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California Coastal Commission 30413(d) Report -- Final Approved Report

Additional submitted attachment is included below.

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September 15, 2016

Janea Scott
Commissioner and Presiding Member
California Energy Commission
1516 Ninth Street
Sacramento, California 95814

RE: Coastal Commission's 30413(d) Report for the Proposed NRG Energy Center Oxnard, LLC Puente Power Project – Application for Certification #15-AFC-01

Dear Ms. Scott:

On September 9, 2016, by a unanimous vote, the California Coastal Commission, at a public hearing, approved forwarding this letter and the attached report for the California Energy Commission's ("CEC's") consideration. The report assesses the proposed Puente Power Project ("P3") for conformity with the Chapter 3 policies of the Coastal Act and the policies of the City of Oxnard's certified Local Coastal Program ("LCP"). The assessment provides findings and recommended conditions that will allow the proposed project to be built and operated consistent, to the extent feasible, with those policies.

The project, proposed by NRG Energy Center Oxnard, LLC (hereafter "NRG" or "the applicant"), consists of the construction of the P3 facility, a single-fuel combustion turbine generator producing up to 262 megawatts (MW) of electricity, and the retirement and demolition of two gas-fired steam-generating units (Units 1 and 2) at the existing Mandalay Generating Station (MGS). Retirement of Units 1 and 2 would end the current plant's reliance on its "once-through cooling" (OTC) system that uses large volumes of seawater to cool the existing generating units.

Pursuant to the Warren-Alquist Act, the CEC has sole permitting authority for locating or modifying power plants with a greater than 50-MW capacity, including those located in the coastal zone. Nevertheless, section 30413(d) of the Coastal Act expressly authorizes the Coastal Commission to participate in the CEC's proceedings and provide findings with respect to specific measures to bring a power plant project located within the coastal zone into conformity with Coastal Act and LCP policies. Warren-Alquist Act section 25523(b) requires the CEC to include the Coastal Commission's recommended specific provisions in its final project decision unless it finds that they are infeasible or would cause greater adverse environmental impacts. Staff of the two Commissions have developed a Memorandum of Agreement that describes the manner in which the two Commissions will coordinate their respective reviews and identifies the process for the CEC to consider the Coastal Commission's findings and recommended specific provisions.

For this proposed project, the Coastal Commission has focused its Coastal Act section 30413(d) review on the project's potential adverse effects in five key issue areas: (1) land use, (2) environmentally sensitive habitat areas ("ESHA") and wetlands, (3) hazards associated with flood, tsunami, and sea level rise, (4) wastewater management, and (5) public access to the shoreline. The attached report includes several specific provisions the Coastal Commission recommends the CEC adopt as part of any final approval of 15-AFC-01 to ensure the proposed project is consistent to the maximum extent feasible with relevant Coastal Act and LCP policies.

Thank you for your consideration of the Coastal Commission's findings and recommendations.

Sincerely,

Susan McHanock, Chief Deputy Director for

JOHN AINSWORTH
Acting Executive Director
California Coastal Commission

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Coastal Commission Report
to
California Energy Commission
on
Application for Certification 15-AFC-01
– NRG Puente Power Project –

Reviewed pursuant to
Coastal Act Section 30413(d)

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I. FINDINGS AND RECOMMENDED SPECIFIC PROVISIONS

A. PROJECT DESCRIPTION

The Mandalay Generating Station (MGS) is an existing electrical generating facility located in the coastal zone in the City of Oxnard (**Exhibits 1, 2**). It is owned and operated by NRG Energy Center Oxnard, LLC (hereafter, either "the applicant" or "NRG"). The power plant site covers about 36 acres in the northwest portion of the City. The site is bordered by sand dunes, a beach area and the Pacific Ocean to the west, McGrath State Park to the north, Harbor Blvd. to the east, and the Southern California Edison (SCE) McGrath Peaker Plant site, an oil storage and distribution facility, and Mandalay County Park to the south (**Exhibit 2**). A switchyard within the site is owned and operated by SCE. Extensive agricultural areas occur inland of the MGS, and the nearest existing residential area is the Oxnard Shores mobile home park approximately one mile south of the P3 site. An approved residential development, the North Shore at Mandalay Bay, scheduled for construction beginning in 2016, would be approximately half a mile from the P3.

The existing MGS includes three operational electrical generating units. The existing Units 1 and 2 (430-megawatt combined generating capacity) are cooled using a "once-through cooling" process in which NRG pumps in up to 254 million gallons per day of ocean water conveyed to the site via a 2.5-mile long canal ("Edison Canal", "Mandalay Canal") connecting to the Channel Islands Harbor. As the seawater is pumped through the facility, it removes excess heat from the generating units and is then discharged as wastewater back into the Pacific Ocean via a concrete and rock-lined outfall structure on the beach immediately seaward of the MGS (see **Exhibits 2-4**). Units 1 and 2 are subject to the State Water Resources Control Board's Statewide Water Quality Control Policy on the Use of Coastal and Estuarine Waters for Power Plant Cooling ("Once-Through Cooling Policy"), which requires that pumping of ocean water for cooling at the MGS be greatly reduced or eliminated by December 2020. A third existing generating unit (Unit 3) consists of an air-cooled, 130-MW gas combustion turbine that does not require once-through cooling.

Proposed Puente Project ("P3")

In April 2015, NRG submitted its Application for Certification ("AFC") to the Energy Commission. NRG is proposing to construct a new, 262-megawatt (MW) generating unit and associated facilities on approximately 3 acres of the MGS site (**Exhibit 3**). All construction laydown and parking areas would also be within the MGS site. If the new P3 generating unit is approved and developed, the existing MGS Units 1 and 2 would be retired and demolished. The existing Unit 3 would be retained and continue to operate. The proposed P3 is more fully described in the CEC's Preliminary Staff Assessment ("PSA"), available at the following web links:

PSA Part 1: http://docketpublic.energy.ca.gov/PublicDocuments/15-AFC-01/TN211885-1_20160620T131522_Revised_P_r_e_l_i_m_in_a_r_y_S_t_a_ff_A_s_s_e_s_s_m_e_n_t.pdf;

PSA Part 2: http://docketpublic.energy.ca.gov/PublicDocuments/15-AFC-01/TN211885-2_20160620T131526__Revised_P_r_e_l_i_m_in_a_r_y_S_t_a_ff_A_s_s_e_s_s_m_e_n_t.pdf.

The main project components include the following:

- A single gas-fired combustion turbine generator (262 MW net generating capacity) providing fast-start, peaking generation capability;
- A 188-foot-tall exhaust stack;
- Four 100-foot-tall transmission line poles connecting the new power block to the existing SCE switchyard;
- Extensions of existing water, storm drain, fire water loop septic and gas lines to service the new generating unit;
- Decommissioning of the existing MGS Units 1 and 2, and demolition and removal of the power block structures and exhaust stacks, once the new generating unit is built and operational.

The proposed new generating unit would run on natural gas supplied by existing pipelines, but would require construction of a new gas metering station adjacent to the P3 site and a new pipeline extending approximately 500 feet from the metering station to the generating unit. The proposed unit would connect to the existing SCE switchyard using one of the breaker positions vacated by the retirement of MGS Units 1 and 2. The new generating facility would be air-cooled and would therefore eliminate the use of ocean water for once-through cooling at MGS.

NRG proposes to construct the P3 over a 21-month period between October 2018 and June 2020. Commercial operation of P3 is anticipated by June 2020. Decommissioning of Units 1 and 2 is proposed to begin by December 2020, with demolition activities beginning by late 2021 and lasting approximately 15 months. The CEC's review anticipates a power plant operating life of 30 years for the P3, extending between 2020 and 2050.

Alternatives

The PSA evaluates a variety of project alternatives, including a "No-Project" alternative, a number of off-site locations, and two on-site project reconfigurations (see PSA beginning page 6.1-1). Several of the key alternatives are as follows:

- *No-Project Alternative*: Not constructing the P3 would avoid several environmental impacts, including impacts to coastal wetlands, but would not fulfill NRG's project objectives.
- *Del Norte/Fifth Street Off-site Alternative*: Constructing the project at this location in eastern Oxnard, five miles inland of the Coastal Zone, would avoid hazards from flooding, sea level rise and tsunamis (see Section I.E, below) and impacts to coastal wetlands, but would result in potentially significant, unavoidable impacts to aviation at a nearby airport due to thermal plumes from the power plant.
- *Ormond Beach Area Off-site Alternative*: Constructing the project at an undeveloped (but cleared and graded) industrial site in southern Oxnard, north of the existing Ormond Beach Generating Station and approximately 0.75 miles inland from the ocean, would avoid coastal hazards and impacts to coastal wetlands. The site is privately-owned and not currently under NRG's control.

- *On-Site Project Reconfiguration*: The PSA also identifies two additional locations within the MGS site where the P3 could be located which would avoid impacts to coastal wetlands (see **Exhibit 5**). The first location, in the northeastern portion of the MGS, is a paved area currently used for parking. The second location, in the center of the site between Units 1 and 2 and the SCE switchyard, includes paved areas and an existing warehouse which would have to be dismantled. No feasibility issues are identified for this alternative.

The alternatives analysis contained in the PSA determines that at least two alternatives -- the off-site Ormond Beach Area location and the on-site reconfigurations – would be environmentally superior to the proposed project, but stops short of determining whether these alternatives would indeed be feasible.

The PSA assumes that under all alternatives other than the proposed project the existing MGS Units 1 and 2 would remain in place, even after the cessation of operations in 2020. In effect, any alternative other than the proposed project is immediately put at a disadvantage because it is assumed that none of the benefits of the removal of the existing facility would be realized. In conversation with Commission staff, City of Oxnard representatives have stated that, if the MGS Units 1 and 2 were to remain in place following the 2020 shutdown, the City would consider declaring the structures a nuisance under state law and pursue all means of requiring their demolition.[1] The Commission urges the CEC to reconsider its baseline for evaluating project alternatives, taking into account the likelihood that the existing MGS Units 1 and 2 would be removed even in the absence of the P3.

B. Regulatory Framework and Standard of Review

Pursuant to the Warren-Alquist Act, the CEC has exclusive siting authority over thermal electric power plants of 50 megawatts or greater capacity proposed to be built in California. According to section 25500 of the Warren-Alquist Act, "The issuance of a certificate by the [Energy] commission shall be in lieu of any permit, certificate, or similar document required by any state, local or regional agency, or federal agency to the extent permitted by federal law, for such use of the site and related facilities, and shall supersede any applicable statute, ordinance, or regulation of any state, local, or regional agency, or federal agency to the extent permitted by federal law." Section 25523(a) of the Warren-Alquist Act additionally requires the CEC to assess the manner in which the proposed facility is to be designed, sited, and operated in order to protect environmental quality and assure public health and safety. Moreover, section 25523(d)(1) of that Act requires that the CEC make findings regarding the conformity of the proposed project with all applicable laws, including federal laws, such as the Coastal Zone Management Act.

The CEC evaluates and makes its determination regarding proposed facilities through its Application for Certification (AFC) process. When the CEC is considering licensing a facility pursuant to its AFC process, it is the lead state agency for purposes of the California Environmental Quality Act (CEQA), and the CEC's Preliminary and Final Staff Assessments (PSA, FSA) include analyses similar to those normally provided in an Environmental Impact Report (EIR). The June 2016 PSA provides the CEC staff analysis of the proposed project,

[1] C. Williamson, City of Oxnard, personal communication, July 26 and August 18, 2016.

examines engineering, environmental, public health, and safety aspects of the facility, and includes proposed conditions of certification, which are similar to mitigation measures identified in an EIR.

While the CEC has exclusive jurisdiction over siting proposed power plants as described above, both the Coastal Act and the Warren-Alquist Act provide a role for the Coastal Commission to play in the CEC's review of power plants proposed to be located in the coastal zone. Both Acts include mechanisms authorizing the Coastal Commission to evaluate whether the proposal conforms to Coastal Act policies and to inform the CEC of the results of this evaluation. Section 30413(d) of the Coastal Act requires the Coastal Commission to 1) "participate in proceedings" that the CEC undertakes pursuant to its siting authority "with respect to any thermal powerplant…to be located…within the coastal zone," and 2) submit to the CEC a report (hereinafter, the "30413(d) report") on the proposed project's conformity with the Coastal Act's resource protection and use policies, and the policies and implementing ordinances of the certified local coastal program ("LCP") (in this case, the certified LCP of the City of Huntington Beach). Additionally, Warren-Alquist Act Section 25523(b) requires the CEC to include in its decision on the AFC any "specific provisions" provided by the Coastal Commission in its 30413(d) report to bring the proposed project into conformity with the policies of the Coastal Act. That section also establishes that the CEC may omit the specific provisions of the Coastal Commission's report only if the CEC finds that adopting the provisions would result in greater adverse impact on the environment or that such provisions would not be feasible. Staff of the two Commissions have prepared a Memorandum of Agreement that describes the manner in which the two Commissions will coordinate their respective reviews and identifies the process for the CEC to consider the Coastal Commission's findings and recommended specific provisions.

Coastal Act section 30413(d) directs that the Coastal Commission's report consider and make findings regarding the following:

> *(1) The compatibility of the proposed site and related facilities with the goal of protecting coastal resources.*
>
> *(2) The degree to which the proposed site and related facilities would conflict with other existing or planned coastal-dependent land uses at or near the site.*
>
> *(3) The potential adverse effects that the proposed site and related facilities would have on aesthetic values.*
>
> *(4) The potential adverse environmental effects on fish and wildlife and their habitats.*
>
> *(5) The conformance of the proposed site and related facilities with certified local coastal programs in those jurisdictions, which would be affected by any such development.*
>
> *(6) The degree to which the proposed site and related facilities could reasonably be modified so as to mitigate potential adverse effects on coastal resources, minimize*

conflict with existing or planned coastal-dependent uses at or near the site, and promote the policies of this division.

(7) Such other matters as the commission deems appropriate and necessary to carry out this division.

This report is the Coastal Commission's analysis of the proposed project's conformity with the Chapter 3 policies of the Coastal Act and the certified LCP. For this proposed project, the Coastal Commission has focused on the following issue areas: (1) land use, (2) wetlands and environmentally sensitive habitat areas (ESHA), (3) flood, tsunami, and sea level rise, (4) wastewater management, and (5) public access and recreation. The Coastal Commission's analysis relies largely on the information contained in the CEC Preliminary Staff Assessment ("PSA"), the evidentiary record of this AFC proceeding that has been compiled thus far, and on information identified in the Substantive File Documents described in Attachment A to this report. To ensure the CEC has the full record necessary to adopt the Coastal Commission's recommended provisions, Coastal Commission staff will docket separately those relevant documents identified as Substantive File Documents.

C. LAND USE

NRG proposes to construct the P3 on approximately 3 acres of the MGS site (**Exhibit 3**). As noted in the PSA's Land Use Section (page 4.6-4), the City's General Plan and Coastal Land Use Plan[2] designate the site as "Public Utility/Energy Facility" (PUE), with allowable uses including large electrical generating and transmission facilities and infrastructure. The Oxnard Coastal Zoning Ordinance identifies the P3 site as within the Coastal Energy Facilities (EC) sub-zone, which is intended to "provide areas that allow for siting, construction, modification and maintenance of power generating facilities and electrical substations consistent with Policies 51, 52, 54, 55 and 56 of the Oxnard coastal land use plan." As summarized in Coastal Zoning Ordinance Section 17-20(A), the following Coastal Act provisions and Land Use Plan policies apply specifically to the EC sub-zone:

(1) *Coastal dependent energy facilities shall be encouraged to locate or expand within existing sites and shall be permitted reasonable long-term growth, where consistent with this article. (Coastal Act Section 30260)*

(2) *All new energy-related development shall conform to the air quality regulations set forth by the Ventura County Air Pollution Control District, the air quality management plan and new source review rule 26. (Policy 29)*

(3) *Energy related development shall not be located in coastal resource areas including sensitive habitats, recreational areas and archaeological sites. All development adjacent to these resource areas or agricultural areas shall be designed to mitigate any adverse impacts. (Policy 52)*

(4) *All new energy-related development shall be located and designed to minimize adverse effects upon public access to the beach. (Policy 54)*

[2] The coastal development policies and standards that apply to the subject project site are found in the two documents that make up the City of Oxnard's Local Coastal Program (LCP), namely the Coastal Land Use Plan (effectively certified in May 1982) and Coastal Zoning Ordinance (effectively certified in March 1985).

(5) No energy related development shall be located seaward of the 100 year flood/wave run-up line as designated by the U.S. Department of Housing Insurance Program Administration and the land use map of the Oxnard coastal land use plan. (Policy 56)

(6) Wastewater from any energy related facilities shall be treated as necessary and put to reuse including, but not limited to the following:

(a) Re-injection into the aquifer or ground water recharge system; and

(b) Recycling for industrial, agricultural or urban use. (Policy 64)

On June 7, 2016, the Oxnard City Council approved an amendment to the City of Oxnard General Plan to prohibit power generation facilities of greater than 50-MW capacity in areas subject to coastal hazards, including the MGS and P3 site. The General Plan amendment became effective on July 7, 2016. The City has indicated that it will seek an amendment to its certified LCP which would incorporate this prohibition. However, no proposed LCP amendment has yet been submitted to or approved by the Coastal Commission. Thus, the proposed P3 generating plant remains a conditionally-permitted use of the Coastal Energy Facilities (EC) sub-zone, and existing LCP policies governing coastal hazards still apply for purposes of the Commission's review under Coastal Act Section 30413(d).

As proposed, the P3 project would conflict with several land use policies applicable to the EC sub-zone. The proposed project location in the northwestern portion of the MGS would place the P3 within an area meeting the definition of a coastal wetland under the LCP and Coastal Act. The project could also result in indirect adverse impacts to adjacent wetlands and environmentally sensitive habitat area, both in direct conflict with LUP Policy 52 and other LCP policies. Additionally, the proposed discharge of wastewater to the beach via an existing outfall would interfere with public access to the beach and pose a potential threat to the beach nesting areas of sensitive avian species, contrary to LUP Policies 52 and 54. The proposed discharge would also fail to meet the mandate of LUP Policy 64 to treat and reuse wastewater from an energy-related facility. These inconsistencies with LCP land use policies are described more fully in Sections I.D, I.F and I.G, below, as are the Commission's recommended specific provisions necessary to achieve consistency with relevant Coastal Act and LCP policies.

