocked initial access for any unanticipated reason (Metzger 2014a). There are two possible secondary entrances south east of the primary access location, one located in the front of the project site and one towards the rear of the property. An additional access point can be restricted to emergency use only and, if possible, should be equipped with the fire department’s preferred system for remote keyless entry. Therefore, staff proposes Condition of Certification **WORKER SAFETY-6** that would require the project owner to provide a second access point to the site for emergency vehicles, and to equip this secondary gate with an acceptable entry system or keypad for fire department personnel to open the gate.

The applicant would be required by Conditions of Certification **WORKER SAFETY-1** and**-2** to provide the final Fire Protection and Prevention Program to staff and to the RBFD prior to construction and operation of the project to confirm the adequacy of the proposed fire protection measures.

Emergency Medical Services Response

Staff conducted a statewide survey to determine the frequency of Emergency Medical Services (EMS) response and offsite firefighter response for natural gas-fired power plants in California. The purpose of the analysis was to determine what impact, if any, power plants may have on local emergency services. Staff has concluded that incidents at power plants that require fire or EMS response are infrequent and represent an insignificant impact on the local fire departments, except for rare instances where a rural fire department has mostly volunteer fire-fighting staff. However, staff has determined that the potential for both work-related and non-work-related heart attacks exists at power plants. In fact, staff's research on the frequency of EMS response to gas-fired power plants shows that many of the responses for cardiac emergencies involved non-work-related incidents, including those involving visitors. The need for prompt response within a few minutes is well documented in the medical literature. Staff believes that the quickest medical intervention can only be achieved with the use of an on-site automatic external defibrillator (AED); the response from an off-site provider would take longer regardless of the provider location. This fact is also well documented and serves as the basis for many private and public locations (e.g., airports, factories, government buildings) maintaining on-site cardiac defibrillation devices. Therefore, staff concludes that, with the advent of modern cost-effective cardiac defibrillation devices, it is proper in a power plant environment to maintain such a device onsite in order to treat cardiac arrythmias resulting from industrial accidents or other non-work related causes.

Staff proposes Condition of Certification **WORKER SAFETY-5,** which would require that this portable AED be located on site, that all power plant employees on site during operations be trained in its use, and that an appropriate number of workers on site during construction and commissioning also be trained in its use.

CUMULATIVE IMPACTS AND MITIGATION

Staff reviewed the potential for the construction and operation of the RBEP combined with existing industrial facilities and expected new facilities to result in impacts on the fire and emergency service capabilities of the RBFD and found that there was no significant potential for cumulative impacts to occur.

Based upon staff's experience with power plants around the state, staff concludes that while it is <u>possible</u> that during a major earthquake (or other major event) response to the power plant could impact Redondo Beach Fire Department services, the <u>probability</u> of that happening is less than significant. Therefore, this project would not have a significant incremental or cumulative impact on the department's ability to respond to a fire or other emergency and no mitigation is required.

The Redondo Beach Fire Department has stated that its ability to respond to emergency calls will not be affected by the construction and operation of the RBEP. Therefore, staff agrees with the applicant that mitigation is not required (Metzger 2014).

COMPLIANCE WITH LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

Staff concludes that construction and operation of the RBEP would be in compliance with all applicable laws, ordinances, regulations, and standards (LORS) regarding long-term and short-term project impacts in the area of worker safety and fire protection.

CONCLUSIONS

Staff concludes that if the applicant for the proposed RBEP provides a Project Construction Safety and Health Program and a Project Operations and Maintenance Safety and Health Program as required by Conditions of Certification **WORKER SAFETY-1**, and **-2** and fulfils the requirements of Condition of Certification **WORKER SAFETY-3** through **-6**, the project would incorporate sufficient measures to ensure adequate levels of industrial safety and comply with applicable LORS. Staff also concludes that the operation of this power plant would not present a significant cumulative impact on the local fire department and therefore mitigation is not required.

PROPOSED CONDITIONS OF CERTIFICATION

WORKER SAFETY-1 The project owner shall submit to the compliance project manager (CPM) a copy of the Project Construction Safety and Health Program containing the following:

- a Construction Personal Protective Equipment Program;
- a Construction Exposure Monitoring Program;
- a Construction Injury and Illness Prevention Program;
- a Construction Emergency Action Plan; and
- a Construction Fire Prevention Plan.

The Personal Protective Equipment Program, the Exposure Monitoring Program, and the Injury and Illness Prevention Program shall be submitted to the CPM for review and approval concerning compliance of the program with all applicable safety orders. The Construction Emergency Action Plan and the Fire Prevention Plan shall be submitted to the Redondo Beach Fire Department for review and comment prior to submittal to the CPM for approval.

Verification: At least 60 days prior to the start of construction, the project owner shall submit to the Redondo Beach Fire Department for review and comment a copy of the Construction Emergency Action Plan and the Fire Prevention Plan. At least 30 days prior to the start of construction, the project owner shall submit to the CPM for review and approval a copy of the Project Construction Safety and Health Program addressing any comments received from the Redondo Beach Fire Department. The final plan submittal shall also include a letter containing comments received from the Redondo Beach Fire Department on the Construction Emergency Action Plan and the Fire Prevention Plan or a statement that no timely comments were received, and a copy of the transmittal letter that accompanied the submittal of the plans.

WORKER SAFETY-2 The project owner shall submit to the CPM a copy of the Project Operations and Maintenance Safety and Health Program containing the following:

- an Operation Injury and Illness Prevention Plan;
- an Emergency Action Plan;
- Hazardous Materials Management Program;
- Fire Prevention Plan (Cal. Code Regs., tit. 8, § 3221); and
- Personal Protective Equipment Program (Cal. Code Regs., tit. 8, §§ 3401—3411).

The Operation Injury and Illness Prevention Plan, Emergency Action Plan, and Personal Protective Equipment Program shall be submitted to the CPM for review and approval concerning compliance of the programs with all applicable safety orders. The Fire Prevention Plan and the Emergency Action Plan shall also be submitted to the Redondo Beach Fire Department for review and comment.

Verification: At least 60 days prior to the start of first-fire or commissioning, the project owner shall submit to the Redondo Beach Fire Department for review and comment a copy of the Project Operations and Maintenance Safety and Health Program. At least 30 days prior to the start of construction, the project owner shall submit to the CPM for review and approval a copy of the Project Construction Safety and Health Program addressing any comments received from the Redondo Beach Fire Department. The final plan submittal shall also include a letter containing comments received from the Redondo Beach Fire Department or a statement that no timely comments were received, and a copy of the transmittal letter that accompanied the submittal of the plans.

WORKER SAFETY-3 The project owner shall provide a site Construction Safety Supervisor (CSS) who, by way of training and/or experience, is knowledgeable of power plant construction activities and relevant laws, ordinances, regulations, and standards; is capable of identifying workplace hazards relating to the construction activities; and has authority to take appropriate action to assure compliance and mitigate hazards. The CSS shall:

- have overall authority for coordination and implementation of all occupational safety and health practices, policies, and programs;
- assure that the safety program for the project complies with Cal/OSHA and federal regulations related to power plant projects;

- assure that all construction and commissioning workers and supervisors receive adequate safety training;
- complete accident and safety-related incident investigations and emergency response reports for injuries and inform the CPM of safety-related incidents; and
- assure that all the plans identified in Conditions of Certification Worker Safety-1 and -2 are implemented.

Verification: At least 60 days prior to the start of site mobilization, the project owner shall submit to the CPM the name and contact information for the Construction Safety Supervisor (CSS). The contact information of any replacement or interim CSS shall be submitted to the CPM within one business day of the release of an acting CSS from the associated duties.