Wastewater Outfall Structure

The existing wastewater outfall structure is located on a separate, NRG-owned parcel immediately seaward of the MGS site (**Exhibits 3, 4**). The outfall consists of a concrete discharge structure and riprap-lined channel cutting across the beach; a chain link fence along the crest of the riprap and behind the concrete discharge point is intended to limit access to the structure. Unlike the MGS site proper, the beach parcel is identified in the Oxnard Coastal Zoning Ordinance (CZO) as within the Coastal Recreation (RC) sub-zone. The purpose of the RC sub-zone is "to provide open space for various forms of outdoor recreation of either a public or private nature … which will protect and enhance areas which have both active and passive recreation potential" (CZO Sec. 37-2.13.1). As summarized in Coastal Zoning Ordinance Section 37-2.13.2, permitted and conditional uses within this sub-zone are limited to recreational and educational activities, along with infrastructure to support such uses (e.g., parking, campgrounds and picnic areas, boat launches, etc.). The wastewater outfall, which pre-dates the certification of the LCP, is a legal non-conforming structure within the RC sub-zone. Nonetheless, CZO Section 37-4.6.1 "provides for the administration of nonconforming buildings

and uses in order to promote the public health, safety and general welfare, and to bring such buildings and uses into conformity with the goals and policies of the Oxnard Coastal Land Use Plan," and is intended to prevent the expansion of nonconforming uses, establish circumstances under which they may be continued, and "provide for the removal, correction or change" of such uses. The proposed reuse of the outfall structures to serve the P3 would represent the extension of a non-conforming use. The Commission urges the CEC to consider alternative approaches to wastewater handling that would allow for the decommissioning and removal of the non-conforming structures, consistent with the goals and policies of the LCP. As described in Section I.G, below, the Commission is recommending the full or partial removal of the outfall structures in order achieve consistency with the public access and recreation policies of the Coastal Act and LCP.

Response to City of Oxnard Comments

In a letter submitted on September 2, 2016, the City of Oxnard's stated that the staff report did not fully address the project's inconsistency with the City's recent 2030 General Plan amendment, which prohibits the siting of power plants of 50 MW or greater capacity in areas subject to environmental hazards, including coastal hazards. This General Plan amendment is acknowledged on page 8 of the proposed 30413(d) report. However, as explained in Section I.B ("Regulatory Framework and Standard of Review") of the report, the Commission's review of the proposed project is limited to its conformity with the Chapter 3 policies of the Coastal Act and the certified LCP. The CEC must nevertheless consider the project's inconsistency with the City's General Plan when evaluating this project; this concern is not, however, appropriately included in the Commission's 30413(d) Report.

The City of Oxnard's letter also states that the proposed project would "not be consistent with the City's interpretation of its LCP." The letter appears to be referring to the policies governing development within the Coastal Energy Facilities (EC) zoning designation (see Oxnard Coastal Zoning Ordinance Section 17-20), specifically the policy stating that "coastal dependent energy facilities shall be encouraged to locate or expand within existing sites and shall be permitted reasonable long-term growth, where consistent with this article." The City asserts that this policy allows only coastal dependent energy-related facilities to be located within the EC sub-zone. The Commission disagrees with this interpretation of the LCP, and on previous occasions has found that the "power generating facilities and electrical substations" allowed under the EC zoning designation are not limited to coastal-dependent facilities (see Appeal No. A-4-OXN-07-096).

Environmental Justice

The issue area of environmental justice is not one that is addressed by the policies of Chapter 3 of the Coastal Act or the City of Oxnard LCP. Although both contain policies protecting and encouraging low-cost, visitor-serving recreational facilities and opportunities, and the LCP contains policies protecting low-cost housing within the coastal zone, neither contain policies addressing potential environmental justice issues associated with power plant siting. Accordingly, the avoidance and mitigation of any adverse effects on the environment that are significant only because of their disproportionate impacts on minority or low-income populations are outside the scope of the Commission's authority under both the Coastal Act and the City's

LCP. Environmental justice concerns have been raised by the City and members of the public, however, so this section constitutes the Commission's response to these comments.

Comments submitted by both the City of Oxnard (see September 2, 2016 letter) and a coalition of environmental and social justice organizations (see September 2, 2016 and September 6, 2016 letters) note that Oxnard has a high proportion of low income and minority residents, and is the site of a disproportionate number of power plants, landfills, oil and gas development and other polluting industries compared to the surrounding region. The commenters suggest that in light of this present and historical burden, Oxnard should not be the site of another coastal power plant.

These concerns are partially addressed by CEC staff in the PSA, which used the most recent U.S. Census data to identify minority and below-poverty level populations within a six-mile radius of the P3. The demographic screening identified environmental justice populations based on race (greater than 50% minority) within the six-mile radius, particularly in Oxnard and Port Hueneme. The analysis also identified these cities having a higher percentage of residents living below the federal poverty level compared with Ventura County as a whole. Following CEQA guidelines, the PSA then evaluates potential impacts to environmental justice populations from the project related to air quality, hazardous materials management, land use, noise and vibration, public health, socioeconomics, soil and water resources, and waste management. In each subject area, the PSA concludes that, with the recommended conditions of certification, that there would be no significant environmental impacts, and thus no significant impacts on environmental justice populations. Given the current lack of enforceable Coastal Act policies addressing environmental justice, the Commission is not recommending that the CEC include additional conditions of approval to specifically address this issue. It nevertheless believes that the CEC should consider the environmental justice concerns raised by the commenters as a factor in its alternatives analysis as it considers the least environmentally damaging location for the proposed new power plant.

D. WETLANDS AND ENVIRONMENTALLY SENSITIVE HABITAT AREAS (ESHA)

Coastal Act Section 30231 states:

> *The biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes appropriate to maintain optimum populations of marine organisms and for the protection of human health shall be maintained and, where feasible, restored through, among other means, minimizing adverse effects of waste water discharges and entrainment, controlling runoff, preventing depletion of ground water supplies and substantial interference with surface waterflow, encouraging waste water reclamation, maintaining natural vegetation buffer areas that protect riparian habitats, and minimizing alteration of natural streams.*

Coastal Act Section 30233(a) states, in relevant part:

> *(a) The diking, filling, or dredging of open coastal waters, wetlands, estuaries, and lakes shall be permitted in accordance with other applicable provisions of this division, where there is no feasible less environmentally damaging alternative, and*

where feasible mitigation measures have been provided to minimize adverse environmental effects, and shall be limited to the following:

(1) New or expanded port, energy, and coastal-dependent industrial facilities, including commercial fishing facilities.

…

(c) In addition to the other provisions of this section, diking, filling, or dredging in existing estuaries and wetlands shall maintain or enhance the functional capacity of the wetland or estuary.

Section 30121 of the Coastal Act defines a wetland as follows:

"Wetland" means 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.

In addition, both Section 13577(b)(1) of the Commission's Administrative Regulations (Title 14, Division 5.5) and LCP Policy 9 provide:

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 soils 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 action, 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.

Coastal Act Section 30240 states:

(a) Environmentally sensitive habitat areas shall be protected against any significant disruption of habitat values, and only uses dependent on those resources shall be allowed within those areas.

(b) Development in areas adjacent to environmentally sensitive habitat areas and parks and recreation areas shall be sited and designed to prevent impacts which would significantly degrade those areas, and shall be compatible with the continuance of those habitat and recreation areas.

LCP Policy 6 states, in relevant part:

As a part of the Phase III Implementation portion of the LCP process, a resource protection ordinance was created, defining the only uses permitted in areas designated on the land use map with the Resource Protection Zone. The ordinance incorporated the

following policies which the City will implement to the extent of its legal and financial ability:

…

d. New development adjacent to wetlands or resource protection areas shall be sited and designed to mitigate any adverse impacts to the wetlands or resource.

A buffer of 100 feet in width shall be provided adjacent to all resource protection areas. The buffer may be reduced to a minimum of 50 feet only if the applicant can demonstrate the large buffer is unnecessary to protect the resources of the habitat area. All proposed development shall demonstrate that the functional capacity of the resource protection area is maintained. The standards to determine the appropriate width of the buffer area are:

1) biological significance of the area
2) sensitivity of the species to disruption
3) susceptibility to erosion
4) use of natural and topographical features to locate development
5) parcel configuration and location of existing development
6) type and scale of development proposed
7) use of existing cultural features to locate buffer zones

When a development is proposed within an environmentally sensitive habitat or a resource protection area, or within 100 feet of such areas, a biological report shall be prepared which includes applicable topographic, vegetative and soils information. The information shall include physical and biological features existing in the habitat areas. The report shall be prepared by a qualified biologist, and shall recommend mitigation measures to protect any impacted resources. All recommendations shall be made in cooperation with the State Department of Fish and Game. When applicable, restoration of damaged habitats shall be a condition of approval.

LCP Policy 52 states in part:

Industrial and energy-related development shall not be located in coastal resource areas, including sensitive habitats, recreational areas, and archaeological sites. All development adjacent to these resource areas or agricultural areas shall be designed to mitigate any adverse impacts …

The findings below separately assess two types of project-related impacts – first, direct wetland impacts within the potential project footprint, and then indirect impacts to adjacent wetlands and ESHA with potential to occur during facility construction and operations. Both the Coastal Act and the City's LCP include policies requiring the protection of wetlands and environmentally sensitive habitat areas. The policies require that development adjacent to environmentally sensitive areas be sited and designed to prevent impacts which would significantly degrade those areas. The LCP prohibits industrial and energy-related development within coastal resource areas, including ESHA and wetlands, and requires that buffer zones be established around such areas to protect them from the indirect impacts of proposed development.

Direct Wetland Impacts

As described in the PSA, the MGS property, including the proposed 3-acre P3 site, was graded during the development of the power plant in the 1950s, and at present consists largely of developed, paved and disturbed areas dominated by ruderal and ornamental vegetation. The proposed P3 site, located on approximately three acres in the northwest corner of the MGS, has previously been used for temporary storage of dredge spoils from the Edison Canal and contaminated soils, but currently supports a mixture of non-native and native vegetation, including several hydrophytic species considered to be wetland indicators.

In the section devoted to "Wetlands and Other Jurisdictional Waters" (PSA p. 4.2-11), the PSA concludes that the site, having been "actively maintained to facilitate operation of existing power generation" and experiencing "varied uses such as a marine dredging spoils storage" does not contain wetlands or other waters under the jurisdiction of the U.S. Army Corps of Engineers or California Department of Fish and Wildlife. A formal wetland delineation commissioned by NRG also concluded that there were no wetlands on the site (AECOM 2016). However, under the definition of a wetland contained in the Coastal Commission's regulations and the City of Oxnard's certified LCP, only one of three parameters – the presence of hydric soils, hydrophytic vegetation, or wetland hydrology – is needed to delineate a coastal wetland. NRG's wetland delineation documents the presence of three hydrophytic plant species on the project site, including pickleweed (*Salicornia pacifica*), woolly seablite (*Suaeda taxifolia*), and slenderleaf iceplant (*Mesembryanthemum nodiflorum*). Each of these species is included on the U.S. Army Corps of Engineers wetland plant list (Lichvar et al. 2014). Pickleweed is considered to be a wetland obligate species ("almost always occurs in wetlands"), while woolly seablite is a facultative wetland plant ("usually occurs in wetlands, but may occur in non-wetlands"). In the PSA, CEC staff recommended that 2.03 acres of the project site be classified as a wetland pursuant to Coastal Act regulations. The Commission's senior ecologist Dr. Jonna Engel has visited the project site and agrees that the presence of these hydrophytic plant species indicates that this portion of the project site meets the definition of a wetland under the Coastal Act and City of Oxnard LCP. Her comments on the wetland status of the site are provided in **Attachment C**. The proposed project would result in the removal of hydrophytic vegetation (including approximately 1,000 woolly seablite plants) and the fill of this 2-acre wetland area.[3]

Under City of Oxnard LCP Policy 52, energy-related development is not an allowable use within coastal resource areas and sensitive habitats, including wetlands as defined in the LCP. In contrast, Coastal Act Section 30233(a) permits wetland fill for a limited set of allowable uses, including "new or expanded … energy … facilities", provided that there are no feasible less environmentally damaging alternatives and where feasible mitigation measures have been provided to minimize the adverse effects of the wetland fill. The construction of a new natural-gas fired generating unit at the MGS would comprise a new or expanded energy facility, and thus would represent an allowable use under Coastal Act Section 30233(a). However, as described

[3] The hydrophytic plant species found on the project site are relatively common in coastal wetlands, and the area is not known to support listed, rare or sensitive wildlife species. Thus, the project site does not meet the definition of an environmentally sensitive habitat area (ESHA) under Section 30107.5 of the Coastal Act.

below, there appear to be several less environmentally damaging alternatives which would avoid the need for wetland fill altogether.

Alternatives
As described above in Section I.C ("Land Use and Alternatives"), the PSA identifies several alternative locations for the P3, both on- and off-site, that would avoid the fill of coastal wetlands and other substantial adverse environmental effects, and which have not been determined to be infeasible. In particular, the Ormond Beach Area off-site alternative (see **Exhibit 1**) and the Conceptual Site Reconfigurations 1 and 2 (**Exhibit 5**) would avoid the fill of coastal wetlands on the project site and, as previously developed/disturbed industrial sites lacking delineated wetlands, would appear to be less environmentally damaging than the proposed location for P3.

In the case of the Ormond Beach Area alternative, the PSA notes that NRG does not have control over the vacant, privately-owned parcels comprising the alternative site and that uncertainties and delays related to acquiring or leasing the site, project design, planning and analysis, and installing utility interconnections could affect the feasibility of this alternative. However, the PSA did not conclude that the use of this site would be infeasible. Either of the Conceptual Site Reconfiguration alternatives crafted by CEC staff would result in the P3 being constructed at a different location within the MGS site. Although these alternatives would require redesigned plans for the power block structures and other facilities, and thus could introduce delays in project completion, they would avoid the greater logistical complications of the Ormond Beach Area alternative. The PSA indicates that the two on-site alternative locations are at slightly lower elevations. As discussed in section I.E (Flood, Tsunami and Sea Level Rise Hazards), the on-site alternative locations may be at marginally greater risk of flooding over the 30-year life of the project, but could, if selected, be protected through measures such as grading to a higher elevation or construction of protective berms.

At present, there appear to be at least three potentially feasible alternative locations for the P3 facility which would maintain the biological productivity and quality of coastal wetlands and avoid the fill of two acres of wetlands that would occur as a result of the propose project.

> **Coastal Commission Recommended Specific Provisions**
> To ensure that the P3 conforms to the policies of Coastal Act Sections 30231 and 30233(a) and LCP Policy 52, we recommend the Energy Commission require that the proposed project be relocated to an alternative site that would not result in direct impacts to or fill of coastal wetlands. Alternative sites could include, but are not limited to, the Ormond Beach Area or on-site reconfiguration alternatives identified in the PSA.

Mitigation
When direct wetland impacts are unavoidable and allowable, mitigation must be required to compensate for the lost habitat functions and values. The Coastal Commission's compensatory mitigation requirements generally include specific performance standards, monitoring provisions, and reporting requirements needed to ensure a project provides the expected level of mitigation. The Coastal Commission also requires a mitigation ratio (in many cases starting at about 4:1) to reflect that it usually takes several years for replacement habitat to succeed and replace the lost functions and values, that performance standards are not always met, and that

mitigation usually results in different functions and values than were present in the affected wetland area.

In order to mitigate for the loss of the 2.03 acres of coastal wetlands that would be eliminated by the P3 as proposed, the PSA recommends **Condition of Certification BIO-9**, which would require NRG to mitigate for the permanent impacts to on-site wetlands at a 2:1 ratio, as follows:

> *The project owner shall provide funds to acquire mitigation land at an existing, or soon to be established, salt marsh or estuary habitat restoration project close to the site of impact … Mitigation shall occur using an established wetland restoration program or mitigation bank, with preference given to programs within the same watershed as the project (Santa Clara-Calleguas), or any other wetland restoration program approved by the CPM.*

Under this condition of certification, NRG would be required to prepare, and submit for CEC approval, a Wetland Compensation Plan including, but not limited to, the following key components:

- A baseline review of existing physical, biological and hydrological conditions at the mitigation site(s), including analyses of existing ecological functions and values and potential constraints on successful habitat creation or restoration efforts;
- A set of goals, objectives and performance criteria for the proposed mitigation site(s) that identify specific creation or restoration measures to be implemented;
- A detailed work plan, including any necessary site grading, vegetation removal and planting, and maintenance activities;
- A monitoring program (minimum 5 years) to determine whether the sites are meeting performance criteria and establish the success of the mitigation program;
- Provision of adequate funding to complete the mitigation work;
- Preparation of annual project and monitoring reports;
- Contingency measures and planning to ensure long-term success.

The PSA concludes that a wetland habitat mitigation ratio of 2:1 is appropriate due to what is described as the "diminished value, form and function" of the existing on-site wetlands, which are purported to "provide little beneficial value to wildlife" and few of the "positive benefits of a wetland, such as water filtration, foraging and habitat for wildlife, or water reabsorption." Commission staff is unaware of any comprehensive studies establishing the detailed hydrological and ecological characteristics of the site. The Commission notes that prior to the development of the MGS, the site was a part of a major coastal dune and wetlands complex extending between the Santa Clara River Estuary and Mugu Lagoon. In this landscape, small, backdune swale and alkali meadow wetlands were common. Some were hydrologically isolated; some were likely seasonal, displaying wetland hydrology for short periods at certain times of year, but nonetheless sufficient to support wetland vegetation (Beller et al. 2011). Speculatively, the presence of wetland vegetation within the project area may indicate the partial re-emergence of vegetation native to this historical landscape during a recent decrease in site disturbance. Alternatively, the presence of salt-tolerant hydrophytic plants at the project site may be related to past deposition of saline dredge spoils at this location. Saline soils, possibly combined with soil compaction and

impaired drainage, may have caused or contributed to the predominance of salt-tolerant hydrophytes on the project site (AECOM 2016).

Regardless, for purposes of conformance with Coastal Act Section 30233(a), the Commission evaluates wetland indicators at a site in its present state, and, where fill of coastal wetlands is unavoidable, requires mitigation sufficient to minimize adverse impacts. Typically, the Commission has found that mitigation at a ratio of 4:1 (mitigation area to impact area) is necessary in order to account for temporal losses of wetland habitat (i.e., the period of time between the filling of the wetlands and the achievement of successful mitigation) and the significant likelihood that a wetland restoration project will fail (or only partially succeed) in meeting its performance standards. In cases where a wetland mitigation site has already been selected and a comprehensive restoration plan with rigorous performance criteria is available for review, the Commission has at times adopted a reduced mitigation ratio. For the P3 project, absent a well-defined wetland mitigation plan, the Commission recommends that a 4:1 mitigation ratio be applied.