The CSS shall submit in the Monthly Compliance Report a monthly safety inspection report to include:

- record of all employees trained for that month (all records shall be kept on site for the duration of the project);
- summary report of safety management actions and safety-related incidents that occurred during the month;
- report of any continuing or unresolved situations and incidents that may pose danger to life or health; and
- report of accidents and injuries that occurred during the month.

WORKER SAFETY-4 The project owner shall make payments to the Chief Building Official (CBO) for the services of a Safety Monitor based upon a reasonable fee schedule to be negotiated between the project owner and the CBO. Those services shall be in addition to other work performed by the CBO. The Safety Monitor shall be selected by and report directly to the CBO and will be responsible for verifying that the Construction Safety Supervisor required by Condition of Certification Worker Safety-3, implements all appropriate Cal/OSHA and Energy Commission safety requirements. The Safety Monitor shall conduct on-site (including linear facilities) safety inspections at intervals necessary to fulfill those responsibilities.

Verification: At least 60 days prior to the start of construction, the project owner shall provide proof of the agreement to fund the Safety Monitor services to the CPM for review and approval.

WORKER SAFETY-5 The project owner shall ensure that a portable automatic external defibrillator (AED) is located on-site during construction and operations, shall implement a program to ensure that workers are properly trained in its use, and that the equipment is properly maintained and functioning at all times. During construction and commissioning, the following persons shall be trained in its use and shall be on site whenever the workers that they supervise are on site: the Construction Project Manager or delegate, the Construction Safety Supervisor or delegate, and all shift foremen. During operations, all power plant employees shall be trained in its use. The training program shall be submitted to the CPM for review and approval.

Verification: At least 60 days prior to the start of site mobilization, the project owner shall submit to the CPM proof that a portable automatic external defibrillator (AED) exists on-site and a copy of the training and maintenance program for review and approval.

WORKER SAFETY-6 The project owner shall identify and provide a second access point for emergency response personnel to enter the site. The plan for this access and the method of gate operation shall be submitted to the Redondo Beach Fire Department for **review and comment** and to the CPM for review and approval, along with a copy of the transmittal letter that accompanied the submittal of the plans to the Redondo Beach Fire Department.

Verification: At least 60 days prior to the start of site mobilization, the project owner shall submit to the Redondo Beach Fire Department and the CPM preliminary plans showing the location of a second access point to the site and a description of how the gate will be opened by the fire department. At least 30 days prior to the start of site mobilization, the project owner shall submit final plans incorporating any comments received from the Redondo Beach Fire Department to the CPM for review and approval. The final plan submittal shall also include a letter containing comments received from the Redondo Beach Fire Department or a statement that no comments were received, and a copy of the transmittal letter that accompanied the submittal of the plans.

REFERENCES

RBEP 2012a –Applicant/AES Southland Development (TN 68597). Application for Certification for the Redondo Beach Energy Project Volumes 1 and 2, dated November 20, 2012. Submitted to CEC/Robert Oglesby on November 21, 2012.

Metzger 2014 –Email communication from Redondo Beach Fire Chief Robert Metzger with Ellie Townsend-Hough, CEC staff. Dated March 6, 2014.

Metzger 2014a –Email communication from Redondo Beach Fire Chief Robert Metzger with Ellie Townsend-Hough, CEC staff. Dated March 25, 2014.

Compliance Conditions and Compliance Monitoring Plan

COMPLIANCE CONDITIONS
AND
COMPLIANCE MONITORING PLAN

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INTRODUCTION

The Redondo Beach Energy Project (RBEP) Compliance Conditions of Certification, including a Compliance Monitoring Plan (Compliance Plan), are established as required by Public Resources Code section 25532. The Compliance Plan provides a means for assuring that the facility is constructed, operated, and closed in compliance with public health and safety and environmental law; all other applicable laws, ordinances, regulations, and standards (LORS); and the conditions adopted by the Energy Commission and specified in the Energy Commission's written Decision on the project's Application for Certification, or otherwise required by law.

The Compliance Plan is composed of elements that:

- set forth the duties and responsibilities of the compliance project manager (CPM), the project owner or operator (project owner), delegate agencies, and others;
- set forth the requirements for handling confidential records and maintaining the compliance record;
- state procedures for settling disputes and making post-certification changes;
- state the requirements for periodic compliance reports and other administrative procedures that are necessary to verify the compliance status for all Energy Commission-approved conditions of certification;
- establish contingency planning, facility non-operation protocols, and closure requirements; and
- establish a tracking method for the technical area conditions of certification that contain measures required to mitigate potentially adverse project impacts associated with construction, operation, and closure below a level of significance; each technical condition of certification also includes one or more verification provisions that describe the means of assuring that the condition has been satisfied.

KEY PROJECT EVENT DEFINITIONS

The following terms and definitions help determine when various conditions of certification are implemented.

Project Certification

Project certification occurs on the day the Energy Commission dockets its decision after adopting it at a publically noticed Business Meeting or hearing. At that time, all Energy Commission conditions of certification become binding on the project owner and the proposed facility. Also at that time, the project enters the compliance phase. It retains the same docket number it had during its siting review, but the letter "C" is added at the end (for example, 09-AFC-7C) to differentiate the compliance phase activities from those of the certification proceeding.

Site Assessment and Pre-Construction Activities

The below-listed site assessment and pre-construction activities may be initiated or completed prior to the start of construction, subject to the CPM's approval of the specific site assessment or pre-construction activities.

Site assessment and pre-construction activities include the following, but only to the extent the activities are minimally disruptive to soil and vegetation and will not affect listed or special-status species or other sensitive resources:

1. the installation of environmental monitoring equipment;

2. a minimally invasive soil or geological investigation;

3. a topographical survey;

4. any other study or investigation to determine the environmental acceptability or feasibility of the use of the site for any particular facility; and

5. any minimally invasive work to provide safe access to the site for any of the purposes specified in 1 through 4, above.

Site Mobilization and Construction

When a condition of certification requires the project owner to take an action or obtain CPM approval prior to the start of construction, or within a period of time relative to the start of construction, that action must be taken, or approval must be obtained, prior to any site mobilization or construction activities, as defined below.

Site mobilization and construction activities are those necessary to provide site access for construction mobilization and facility installation, including both temporary and permanent equipment and structures, as determined by the CPM.

Site mobilization and construction activities include, but are not limited to:

1. ground disturbance activities like grading, boring, trenching, leveling, mechanical clearing, grubbing, and scraping;

2. site preparation activities, such as access roads, temporary fencing, trailer and utility installation, construction equipment installation and storage, equipment and supply laydown areas, borrow and fill sites, temporary parking facilities, chemical spraying, controlled burns; and

3. permanent installation activities for all facility and linear structures, including access roads, fencing, utilities, parking facilities, equipment storage, mitigation and landscaping activities, and other installations, as applicable.

Commissioning

Commissioning activities test the functionality of the installed components and systems to ensure the facility operates safely and reliably. Commissioning provides a multistage, integrated, and disciplined approach to testing, calibrating, and proving all of the project's systems, software, and networks. For compliance monitoring purposes, examples of commissioning activities include interface connection and utility pre-testing, "cold" and "hot" electrical testing, system pressurization and optimization tests, grid synchronization, and combustion turbine "first fire" and tuning.