> **Coastal Commission Recommended Specific Provisions**
> If the CEC determines that relocating the P3 to an alternative site that avoids fill of coastal wetlands is infeasible, consistency with Coastal Act Section 30233(a) would still require that the adverse impacts of wetland fill be minimized by the provision of feasible mitigation measures. In order to ensure that the proposed mitigation fully compensates for temporal losses of wetland habitat and accounts for significant uncertainties in the success of any wetland restoration project, and thus minimizes the adverse effects of the project, the Commission recommends that the CEC modify **Condition BIO-9** to require compensatory mitigation for direct impacts to wetlands in the form of wetland restoration at a **4:1 ratio** at a nearby location.

Indirect Impacts to Wetlands and ESHA

Several components of the project as currently proposed are inconsistent with LCP Policy 6, which requires new development to be located at least 100 feet from wetlands and other resource protection areas. Additionally, project construction, operation and demolition activities have the potential to cause adverse indirect impacts to nearby wetlands and ESHA due to dewatering, noise and vibration, and wastewater discharge onto the beach. These impacts are described below, along with recommended conditions to ensure the project avoids and minimizes these impacts to the extent feasible, as required by relevant LCP and Coastal Act provisions.

Background

The P3 site is situated within a remnant coastal dune, lagoon and wetlands complex that formerly extended along the coast between the Santa Clara River and Mugu Lagoon (e.g., Beller et al. 2011). Although much of this coastal lowland ecosystem has been developed or converted to agricultural use, relatively intact dune, beach, and wetland habitats and vegetation communities remain in the vicinity of MGS property, and along the coast to the north and south. Wetland and riparian habitats (e.g., bulrush marsh, arroyo willow thickets, mulefat scrub) occur surrounding McGrath Lake and in the open space immediately to the north of the project site, in scattered patches east of Harbor Blvd., and within Mandalay County Park/State Beach to the south of the MGS (*see* **Exhibits 6**, **7**). At present, the California Coastal Conservancy, in partnership with

local government and other organizations, is undertaking major habitat restoration efforts in the project area, including along the Santa Clara River floodplain and south of the project site at Ormond Beach. Active dune and wetland habitat restoration is also occurring around McGrath Lake and in the area immediately north of the project site and MGS boundary.

Coastal dunes supporting both native and non-native vegetation communities occur along the shoreline to the north, west and south of the project site (see **Exhibit 7**). The wetland, dune and beach habitats in the project vicinity are known to support a variety of common and rare/sensitive wildlife species (see **Exhibit 8**). Special-status species occurring in the project area include the federally-listed California least tern (endangered) and Western snowy plover (threatened); state-listed "Species of Special Concern" such as burrowing owl, western pond turtle, silvery legless lizard, Blainville's horned lizard, and two-striped garter snake and globose dune beetle may also occur in the area due to the presence of suitable wetland, riparian and dune habitats. The beaches and sand dunes within Mandalay State Beach and McGrath State Beach in the vicinity of the project site support both wintering populations and breeding populations of Western snowy plover, and the beaches and dunes immediately in front of the MGS are included in the designated critical habitat for this species (**Exhibit 8**). The northwest corner of the project site is approximately 500 feet from the closest potential snowy plover nesting area. California least tern is known to nest on the open beaches between the Santa Clara River mouth and McGrath Lake, and in the immediate vicinity of the MGS.

Due to their rarity, sensitivity to disturbance, and the presence of special-status species, many of the coastal dune, scrub and riparian habitats surrounding the MGS site meet the Coastal Act and LCP definitions of ESHA, and thus require special protection.

Required Buffer
LCP Policy 6 requires a minimum 100-foot buffer between new development and resource protection areas, including ESHA and wetlands. As shown in the PSA and **Exhibit 7**, the boundaries of the P3 project site are located approximately 100 feet from mulefat scrub ESHA (some of which is currently undergoing habitat restoration, see above), which could result in non-conformity to this LCP policy. The P3 site is also immediately adjacent to a line of coastal dunes that, though dominated by non-native iceplant vegetation, may nonetheless provide habitat value.

The proximity of the project site to the habitat areas may also exacerbate some of the other indirect adverse impacts described below, including potential dewatering of wetland habitat during project construction, and adverse effects of noise, vibration, and project lighting on listed sensitive species known or potentially occurring in those areas during both construction and operations. The PSA includes proposed **Condition BIO-6**, which would require the development and implementation of a Biological Resources Mitigation Implementation and Monitoring Plan, **Condition BIO-7**, which identifies a number of impact avoidance and minimization measures that, if implemented, would reduce the project's indirect impacts on nearby wetlands and ESHA, and **Conditions BIO-1** through **BIO-4**, which would appoint and define the duties and authority of a designated biologist and biological monitors to oversee project activities (see PSA, pp. 4.2-46 to 4.2-53).

Coastal Commission Recommended Specific Provision
To ensure the project conforms to the extent feasible with LCP Policy 6, we recommend the Energy Commission modify **Condition BIO-7** to require that NRG design the P3 such that all project-related development is at least 100 feet, and further, if feasible, from nearby areas that meet the Coastal Commission and LCP definitions of wetlands or ESHA. We also recommend that submittal of revised project plans be required to reflect these changes in the project layout.

This recommended modification would also require NRG to submit a revised project plan showing that all project-related development is at least 100 feet from wetlands and ESHA. This requirement could be met through the selection of an off-site alternative location (such as the Ormond Beach Area site), relocating the project to one of the two on-site alternative locations identified in the Alternatives section (PSA pages 211-324), or by moving the proposed project footprint (specifically, the construction and laydown area) a few dozen feet away from the northern boundary of the site, which abuts the wetland/ESHA restoration area. Such an adjustment would appear to be feasible based on the amount of space available within the project site.

Avoiding Effects of Construction Dewatering on Adjacent ESHA/Wetland Areas
Groundwater levels beneath the MGS and proposed P3 site were detected at approximately 9 feet below ground surface (bgs) during a 2013 geotechnical survey, and historically have been measured between approximately 5 to 9 feet bgs (PSA page 4.10-12). Results from groundwater monitoring wells maintained by Southern California Edison on or near the MGS site indicate that groundwater levels are hydraulically-connected to the ocean and fluctuate with tidal cycles and in response to seasonal changes in climate. Groundwater at the site is directly connected to and generally down-gradient from groundwater underlying wetlands and riparian habitats within McGrath State Beach and adjacent to the northern side of the MGS property. Groundwater withdrawal ("dewatering") during project construction activities has the potential to accelerate groundwater flow and lower the water table in areas adjacent to the project site, with possible adverse effects on neighboring wetland habitats.

The PSA states that installation of foundations for the P3 power block would involve excavation to a maximum depth of approximately 7 feet bgs, and thus could require dewatering of groundwater. In the event that groundwater is encountered during excavation and dewatering is necessary, NRG proposes to install shoring around the construction area and dewatering sumps within the shored area. Assuming the groundwater depth during construction activities is 7 feet bgs, dewatering is expected to last for 90 days, with an estimated water withdrawal rate of 0.3 million gallons per day (MGD). NRG has estimated that, using this approach, the "radius of influence" (area in which groundwater levels are affected) of the proposed dewatering would be contained within the project site. In the PSA, CEC staff agrees with this assessment and concludes that the proposed dewatering during construction would be unlikely to affect groundwater levels in adjacent wetland areas. The PSA also recommends **Condition SOIL&WATER-3**, which would require NRG to prepare and submit for approval a dewatering plan prior to the excavation of the power block foundation.

Groundwater drawdown that adversely affected nearby wetlands or ESHA would be inconsistent with LCP Policies 6 and 52 and Coastal Act Sections 30231 and 30240, which require that habitat values be maintained and protected and that development adjacent to these areas mitigate any adverse impacts. Although it appears unlikely that the wetlands and riparian habitats adjacent to the project would be affected by the proposed dewatering activities, insufficient information exists to support a definitive conclusion (for instance, the PSA has not provided a numerical estimate of the dewatering radius of influence). NRG has also indicated its willingness to monitor groundwater levels adjacent to the construction site using existing wells and/or temporary piezometer wells.

Coastal Commission Recommended Specific Provisions

To ensure project dewatering is done in a manner consistent with applicable Coastal Act and LCP policies, the Commission recommends that the CEC modify **Condition SOIL&WATER-3** to require that groundwater level monitoring measures be included in the required dewatering plan. Specifically, we recommend that the required monitoring include monitoring of groundwater levels at a minimum of two locations along the northern edge of the MGS parcel (between the P3 site and adjacent habitat areas). Additionally, we recommend that **Condition SOIL&WATER-3** be modified to require that NRG immediately cease dewatering activities if groundwater monitoring demonstrates a decrease in groundwater levels outside of the previously-projected radius of influence, until such time as NRG has revised the dewatering and/or foundation installation plan to reduce the area of groundwater drawdown such that reduced groundwater levels do not extend beyond the monitoring wells and parcel boundary.

Reducing Effects of Project Noise and Vibration on Adjacent ESHA/Wetland Areas

The PSA (see page 4.2-29, Biological Resources, Table 5) identifies expected routine construction and demolition noise levels at several locations surrounding the project site, including within nearby ESHA/wetland areas to the north and west of the MGS. At the selected location within the wetlands near McGrath Lake (site LT-B, approx. 1,000 feet north of the MGS), noise levels from project demolition are estimated to be less than 57 dBA; at the edge of the dunes approximately 500 feet west of the MGS (site LT-A), project noise levels are estimated to be less than 64 dBA.[4] These estimates are similar to ambient noise levels measured along the shoreline. However, it should be noted that areas of suitable habitat for sensitive species, including wetlands and coastal dunes, occur within 100 feet of the P3 site, and thus may be subjected to noise levels higher than those estimated for the more distant locations included in Table 5.

The PSA (see pages 4.2-30 and 4.7-9) also indicates that certain proposed activities, specifically pile driving during P3 construction and the planned explosive demolition of MGS Units 1 and 2, would produce short periods of more intense noise. The PSA states that pile driving using traditional techniques can be expected to reach 104 dBA at 50 feet, and that noise levels at sensitive receptor locations (sites LT-1, -2, and -3) between 2,600 and 4,100 feet south of the

[4] dBA is a measure of the relative loudness of sounds through the air, in decibels. Decibels describe the intensity of sound, and are logarithmic – for example a 60 dBA sound is perceived as twice as loud as a 50 dBA sound. Typical sound levels include 30-35 dBA in quiet, rural areas, 70-75 dBA for freeways from about 50 feet away, and 100 dBA for a jet taking off from 1000 feet away.

MGS would reach from 66 – 70 dBA. The explosive demolition of the Units 1 and 2 structures would generate short bursts of noise at levels of 100 – 110 dBA at a location (LT-1, Oxnard Shores development) approximately 3,900 feet from the MGS. Large habitat areas known to support sensitive species (for example, Western snowy plover nesting areas), including the wetlands surrounding McGrath Lake and dune and beach areas along McGrath State Beach, Mandalay State Beach, and fronting the project site, are closer to the existing power blocks than the LT-1 location, and would thus almost certainly be exposed to noise levels in excess of 110 dBA during demolition activities.

The PSA notes that elevated noise levels during project construction could discourage sensitive species from using nearby habitat areas and adversely affect their breeding or nesting behavior, and that chronic exposure to excessive noise has been demonstrated to adversely affect foraging behavior, reproductive success, population density, and community structure. Although avian species may be more sensitive to noise during breeding and nesting season, several types of "take" or harm identified above could occur any time of year due to the relatively high noise levels expected from project construction activities, in particular the planned pile driving and explosive demolition.

Commission staff has previously sought guidance from staff of the California Department of Fish and Wildlife (CDFW) on acceptable noise levels and mitigation measures for construction projects near habitat areas used by sensitive avian species.[5] Both CDFW and the U.S. Fish and Wildlife Service (USFWS) have developed and implemented recommended measures on a number of such projects, and have developed detailed thresholds for use in identifying potential "take" or harm to sensitive species.[6] These thresholds range from "hearing damage" to "masking," which is a level preventing or reducing communication among individuals, and can result from proximity to construction equipment like that being used for this project.

The conclusions and recommendations of CDFW and USFWS essentially identify potential harm or "take" when noise levels are above ambient and greater than about 60 dBA. These sound levels are considered harmful to avian species and could result in "take" of special status species that use these ESHA/wetland areas, such as Western Snowy Plover, California Least Tern, and Burrowing Owl. Mitigation measures employed by both CDFW and USFWS generally require that applicants conduct monitoring to ensure sound levels remain below thresholds known to result in take and conduct nesting surveys and ongoing monitoring to identify and avoid potential adverse effects to nesting birds.

While the PSA describes the expected decibel levels from construction activities, including pile driving, it does not identify the expected increase in ground borne noise and vibration levels (VdB) that would occur in adjacent ESHA/wetland areas during project operations, particularly during pile driving.[7]

[5] Commission staff personal communication with CDFW staff, September 19 and October 18, 2013.

[6] See, for example, Dooling and Popper (2007), *The Effects of Highway Noise on Birds*, prepared for California Department of Transportation.

[7] Ground borne noise and vibration is measured using "VdB," or vibration decibel levels, to distinguish it from airborne sound. Very low VdB levels can be imperceptible, but levels of around 100 VdB and higher can cause structural damage.

To reduce noise effects on nearby avian species and other sensitive receptors, the PSA's proposed **Condition Noise-6** would, among other things, restrict heavy equipment operation and "noisy work" during construction and demolition activities to daylight hours and weekdays, require the use of noise attenuation devices on vehicles, require the replacement of equipment generating excessive noise, and require the use of temporary acoustic barriers if found to be beneficial for reducing noise. Additionally, proposed **Condition BIO-8** would include the following requirements to avoid and minimize noise impacts to nesting birds: (1) Pre-construction nest surveys in all potential nesting habitat within 0.25-mile of the project boundary for any construction/demolition activities during the breeding and nesting season (February 1 – August 31); (2) weekly monitoring of any detected nests for signs of disturbance; if nest disturbance is observed, adaptive measures (e.g., halting construction, use of noise barriers, etc.) must be implemented until fledging has occurred; (3) explosive demolition of Units 1 and 2 must occur outside the nesting season; (4) pile driving should occur outside the nesting season "to the extent possible"; and (5) required reporting and notification to resource agencies.

Coastal Commission Recommended Specific Provisions

The Commission generally concurs with the PSA's recommended approach to avoiding and reducing noise-related effects in the nearby ESHA and wetland areas. However, the Commission recommends two modifications to **Condition BIO-8** to ensure consistency with Coastal Act and LCP provisions requiring protection of these habitat areas:

- **Inclusion of noise monitoring and noise thresholds:** The sensitive-species monitoring provisions of **Condition BIO-8** should be modified to include both monitoring of noise levels and an allowable noise threshold in adjacent sensitive habitat, in order to prevent disturbance of nesting birds during construction and demolition activities. Specifically, **Condition BIO-8** should be modified to require that NRG prepare and implement a Noise Monitoring Plan throughout construction and demolition activities taking place during the bird breeding season (February 1 to August 31). The Plan should require continuous noise monitoring at several locations near known or suitable nesting habitat adjacent to the project site, and should require that noise levels at these monitoring locations not exceed 8 dBA above ambient levels or 60 dBA (hourly average Leq), whichever is greater. In addition, sound levels within 100 feet of active nests (as identified during the nesting surveys required pursuant to Condition BIO-8) should not exceed 65 dBA. The Plan should also require that monitoring devices be reviewed daily during any construction occurring within 400 feet of the project's boundary with adjacent wetland, mulefat scrub or dune areas, and during any pile-driving activities. If construction noise exceeds these levels, NRG should be required to implement noise-reduction measures, which may include installing temporary sound barriers, or, as feasible, moving noise-generating activities further from the ESHA/wetland areas, and avoiding pile driving or confining pile driving to project areas furthest from the sensitive habitats.

  These recommendations are complementary to and more protective of sensitive wildlife than the current requirements of **Condition BIO-8**, which would rely on relatively infrequent monitoring of known nests and would not require impact

avoidance measures to be enacted until the disturbance or "take" of nesting birds had already occurred.

- **Prohibition on pile driving during nesting season:** Second, **Condition BIO-8** should be modified to require that NRG schedule and conduct all pile driving activities outside the February 1 through August 31 breeding and nesting season. **Condition BIO-8** currently leaves open the possibility that pile driving could occur in close proximity to active nesting areas. As noted above, the PSA already anticipates that noise levels during pile driving would exceed the 60 – 65 dBA threshold deemed by the CDFW and USFWS to be protective of nesting birds at distances of 2,600 to 4,100 feet, which would encompass large areas of known and suitable nesting habitat in the wetlands and dunes surrounding the MGS site. Additionally, pile driving has the potential to cause substantial vibration levels (VdB), in nearby wetlands and ESHA, although the PSA does not identify those expected levels. Given the expected threshold exceedance and the additional unquantified but likely significant vibration-related effects, this modification would further reduce project-related adverse effects on nearby ESHA and wetland areas.

Wastewater Discharge & Impacts of Outfall Structure Maintenance

LCP Policy 64 states:

> *It shall be a condition of approval that, wherever possible, wastewater from any industrial or energy-related facility shall be treated as necessary and put to reuse including, but not limited to, the following: the reinjection into the aquifer or ground water recharge system, recycling for industrial use, agricultural use, or urban services.*

NRG proposes to discharge storm water and process wastewater from the P3 to the beach fronting the MGS via an existing outfall structure (see **Exhibits 3, 4**). The outfall and existing wastewater discharges are permitted under Los Angeles RWQCB Order No. R4-2015-0201, which expires in December 2020, at which point the existing MGS Units 1 and 2 must cease operations. New discharges from the P3 may require further authorization from the RWQCB.

At present, wastewater generated at the MGS – including cooling water, process water, and storm water runoff from the power plant site – is collected in two large retention basins (North and South Basins) and discharged via the existing concrete and rock outfall structure on the beach in front of the plant. At maximum capacity, the existing MGS discharges up to 255 million gallons per day of wastewater. However, as noted in the PSA (see page 4.10-66), since 2010 MGS Units 1 and 2 have operated at an average capacity factor of less than 4%, with average ocean water intake (and wastewater discharge) rates ranging from 42 to 109 million gallons per day.

This wastewater discharge process sends large volumes of warm water across the beach, scouring a channel or trench that can be several feet deep (see **Exhibits 4, 12**). The channel is frequently fully or partially blocked by natural sand accumulation, at times causing extensive alongshore ponding in the back-beach area (**Exhibit 4**). NRG has previously applied to the City for an emergency coastal development permit to bulldoze a discharge channel. In reviewing this application, the City of Oxnard found that the wastewater pond can extend toward nesting sites for Western snowy plover and California least tern, representing a threat to these areas (see

Emergency CDP No. PZ 15-000-17, granted on April 6, 2015). Maintenance of a free-flowing channel for wastewater discharge is "required for the safe operation of the power plant and to prevent ponding of the discharge laterally on the beach to the north and south, potentially flooding Least Tern and Snowy Plover nesting areas and creating a hazard to the public utilizing the beach." More recently, NRG has applied to the City for a regular CDP to allow the "periodic removal of sand barriers which accumulate and obstruct the proper flow into the ocean from the saltwater discharge system …"[8]

Following the construction of the P3 and decommissioning of MGS Units 1 and 2, the use of ocean water for once-through cooling would be eliminated; because the P3 would be a dry-cooled facility and use dry low-NO_x burners, the use of cooling water would no longer be necessary, and the volume of wastewater generated at the site would be greatly reduced. The PSA states (see page 4.10-16) that the annual water use at the new P3 would be less than 20 acre-feet per year (AFY), including both industrial process water (approximately 16 AFY) and potable water (about 3 AFY), provided by the City of Oxnard through the existing MGS potable water system. Nonetheless, NRG proposes to retain the existing retention basins and outfall structures in order to allow for the collection and discharge of wastewater (storm water and process water) associated with the new P3.

As a part of the P3, a new storm water conveyance system would be constructed to direct runoff from the P3 site to the existing North and South basins for disposal, or, possibly, to a service water tank for reuse. The PSA describes the proposed handling of storm water as follows (see page 4.10-17):

> *Depending on availability, P3 storm water may be reclaimed and stored an existing service-water tank, which would offset a corresponding amount of potable water usage. A system would be installed to provide the ability to reuse storm water collected from the new P3 project area to the service-water tank. Excess storm water would discharge to the existing North and South basins.*

Processed wastewater from the new P3 would be directed to the existing retention basins and discharged, along with storm water, to the ocean via the existing outfall structure

Wastewater discharge associated with the proposed P3 has the potential to result in similar problems associated with wastewater ponding as are presently observed, which could threaten known nesting sites of listed avian species and require regular channel excavation activities that would damage and disrupt beach habitats.

In comments submitted to the Los Angeles RWQCB, the City of Oxnard has indicated that several feasible alternatives to the beach discharge of wastewater exist, including discharge into the City's storm or sanitary sewer system or to the Edison Canal to promote water circulation.[9] Other alternatives that should be evaluated include the treatment and reinjection of wastewater for groundwater recharge (to replace infiltration lost as a result of capture by impervious surfaces on the MGS site), and treatment and recycling for off-site industrial, agricultural or urban use, or

[8] Coastal Development Permit application submitted to the City of Oxnard by NRG California South LP, May 4, 2015.

[9] See Los Angeles Regional Water Quality Control Board, "Response to Comments for the Tentative Time Schedule Order (TSO) for NRG California South LP Mandalay Generating Station, Oxnard, CA. (NPDES No. CA0001180, CI No. 2093)", December 21, 2015. (15-AFC-01 TN# 207118, submitted 12/24/15).

other beneficial uses, consistent with LCP Policy 64 (See Section I.F below for a discussion of the public access impacts of the proposed discharge system).

Coastal Commission Recommended Specific Provisions

To ensure consistency with Coastal Act and LCP Policies requiring the maintenance and protection of marine resources and sensitive species and habitats and the minimization of adverse impact from adjacent development, and LCP Policy 64, requiring the reuse of wastewater from energy-related facilities, the Commission recommends that the CEC require NRG to develop a Wastewater Reuse and Recycling Plan, including any necessary water treatment, that would maximize reuse of the process wastewater and storm water generated and collected at the MGS following the construction of the P3 and decommissioning of Units 1 and 2 and eliminate the discharge of wastewater to the beach. The Plan could include the possible reclamation, storage and reuse of storm water as described above, the treatment and reinjection of wastewater for purposes of groundwater recharge (to replace infiltration lost as a result of impervious surfaces on the MGS site), treatment and discharge to the Edison Canal (if such use would promote water circulation necessary to prevent stagnation), treatment and recycling for off-site industrial, agricultural or urban use, or other beneficial uses. In the event that full wastewater reuse and recycling is determined to be infeasible, we recommend that the CEC require the Wastewater Plan to include measures that would prevent the recurrence of back-beach ponding, avoid impacts to avian nesting areas, and eliminate the need for repeated excavation of a discharge channel on the beach.

Conclusion

The Commission finds that the CEC's implementation of the above-recommended Specific Provisions would allow the proposed project to be consistent to the extent feasible with relevant policies of the Coastal Act and LCP.

E. FLOOD, SEA LEVEL RISE, AND TSUNAMI HAZARDS

Coastal Act Section 30253 states, in relevant part:

New development shall do all of the following:

(a)Minimize risks to life and property in areas of high geologic, flood, and fire hazard.

(b) Assure stability and structural integrity, and neither create nor contribute significantly to erosion, geologic instability, or destruction of the site or surrounding area or in any way require the construction of protective devices that would substantially alter natural landforms along bluffs and cliffs.

LCP Policy 39 states:

All applications for grading and building permits and subdivisions shall be reviewed for threats from hazards such as seismic activity, liquefaction, tsunami run-up, seiche, beach erosion, flood, storm wave run-up, and expansive soils. Geologic reports may be required

in known hazard areas. Appropriate mitigation measures shall be applied to minimize threat from any hazards.

LCP Policy 40.a states:

If new development is located within the 100-year flood and storm wave runup area as designated by the Department of Housing and Urban Development and on the land use map, it shall be designed and engineered to withstand the effects of the flooding and wave runup without the use of seaways or other protective structures. Particular care shall be given in protecting the necessary gas, electrical, sewer and water connections from breaking in the event of heavy wave runup. Any person developing property within the 100-year flood line shall agree to indemnify and hold the City harmless from any liability or damages resulting from the construction of his development.

LCP Policy 56 states:

No energy related development shall be located seaward of the 100 year flood/wave run-up line as designated by the U.S. Department of Housing Insurance Program Administration and the land use map of the Oxnard Land Use Plan.

The P3 site and MGS as a whole are located in a relatively low-lying area immediately adjacent to the shoreline and the Pacific Ocean. As a result, the site may be subject to present and future adverse effects from flooding, sea level rise and tsunamis. The Commission's Senior Coastal Engineer, Dr. Lesley Ewing, has reviewed the coastal hazards analysis contained in the PSA as well as other relevant sources of information, and has summarized her evaluation in a memorandum included in this report as **Appendix B**. The findings below describe the current and future vulnerabilities of the proposed project site, and provide recommended specific provisions to allow consistency with relevant Coastal Act and LCP policies.

Site Elevations & Topography

The PSA describes the MGS site as generally flat, with grade elevations of between 12 and 14 feet above the North American Vertical Datum of 1988 (NAVD88), which at this location, during the current tidal epoch, is approximately equal to the mean lower low water (MLLW) level.[10] The proposed P3 site, in the northwestern corner of the property, is slightly higher (approximately +14 feet) than the rest of the MGS (grade elevations +12 to 13 feet). To the west, the MGS is bordered by a line of dune generally ranging from +20 to 30 feet at its crest, affording a degree of natural protection to the site. The beach to the west of the dunes is several hundred feet wide, varying over time and in response to seasonal wave conditions. An artificial flood protection berm along the northern edge of the MGS property was constructed in the 1970s; the top of this berm reaches elevations of +17 – 20 feet. Based on the topographic map of the site provided in the PSA (see Project Description Fig. 3, p. 3-6), a low point in the dunes (approx. +17.6 feet) exists along an access road in the northwestern corner of the MGS, where the dunes intersect with the artificial berm. The banks of the Edison (Mandalay) Canal, along the southern portion of the MGS site, are at an elevation of approximately +12 feet.

[10] Throughout this report, elevations are reported relative to NAVD88 unless otherwise indicated.

Present-day Flood Hazards

FEMA Maps

The PSA evaluates present-day flood hazards at the P3 site based on the 2010 Federal Insurance Rate Maps (FIRM) created by the Federal Emergency Management Agency (FEMA), which show areas subject to flooding based on historic, meteorologic, hydrologic and hydraulic data, as well as existing surface features such as flood-control structures and development (see **Exhibit 9a**). The 2010 FIRM for Oxnard shows the MGS as outside the 100-year flood zone ("base flood zone"), which is the area with a 1% annual probability of flood occurrence, but largely within the 500-year flood zone (0.2% annual chance of occurrence). The 100-year flood zone immediately seaward of the MGS, however, is identified as a VE zone, which indicates an area subject to flooding by deep, fast-moving water with a high potential to cause erosion or structural damage (see **Appendix B**). The VE zone base flood elevation adjacent to the project site is estimated to be +13 feet NAVD88, similar to the elevation of the MGS and P3 site. The base flood elevation related to a Santa Clara River floodway in the area immediately to the north of the P3 site is approximately +12 feet. These flood elevations are similar to those on much of the MGS site (and slightly lower than the elevation of the proposed P3 site), indicating that the MGS's position outside the 100-year flood zone is dependent on the continued presence and integrity of the line of dunes immediately to the west of the site, and of the artificial berm along the site's northern boundary.

Updates to the FIRM for the Oxnard area are in progress, with new preliminary maps expected to be released in September 2016. Importantly, the 2016 updates represent the first comprehensive re-examination of coastal flood risk since the initial flood maps were prepared in the 1980s. A draft Work Map for the 2016 FIRM update is provided in the PSA as a supplement to the 2010 map. On this map (**Exhibit 9b**), the P3 site remains outside the 100-year flood zone, but the coastal base flood elevation has been increased by over 50% to +20 feet NAVD88, and the seaward edge of the VE zone has been extended approximately 230 feet inland into the line of dunes west of the MGS. Though not shown on the draft Work Map, at a base flood elevation of 20 feet, floodwaters would be expected to spill over into the MGS site via low points in the dune and berm system noted above. Storm conditions capable of producing a coastal base flood elevation of +20 feet would be accompanied by large waves and fast-moving water, potentially leading to the erosion of the beach and fronting dunes and overtopping of the dunes in some locations.

Additionally, neither the existing 2010 FIRM nor the 2016 draft Work Map appear to account for the presence of the Edison Canal along the southeastern boundary of the MGS. The canal is directly connected to the Pacific Ocean via Channel Islands Harbor, and thus could be subject to elevated water levels during a severe storm or flood event, although the increase in canal water levels at the MGS would be attenuated by the long distance up the canal and lags in water transport. If water levels in the canal were to exceed approximately +12 -13 feet, then the MGS and P3 site would also be exposed to flooding from this source.

In summary, the 2010 and draft 2016 FEMA flood hazard maps indicate that the MGS and project site are subject to a certain degree of flood risk. The MGS (and a small portion of the P3 site) are located within the current 500-year flood zone, and thus could be expected to flood during an extreme event. The site lies outside the 100-year flood zone by virtue of the protective

dunes and artificial berm surrounding its seaward margins. However, when low points in these features are considered, and the likelihood of erosion during a storm event is taken into account, the project site could be exposed to flooding during a 100-year flood.

Other Flood Hazard Analyses

Several other existing studies support the conclusion that the project site is currently vulnerable to flooding during a large storm or flood event. Recently, the City of Oxnard commissioned a vulnerability assessment of existing and future coastal hazards at the MGS (Revell 2015).[11] This assessment is based largely on coastal hazards modeling and mapping carried out as part of The Nature Conservancy (TNC)'s Coastal Resilience Ventura project (*see* ESA PWA 2013).[12] In contrast to the FEMA maps and PSA analysis, which do not account for erosion during a large storm event, the TNC and Revell analyses take a highly conservative approach to modeling coastal erosion, essentially allowing high waves and water levels during an extreme storm to operate on the beach and dunes at the site for an "undefined" duration. Consistent with the FEMA draft Work Map, these studies project that water levels during a 100-year flood event would near the crest of the dunes west of the project site (ESA PWA 2013, see Fig. 3). A 100-year storm event is also projected to result in significant beach and dune erosion, leaving the site vulnerable to subsequent storm events. Much of the MGS site could be exposed to flooding during a 500-year event (modeled using wave conditions observed during the 1982-83 El Nino) (**Exhibit 9d**). The P3 site, due to its slightly higher elevation, would escape flooding, but necessary supporting facilities such as the SCE switchyard would flood and access to the P3 would be restricted. Although this site-specific assessment should be considered a "worst case" scenario due to its extreme treatment of the erosion potential at the site, it nonetheless highlights that such erosion is likely to be a major determinant of the severity of flooding at the site (Revell 2015). It also suggests that during a 500-year wave event, large portions of the MGS site could be subject to direct wave impacts following substantial erosion of the protective dunes.

A separate flood hazard modeling effort in the vicinity of the proposed project was conducted as part of the California Coastal Conservancy (Conservancy)'s Santa Clara River Parkway project, which seeks to restore a continuous river and floodplain corridor along the full Ventura County length of the river for purposes of aquatic and riparian habitat enhancement and conservation, improved flood protection, and public access. Flood hazard modeling was carried out in order to better understand the potential effects of different scenarios of river levee setback and removal (Stillwater Sciences 2011).[13] In contrast to the existing FIRM and FEMA's draft 2016 map, the Conservancy's model of a 100-year flood event on the Santa Clara River under existing conditions suggests that the project site could be subject to inundation (**Exhibit 9c**; see also Stillwater Science 2011, Fig. 6b). The greater extent of flooding projected in the Conservancy analysis is attributed to the use of a two-dimensional hydrodynamic model which more accurately represents the hydraulic effects of low-lying topography and lateral berms or levees.

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[11] Revell, D. (2015). *Vulnerabilities of the Proposed Mandalay Generating Station to Existing and Future Coastal Hazards and Sea Level Rise*. Revell Coastal, LLC, April 6, 2015.

[12] ESA PWA (2013). *Coastal Resilience Ventura – Technical Report for Coastal Hazards Mapping*. Prepared for the Nature Conservancy, July 31, 2013, 59 pp. http://maps.coastalresilience.org/ventura/methods/CRV_Hazards_Mapping_Technical_Report.pdf

[13] Stillwater Sciences (2011). *Santa Clara River Parkway: Levee Setback Assessment of the Lower Santa Clara River, Ventura County, California*. Prepared for the California State Coastal Conservancy, September 2011, 72 pp.

Based on the available evidence, Commission staff believes that the PSA may underestimate existing, site-specific flood hazards at the project site, including flooding that could occur during a 100-year (1% annual chance of exceedance) or greater event.

Sea Level Rise

The project site is within an area of the Ventura County coastline that has been identified as being susceptible to sea level rise. It has a wide range of major infrastructure, including the existing power plants and proposed P3, which will eventually be affected unless significant effort is taken to protect, replace, or remove it. Recent studies found that the Ventura County coastline has structures worth more than $2.2 billion (in 2000 dollars), including the power plant, that are vulnerable to a 4.5-foot rise in sea level, which is a level expected before the end of this century.[14]

California has adopted the 2013 *State of California Sea-Level Rise Guidance Document* ("*State Guidance Document"*), and more recently, the Coastal Commission adopted the August 2015 *Sea Level Rise Policy Guidance: Interpretive Guidelines for Addressing Sea Level Rise in Local Coastal Programs and Coastal Development Permits*. Both guidance documents recommend the 2012 National Research Council (NRC) Report, *Sea Level Rise for the Coasts of California, Oregon, and Washington: Past, Present, and Future,*[15] as the current best available science on sea level rise. The NRC Report anticipates sea level rise of up to two feet by 2050 and up to 5.5 feet by 2100 along this part of the Ventura County shoreline.

Both the *State Guidance Document* and the Commission's *Sea Level Rise Policy Guidance* caution that current sea level rise projections may underestimate the actual amount of increase and that uncertainties about these projections increase as planning timeframes increase – i.e., they are likely to be more accurate for the next several decades and less so for subsequent decades in the latter part of the century. Both guidance documents also note that the rate of sea level rise is expected to be non-linear, with accelerating rates of increase later in this century. The guidances recommend that state agencies during project evaluation consider the projected lifespan of the facility, its cost, and the impact or consequence of damage or loss of the facility. They also recommend that consideration be given to the project's adaptive capacity, impacts, and risk tolerance for projects with an expected timeframe beyond 2050.[16]

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[14] Heberger, Matthew, et al., *The Impacts of Sea-Level Rise on the California Coast*, prepared by the Pacific Institute for the California Climate Change Center – California Energy Commission, California Environmental Protection Agency, Metropolitan Transportation Commission, California Department of Transportation, the California Ocean Protection Council, March 2009.

See also Coastal Resilience Ventura website: http://coastalresilience.org/project-areas/ventura-county-challenges/ Accessed August 22, 2016.

[15] For more information on the NRC Report, go to http://www.nap.edu/catalog.php?record_id=13389 and on the OPC Guidance, go to: http://www.opc.ca.gov/webmaster/ftp/pdf/docs/2013_SLR_Guidance_Update_FINAL1.pdf .

[16] See also California Emergency Management Agency, California Natural Resources Agency, and Federal Emergency Management Agency, *California Adaption Planning Guide: Planning For Adaptive Communities*, September 2012.

Importantly, and as noted in both guidance documents, the expected increases in water levels are likely to occur not at some point several decades in the future, but as gradual increases over time, accompanied by larger, temporary rises during short-term events, such as storm waves, or during recurring events like El Nino. The *State Guidance Document* notes that, "[w]here feasible, consideration should be given to scenarios that combine extreme oceanographic conditions on top of the highest water levels projected to result from SLR over the expected life of a project." It also states that water levels during these large, short-term events along some parts of the coast have already exceeded sea level rise levels projected for 2030 and have reached levels projected for 2050.