Start of Commercial Operation

For compliance monitoring purposes, "commercial operation" or "operation" begins once commissioning activities are complete, the certificate of occupancy has been issued, and the power plant has reached reliable steady-state electrical production. At the start of commercial operation, plant control is usually transferred from the construction manager to the plant operations manager. Operation activities can include a steady state of electrical production, or, for "peaker plants," a seasonal or on-demand operational regime to meet peak load demands.

Non-Operation and Closure

Non-operation is time-limited and can encompass part or all of a facility. Non-operation can be a planned event, usually for equipment maintenance or repair, or unplanned, usually the result of unanticipated events or emergencies.

Closure is a facility shutdown with no intent to restart operation. It may also be the cumulative result of unsuccessful efforts to re-start over an increasingly lengthy period of non-operation, condemned by inadequate means and/or lack of a viable plan. Facility closures can occur due to a variety of factors, including, but not limited to, irreparable damage and/or functional or economic obsolescence.

ROLES AND RESPONSIBILITIES

Provided below is a generalized description of the compliance roles and responsibilities for Energy Commission staff (staff) and the project owner for the construction and operation of the RBEP.

COMPLIANCE PROJECT MANAGER RESPONSIBILITIES

The CPM's compliance monitoring and project oversight responsibilities include:

1. ensuring that the design, construction, operation, and closure of the project facilities are in compliance with the terms and conditions of the Decision;
2. resolving complaints;
3. processing post-certification project amendments for changes to the project description, conditions of certification, ownership or operational control, and requests for extension of the deadline for the start of construction (see COM-10 for instructions on filing a Petition to Amend or to extend a construction start date);

4. documenting and tracking compliance filings; and

5. ensuring that compliance files are maintained and accessible.

The CPM is the central contact person for the Energy Commission during project pre-construction, construction, operation, emergency response, and closure. The CPM will consult with the appropriate responsible parties when handling compliance issues, disputes, complaints, and amendments.

All project compliance submittals are submitted to the CPM for processing. Where a submittal requires CPM approval, the approval will involve appropriate Energy Commission technical staff and management. All submittals must include searchable electronic versions (.pdf, MS Word, or equivalent files).

Pre-Construction and Pre-Operation Compliance Meeting

The CPM usually schedules pre-construction and pre-operation compliance meetings prior to the projected start-dates of construction, plant operation, or both. These meetings are used to assist the Energy Commission and the project owner's technical staff in the status review of all required pre-construction or pre-operation conditions of certification, and facilitate staff taking proper action if outstanding conditions remain. In addition, these meetings ensure, to the extent possible, that the Energy Commission's conditions of certification do not delay the construction and operation of the plant due to last-minute unforeseen issues or a compliance oversight. Pre-construction meetings held during the certification process must be publicly noticed unless they are confined to administrative issues and processes.

Energy Commission Record

The Energy Commission maintains the following documents and information as public records, in either the Compliance files or Dockets Unit files, for the life of the project (or other period as specified):

- all documents demonstrating compliance with any legal requirements relating to the construction, operation, and closure of the facility;
- all Monthly and Annual Compliance Reports (MCRs, ACRs) filed by the project owner;
- all project-related complaints of alleged noncompliance filed with the Energy Commission; and
- all petitions for project or condition of certification changes and the resulting staff or Energy Commission action.

CHIEF BUILDING OFFICIAL DELEGATION AND AGENCY COOPERATION

Under the California Building Code standards, while monitoring project construction and operation, staff acts as, and has the authority of, the Chief Building Official (CBO). Staff may delegate some CBO responsibility to either an independent third-party contractor or a local building official. However, staff retains CBO authority when selecting a delegate

CBO, including the interpretation and enforcement of state and local codes, and the use of discretion, as necessary, in implementing the various codes and standards.

The delegate CBO will be responsible for facilitating compliance with all environmental conditions of certification, including cultural resources, and for the implementation of all appropriate codes, standards, and Energy Commission requirements. The CBO will conduct on-site (including linear facilities) reviews and inspections at intervals necessary to fulfill these responsibilities. The project owner will pay all delegate CBO fees necessary to cover the costs of these reviews and inspections.

PROJECT OWNER RESPONSIBILITIES

The project owner is responsible for ensuring that all conditions of certification in the RBEP Decision are satisfied. The project owner will submit all compliance submittals to the CPM for processing unless the conditions specify another recipient. The Compliance Conditions regarding post-certification changes specify measures that the project owner must take when modifying the project's design, operation, or performance requirements, or to transfer ownership or operational control. Failure to comply with any of the conditions of certification may result in a correction order, an administrative fine, certification revocation, or any combination thereof, as appropriate. A summary of the Compliance Conditions of Certification are included as **Compliance Table 1** at the end of this Compliance Plan.

COMPLIANCE ENFORCEMENT

The Energy Commission's legal authority to enforce the terms and conditions of its Decision are specified in Public Resources Code sections 25534 and 25900. The Energy Commission may amend or revoke a project certification and may impose a civil penalty for any significant failure to comply with the terms or conditions of the Decision. The Energy Commission's actions and fine assessments would take into account the specific circumstances of the incident(s).

PERIODIC COMPLIANCE REPORTING

Many of the conditions of certification require submittals in the MCRs and ACRs. All compliance submittals assist the CPM in tracking project activities and monitoring compliance with the terms and conditions of the RBEP Decision. During construction, the project owner or an authorized agent will submit compliance reports on a monthly basis. During operation, compliance reports are submitted annually; though reports regarding compliance with air quality conditions of certification may be required more often (see **AIR QUALITY)**. These reports and the requirements for an accompanying compliance matrix are described below.

NONCOMPLIANCE COMPLAINT PROCEDURES

Any person or agency may file a complaint alleging noncompliance with the conditions of certification. Such a complaint will be subject to review by the Energy Commission pursuant to Title 20, California Code of Regulations, section 1237, but, in many instances, the issue(s) can be resolved by using an informal dispute resolution process. Both the informal and formal complaint procedures, as described in current state law and regulations, are summarized below. Energy Commission staff will follow these provisions unless superseded by future law or regulations. The California Office of Administrative Law provides on-line access to the California Code of Regulations at http://www.oal.ca.gov/.

Informal Dispute Resolution Process

The following informal process is designed to resolve code and compliance interpretation disputes stemming from the project's conditions of certifications and other LORS. The project owner, the Energy Commission, or any other party, including members of the public, may initiate the informal dispute resolution process. Disputes may pertain to actions or decisions made by any party, including the Energy Commission's delegate agents.

This process may precede the formal complaint and investigation procedure specified in Title 20, California Code of Regulations, section 1237, but is not intended to be a prerequisite or substitute for it. This informal procedure may not be used to change the terms and conditions of certification in the Decision, although the agreed-upon resolution may result in a project owner proposing an amendment. The informal dispute resolution process encourages all parties to openly discuss the conflict and reach a mutually agreeable solution. If a dispute cannot be resolved, then the matter must be brought before the full Energy Commission for consideration via the complaint and investigation procedure specified in Title 20, California Code of Regulations, section 1237.

Request for Informal Investigation

Any individual, group, or agency may request that the CPM conduct an informal investigation of alleged noncompliance with the Energy Commission's conditions of certification. Upon receipt of an informal investigation request, the CPM will promptly provide both verbal and written notification to the project owner of the allegation(s), along with all known and relevant information of the alleged noncompliance. The CPM will evaluate the request and, if the CPM determines that further investigation is necessary, will ask the project owner to promptly conduct a formal inquiry into the matter and provide within seven days a written report of the investigation results, along with corrective measures proposed or undertaken. Depending on the urgency of the matter, the CPM may conduct a site visit and/or request that the project owner provide an initial verbal report within 48 hours.

Request for Informal Meeting

In the event that either the requesting party or Energy Commission staff are not satisfied with the project owner's investigative report or corrective measures, either party may submit a written request to the CPM for a meeting with the project owner. The request shall be made within 14 days of the project owner's filing of the required investigative report. Upon receipt of such a request, the CPM will attempt to:

1. immediately schedule a meeting with the requesting party and the project owner, to be held at a mutually convenient time and place;

2. secure the attendance of appropriate Energy Commission staff and staff of any other agencies with expertise in the subject area of concern, as necessary; and

3. conduct the meeting in an informal and objective manner so as to encourage the voluntary settlement of the dispute in a fair and equitable manner.

After the meeting, the CPM will promptly prepare and distribute copies to all parties and to the project file, of a summary memorandum that fairly and accurately identifies the positions of all parties and any understandings reached. If no agreement was reached, the CPM will direct the complainant to the formal complaint process provided under Title 20, California Code of Regulations, section 1237.

Formal Dispute Resolution Procedure

Any person may file a complaint with the Energy Commission's Dockets Unit alleging noncompliance with a Commission Decision adopted pursuant to Public Resources Code section 25500. Requirements for complaint filings and a description of how complaints are processed are provided in Title 20, California Code of Regulations, section 1237.

POST-CERTIFICATION CHANGES TO THE ENERGY COMMISSION DECISION

The project owner must petition the Energy Commission pursuant to Title 20, California Code of Regulations, section 1769, to modify the design, operation, or performance requirements of the project and/or the linear facilities, or to transfer ownership or operational control of the facility. **It is the responsibility of the project owner to contact the CPM to determine if a proposed project change should be considered a project modification pursuant to section 1769.** Implementation of a project modification without first securing Energy Commission approval may result in an enforcement action including civil penalties in accordance with Public Resources Code, section 25534.

Below is a summary of the criteria for determining the type of approval process required, reflecting the provisions of Title 20, California Code of Regulations, section 1769, at the time this compliance plan was drafted. If the Energy Commission modifies this regulation, the language in effect at the time of the requested change shall apply. Upon request, the CPM can provide sample formats of these submittals.

Amendment

The project owner shall submit a Petition to Amend the Energy Commission Decision, pursuant to Title 20, California Code of Regulations, section 1769 (a), when proposing modifications to the design, operation, or performance requirements of the project and/or the linear facilities. If a proposed modification results in an added, changed, or deleted condition of certification, or makes changes causing noncompliance with any applicable LORS, the petition will be processed as a formal amendment to the Decision, triggering public notification of the proposal, public review of the Energy Commission staff's analysis, and consideration of approval by the full Energy Commission.

Change of Ownership and/or Operational Control

Change of ownership or operational control also requires that the project owner file a petition pursuant to section 1769 (b). This process requires public notice and approval by the full Commission. The petition shall be in the form of a legal brief and fulfill the requirements of section 1769 (b).

Staff-Approved Project Modification

Modifications that do not result in additions, deletions, or changes to the conditions of certification, that are compliant with the applicable LORS, and that will not have significant environmental impacts, may be authorized by the CPM as a staff-approved project modification pursuant to section 1769 (a)(2). Once the CPM files a Notice of Determination of the proposed project modifications, any person may file an objection to the CPM's determination within 14 days of service on the grounds that the modification does not meet the criteria of section 1769 (a)(2). If there is a valid objection to the CPM's determination, the petition must be processed as a formal amendment to the Decision and must be considered for approval by the full Commission at a publically noticed Business Meeting or hearing.

Verification Change

Each condition of certification (except for the Compliance Conditions) has one or more means of verifying the project owner's compliance with the provisions of the condition. These verifications specify the actions and deadlines by which a project owner demonstrates compliance with the Energy Commission-adopted conditions. A verification may be modified by the CPM without requesting a Decision amendment if the change does not conflict with any condition of certification, does not violate any LORS, and provides an effective alternative means of verification.

EMERGENCY RESPONSE CONTINGENCY PLANNING AND INCIDENT REPORTING

To protect public health and safety and environmental quality, the conditions of certification include contingency planning and incident reporting requirements to ensure compliance with necessary health and safety practices. A well-drafted contingency plan avoids or limits potential hazards and impacts resulting from serious incidents involving personal injury, hazardous spills, flood, fire, explosions or other catastrophic events and ensures a comprehensive timely response. All such incidents must be reported immediately to the CPM and documented. These requirements are designed to build from "lessons learned," limit the hazards and impacts, anticipate and prevent recurrence, and provide for the safe and secure shutdown and re-start of the facility.

FACILITY CLOSURE

The Energy Commission cannot reasonably foresee all potential circumstances in existence when a facility permanently closes. Therefore, the closure conditions provided herein strive for the flexibility to address circumstances that may exist at some future time. Most importantly, facility closure must be consistent with all applicable Energy Commission conditions of certification and the LORS in effect at that time.

Although a non-operational facility may intend to resume operations, if it remains non-operational for longer than one year and the project owner does not present a viable plan to resume operation, the Energy Commission can conclude that closure is imminent and direct the project owner to commence closure preparations. Should the project owner effectively abandon a facility, the Energy Commission can access the required financial assurance funds to begin closure, but the owner remains liable for all associated costs.

Prior to submittal of the facility's Final Closure Plan to the Energy Commission, the project owner and the CPM will hold a meeting to discuss the specific contents of the plan. In the event that significant issues are associated with the plan's approval, the CPM will hold one or more workshops and/or the Commission may hold public hearings as part of its approval procedure.

With the exception of measures to eliminate any immediate threats to public health and safety or to the environment, facility closure activities cannot be initiated until the Energy Commission approves the Final Closure Plan and Cost Estimate, and the project owner complies with any requirements the Commission may incorporate as conditions of approval of the Final Closure Plan.

COMPLIANCE CONDITIONS OF CERTIFICATION

For the RBEP, staff proposes the Compliance Conditions of Certification below.

COM-1: **Unrestricted Access.** The project owner shall take all steps necessary to ensure that the CPM, responsible Energy Commission staff, and delegated agencies or consultants have unrestricted access to the facility site, related facilities, project-related staff, and the records maintained on-site to facilitate audits, surveys, inspections, and general or closure-related site visits. Although the CPM will normally schedule site visits on dates and times agreeable to the project owner, the CPM reserves the right to make unannounced visits at any time, whether such visits are by the CPM in person or through representatives from Energy Commission staff, delegated agencies, or consultants.

COM-2: **Compliance Record.** The project owner shall maintain electronic copies of all project files and submittals on-site, or at an alternative site approved by the CPM, for the operational life and closure of the project. The files shall also contain at least one hard copy of:

1. the facility's Application for Certification;
2. all amendment petitions and Energy Commission orders;
3. all site-related environmental impact and survey documentation;
4. all appraisals, assessments, and studies for the project;
5. all finalized original and amended structural plans and "as-built" drawings for the entire project;

6. all citations, warnings, violations, or corrective actions applicable to the project, and

7. the most current versions of any plans, manuals, and training documentation required by the conditions of certification or applicable LORS.

Energy Commission staff and delegate agencies shall, upon request to the project owner, be given unrestricted access to the files maintained pursuant to this condition.

COM-3: **Compliance Verification Submittals.** Verification lead times associated with the start of construction may require the project owner to file submittals during the AFC process, particularly if construction is planned to commence shortly after certification. The verification procedures, unlike the conditions, may be modified as necessary by the CPM.