Future Flooding from Sea Level Rise and Storms

The PSA evaluates the proposed project based on a 30-year operating life, which would extend until approximately 2050. Under the "high" scenario contained in the 2012 NRC Report, the project vicinity could experience to up to two feet of sea level rise by 2050. This projected level of sea level rise is then added to present-day high tide elevations to arrive at a first-order estimate of the flooding hazard in 2050 under "still water" conditions. With two feet of sea level rise, the MHHW level in 2050 would be approximately +7.4 feet NAVD88; a future "king tide" (maximum high tide occurring a few times a year) could reach +9 feet. These projected water levels would remain below the project site elevation of about +14 feet, and well below the tops of the dunes fronting the project site. In order to estimate the combined flooding hazard created by sea level rise in conjunction with storms, the PSA uses model output from a preliminary version of the USGS Coastal Storm Modeling System (CoSMoS 3.0) for Southern California. Soil and Water Resources Figure 12 (PSA page 4.10-56) shows the extent of inundation expected during a "100-year Total Water Level" event (taking into account tides, storm surges, wave setup and runup and other sea level anomalies) combined with 100 cm (3.3 feet) of sea level rise. As shown in **Exhibit 10a**, under this projection, the MGS and P3 site remain entirely free of flooding. Accompanying cross-sections indicate that wave runup would reach an elevation of approximately +16 feet on the line of dunes west of the MGS (see PSA page 4.10-57).

Commission staff notes that this projected maximum wave runup elevation with over 3 feet of sea level rise is lower than the *present-day* coastal base flood elevation (+20 feet NAVD88) shown on the 2016 draft FEMA flood map (**Exhibit 9b**). If two feet of sea level rise are added to the 2016 coastal base flood elevation, the 100-year flood zone in 2050 could reach +22 feet, which would almost certainly result in overtopping of the dunes and at least some flooding of the project site, even without accounting for erosion.[17]

Accounting for Coastal Erosion

The preliminary version of CoSMoS 3.0 used in the PSA does not account for long-term shoreline change or storm-driven erosion. The PSA states that CEC staff will refine its assessment of future flooding risk after the full version of CoSMoS 3.0, including long-term

[17] A simple method recommended by FEMA for modifying existing flood maps for future sea level rise conditions is the "Base Flood plus 1, 2, 3" or the simple addition of some amount of sea level to the current flood levels. More rigorous methods often yield more defensible future flood levels and these methods are often necessary for complex terrains; however, the simple additive process often provides a decent first-order projection of the changes to the flood level and flood extent for future sea level rise. *See* Executive Order 13690, "Establishing a Federal Flood Risk Management Standard and a Process for Further Soliciting and Considering Stakeholder Input," January 30, 2015.

coastal evolution projections, becomes available. In the meantime, the PSA contains an extensive discussion of historical trends in beach width and sediment supply in the vicinity of the project, and concludes as follows:

> *Based on staff's research, this section of shoreline does not appear to be at high risk of erosion. A comparison between two aerial photographs taken in 1947 and 2014, show an increase in beach width that is conservatively estimated to be 200 feet ... The site-specific characteristics of the beach (e.g. wide, dune backed, relatively low exposure to southern swells, and downcoast from a large sediment source, the Santa Clara River) supports this long-term shoreline accretion. In addition, there was no recorded damage to the MGS facility during the two strongest El Niño cycles on record (occurring 1982/83 and 1997/98) … Sediment supply is not expected to decrease during the project lifetime.* (PSA page 4.10-58; see also discussion beginning on PSA page 4.10-39)

The detailed discussion of sediment supply and long-term shoreline evolution contained in the PSA highlights a crucial point: The vulnerability of the project site to flood hazards, now and in the future, will be determined in part by the status of the coastal dunes immediately west of the MGS, and by the condition of the artificial berm along the site's northern boundary. Based on the large (though highly variable) sediment loads carried to the shore by the Santa Clara River and a history of sand dredging and bypassing activities at Ventura Harbor up coast of the site, the PSA concludes that the risk of significant long-term shoreline erosion at the site is slight and can essentially be discounted in projecting the effects of future sea level rise.

This conclusion, however, does not take into account the uncertainty surrounding future sand bypassing. On average, sediment discharge from the Santa Clara River has comprised the majority of the shoreline sediment supply in the project vicinity, with sand bypassing from Ventura Harbor a secondary source. This balance of sources, however, does not mean that the bypassed sand is insignificant. The construction of Ventura Harbor in 1963 disrupted longshore sand transport in the Santa Barbara littoral cell, leading to impoundment of sand north of the harbor and beach erosion at downcoast locations, including in front of the MGS (Adams 1976; Revell 2015). Since dredging and sand bypassing in the harbor began in 1966, the beach width at the MGS has, on average, increased. While not the only factor involved, sand bypassing from Ventura Harbor appears to be important for maintaining beach widths at locations to the south. Annual sand bypassing volumes have been highly variable, ranging from less than 200,000 cubic yards to nearly 2.5 million cubic yards, and are dependent on funding for dredging activities. In recent years, Army Corps of Engineers funding for dredging at Ventura Harbor has been inconsistent, and future levels of funding for harbor dredging remain uncertain.

Furthermore, even a long-term trend toward shoreline accretion does not eliminate medium-term fluctuations in beach width that could leave the project site more vulnerable than average to erosion and flooding during a major storm event. As noted in the PSA (see page 4.10-44), sediment yield from the Santa Clara river is highly episodic, and the past record includes multiple periods of two to five years during which little or no sediment discharge occurred (typically during drought). During such periods, and/or when harbor sand bypassing is at a minimum, beach widths near the project site may be reduced, leaving the site more vulnerable to the next large coastal storm.

The risk of future flooding at the project site will also be related to the degree of wave-driven erosion of the protective dunes during a major storm event. Large storm waves reaching an elevation of +16 feet NAVD88 at the project site would be expected to result in significant dune erosion, reducing both the height and width of the dune crest; the degree of erosion would likely be greater for waves reaching an elevation of +22 feet (2016 FEMA coastal base flood plus two feet of sea level rise, see above). The City of Oxnard's flood hazard vulnerability assessment (Revell 2015) attempts to account for both erosion and temporary increases in water level related to an extreme storm event. The modeling in this analysis assumes water levels and wave conditions observed during the historical "storm of record" (wave heights up to 25 feet NAVD88 during a January 1983 storm) and, as noted above, makes very conservative assumptions about the amount of dune erosion that could occur during such a storm. In the report, this approach to modeling erosion is described as being qualitatively similar to what might occur during a series of storms with no time for dune recovery. The modeling also assumes that sediment supply (riverine + sand bypass) will remain unchanged from the present. The results of this analysis, shown in **Exhibit 10b**, suggest that the P3 site could be essentially surrounded by floodwaters during an extreme storm in 2030 (8 inches of sea level rise), and that most of the project site would be vulnerable by 2060 (25 inches of sea level rise). The hazard maps presented in the City's analysis represent extreme, but plausible, scenarios, approximating the potential effects of a 500-year storm under future sea level rise conditions.

Information submitted by NRG provides a contrasting view of the flooding and sea level rise hazards at the site. Comments submitted on September 2, 2016, can be summarized as follows:

- A comparison of aerial photos indicates that the beach fronting the MGS site has increased by more than 300 feet since 1947;
- Even if Ventura Harbor dredging ceased, a bypass bar would likely form and sand transport past the harbor would eventually resume;
- No actual flooding of the project site occurred during the January 1983 storm which provides oceanographic inputs for the Revell (2015) and ESA PWA (2013) modeling studies, suggesting that no flooding would occur during a similar storm in the future; furthermore, beach and dune widths fronting the MGS have increased since 1983;
- Historical rates of sea level rise have not resulted in narrowing of the beach;
- Assuming a beach slope of 3%, even the "high scenario" of two feet of sea level rise by 2050 would result in beach narrowing of only approximately 70 feet, leaving behind a beach over 200 feet wide;
- Tsunami or storm waves entering the Edison canal would be rapidly attenuated, making flooding of the project site from the Canal unlikely.

Based on these considerations, NRG believes that the potential for flooding at the site during the project's proposed 30-year life is minimal.

Long-term Sea Level Rise

The 2012 NRC Report projects that sea level along the Southern California coast could increase by 5.5 feet by 2100; alone or in combination with severe storms, an increase of this magnitude would pose serious threats to coastal structures in the Oxnard area, including on the project site. After 2050, the MGS would become increasingly vulnerable to flooding during winter storms,

and by the latter quarter of the century, could begin to experience flooding under "still water" conditions, that is, without accounting for the effects of storm waves. For example, a "king tide" event during an El Nino year in 2080 could produce still water levels in excess of +12 feet NAVD88, at which point the banks of the Edison Canal would be overtopped and the lower portions of the MGS inundated. The greater amounts of sea level rise projected for the later decades of the century could also increase groundwater levels (which are tidally-influenced at this location) potentially affecting the foundations of the remaining facilities and increasing susceptibility to seismic hazards such as liquefaction and lateral spread.

In summary, although the amount and impacts of sea level rise at the site remain uncertain, sea level rise would exacerbate existing coastal hazards at the project site, and increase the likelihood that the site could be flooded during the 30-year project life. Assuming a present-day coastal base flood elevation of +20 feet NAVD88, up to two feet of sea level rise would increase the likelihood of breaching or overtopping of the protective dunes during a 100-year storm event, resulting in some degree of flooding at the MGS. Sea level rise will also increase the area subject to flooding during a 500-year storm. Moreover, high waves and fast-moving water during a major storm event are also likely to result in some erosion of the protective dunes adjacent to the MGS, which would increase the extent and severity of flooding at the site. The potential for long-term changes in shoreline sand supply (related to variable riverine sediment input and sand bypassing at Ventura Harbor) add an additional element of uncertainty to future flooding projections.

Tsunami Hazards

Available evidence suggests that the MGS and P3 site could also be subject to inundation from a large tsunami during the proposed 30-year project life, particularly in conjunction with sea level rise.

The 2009 California Geological Survey (CGS) *Tsunami Inundation Map* for the Oxnard area shows the project site as lying just inland of the tsunami runup zone, apparently protected by the dunes to the west of the MGS (see **Exhibit 11**). As reported in the PSA, the map indicates that land within the project vicinity situated at elevations of less than seven feet above mean sea level (+9.75 feet NAVD88) could be inundated by a tsunami. In contrast to the FEMA flood hazard maps, the 2009 CGS Map is based not on 100- or 500-year probabilities, but on the maximum expected inundation an area could experience from either far-field tsunamis (i.e. those tsunamis that are generated far from Oxnard) and from locally generated or near-field events.[18] For each mapped area of the coast, the CGS identified expected inundation levels for every 30-meter grid within the modeled runup zone. The site's tsunami risk and its expected tsunami runup elevations are also based in part on nearby seafloor bathymetry and other offshore characteristics. [19]

[18] Tsunami inundation analyses used in land use planning often refer to 100-year and 500-year events, based on FEMA's methods for floodplain mapping. For several reasons, however, determining tsunami probabilities is significantly more difficult than predicting flood events. Tsunamis occur less frequently than floods, their historic and prehistoric records are often less exact, and the events that generate them can occur over a much larger area. The CGS is in the process of developing probabilistic tsunami hazard maps for the California coast, but maps covering the Oxnard area are not yet publically available.

[19] See Legg, Borrero, and Synolakis, *Evaluation of Tsunami Risk to Southern California Coastal Cities*, Federal Emergency Management Agency and Earthquake Engineering Research Institute, January 2003.

In a related 2013 study, the USGS determined, based on modeling of a dozen distant and local tsunami sources, that the Oxnard area could be subjected to a high incoming tsunami wave elevation of 9.51 feet (related to the local-source Goleta Landslide slide No. 2 scenario) and a maximum onshore runup elevation of 10.17 feet (Wood 2013). If such a tsunami were to occur at Mean High Water (MHW) conditions, the modeling indicates runup would extend to 16 feet NAVD88 along the dunes at the project site (CGS 2009). At higher water levels, such as MHHW or during a king tide, the tsunami inundation and runup could extend several feet higher.

A more recent modeling study, based on a broader consideration of potential local offshore earthquake sources than in previous studies, projects an area of tsunami inundation along the Oxnard coastline that significantly exceeds the tsunami inundation zone shown in the 2009 CGS Map (Ryan et al. 2015). The modeling suggests that a large (MW 7.3 – 7.8), multi-segment earthquake offshore of Ventura could result in a tsunami causing inundation at the project site. The PSA notes that the scale of the mapping in the study is not well-suited to assessing site-specific inundation hazards. Nonetheless, the findings of this study highlight that tsunami hazards along the Southern California coastline remain incompletely understood, and that inundation and runup greater than anticipated in the 2009 CGS Map are plausible.

Effects of Sea Level Rise
The PSA also considers the potential for future sea level rise to exacerbate the risk of tsunami flooding (see Geology and Paleontology, pp. 5.2-33 to 5.2-35). The PSA describes the future risk of tsunami inundation as follows:

> *[I]f sea level rises as projected (4.9 feet above NAVD88), and the maximum tsunami (9.51 feet) occurs during MHW (+2 feet MSL) at the end of the project's design life, the leading edge of tsunami derived water inundation could approach an elevation of approximately 16.4 feet.*
>
> *The top of the dunes to the west of the P3 site range from approximately elevation 21 to32 feet (NAVD88). An artificial berm was constructed along the northern and eastern edges of the property in the early 1970s to protect the facility from flooding. The top of the engineered berm is at an elevation of approximately 17 to 20 feet (NAVD88).*
>
> *The major portions of the project are designed to be constructed at elevations of approximately 14 feet above NAVD88. Without the protection of the dunes and flood control berms, the site could be subject to inundation by as much as 2.4 feet of water following the "worst case" tsunami. However, based on the elevations of the protective dunes and flood control berm, the site would not be subject to impacts from inundation. Using these estimates with sea level rise rates as they are accepted today, there is less than a one foot of vertical separation between the low point on the site flood control berm protecting the site and the tsunami inundation area which extends to the project boundary. Since these estimates are not precise and, in an abundance of caution, staff concludes there is potential for flooding that could impact worker safety.*
>
> …

> *Given the current planning scenarios that show the project site is bounded by the tsunami inundation zone (CGS 2009) and protected by a flood control berm with less than one foot of vertical separation, staff is concerned there may be a threat of impact to worker health and safety from site flooding. Since the science behind estimating sea level rise is evolving, it is also possible rates could change during the life of the project and project design would not adequately incorporate mitigation for potential site inundation. In addition, recent fault studies and tsunami modeling that are currently being evaluated by the scientific community could also indicate additional potential for tsunami impacts at the site. Staff concludes that it would be appropriate for the project owner to be prepared to respond to a potential tsunami event and ensure that all workers and site visitors would be safe from an event similar to the nearby areas of the city of Oxnard that are located in a tsunami evacuation zone.*

To address this concern, the PSA recommends **Condition GEO-1**, which would require NRG to prepare and implement a Tsunami Hazard Mitigation Plan (THMP), which would "include among other things a discussion of the Ventura County Hazard Mitigation Plan and City of Oxnard Tsunami Evacuation Plan and how they apply to the project. It would also include discussion of criteria for a response to ensure worker safety for a tsunami event and show where on- and offsite refuge can be accessed, and evacuation routes that are recommended by the applicable Ventura County and city of Oxnard tsunami hazard response plans. The THMP would also include a training program for visitors and workers. The purpose of training would be to inform workers and visitors on how to respond to tsunami hazards and where they may obtain refuge in the event it is determined it is necessary to evacuate the project site."

Commission staff believes that, in a number of respects, the analysis contained in the PSA may underestimate the tsunami flooding hazard at the P3 site. First, the analysis of the combined hazard from a "maximum" tsunami (based on the 2009 CGS Map) and sea level rise considers only consider "still water" tsunami inundation without accounting for the substantial amount of runup that would be associated with a large tsunami wave. The height of the tsunami wave (9.51 feet) is simply added to the projected MHW level with two feet of sea level rise, yielding an inundation height of 16.4 feet. For comparison, the CGS and USGS modeling efforts predict a present-day runup elevation of 16 feet. With future sea level rise, the tsunami runup elevation in 2050 could be two feet higher, at approximately +18 feet NAVD88. In this scenario, the tsunami runup would exceed the height of low points along the artificial berm and dunes.

Second, and perhaps more critically, a large tsunami reaching an elevation of 16 feet (NAVD88) or more would likely result in significant erosion as it impacted the dune field and/or berm. Once one wave breached the dunes, subsequent smaller waves could then add to the site flooding. Additionally, future sea level rise and storms may weaken and reduce the height of the dunes (see above), increasing site vulnerability to a tsunami event.

Third, the project site may also be vulnerable to tsunami flooding via the Edison Canal along the southern margin of the MGS. The Canal is directly connected to the ocean via Channel Islands Harbor, and its banks on the MGS site near the existing cooling intake are at an elevation of approximately 12 feet NAVD88. As a result, the project site may be subject to tsunami-driven

seiches running up the canal.[20] In its September 2, 2016 comment letter, NRG references a recent study (Thio et al. 2015) examining the progression of a large tsunami wave entering Channel Islands Harbor and the Edison Canal. Based on this study, a tsunami wave with an amplitude of 5.7 feet (1.75 m) in the ocean would attenuate to an amplitude of just 1.3 feet (0.4 m) approximately 2.5 miles up the canal. Although it is not clear if a larger, 9.51-foot tsunami wave proceeding up the Edison Canal at high tide would attenuate to a similar degree, the risk of project site flooding via the Edison Canal appears to be low during the proposed 30-year life of the project.

As evidenced by recent tsunami events worldwide and in California, a 9- to 10-foot tsunami can cause significant adverse impacts. At this site, it could result in partial inundation and possible damage to below-grade facility components. It is also possible that damaged structural components could contribute structural debris to the tsunami and worsen the damage at the facility or nearby structures and properties. A tsunami of this size could also result in significant threats to life safety for any plant personnel or members of the public on the site at the time the tsunami struck.

Tsunami mitigation

Other than locating proposed facilities outside of tsunami runup areas, the simplest approach to preventing or reducing tsunami-related hazards is to elevate structures above expected runup levels. However, elevating the facility's proposed structures would require significant amounts of fill and would have the potential to redirect tsunami energy away from the facility and towards other nearby structures and properties. Additional fill could also be used to create berms around the structures while keeping the structures at the same proposed elevation; however, this approach could similarly redirect tsunami energy towards other nearby properties.