A cover letter from the project owner or an authorized agent is required for all compliance submittals and correspondence pertaining to compliance matters. **The cover letter subject line shall identify the project by AFC number, cite the appropriate condition of certification number(s), and give a brief description of the subject of the submittal**. When submitting supplementary or corrected information, the project owner shall reference the date of the previous submittal and the condition(s) of certification applicable.

All reports and plans required by the project's conditions of certification shall be submitted in a searchable electronic format (.pdf, MS Word or Excel, etc.) and include standard formatting elements such as a table of contents identifying by title and page number each section, table, graphic, exhibit, or addendum. All report and/or plan graphics and maps shall be adequately scaled and shall include a key with descriptive labels, directional headings, a bar scale, and the most recent revision date.

The project owner is responsible for the content and delivery of all verification submittals to the CPM, whether the actions required by the verification were satisfied by the project owner or an agent of the project owner. All submittals shall be accompanied by an electronic copy on an electronic storage medium, or by e-mail, as agreed upon by the CPM. If hard copy submittals are required, please address as follows:

CPM Name, Compliance Project Manager
Redondo Beach Energy Project (RBEP) (12-AFC-03C)
California Energy Commission
1516 Ninth Street (MS-2000)
Sacramento, CA 95814

COM-4: **Pre-Construction Matrix and Tasks Prior to Start of Construction.** Prior to the start of construction, the project owner shall submit to the CPM a compliance matrix including only those conditions that must be fulfilled before the start of construction. The matrix shall be included with the project owner's first compliance submittal or prior to the first pre-construction meeting, whichever comes first, and shall be submitted in a format similar to the description below.

Site mobilization and construction activities shall not start until the following have occurred:

1. **The project owner has submitted the pre-construction matrix and all compliance verifications pertaining to pre-construction conditions of certification; and**

2. **The CPM has issued an authorization-to-construct letter to the project owner.**

The deadlines for submitting various compliance verifications to the CPM allow staff sufficient time to review and comment on, and, if necessary, also allow the project owner to revise the submittal in a timely manner. These procedures help ensure that project construction proceeds according to schedule. Failure to submit required compliance documents by the specified deadlines may result in delayed authorizations to commence various stages of the project.

If the project owner anticipates site mobilization immediately following project certification, it may be necessary for the project owner to file compliance submittals prior to project certification. In these instances, compliance verifications can be submitted in advance of the required deadlines and the anticipated authorizations to start construction. The project owner must understand that submitting compliance verifications prior to these authorizations is <u>at the owner's own risk</u>. Any approval by Energy Commission staff prior to project certification is subject to change based upon the Commission Decision, or amendment thereto, and early staff compliance approvals do not imply that the Energy Commission will certify the project for actual construction and operation.

COM-5: **Compliance Matrix.** The project owner shall submit a compliance matrix to the CPM with each MCR and ACR. The compliance matrix provides the CPM with the status of all conditions of certification in a spreadsheet format. The compliance matrix shall identify:

1. the technical area (e.g., biological resources, facility design, etc.);

2. the condition number;

3. a brief description of the verification action or submittal required by the condition;

4. the date the submittal is required (e.g., 60 days prior to construction, after final inspection, etc.);

5. the expected or actual submittal date;

6. the date a submittal or action was approved by the Chief Building Official (CBO), CPM, or delegate agency, if applicable;

7. the compliance status of each condition (e.g., “not started,” “in progress,” or “completed” (include the date); and

8. if the condition was amended, the updated language and the date the amendment was proposed or approved.

The CPM can provide a template for the compliance matrix upon request.

COM-6: **Monthly Compliance Reports and Key Events List.** The first MCR is due one month following the docketing of the project’s Decision unless otherwise agreed to by the CPM. The first MCR shall include the AFC number and an initial list of dates for each of the events identified on the Key Events List. (The Key Events List form is found at the end of this Compliance Plan.)

During project pre-construction, construction, or closure, the project owner or authorized agent shall submit an electronic searchable version of the MCR within ten business days after the end of each reporting month, unless otherwise specified by the CPM. MCRs shall be clearly identified for the month being reported. The searchable electronic copy may be filed on an electronic storage medium or by e-mail, subject to CPM approval. The compliance verification submittal condition provides guidance on report production standards, and the MCR shall contain, at a minimum:

1. a summary of the current project construction status, a revised/updated schedule if there are significant delays, and an explanation of any significant changes to the schedule;

2. documents required by specific conditions to be submitted along with the MCR; each of these items shall be identified in the transmittal letter, as well as the conditions they satisfy, and submitted as attachments to the MCR;

3. an initial, and thereafter updated, compliance matrix showing the status of all conditions of certification;

4. a list of conditions that have been satisfied during the reporting period, and a description or reference to the actions that satisfied the condition;

5. a list of any submittal deadlines that were missed, accompanied by an explanation and an estimate of when the information will be provided;

6. a cumulative list of any approved changes to the conditions of certification;

7. a list of any filings submitted to, and permits issued by, other governmental agencies during the month;

8. a projection of project compliance activities scheduled during the next two months; the project owner shall notify the CPM as soon as any changes are made to the project construction schedule that would affect compliance with conditions of certification;

9. a list of the month's additions to the on-site compliance file; and

10. a list of complaints, notices of violation, official warnings, and citations received during the month; a description of the actions taken to date to resolve the issues; and the status of any unresolved actions.

COM-7: **Annual Compliance Reports.** After construction is complete, the project owner must submit to the CPM searchable electronic ACRs instead of MCRs. ACRs shall be completed for each year of commercial operation, may be required for a specified period after decommissioning to monitor closure compliance, as specified by the CPM, and are due each year on a date agreed to by the CPM. The searchable electronic copies may be filed on an electronic storage medium or by e-mail, subject to CPM approval. Each ACR must include the AFC number, identify the reporting period, and contain the following:

1. an updated compliance matrix showing the status of all conditions of certification (fully satisfied conditions do not need to be included in the matrix after they have been reported as completed);

2. a summary of the current project operating status and an explanation of any significant changes to facility operations during the year;

3. documents required by specific conditions to be submitted along with the ACR; each of these items shall be identified in the transmittal letter with the condition it satisfies and submitted as an attachment to the ACR;

4. a cumulative list of all post-certification changes approved by the Energy Commission or the CPM;

5. an explanation for any submittal deadlines that were missed, accompanied by an estimate of when the information will be provided;

6. a list of filings submitted to, or permits issued by, other governmental agencies during the year;

7. a projection of project compliance activities scheduled during the next year;

8. a list of the year's additions to the on-site compliance file;

9. an evaluation of the Site Contingency Plan, including amendments and plan updates; and

10. a list of complaints, notices of violation, official warnings, and citations received during the year, a description of how the issues were resolved, and the status of any unresolved matters.

COM-8: Confidential Information. Any information that the project owner designates as confidential shall be submitted to the Energy Commission's Executive Director with an application for confidentiality, pursuant to Title 20, California Code of Regulations, section 2505 (a). Any information deemed confidential pursuant to the regulations will remain undisclosed, as provided in Title 20, California Code of Regulations, section 2501.

COM-9: Annual Energy Facility Compliance Fee. Pursuant to the provisions of section 25806 (b) of the Public Resources Code, the project owner is required to pay an annually adjusted compliance fee. Current compliance fee information is available on the Energy Commission's website at http://www.energy.ca.gov/siting/filing_fees.html. The project owner may also contact the CPM for the current fee information. The initial payment is due on the date the Energy Commission dockets its final Decision. All subsequent payments are due by July 1 of each year in which the facility retains its certification.

COM-10: Amendments, Staff-Approved Project Modifications, Ownership Changes, and Verification Changes. The project owner shall petition the Energy Commission, pursuant to Title 20, California Code of Regulations, section 1769, to modify the design, operation, or performance requirements of the project or linear facilities, or to transfer ownership or operational control of the facility. The CPM will determine whether staff approval will be sufficient, or whether Commission approval will be necessary. **It is the project owner's responsibility to contact the CPM to determine if a proposed project change triggers the requirements of section 1769.** Section 1769 details the required contents for a Petition to Amend an Energy Commission Decision. The only change that can be requested by means of a letter to the CPM is a request to change the verification method of a condition of certification.

Implementation of a project modification without first securing Energy Commission, or Energy Commission staff, approval may result in an enforcement action, including civil penalties, in accordance with section 25534 of the Public Resources Code. If the Energy Commission's rules regarding amendments are revised, the rules in effect at the time the change is requested shall apply.

COM-11: Reporting of Complaints, Notices, and Citations. Prior to the start of construction or closure, the project owner shall send a letter to property owners within one mile of the project, notifying them of a telephone number to contact project representatives with questions, complaints, or concerns. If the telephone is not staffed 24 hours per day, it must include automatic answering with a date and time stamp recording.

The project owner shall respond to all recorded complaints within 24 hours or the next business day. The project site shall post the telephone number on-site and make it easily visible to passersby during construction, operation, and closure. The project owner shall provide the contact information to the CPM and promptly report any disruption to the contact system or telephone number change to the CPM, who will provide it to any persons contacting him or her with a complaint.

In addition to including all complaints, notices, and citations included with the MCRs and ACRs within five days of receipt, the project owner shall report, and provide copies to the CPM of, all complaints, including noise and lighting complaints, notices of violation, notices of fines, official warnings, and citations. Complaints shall be logged and numbered. Noise complaints shall be recorded on the form provided in the **NOISE AND VIBRATION** Conditions of Certification. All other complaints shall be recorded on the complaint form (Attachment A) at the end of this Compliance Plan.

COM-12: Emergency Response Site Contingency Plan. No less than 60 days prior to the start of commercial operation, or other date agreed to by the CPM, the project owner shall submit for CPM review and approval, an Emergency Response Site Contingency Plan (Contingency Plan). The Contingency Plan shall evidence a facility's coordinated emergency response and recovery preparedness for a series of reasonably foreseeable emergency events. The CPM may require the updating of the Contingency Plan over the life of the facility. Contingency Plan elements include, but are not limited to:

1. a site-specific list and direct contact information for persons, agencies, and responders to be notified for an unanticipated event;

2. a detailed and labeled facility map, including all fences and gates, the windsock location (if applicable), the on- and off-site assembly areas, and the main roads and highways near the site;

3. a detailed and labeled map of population centers, sensitive receptors, and the nearest emergency response facilities;

4. a description of the on-site, first response and backup emergency alert and communication systems, site-specific emergency response protocols, and procedures for maintaining the facility's contingency response capabilities, including a detailed map of interior and exterior evacuation routes, and the planned location(s) of all permanent safety equipment;

5. an organizational chart including the name, contact information, and first aid/emergency response certification(s) and renewal date(s) for all personnel regularly on-site;

6. a brief description of reasonably foreseeable, site-specific incidents and accident sequences (on- and off-site), including response procedures and protocols and site security measures to maintain 24-hour site security;

7. procedures for maintaining contingency response capabilities; and

8. the procedures and implementation sequence for the safe and secure shutdown of all non-critical equipment and removal of hazardous materials and waste (see also specific conditions of certification for the technical areas of **PUBLIC HEALTH**, **SOLID WASTE MANAGEMENT**, **HAZARDOUS MATERIALS MANAGEMENT**, and **WORKER SAFETY**).

COM-13: Incident-Reporting Requirements. Within one hour, the project owner shall notify the CPM or Compliance Office Manager, by telephone and e-mail, of any incident at the power plant or appurtenant facilities that results or could result in any of the following:

1. reduction in the facility's ability to respond to dispatch (excluding forced outages caused by protective equipment or other typically encountered shutdown events);

2. health and safety impacts on the surrounding population;

3. property damage off-site;

4. response by off-site emergency response agencies;

5. serious on-site injury;

6. serious environmental damage; or

7. emergency reporting to any federal, state, or local agency.

The notice shall describe the circumstances, status, and expected duration of the incident. If warranted, as soon as it is safe and feasible, the project owner shall implement the safe shutdown of any non-critical equipment and removal of any hazardous materials and waste that pose a threat to public health and safety and to environmental quality (also, see specific conditions of certification for the technical areas of **HAZARDOUS MATERIALS MANAGEMENT** and **WASTE MANAGEMENT**).

Within one week of the incident, the project owner shall submit to the CPM a detailed incident report, which includes, as appropriate, the following information:

1. a brief description of the incident, including its date, time, and location;

2. a description of the cause of the incident, or likely causes if it is still under investigation;

3. the location of any off-site impacts;

4. description of any resultant impacts;

5. a description of emergency response actions associated with the incident;

6. identification of responding agencies;

7. identification of emergency notifications made to federal, state, and/or local agencies;

8. identification of any hazardous materials released and an estimate of the quantity released;

9. a description of any injuries, fatalities, or property damage that occurred as a result of the incident;

10. fines or violations assessed or being processed by other agencies;

11. name, phone number, and e-mail address of the appropriate facility contact person having knowledge of the event; and

12. corrective actions to prevent a recurrence of the incident.

The project owner shall maintain all incident report records for the life of the project, including closure. After the submittal of the initial report for any incident, the project owner shall submit to the CPM copies of incident reports within 24 hours of a request.

COM-14: **Non-operation.** If the facility ceases operation temporarily, either planned or unplanned, for longer than one week (or other CPM-approved date), but less than three months (or other CPM-approved date), the project owner shall notify the CPM, interested agencies, and nearby property owners. Notice of planned non-operation shall be given at least two weeks prior to the scheduled date. Notice of unplanned non-operation shall be provided no later than one week after non-operation begins.

For any non-operation, a Repair/Restoration Plan for conducting the activities necessary to restore the facility to availability and reliable and/or improved performance shall be submitted to the CPM within one week after notice of non-operation is given. If non-operation is due to an unplanned incident, temporary repairs and/or corrective actions may be undertaken before the Repair/Restoration Plan is submitted. The Repair/Restoration Plan shall include:

1. identification of operational and non-operational components of the plant;

2. a detailed description of the repair or restoration activities;

3. a proposed schedule for completing the repair or restoration activities;

4. an assessment of whether or not the proposed activities would require changing, adding, and/or deleting any conditions of certification, and/or would cause noncompliance with any applicable LORS; and

5. planned activities during non-operation, including any measures to ensure continued compliance with all conditions of certification and LORS;

Written updates to the CPM for non-operational periods, until operation resumes, shall include:

1. progress relative to the schedule;
2. developments that delayed or advanced progress or that may delay or advance future progress;
3. any public, agency, or media comments or complaints; and
4. projected date for the resumption of operation.

During non-operation, all applicable conditions of certification and reporting requirements remain in effect. If, after one year from the date of the project owner's last report of productive Repair/Restoration Plan work, the facility does not resume operation or does not provide a plan to resume operation, the Executive Director may assign suspended status to the facility and recommend commencement of permanent closure activities. Within 90 days of the Executive Director's determination, the project owner shall do one of the following:

1. If the facility has a closure plan, the project owner shall update it and submit it for Energy Commission review and approval.
2. If the facility does not have a closure plan, the project owner shall develop one consistent with the requirements in this Compliance Plan and submit it for Energy Commission review and approval.