Other possible mitigation approaches include incorporating tsunami-resistant design features into structures that are subject to inundation. These features include enclosing below-grade structures within reinforced concrete walls to resist tsunami forces, protecting tanks against uplift due to tsunami buoyant forces, and others.[21] Another standard approach for facilities in tsunami-prone areas is to develop and implement a safety plan that includes on-site signage, training for facility personnel to know how to recognize tsunami watches and warnings that may be issued, and identifying an evacuation site. As a general matter, the Commission agrees with the tsunami hazard mitigation approach that would be required under **Condition GEO-1**. However, when combined with the significant present and future flooding hazards at the project site from storms, sea level rise, and wave-driven erosion, the Commission believes that the most prudent response to the tsunami hazard would be to select an alternative project location outside the tsunami hazard zone.

Discussion

The available site-specific evidence, including that contained in the PSA and other relevant sources, indicates that the MGS, including the P3 site, could flood under certain conditions. A

[20] A seiche is a wave generated by the same types of events that cause a tsunami, but that occurs within an enclosed water body such as a bay, reservoir, or, in this case, a flood control channel.

[21] See, for example, the 2008 Federal Emergency Management Agency's (FEMA's) *Guidelines for Design of Structures for Vertical Evacuation from Tsunamis*.

coastal base flood level of +20 feet NAVD88, combined with erosion of the fronting dunes, has the potential to result in some site flooding during a present-day 100-year flood event, and sea level rise is expected to exacerbate this hazard during the proposed 30-year life of the project. The single most important determinant of flooding risk at the site, at least in the near-term, appears to be the status of beach and fronting dunes. However, unlike a seawall, these natural features are subject to change in response to natural and anthropogenic processes. The Commission's Senior Coastal Engineer has concluded that "[l]oss of the protective beach and dune system, while not highly likely, is nevertheless possible. Without the fronting dunes, the proposed site would be at significant risk of flooding, even under current sea level conditions." (See **Appendix B**). At this location, a vulnerability analysis that does not account for dune erosion must be considered incomplete.

Flooding at the project site could cause significant adverse impacts. For example, ground-level or below grade facility components could be subject to complete inundation, potentially resulting in plant outages. Additionally, debris carried by a flood could damage above-grade components of the facility, or conversely, structural debris from the facility could damage nearby structures or property. Potential risks include temporary or permanent loss, or reduction, of electricity production to the area, damage to adjacent properties, and increased public costs to provide measures that would protect the facility from these flood events. These flood risks will increase with the expected increase in sea level rise during the project's operating life.

The PSA states that the proposed P3 would not represent a "critical facility" in the context of the electricity generation and distribution system, and on this basis concludes that a higher tolerance for flooding risk is appropriate. However, the Commission notes that the proposed facility would remain an important component of the regional system, and that electrical generating stations are typically classified as critical facilities for purposes of natural hazards and emergency planning. FEMA guidance indicates that the planning and siting of facilities such as police and fire stations, hospitals and electrical facilities should be based on avoiding risks from the 500-year flood event.[22] Previous Coastal Commission decisions and recommendations on the siting of major energy and industrial infrastructure have included requirements that the proposed facilities be sited and designed to avoid flood hazards at the 500-year (0.2% annual chance of occurrence) level.[23] In the present case, the available evidence suggests that the project site may be vulnerable to both 100-year and 500-year flood events. Flood events of these magnitudes and their associated risks are reasonably foreseeable, since during the project's four years of construction and its 30-year operating life, it would have about a 2 in 7 chance of experiencing the 100-year flood and a 1 in 15 chance of experiencing the 500-year flood event.[24]

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[22] See, for example, *Design Guide for Improving Critical Facility Safety from Flooding and High Winds*, FEMA Publication 543, January 2007, as well as CalEMA criteria described at: http://hazardmitigation.calema.ca.gov/plan/local_hazard_mitigation_plan_lhmp

[23] See, for example, the adopted findings on the SCE Oxnard Peaker Plant (Appeal No. A-4-OXN-07-096) and the 30413(d) Report for the AES Huntington Beach Energy Project (Application for Certification #12-AFC-12).

[24] The calculation used to determine these probabilities is $r = 1-(1- 1/T)^N$, with T = the return period (i.e., the 100- or 500-year event), N = the expected life of the facility (i.e., eight years construction and 30 years operation), with r equal to the probability that the event will occur at least once in N years. During a 38-year facility life, there is about a 32% probability it would experience a 100-year event and about a 7% probability it would experience a 500-year event.

Ultimately, in spite of the uncertainty surrounding the exact degree of risk, there is substantial evidence that the project site could be exposed to flooding during its proposed 30-year operating life, and that over the long-term, this possibility would become a certainty. In this situation, Coastal Act Section 30253 requires that risks to life and property be minimized, and the stability and structural integrity of new development be assured, without resorting to the construction of shoreline protective devices. The Commission believes that the requirements of this policy can best be met through risk avoidance, that is, by the selection of an alternative inland site that is free of flooding hazards. The PSA indicates that one such site, the Ormond Beach Area Alternative, may exist.

The PSA also evaluates several other off-site alternatives, but for a variety of reasons, finds them to be infeasible and eliminates them from further consideration. Among these off-site alternatives is the Calpine Mission Rock Energy Center, a proposed 274-MW natural gas-fired generating station that would be located on an industrial site in inland Ventura County, near Santa Paula. An AFC for this project (15-AFC-02) is currently under CEC review. The PSA assumes that, as a proposed power plant location owned by another developer, the Mission Rock site is unavailable to NRG for development of the P3 project. Without endorsing the Mission Rock proposal specifically, the Commission notes more generally that, regardless of the specific project proponent, the development of a comparably-sized project at another location could obviate the need to develop new generating capacity at the MGS, potentially avoiding the resource impacts and coastal hazard vulnerabilities associated with this site. Most critically, evidence suggests that the MGS site could be subject to flooding within the 30-year project time frame, and that the likelihood of flooding would only increase beyond 2050. As a result, the proposed project cannot provide a long-term solution to regional power generation needs. The Commission urges the CEC to consider a broader range of alternatives, including locations or projects which would allow for the safe siting of power generation capacity over the long term, beyond 2050, and which would eliminate the need to locate a new generating facility at the MGS site in an area susceptible to current and future coastal hazards.

Coastal Commission Recommended Specific Provisions

To address hazards presented by flooding, sea level rise and tsunamis, and their associated risks to the proposed facility, and to allow consistency with relevant provisions of the Coastal Act and LCP, the Commission recommends the CEC develop a new condition of certification achieving the following:

- **Relocation of Project to Minimize Risk of Flooding:** In order to ensure that the proposed project minimizes risks to life and property, assures stability and structural integrity, and remains inland of the 100-year flood zone over the full life of the project, as required by Coastal Act Section 30253 and LCP Policies 40 and 56, the Commission recommends that the CEC require NRG to relocate the proposed project to an alternative site that is (a) outside the current 100-year and 500-year flood zones, and (b) would not be at risk of flooding related to high water levels, storm waves or coastal erosion, including the effects of sea level rise, over the full 30-year project term.

If the CEC determines that there is no feasible site meeting these criteria to which the project could be relocated, the Commission recommends the following new and modified conditions are necessary allow consistency, to the extent feasible, with relevant Coastal Act and LCP policies:

- **Flood Damage Prevention:** In order to minimize risks to life and property from flooding within the confines of the MGS site, the Commission recommends the CEC include the following new condition of approval:

  > Prior to the start of construction, NRG shall submit for CPM review and approval, certification from a licensed engineer that the proposed facility is elevated above, or protected from, a 500-year flood event at the project site that includes an additional 24 inches of sea level rise. The engineer's determination shall describe the methods and include the calculations used to determine the elevation of the current 500-year flood event at the site and those used to determine the elevation of a future 500-year flood event with the additional 24 inches of sea level rise expected during the facility's thirty year operating life.
  >
  > The elevations and proposed changes to the facility design shall be incorporated into the final project design submitted to the CPM.

- **No Shoreline Protective Device:** Coastal Act Section 30253(b) requires that new development "neither create nor contribute significantly to erosion, geologic instability, or destruction of the site or surrounding area **or in any way require the construction of protective devices** …" To ensure consistency with this policy, the Commission recommends that the CEC include the following new condition of approval:

  > In the event that the approved development, including any future improvements, is threatened with damage or destruction from coastal hazards, or is damaged or destroyed by coastal hazards, protective structures (including but not limited to seawalls, revetments, groins, deep piers/caissons, etc.) shall be prohibited. By acceptance of the CEC approval, the project owner waives any right to construct such protective structures, including any that may exist under Public Resources Code Section 30235.

- **Beach and Dune Monitoring:** Due to the importance of a wide beach and intact dunes for reducing flood hazards at the project site, the Commission recommends that the CEC require NRG to implement a Beach and Dune Monitoring Program to be carried out over the life of the project. The purpose of this monitoring would be to determine if, and at what rate, the beach and/or dunes are eroding. The Program should include triggers for further action based on the degree of beach narrowing and/or dune loss, and measures should be identified that could halt or slow the observed erosion without construction of shoreline protective devices. One such measure could include financial support for dredging and sand

bypassing at Ventura Harbor, particularly if a hiatus in sand bypassing is shown to be contributing to erosion at the project site.

- **Facility Removal**. As discussed above, in the second half of the century the MGS is likely to be subject to hazards, including increasingly frequent and severe flooding and shoreline erosion, which will render the facility, including the P3, inoperable. In order to minimize this risk to life and property, and assure that the proposed development does not contribute to the destruction of the site or surrounding area, as required by Coastal Act Section 30253, the Commission recommends that the CEC require NRG to submit a plan, prior to the end of the proposed 30-year life of the P3, for the decommissioning and full removal of the facility.

Conclusion
The Commission finds that the CEC's implementation of the above-recommended Specific Provisions would allow the proposed project to be consistent to the extent feasible with relevant policies of the Coastal Act and LCP.

F. PUBLIC ACCESS AND RECREATION

Coastal Act Section 30210 states:

> *In carrying out the requirements of Section 4 of Article X of the California Constitution, maximum access, which shall be conspicuously posted, and recreational opportunities shall be provided for all the people consistent with public safety needs and the need to protect public rights, rights of private property owners, and natural resources areas from overuse.*

Coastal Act Section 30211 states:

> *Development shall not interfere with the public's right of access to the sea where acquired through use or legislative authorization, including, but not limited to, the use of dry sand and rocky coastal beaches to the first line of terrestrial vegetation.*

Coastal Act Section 30212 states, in relevant part:

> *(a) Public access from the nearest public roadway to the shoreline and along the coast shall be provided in new development projects except where: (1) it is inconsistent with public safety, military security needs, or the protection of fragile coastal resources, (2) adequate access exists nearby, or, (3) agriculture would be adversely affected. Dedicated accessway shall not be required to be opened to public use until a public agency or private association agrees to accept responsibility for maintenance and liability of the accessway.*

LCP Policy 52 states, in relevant part:

> *Energy related development shall not be located in coastal resource areas including sensitive habitats, recreational areas and archaeological sites. All development adjacent to*

> *these resource areas or agricultural areas shall be designed to mitigate any adverse impacts.*

LCP Policy 54 states:

> *All new energy related development shall be located and designed to minimize adverse effects on public access to the beach. Where appropriate, an access dedication shall be a condition of approval.*

LCP Policy 72 states, in relevant part:

> *Public access to and along the shoreline and the Inland Waterway shall be required as a condition of permit approval for all new developments between the shoreline and the first public roadway inland from the shore …*
>
> 1. *Exceptions may be made when access would be inconsistent with public safety, military security, the protection of fragile coastal resources, or when agriculture would be adversely affected.*

Section 25529 of the Warren-Alquist Act states, in relevant part:

> *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 development, including the construction of the new P3 facility and the decommissioning and removal of the existing Units 1 and 2, would be largely contained within the MGS site, where public access is not available. However, the project, as proposed, would nonetheless affect public access in several ways. First, as part of the P3 development, NRG proposes to discharge process wastewater and storm water runoff directly onto the beach area in front of the plant via an existing wastewater outfall structure, reducing the usable area of the beach, impeding lateral access, and at times creating a public hazard. Second, in order to meet the requirements of Section 25529 of the Warren-Alquist Act, the CEC is expected to require that NRG establish a public access area as a condition of certification of the P3. If carefully selected and planned, this required public access area could also meet Coastal Act and City of Oxnard LCP requirements that new shoreline development provide and enhance public access and recreational opportunities. Third, the proposed construction and demolition activities would

generate increased traffic on coastal roadways which could interfere with public access. These issues, and the Commission's recommended provisions to address them, are described below.

Project Setting

The MGS is located between two state beaches -- McGrath State Beach to the north, and Mandalay State Beach/County Park to the south – which are connected by the beach area directly in front of the power plant site (**Exhibit 2**). This NRG-owned beach parcel is a popular beach recreation site and is zoned for Coastal Recreation under the City of Oxnard's Coastal Zoning Ordinance. Although privately owned, the beach parcel has a sustained history of public recreational use. Additionally, the City of Oxnard has discovered in Ventura County public records a June 1933 agreement between the Dominick McGrath Company, the former landowner of the beach parcel and Ventura County permanently granting an 80-foot wide right-of-way at the eastern edge of the parcel to the County for use as a public road (the existing, unimproved "Mandalay Beach Road") to traverse the property.

Wastewater Discharge and Reuse of Outfall Structures

As part of the P3 development, NRG proposes to discharge process wastewater and storm water runoff directly onto the NRG beach parcel via an existing wastewater outfall structure. The outfall consists of a concrete discharge structure and riprap-lined channel cutting across the beach; a chain link fence along the crest of the riprap and behind the concrete discharge point is intended to limit access to the structure. At present, when the existing MGS is operating, large volumes of warm, used cooling water and other wastewaters are discharged across the beach, forming a channel that can be several feet deep (see **Exhibit 12**). The channel is frequently fully or partially blocked by natural sand accumulation, at times causing extensive alongshore ponding in the back-beach area.

The area of beach occupied by the outfall structure, riprap, fence, and discharge channel, and effectively removed from public recreational use, is approximately 275 feet across-shore by 120 feet alongshore, or 33,000 square feet. Even when the outfall is not active, the existing riprap, fence and channel depression impede lateral access in this area. When discharge is occurring, and in particular when back-beach ponding develops, a much larger area of beach becomes inaccessible. At times, the barrier to beach access presented by the discharge channel and/or pond extends onto public lands below the mean high tide line. A previous emergency CDP granted by the City of Oxnard to allow bulldozing to relieve back-beach ponding has noted that maintenance of a free-flowing channel for wastewater discharge is "required for the safe operation of the power plant and to prevent ponding of the discharge laterally on the beach to the north and south … creating a hazard to the public utilizing the beach." (ECDP No. 15-000-17, April 6, 2015).

As proposed, the P3 facility would discharge process wastewater and storm water runoff to the beach through the existing outfall. Although wastewater discharge volumes would be greatly reduced, both the hard structures and discharge channel would remain, and the potential for back-beach ponding of wastewater would persist and possibly increase due to lower discharge volumes. As a result, the proposed wastewater discharges associated with the P3 would have a direct adverse effect on coastal public access, contrary to Coastal Act Sections 30210 and 30211, which require maximum public access to be provided, and avoiding interfering with the public's

right of access to the sea, including where acquired by use, and to LCP Policy 54, which requires that all new energy development be located and designed to minimize adverse effects on public access to the beach.

Moreover, the proposed retention and reuse of the existing outfall structures, including the fence and riprap, would, in effect, reauthorize and extend a non-conforming use under the City of Oxnard Coastal Zoning Ordinance, a stated goal of which is to "bring such buildings and uses into conformity with the goals and policies of the Oxnard Coastal Land Use Plan" (CZO Section 37-4.6.1). The reuse of these structures would conflict with the intent of LCP Policy 52, which provides that energy-related development should not be located in coastal recreation areas.

As noted previously, the City of Oxnard has stated that there are several feasible alternatives to the beach discharge of wastewater which would reduce the project's adverse impacts on public access and recreation. These alternatives include the discharge of wastewater into the City's storm or sanitary sewer system or to the Edison Canal to promote water circulation. Other alternatives that should be evaluated include the treatment and reinjection of wastewater for groundwater recharge (to replace infiltration lost as a result of capture by impervious surfaces on the MGS site), and treatment and recycling for off-site industrial, agricultural or urban use, or other beneficial uses.

> **Coastal Commission Recommended Specific Provisions:**[25]
> To ensure consistency with Coastal Act Sections 30210 and 30211, and LCP Policies 52 and 54, the Commission recommends that the CEC require NRG to develop a Wastewater Reuse and Recycling Plan, including any necessary water treatment, that would maximize reuse of the process wastewater and storm water generated and collected at the MGS following the construction of the P3, and eliminate the discharge of wastewater to the beach. In the event that full wastewater reuse and recycling is determined to be infeasible, the Commission recommends that the CEC require that the Wastewater Plan include measures that would prevent the recurrence of back-beach ponding, avoid the creation of public hazards and other impacts to public access and recreation, and eliminate the need for repeated excavation of a discharge channel on the beach.

With the discontinuation of once-through cooling, the volume of wastewater generated at the MGS would be greatly reduced, increasing the feasibility of alternative approaches for the handling and disposal of wastewater at the site. With the implementation of the Wastewater Reuse and Recycling Plan, the large existing wastewater outfall structures, including the concrete outfall, riprap groins, and chain-link fence, would no longer be necessary. The full or partial removal of these structures during the decommissioning and demolition of Units 1 and 2 would be consistent with the goals and policies of the Oxnard LCP, and would significantly improve coastal access and recreation opportunities on the beach in front of the plant. As discussed in greater detail below, the Commission recommends that the CEC include the removal of the outfall structures as a part of the required project's required public access component.

[25] This same recommendation was made in the marine resource section above to address the adverse impacts of the proposed wastewater treatment system on marine resources and its inconsistency with LCP Policy 64.