COM-15: Facility Closure Planning. To ensure that a facility's eventual permanent closure and long-term maintenance do not pose a threat to public health and safety and/or to environmental quality, the project owner shall coordinate with the Energy Commission to plan and prepare for eventual permanent closure.

A. Provisional Closure Plan and Estimate of Permanent Closure Costs

To assure satisfactory long-term site maintenance and adequate closure for "the whole of a project," the project owner shall submit a Provisional Closure Plan and Cost Estimate for CPM review and approval within 60 days after the project owner either initiates commercial operation of the facility, or puts into operation or effect a modification approved by the Energy Commission. The Provisional Closure Plan and Cost Estimate shall consider applicable final closure plan requirements, including interim and long-term, post-closure site maintenance costs, and reflect:

1. facility closure costs at a time in the facility's projected life span when the mode and scope of facility operation would make permanent closure the most expensive;
2. the use of an independent third party to carry out the permanent closure; and
3. no use of salvage value to offset closure costs.

The Provisional Closure Plan and Cost Estimate shall provide for a phased closure process and include but not be limited to:

1. comprehensive scope of work and itemized budget;
2. closure plan development costs;
3. dismantling and demolition;
4. recycling and site clean-up;
5. mitigation and monitoring direct, indirect, and cumulative impacts;
6. site remediation and/or restoration;
7. interim operation and post-closure monitoring and maintenance, including long-term equipment replacement costs; and
8. contingencies.

The project owner shall include an updated Provisional Closure Plan and Cost Estimate in every fifth-year ACR for CPM review and approval. Each updated Provisional Closure Plan and Cost Estimate shall reflect the most current regulatory standards, best management practices, and applicable LORS.

B. Final Closure Plan and Cost Estimate

At least three years prior to initiating a permanent facility closure, the project owner shall submit for Energy Commission review and approval, a Final Closure Plan and Cost Estimate, which includes any long-term, post-closure site maintenance and monitoring. Final Closure Plan and Cost Estimate contents include, but are not limited to:

1. a statement of specific Final Closure Plan objectives;
2. a statement of qualifications and resumes of the technical experts proposed to conduct the closure activities, with detailed descriptions of previous power plant closure experience;
3. identification of any facility-related installations not part of the Energy Commission certification, designation of who is responsible for these, and an explanation of what will be done with them after closure;
4. a comprehensive scope of work and itemized budget for permanent plant closure and long-term site maintenance activities, with a description and explanation of methods to be used, broken down by phases, including, but not limited to:
    a. dismantling and demolition;
    b. recycling and site clean-up;

c. impact mitigation and monitoring;

d. site remediation and/or restoration;

e. post-closure maintenance; and

f. contingencies.

5. a revised/updated Final Cost Estimate for all closure activities, by phases, including long-term, post-closure site monitoring and maintenance costs, and replacement of long-term post-closure equipment;

6. a schedule projecting all phases of closure activities for the power plant site and all appurtenances constructed as part of the Energy Commission-certified project;

7. an electronic submittal package of all relevant plans, drawings, risk assessments, and maintenance schedules and/or reports, including an above- and below-ground infrastructure inventory map and registered engineer's or delegate CBO's assessment of demolishing the facility; additionally, for any facility that permanently ceased operation prior to submitting a Final Closure Plan and Cost Estimate and for which only minimal or no maintenance has been done since, a comprehensive condition report focused on identifying potential hazards;

8. all information additionally required by the facility's conditions of certification applicable to plant closure;

9. an equipment disposition plan, including:

    a. recycling and disposal methods for equipment and materials; and

    b. identification and justification for any equipment and materials that will remain on-site after closure;

10. a site disposition plan, including but not limited to:

    a. proposed rehabilitation, restoration, and/or remediation procedures, as required by the conditions of certification and applicable LORS,

    b. long-term site maintenance activities, and

    c. anticipated future land-use options after closure;

11. identification and assessment of all potential direct, indirect, and cumulative impacts and proposal of mitigation measures to reduce significant adverse impacts to a less-than-significant level; potential impacts to be considered shall include, but not be limited to:

    a. traffic

b. noise and vibration

c. soil erosion

d. air quality degradation

e. solid waste

f. hazardous materials

g. waste water discharges

h. contaminated soil

12. identification of all current conditions of certification, LORS, federal, state, regional, and local planning efforts applicable to the facility, and proposed strategies for achieving and maintaining compliance during closure;

13. updated mailing list or listserv of all responsible agencies, potentially interested parties, and property owners within one mile of the facility;

14. identification of alternatives to plant closure and assessment of the feasibility and environmental impacts of these; and

15. description of and schedule for security measures and safe shutdown of all non-critical equipment and removal of hazardous materials and waste (see conditions of certification for **PUBLIC HEALTH**, **SOLID WASTE MANAGEMENT**, **HAZARDOUS MATERIALS MANAGEMENT**, and **WORKER SAFETY**).

If an Energy Commission-approved Final Closure Plan and Cost Estimate are not implemented within one year of its approval date, it shall be updated and re-submitted to the Commission for supplementary review and approval. If a project owner initiates but then suspends closure activities, and the suspension continues for longer than one year, or subsequently abandons the facility, the Energy Commission may access the required financial assurance funds to complete the closure. The project owner remains liable for all costs of contingency planning and closure.

COM-16: Financial Assurance for Closure and Post-Closure Care. The project owner shall provide financial assurances to the Energy Commission, guaranteeing adequate and readily available funds to finance interim operation, facility closure, and post-closure site care, as needed.

Within 30 days following CPM approval of the project owner’s first Provisional Closure Plan and Cost Estimate, pursuant to **COM-15**, the project owner shall establish an irrevocable closure surety bond and standby trust fund. The surety bond shall guarantee the project owner’s performance of closure, as specified in the Provisional Closure Plan, and shall be in the amount of the CPM-approved Provisional Closure Cost Estimate. The standby trust fund shall have as its beneficiary the California State Energy Resources Conservation and Development Commission.

Within 60 days of CPM approval of each sequential Provisional Cost Estimate prepared pursuant to **COM-15**, the amount of the surety bond shall be adjusted to reflect any change in the estimate. Within 30 days of making the adjustment, the project owner shall submit for CPM review and approval documentation of the adjustment. Each year, on the anniversary of the establishment of the surety bond and standby trust fund, the project owner shall provide to the CPM documentation from the sureties of the bond's current value.

Using surety bond funds to implement closure may not fully satisfy the project owner's obligations under these conditions.

Provisions from California Bond and Undertaking Law, as well as other statutory and case law, may be applicable.