Public Access Improvements

As noted in the PSA, NRG's application for certification includes no public access component that would meet the requirements of Section 25529 of the Warren-Alquist Act. The PSA identifies several potential options for satisfying the public access requirement in the vicinity of the MGS, including both on- and off-site alternatives (see PSA Land Use section, pages 4.6-9 to 4.6-10). The PSA concludes that improving access on the NRG-owned beach parcel, encompassing 1,800 feet of beach frontage immediately in front of the MGS, is "the most practicable and feasible of the potential options," and acknowledges that improving lateral access and enhancing the safety of pedestrian travel in this area is a goal of the City of Oxnard's LCP. The PSA summarizes options for improving public access in the beach parcel as follows:

> *In light of the foreseeable relocation and enhancement of McGrath State Beach (located north of P3) and the expansion of the Beach Walk at Mandalay (formerly named North Shore) development (located south of P3) pedestrian traffic along the beach would most likely increase and a boardwalk or pedestrian path linking McGrath Beach with recreation facilities to the south would be a welcome amenity for recreational use. Enhancement opportunities for a public use area include, but are not limited to, providing a public use easement or dedication of land to the city of Oxnard; implementation of a pedestrian path or boardwalk linking both McGrath State Beach and Mandalay Beach City/County Park; secure MGS outfall area; provide trash cans; and signs delineating sensitive habitat areas.*

The PSA's **Condition LAND-1** would require NRG to establish an area for public use consistent with PRC Section 25529, but stops short of identifying a specific location and the form or manner in which the public access enhancements would be implemented.

The Commission agrees that the NRG-owned beach parcel fronting the MGS would be an appropriate location for the establishment of a public access area pursuant to Section 25529. The Commission also notes that evidence exists suggesting that the public's right of access to this beach area may have already been established through many decades of recreational use, although this has not yet been adjudicated. Recreational use of the area is recognized in the City's LCP Coastal Zoning Ordinance, which designates this parcel as a coastal recreation area. As mentioned above, a 1933 agreement between the McGrath Company (former landowners) and Ventura County demonstrate that an 80-foot wide right-of-way at the eastern edge of the beach parcel was granted to the County for use as a public road (the existing, unimproved "Beach Road"), which is currently used by the public for access to the beach. In addition, this stretch of beach is used by the public as a segment of the California Coastal Trail (CCT).[26]

In light of the evidence of public uses of the beach parcel, merely declaring this area open to recreational use or installing signs would not alter the existing situation or materially enhance public access in the area. Similarly, the "provision of a boardwalk or pedestrian path across the beach parcel," as suggested in the PSA, would to a large degree duplicate the existing public use of the Beach Road, but would not fulfill the requirement to maximize access under the Coastal Act and the LCP.

[26] For example, see the CCT Ventura County Section 6 map produced by Coastwalk California, accessed August 18, 2016, at: http://californiacoastaltrail.info/hikers/hikers_main.php?DisplayAction=DisplaySection&CountyId=16&SectionId=88.

Among the public access enhancement options at the site mentioned in the PSA, only "the provision of a public use easement or dedication of land to the city of Oxnard" and/or the securing of the MGS outfall area would materially improve upon the public access rights and opportunities that already exist on the beach parcel. A public access land dedication or easement would permanently secure the public's right to use the land, and would prevent future private development that could interfere with public access. The removal or reduction of the outfall structures, as discussed above, would eliminate a recognized, significant barrier to access along the shoreline. Moreover, dedication of the land to the City would meet the requirements of LUP Policy 54, which requires that, "where appropriate," a public access dedication be a condition of approval for all new energy-related development.

Coastal Commission Recommended Specific Provisions:
To address the public access requirements of Section 25529 of the Warren-Alquist Act as well as the relevant provisions of the Coastal Act and LCP, the Commission recommends that **Condition LAND-1** be modified to require the full removal, partial removal, or down-sizing of the existing outfall structures (including riprap and fence), to eliminate or minimize impacts to public access.

Facility Abandonment
As discussed at length in Section I.E, above, the project site is currently subject to flooding and erosion hazards which are expected to increase in the future. On-going wave action and future sea level rise ensure that at some point in the future, likely in the decades following 2050, the project site will be subject to increasingly frequent flooding and higher rates of coastal erosion that will accelerate shoreline retreat. If portions of either the existing MGS or the proposed P3 are allowed to be abandoned in place, they have the potential to become safety hazards and barriers to shoreline access on what will eventually be public tidelands below the MHTL. For example, the erosion-driven exposure of below-grade components of the MGS and/or P3 would degrade the quality of the beach, present hazards to beach goers, and otherwise restrict public access and recreation on a portion of the future beach.

Coastal Commission Recommended Specific Provision:
In order to avoid foreseeable public access impacts from any future abandonment-in-place of the MGS and/or P3, and to allow consistency with Coastal Act and LCP policies requiring maximum public access and requiring that energy-related development be designed to minimize adverse effects on public access, the Commission recommends that the CEC include a new condition of approval requiring that NRG develop decommissioning plans which include the removal of all MGS and P3 structures and facilities, including below-grade components, at the end of the operating lives of the respective facilities.

Project-Related Traffic
Project-related traffic during approximately four years of construction, decommissioning and demolition activities at the facility site will occur along several thoroughfares which provide public access to the shoreline. These include the Harbor Boulevard, West Gonzales Road, Victoria Avenue, and West 5th Street. The PSA indicates that average daily construction traffic would include about 210 one-way trips, with most (180) due to the workers' commutes and the

remainder due to truck deliveries. However, only 69 (33%) of the total one-way trips are expected to occur during peak commute hours, when traffic is typically heaviest. Average daily project-related traffic during demolition activities would be similar (214 one-way trips), but with a greater proportion (66 trips) as truck traffic. The PSA identifies relatively minor increases in delays at nearby intersections during peak construction and traffic periods, but in all but one case does not predict any declines in Traffic Levels of Service (LOS).[27] Peak construction traffic would increase delays and degrade LOS to Level E at the intersection of Harbor Boulevard with the MGS entrance. However, this intersection is controlled by a stop sign at the MGS exit driveway, with Harbor Boulevard uncontrolled and free-flowing, so delays are expected to affect only traffic exiting the project site, not the general public. To address this issue and minimize adverse impacts on traffic safety along Harbor Blvd., the PSA proposes **Condition TRANS-2**, which would require NRG to prepare a Traffic Control Plan governing the ingress and egress of vehicles to and from the MGS site and requiring signage along Harbor Blvd. warning drivers of construction traffic exiting the project site.

Elsewhere, the PSA indicates that certain phases of P3 construction could include work seven days a week. The PSA does not, however, describe the levels of project-related traffic that would be generated during these periods, nor whether construction traffic outside of the normal work-week could adversely affect recreational traffic, and thus public access, along the Harbor Boulevard corridor.

Coastal Commission Recommended Specific Provision

To ensure consistency with Coastal Act and LCP policies protecting public access to the coast, the Commission recommends that **Condition TRANS-3** be modified to require NRG to include in its Traffic Control Plan any measures necessary to minimize construction traffic on weekends and holidays, and to avoid delays and degraded LOS during these key recreational periods.

Conclusion

The Commission finds that the CEC's implementation of the above-recommended Specific Provisions would allow the proposed project to be consistent to the extent feasible with relevant policies of the Coastal Act and LCP.

[27] The Level of Service refers to a method used to quantify existing baseline traffic conditions and the level of traffic congestion that may be present at certain times of day or under certain conditions. Levels of Service range from Level A, which allows the free flow of traffic, to Level F, which produces jammed conditions and significant delays.

APPENDIX A – SUBSTANTIVE FILE DOCUMENTS

Correspondence Received:

August 22, 2016 letter from Douglas Bosco, "Re: Section 30413(d) Review of Puente Power Project."

September 1, 2016 letter from Brian Segee and Matthew Vespa, representing the Environmental Coalition of Ventura County, Environmental Defense Center, and Sierra Club, "Re: Proposal to Upgrade Mandalay Generating Station (Energy, Ocean Resources and Federal Consistency) (Agenda Item F10a)."

September 1, 2016 letter from Tim Flynn, Mayor, City of Oxnard, "RE: Item F10a Comment Letter Supporting Staff Recommendation (9/9/16 Coastal Commission Meeting)."

September 1, 2016 letter from April Rose Sommers, The Protect Our Communities Foundation, "RE: Puente Power Plant Sept. 9, 2016 Agenda item # 10(a)."

September 2, 2016 letter from Michael Carroll, Latham & Watkins LLP, representing NRG Energy Center Oxnard LLC, "Re: Puente Power Project."

September 6, 2016 letter from Michael Carroll, Latham & Watkins LLP, representing NRG, "Re: Puente Power Project – Response to Recommended Specific Provisions in August 26, 2016 Proposed Report."

September 6, 2016 letter from California Environmental Justice Alliance, Environmental Coalition, Environmental Defense Center, Sierra Club, Surfrider Foundation, Ventura Audubon Society, Ventura Coastkeeper, and Wishtoyo Foundation, "Re: Proposal to Upgrade Mandalay Generating Station (Energy, Ocean Resources and Federal Consistency) (Agenda Item F10a)."

September 7, 2016 letter from Senator Hannah-Beth Jackson, 19th Senate District, California State Legislature, "RE: Comment Letter on Item F10a – Adopt Staff Recommendation – SUPPORT."

September 8, 2016 letter from Dawn Gleiter, NRG Energy Center Oxnard LLC, "Re: Agenda Item 10a; September 9, 2016, Proposal to Upgrade Mandalay Generating Station."

September 8, 2016 letter from Lily Verdone and Sarah Newkirk, The Nature Conservancy, "Re: California Energy Commission's Application for Certification (15-AFC-01) – NRG Energy Center Oxnard, LLC, Puente Power Project, reviewed pursuant to Coastal Act section 30413(d)."

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California Energy Commission, *Opportunities to Expand Coastal Power Plants in California*, Staff Report P700-80-001, June 1980, Sacramento, CA.

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City of Oxnard Coastal Land Use Plan

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August 23, 2016

TO: Dr. Joe Street, Environmental Scientist

FROM: Lesley Ewing, Ph.D. PE, Sr. Coastal Engineer

SUBJECT: Puente Power Plant Project, Oxnard, CA

At your request, I have reviewed the following materials related to the potential flooding and inundation risks identified for the Puente Power Plant Project at the Mandalay Generating Station.

- California Energy Commission. 2016. Preliminary Staff Assessment (the following sections)
  - Jon Hilliard, AICP. Project Description.
  - Marylou Taylor, PE. Soil & Water Resources.
  - Paul Marshall, CEG. Geology and Paleontology
  - Site Plan
- Pacific Institute. 2009. California Flood Risk: Sea Level Rise, Oxnard Quadrangle.
- California Coastal Commission. 2009. Adopted Finding on Appeal De Novo Review, A-4-OXN-07-096 (Southern California Edison Peaker Plant)
- FEMA 2010. Flood Insurance Rate Map for Oxnard/Puente Site.
- City of Oxnard (Chris Williamson, Planner). 2015. Comments Responding to CEC Issues Identification of August 19, 2015.
- ESA/PWA. 2013. Coastal Resilience Ventura: Technical Report for Coastal Hazards Mapping, prepared for The Nature Conservancy.
- David Cannon, PE. 2014 (Docketed Date 6/8/2015). Testimony of David Cannon on behalf of the City of Oxnard, Submitted by City of Oxnard on Tsunami and Coastal Hazards for CPUC Case A 14-11-016.
- Everest International Consultants. 2015. Sea level Rise Vulnerability Assessment: Tsunami Analysis Mandalay Bay Generating Station, prepared for the City of Oxnard.
- David Revell, Ph.D. 2014 (Docketed Date 6/8/2015). Testimony of Dr. David Revell on behalf of the City of Oxnard on Sea Level Rise Submitted, Submitted to for CPUC Case A 14-11-016.
- Revell Coastal. 2015. Vulnerabilities of the Proposed Mandalay generating Station to Existing and Future Coastal Hazards and Sea Level Rise.

NRG has proposed to construct a new power plant, the Puente Power Plant (Puente), within the boundary of the existing Mandalay Generating Station (MGS). The MGS site fronts on the Pacific Ocean, protected from ocean waves by a broad sand beach and some sand dunes. Several areas of undeveloped land exist on the MGS site and the proposed location for the Puente project is on the northwest portion of the site. This portion of the MGS site is slightly higher than the rest of the site, and

due to the vegetation found at this location, a part of the proposed Puente site may be characterized as a wetland area. Due to the potential concerns with habitat disruption for development on the northwest portion of the MGS site, this summary of hazard concerns will cover the bulk of the MGS site and not examine only the proposed Puente site.

Current or Near-term Flooding Risks to the MGS SIte

The MGS is an existing industrial site that fronts the Pacific Ocean. The examination of flood and erosion risks for the PSA relied primarily upon existing sources. While the California Energy Commission does not require an examination of future risks associated with changing sea level or climate conditions the PSA did include analysis of potential future changes to storm and riverine flooding risks, based on available resources. In addition, the City of Oxnard provided several studies of vulnerability of the MGS site to sea level rise, flooding and tsunamis. Neither the PSA nor the City reports provide the level of site-specific detail that would be required if this project were to be a Coastal Commission permit review; nevertheless, the provided materials do present a good indication of the current and future vulnerabilities of this coastal site.

The identification of current flood vulnerabilities has relied primarily upon the flood maps from FEMA. FEMA flood maps identify several types of flood risks. Along the coast, the three most frequently mapped zones are the VE Zone, areas with a 1% probability of flood occurrence (the 100-year flood risk, often called the A-zone) and the 0.2% probability of flood occurrence (the 500-year flood risk, often called the X-zone). The VE zone is used to characterize locations of fast-moving water where the water is 3 feet or deeper over the land. The VE zone has been separated from the other flood zones because the fast moving water can be a threat to people and it has the potential to cause erosion or structural damage. Because of the erosive potential of these flows, FEMA regulations do not allow the use of grading as a way to protect structures in this flood zone.

The 2010 FEMA map[1] shows a VE zone offshore of the MGS, with an identified elevation of +13' NAVD88 and it also shows that portions of the MGS site are now at risk from a 0.2% probability of occurrence flood. The Commission rarely relies solely upon the FEMA flood maps for coastal risk. One reason is that the current map products often focused on inland and riverine flooding and they often did not provide adequate characterization of the wave conditions that drive coastal, non-riverine flood events. Also these maps only portray the flood risks represented at the time of the mapping, and these maps do not identify changes to flood risk that could result from rising sea level or changing coastal conditions. FEMA is in the process of updating the coastal flood maps for the entire state of California. The maps for Ventura and Oxnard are still in preparation; however, the PSA included a 2016 draft FEMA map of the VE zone, that shows the potential for fast-moving water to reach +20'NAVD88 and that the VE zone

[1] The PSA calls the existing FEMA flood map, the 2010 map, where 2010 refers to the year that the maps were revised and/or provided as digital map products. Much of the data was developed in the 1980s, with locational updates through Letters of Map Revision added to the maps as appropriate. The draft coastal mapping effort that is currently in process is the first comprehensive examination of coastal flood risk since the initial flood maps were prepared.

could be up to 230-feet closer to the MGS than shown on the 2010 map[2]. The dunes at the MGS site are between +17' and +23' NAVD88. The draft 2016 FEMA map does not show that the VE zone extends inland of the dunes; however, under conditions when fast moving flood water reaches +20' NAVD88, there is the potential for erosion of the fronting dunes and overtopping some of the dunes in some locations. Also, the 2016 draft FEMA map does not show the resulting modifications to the A or X zones that would accompany these changes to the VE zone.

If the MGS site were to flood from the coastal side, it could occur in one of two ways, either through a low area or breach in the dunes or overtopping of the dunes. If there is a breach in the dunes, much of the flood water could leave the site through the same breach. However, since the main MGS site is lower than the dunes, water that enters the site through overtopping will not be able to return seaward by the same path. Overtopping water will be contained on the site, similar to storm water. While storage capacity has been examined for storm water, the analysis has not taken overtopping water into account.

Future Flood Risks to the MGS Site

The current, 2010 FEMA map and the 2016 draft FEMA map consider only current water level conditions. Site flood risks will be expected to increase with several changes in climate conditions. If river flow increases with climate change, risks of riverine flooding would also increase. The PSA found a medium to high likelihood that the site would experience riverine flooding; however, since the site is not considered to be a critical facility, the risks to the site are low to medium. The PSA did examine climate related flood risks, following the direction of the State OPC Guidance for the examination of risks related to sea level rise. The coastal flooding analysis relied upon draft results from Version 3.0 of the USGS Coastal Storm Modeling System (CoSMoS 3.0). The analysis examined concerns with 3.3 feet of sea level rise, but no change in the beach conditions are included in the initial CoSMoS modeling. The 30-year proposed project life would use the range of sea level projections for 2050, which are from 0.39 feet to 2.0 feet. The CoSMoS 3.0 modeling shows the site to be safe from flooding from a 100-year storm event with 3.3 feet of sea level rise. The 3.3 feet of sea level rise is more than a foot higher than the Commission's Adopted Sea Level Rise Guidance would recommend for 2050. As a result of this modeling, the PSA found that the project site has a low flood risk for the 30-year project life. The PSA did recognize that the draft CoSMoS results do not take site erosion or shoreline change into account and proposed to re-examine the potential flood risks once the CoSMoS modeling is upgraded this fall or winter to include shoreline change.

[2] Based upon personal communication with Darryl Hatheway, coastal scientist with AECOM and project manager for the FEMA mapping in southern California, the main explanation for changes to the VE zone is due to the new, peer-reviewed coastal analysis and mapping guidance. The updates to the VE zone were undertaken in compliance with FEMA's 2005 Guidelines for Coastal Flood Hazard Analysis and Mapping for the Pacific Coast of the United States and FEMA's 2015 Guidance for Flood Risk Analysis and Mapping: Coastal Floodplain Mapping, and, as such, are not likely to be revised in further iterations of the draft FIRM maps or during the next phase and development of the preliminary FIRM maps. However, the coastal study also has a statutory 90-day appeal

The Resilience Ventura study mapped vulnerability of the current and 2100 (high sea level rise scenario) flood plain of the Santa Clara River area. The MGS site is on the border of the area of interest; however, this 2013 vulnerability study shows the MGS site to be just outside of the current and future flood plain. Revell Coastal mapped a combination of erosion, flooding and wave impacts for 2030, 2060 and 2100, for various increases in sea level and these maps show that most of the MGS site could be subject to flooding with a rise in sea level of only a few inches. Due to the higher topographic relief of the proposed Puente site, it is one of the last portions of the MGS site to be affected by flooding. Based on the analysis from Revell Coastal, the current Mandalay Power Plant and the transmission yard are both within the identified flood areas and by 2060, of the Puente site could also be at risk from the 1% probability of occurrence event. Beach erosion and dune loss appear to be critical elements that differentiate the Revell Coastal mapping results from other studies. The MGS site, inland of the dunes, is fairly low and most of the flood analyses assume that the dunes will protect the inland area from most flood conditions. However, as indicated by the Revell Coastal analysis, a long-duration storm or a series of storms could erosion much of the beach and dune system under current conditions. Revell Coastal and Everest Consultants also both identify changes to the sediment supply that could lead to greater erosion. Reductions in sediment supply to the beach seaward of the MGS site, either by an extended period of low flows in the Santa Clara River or by a reduction in harbor by-pass dredging at Ventura Harbor, could trigger a reduction in beach width, greater wave attack of the dunes and deflation or loss of the protective dunes on and adjacent to the MGS site.