KEY EVENTS LIST

PROJECT: ______________________________

DOCKET #: ______________________________

COMPLIANCE PROJECT MANAGER: ______________________________

EVENT DESCRIPTION	DATE
Certification Date	
Obtain Site Control	
On-line Date	
POWER PLANT SITE ACTIVITIES	
Start Site Assessment/Pre-construction	
Start Site Mobilization/Construction	
Begin Pouring Major Foundation Concrete	
Begin Installation of Major Equipment	
Completion of Installation of Major Equipment	
First Combustion of Turbine	
Obtain Building Occupation Permit	
Start Commercial Operation	
Complete All Construction	
TRANSMISSION LINE ACTIVITIES	
Start Transmission Line Construction	
Synchronization with Grid and Interconnection	
Complete Transmission Line Construction	
FUEL SUPPLY LINE ACTIVITIES	
Start Gas Pipeline Construction and Interconnection	
Complete Gas Pipeline Construction	
WATER SUPPLY LINE ACTIVITIES	
Start Water Supply Line Construction	
Complete Water Supply Line Construction	

Compliance Table 1:
Summary of Compliance Conditions of Certification

Condition Number	Subject	Description
COM-1	Unrestricted Access	The project owner shall grant Energy Commission staff and delegate agencies or consultants unrestricted access to the power plant site.
COM-2	Compliance Record	The project owner shall maintain project files on-site. Energy Commission staff and delegate agencies shall be given unrestricted access to the files.
COM-3	Compliance Verification Submittals	The project owner is responsible for the delivery and content of all verification submittals to the CPM, whether conditions were satisfied by work performed by the project owner or his agent.
COM-4	Pre-construction Matrix and Tasks Prior to Start of Construction	Construction shall not commence until the all of the following activities/submittals have been completed: • Project owner has submitted a pre-construction matrix identifying conditions to be fulfilled before the start of construction; • Project owner has completed all pre-construction conditions to the CPM's satisfaction; and • CPM has issued a letter to the project owner authorizing construction.
COM-5	Compliance Matrix	The project owner shall submit a compliance matrix (in a spreadsheet format) with each Monthly and Annual Compliance Report, which includes the current status of all Compliance Conditions of Certification.
COM-6	Monthly Compliance Reports and Key Events List	During construction, the project owner shall submit Monthly Compliance Reports (MCRs) which include specific information. The first MCR is due one month following the docketing of the Energy Commission's Decision on the project and shall include an initial list of dates for each of the events identified on the Key Events List.
COM-7	Annual Compliance Reports	After construction ends, and throughout the life of the project, the project owner shall submit Annual Compliance Reports (ACRs) instead of Monthly Compliance Reports.
COM-8	Confidential Information	Any information the project owner designates as confidential shall be submitted to the Energy Commission's Executive Director with a request for confidentiality.
COM-9	Annual Fees	Required payment of the Annual Energy Facility Compliance Fee.
COM-10	Amendments, Staff-Approved Project Modifications, Ownership Changes, and Verification Changes	The project owner shall petition the Energy Commission to delete or change a condition of certification, modify the project design or operational requirements, and/or transfer ownership or operational control of the facility.
COM-11	Reporting of Complaints, Notices, and Citations	Prior to the start of construction, the project owner shall provide all property owners within a one-mile radius a telephone number to contact project representatives with questions, complaints, or concerns. The project owner shall respond to all recorded complaints within 24 hours. Within ten days of receipt, the project owner shall report to the CPM all notices, complaints, violations, and citations.

Compliance Table 1:
Summary of Compliance Conditions of Certification

Condition Number	Subject	Description
COM-12	Site Contingency Plan	No less than 60 days prior to the start of commercial operation, the project owner shall submit an on-site Contingency Plan to ensure protection of public health and safety and environmental quality during a response to an emergency.
COM-13	Incident-Reporting Requirements	The project owner shall notify the CPM within one hour of an incident and submit a detailed incident report within one week, maintain records of incident report, and submit public health and safety documents with employee training provisions.
COM-14	Non-Operation	No later than two weeks prior to a facility's planned non-operation, or no later than two weeks after the start of unplanned non-operation, the project owner shall notify the CPM, interested agencies and nearby property owners of this status. During non-operation, the project owner shall provide written updates to the CPM.
COM-15	Facility Closure Planning	Within 60 days after initiating commercial operation, the project owner shall submit a Provisional Closure Plan and Cost Estimate for permanent closure. At least three years prior to closing, the project owner shall submit a Final Closure Plan and Cost Estimate.
COM-16	Financial Assurance for Closure and Post-Closure Care	Within 30 days following approval of the Provisional Closure Plan and Cost Estimate or the Final Closure Plan and Cost Estimate (whichever is most recent), the project owner shall establish a CPM-approved closure financial assurance mechanism to ensure the availability of funds needed to adequately perform facility closure and post-closure site care.

ATTACHMENT A
COMPLAINT REPORT AND RESOLUTION FORM

COMPLAINT LOG NUMBER:________________________________ DOCKET NUMBER:____________

PROJECT NAME:____

COMPLAINANT INFORMATION

NAME:____ PHONE NUMBER:____________________________

ADDRESS:____

COMPLAINT

DATE COMPLAINT RECEIVED:_______________________ TIME COMPLAINT RECEIVED:___________________

COMPLAINT RECEIVED BY: _________________________ ☐ TELEPHONE ☐ IN WRITING (COPY ATTACHED)

DATE OF FIRST OCCURRENCE:_____________________

DESCRIPTION OF COMPLAINT (INCLUDING DATES, FREQUENCY, AND DURATION):________________________

____

____

FINDINGS OF INVESTIGATION BY PLANT PERSONNEL:____

____

____

DOES COMPLAINT RELATE TO VIOLATION OF A CEC REQUIREMENT? ☐ YES ☐ NO

DATE COMPLAINANT CONTACTED TO DISCUSS FINDINGS:____

DESCRIPTION OF CORRECTIVE MEASURES TAKEN OR OTHER COMPLAINT RESOLUTION:_________________

____

____

DOES COMPLAINANT AGREE WITH PROPOSED RESOLUTION? ☐ YES ☐ NO

IF NOT, EXPLAIN:____

____

CORRECTIVE ACTION

IF CORRECTIVE ACTION NECESSARY, DATE COMPLETED:____

DATE FIRST LETTER SENT TO COMPLAINANT (COPY ATTACHED):___________________________________

DATE FINAL LETTER SENT TO COMPLAINANT (COPY ATTACHED):___________________________________

OTHER RELEVANT INFORMATION:____

____

____

"This information is certified to be correct."

PLANT MANAGER SIGNATURE:_______________________________________ DATE:______________

(ATTACH ADDITIONAL PAGES AND ALL SUPPORTING DOCUMENTATION, AS REQUIRED)

Preparation Team

REDONDO BEACH ENERGY PROJECT (12-AFC-03)
PRELIMINARY STAFF ASSESSMENT

PREPARATION TEAM

Executive Summary .... Patricia Kelly

Introduction .... Patricia Kelly

Project Description .... Patricia Kelly

Environmental Assessment

Air Quality.. Joseph Hughes

Alternatives .... Negar Vahidi and Scott Debauche

Biological Resources.. Andrea Martine

Cultural Resources.............................. Gabriel Roark, Thomas Gates, and Melissa Mourkas

Hazardous Materials Management .... Brett Fooks, PE and Geoff Lesh, PE

Land Use.. Steven Kerr

Noise and Vibration .... Edward Brady and Shahab Khoshmashrab

Public Health .... Huei-An (Ann) Chu, Ph.D.

Socioeconomics .... Lisa Worrall

Soil and Water Resources... Abdel-Karim Abulaban, P.E.

Traffic and Transportation .... John Hope

Transmission Line Safety and Nuisance .... Obed Odoemelam, Ph.D.

Visual Resources .... Jeff Juarez

Engineering Assessment

Facility Design .... Edward Brady and Shahab Khoshmashrab

Geology and Paleontology .... Casey Weaver, CEG

Power Plant Efficiency.. Edward Brady and Shahab Khoshmashrab

Power Plant Reliability.. Edward Brady and Shahab Khoshmashrab

Transmission System Engineering .... Sudath Edirisuriya and Ean O’Neill

Waste Management ...Ellie Townsend-Hough

Worker Safety and Fire Protection .... Ellie Townsend-Hough

Compliance Conditions and Compliance Monitoring Plan............... Camille Remy-Obad

Project Assistant.. April Dearbaugh