Revell Coastal identifies changes in the by-passing practices at Ventura Harbor as one of the more likely causes for a major reduction in sand supply. Dredging volumes from Ventura Harbor vary greatly, with a high of almost 2,400,000 cy in 1972, to multiple years with volumes of approximately 150,000 cy. Over the 44 year record from 1964 to 2007, inclusive, dredge volumes were less than 500,000 cy in 21 years and more than 500,000 cy in 23 years. Low by-passing volumes at Ventura Harbor have occurred in the past. There is no assurance that future dredging will maintain the 600,000 cy average volumes that has been typical of this harbor; nor is there any evidence of plans to cease by-passing. The recent interruption in dredging at the Channel Islands Harbor was due to a funding shortage, and if Ventura Harbor has funds available for dredging, it is highly likely that they will continue harbor dredging and sediment by-passing.

The PSA notes that the Santa Clara River is a far more significant source of sediment for the MGS site than by-passing at Ventura Harbor. In reality sand is a fungible commodity and the width of the beach seaward of the MGS site is due to sand from all the upcoast littoral sources. Since transport can be bi-directional, some of the sand at the MGS beach site may also be from the downcoast area. A health beach, however, is important to the flood safety of the project site, and the concerns about beach and dune erosion identified by Revell Coastal are important to the current and future flood analysis of the site.

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process and community adoption period to pass through before the preliminary FIRM can be considered as final and used as regulatory FIRM base flood elevations and hazard zones.

A final source of potential MGS site flooding is the Edison Canal which has a direct connection to the ocean through Channel Islands Harbor. The Canal is a constructed, concrete-lined channel that, among other things, brings ocean water to the MGS site. Under present conditions, water levels in the Canal are contained within the channel; however, as sea levels increase or as the driving forces from storm waves increase, water levels in the Canal can be expected to increase. Due to the length of the Canal there is a drop in water level along the Canal, so that the water level at the plant would be slightly lower than the ocean level unless the pumping system is drawing water into the MGS site and to the far end of the Canal. With a rise in sea level, the Canal level would increase and with a rise in the forcing conditions, as noted in the change between the 2010 and draft 2015 FEMA maps where the VE zone has been changed from 13' NAVV88 to 20' NAVD88. Neither the PSA nor the draft FEMA maps identify the amount of increase that might occur. An identical increase between harbor water level and Canal water level is not likely to occur, however, the general result would be an increase in water level and an increase in the duration of high water that will occur at the inland extent of the Canal.

Flood Risks, Key Flood Issues and Flooding Unknowns

The PSA analysis acknowledges that the MGS Site could flood under certain conditions. The designation of the flood risk as 'low' or 'medium' are based on the exposure of the site to flooding and the identified insensitivity of the electrical system to the loss of this facility if the site is flooded. Looking strictly at the flood exposure, this is not an ideal site for a power plant. The precautionary principle would push for a site that minimizes risk through hazard avoidance rather than minimizing the source sensitivity. Alternative inland sites are available and would avoid any concern about flood risk or increased risk due to rising sea level or beach and dune erosion.

Loss of the protective beach and dune system, while not highly likely, is nevertheless possible. Without the fronting dunes, the proposed site would be a significant risk of flooding, even under current sea level conditions. With the dune system intact, this site may be generally safe from most flood threats. The full development of the updated FEMA maps, including the 1% and 0.2 % probability of flood occurrence would greatly increase our understanding of flood risk of this site for current flood conditions. The CoSMoS modeling of storms and long-term erosion would greatly increase our understanding of flood risk for future sea level rise and shoreline changes conditions. Under the normal Coastal Commission application process, the applicant would have been required to do some of these analyses, rather than rely solely upon other studies and work from other groups. It is clear that that the site is at risk from flooding, however, the full flood risk cannot be established with the available analyses.

Some of the flood analyses show that the proposed Puente plant location might be high enough to avoid flooding, much of the rest of the MGS site, including the transmission yard and access roads, could be at risk from storm flooding. The proposed project is part of a system and site access and power distribution are both important to the power system. As noted previously, alternative inland sites could avoid any concerns about losses of plant access or power distribution due to flooding.

Elevation is a way to protect development from flood risk and elevation of the proposed plant site has made this one of the more flood safe portions of the MGS site. Unfortunately the proposed Puente site supports wetland vegetation so that the more safe site for flood purposes is also the most damaging site for habitat purposes. Since most of the MGS site has been disturbed already by grading or construction activities, there are portions of the MGS site that could be graded to provide a comparable level or flood protection that what is available at the Puente site. If the MGS site is found to be an appropriate site for the future Puente Power Plant, alternative locations could be considered, where an equivalent flood safe elevation could be achieved through site grading of already disturbed areas.

Recommendations concerning Flooding

Since the best way to deal with hazards is through avoidance, the relocation of this proposed project at a different and more inland site could avoid or greatly reduce flood risks.

If avoidance or relocation from the MGS site is not possible, development of an elevated site, away from the sensitive habitat areas, would provide for an environmentally preferable, moderately safe option for the 30 year proposed project.

Use of this site for power generation beyond 2050 should be strongly discouraged. Flood risks at this site would be expected to increase substantially during the second half of the 21st century and large areas of the entire MGS site, even with elevation, could be at risk.

Due to the importance of the dunes for flood protection, a Beach and Dune Monitoring Program should be established. The purpose of this monitoring would be to determine if and by how much the beach or dunes are eroding. Triggers for dune loss should be established, and efforts should be identified that could halt or slow this erosion. A possible effort could be to support Ventura harbor dredging financially to increase sand bypassing to the MGS site; or if by-passing stops and beach erosion or dune erosion is identified by monitoring.

Despite all efforts to reduce flood risk at this site, there will remain a concern for flood risk and possible erosion impacts. This project should be required to commit to avoid any future shoreline armoring to protect this development. Also, if pre-existing armoring is discovered on this site, as occurred at Hueneme and at several beaches in New Jersey that were hit by Hurricane Sandy, there should be no expectation that any relict armoring might be rebuilt or maintained.

M E M O R A N D U M

FROM: Jonna D. Engel, Ph.D., Ecologist

TO: Joseph Street, Environmental Scientist

SUBJECT: NRG Puente Power Plant Project, Oxnard, California

DATE: September 14, 2016

Documents Reviewed:

Love, Julie (AECOM). August 31, 2016. Wetland Technical Study Summary. Memorandum to Joseph Street, California Coastal Commission.

California Energy Commission (CEC), June 2016. Preliminary Staff Assessment Section 4.3 (Biological Resources), Application for Certification No. 15-AFC-01, NRG Oxnard Energy Center, LLC Puente Power Project (15-AFC-01).

On November 19, 2015, I visited the site of NRG's proposed Puente Power Plant ("P3") with NRG staff, California Energy Commission staff, and AECOM biologists. The site is just west of the existing Mandalay power plant in close proximity to the Pacific Ocean, McGrath Lake, and the Edison Canal. We walked the site and NRG staff described past uses such as staging and canal channel dredge spoils storage and how they, as well as the AECOM biologists, believe this may have influenced the soils and vegetation in the area. We also discussed the results of the wetland delineation performed in March 2015 which resulted in identification and mapping of a large area dominated by hydrophytic vegetation.

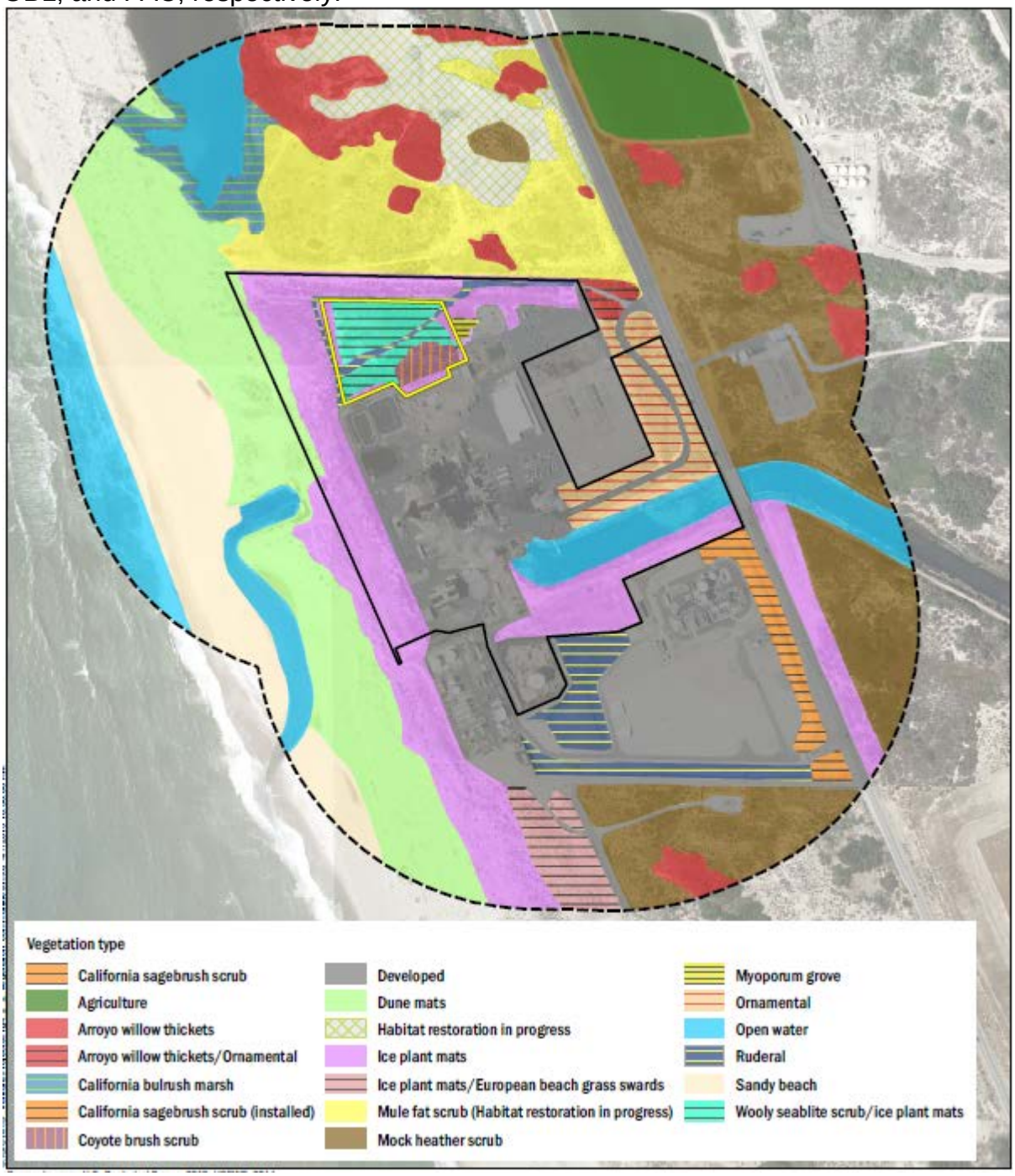
The Coastal Commission has a one parameter wetland definition; the Commission considers an area to be a wetland if it is positive for at least one of three wetland parameters; hydrophytic vegetation, hydric soils, or hydrology. As stated in the AECOM August 31, 2016 letter, "The Coastal Commission has issued regulations and guidance directing that the delineation of coastal wetlands should employ the three-parameter approach used by the USACE, but that a positive wetland determination can be made based on the presence of any one parameter, rather than requiring all three parameters to be present." AECOM performed a wetland delineation in March 2015 and found that three species of wetland plants dominated the area proposed for the power plant; woolly seablite (*Suaeda taxifolia)*, pickleweed (*Salicornia pacifica)*, and slenderleaf ice plant

(*Mesembryanthemum nodiflorum*) (Figure 1). The National Wetland Inventory identifies the wetland status of these plants as FACW, OBL, and FAC, respectively. During the November site visit I carefully examined the vegetation in the area proposed for the power plant and confirmed that the area mapped as "woolly seablite scrub/ice plant mat" is dominated by the three species of wetland plants identified by AECOM.

Whether the soil salt content and compaction and presence of salt marsh species result from past activities or natural processes or a combination of both is not relevant because, for purposes of conformance with Coastal Act Section 30233(a), the Commission evaluates wetland indicators at a site in its present state. In this case, the area is dominated by three plants with wetland indicator status; one (pickleweed) with obligate (OBL) status meaning it is found in wetlands greater than 99% of the time, one (woolly seablite) with facultative wet (FACW) status meaning it is found in wetlands 67 to 99% of the time, and one with facultative (FAC) status meaning it is found in wetlands between 34 to 66% of the time. If the site supported just one or two FAC species, we would consider the possibility of a false positive wetland determination. However, this is not the case at the proposed power plant site.

Based on the Commission's wetland definition, AECOM's wetland delineation, and my site visit observations, I find that the area identified by AECOM as "woolly seablite/ice plant mat" within of the area proposed for Puente Power Plant is wetland habitat (approximately 75% of the site).

Figure 1 (PSA Fig. 4-2.2, *Vegetation Communities)*. Proposed location for P3 outlined in yellow. More than 75% of the site is dominated by wetland vegetation including woolly seablite, pickleweed, and slenderleaf iceplant whose wetland status is FACW, OBL, and FAC, respectively.



GEOLOGY AND PALEONTOLOGY - FIGURE 1

Puente Power Project (P3) - Regional Vicinity Map

CALIFORNIA ENERGY COMMISSION - SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: NRG 2015a

Exhibit 1
Application for Certification No. 15-AFC-01
NRG Puente Power Project
Project Vicinity

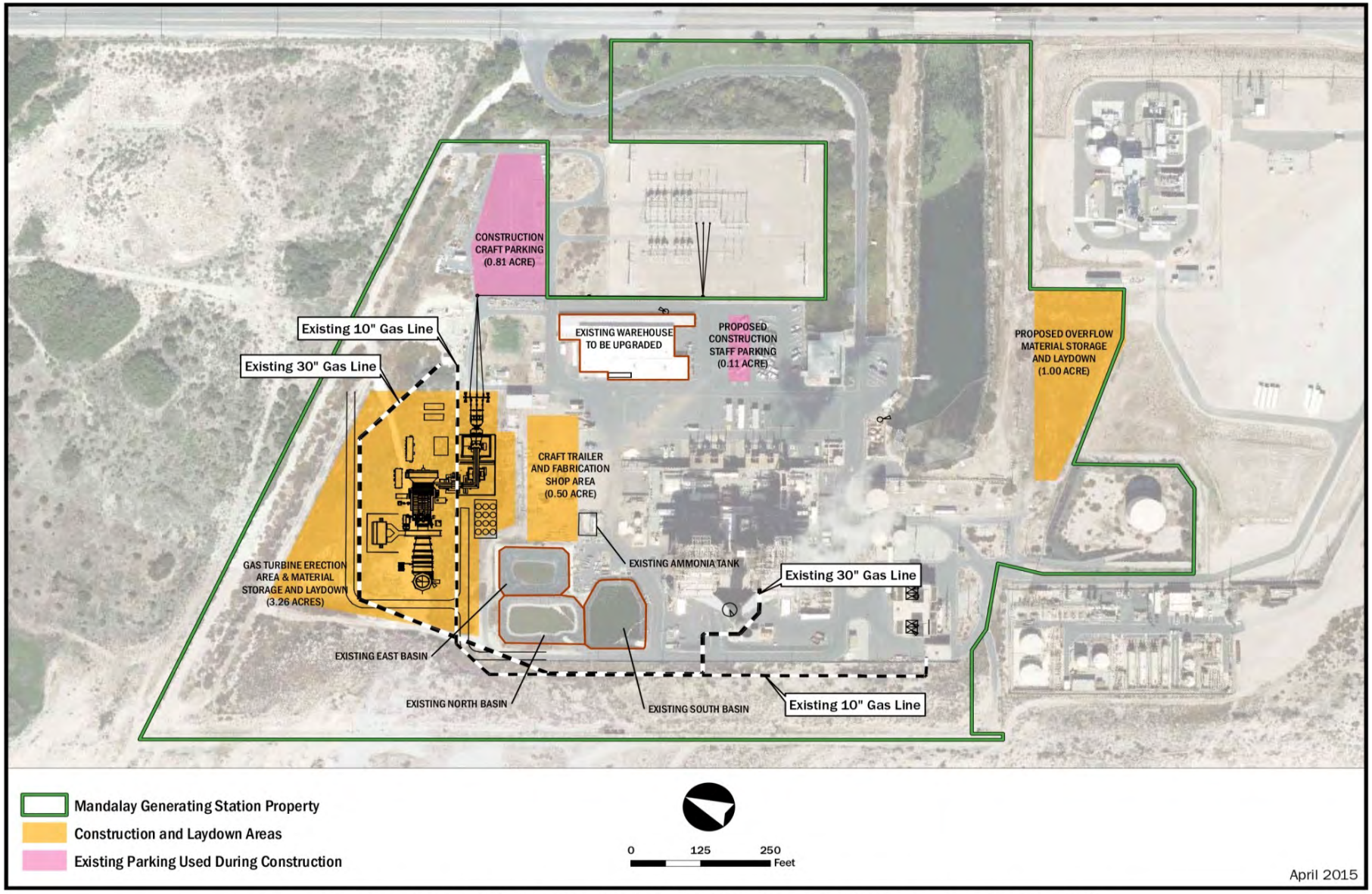
PROJECT DESCRIPTION - FIGURE 2
Puente Power Project - Project Location

CALIFORNIA ENERGY COMMISSION-SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION
SOURCE: AFC Figure 2.4-1

Exhibit 2
Application for Certification 15-AFC-01
NRG Puente Power Project
Project Location

PROJECT DESCRIPTION - FIGURE 1

Puente Power Project - Site Plan

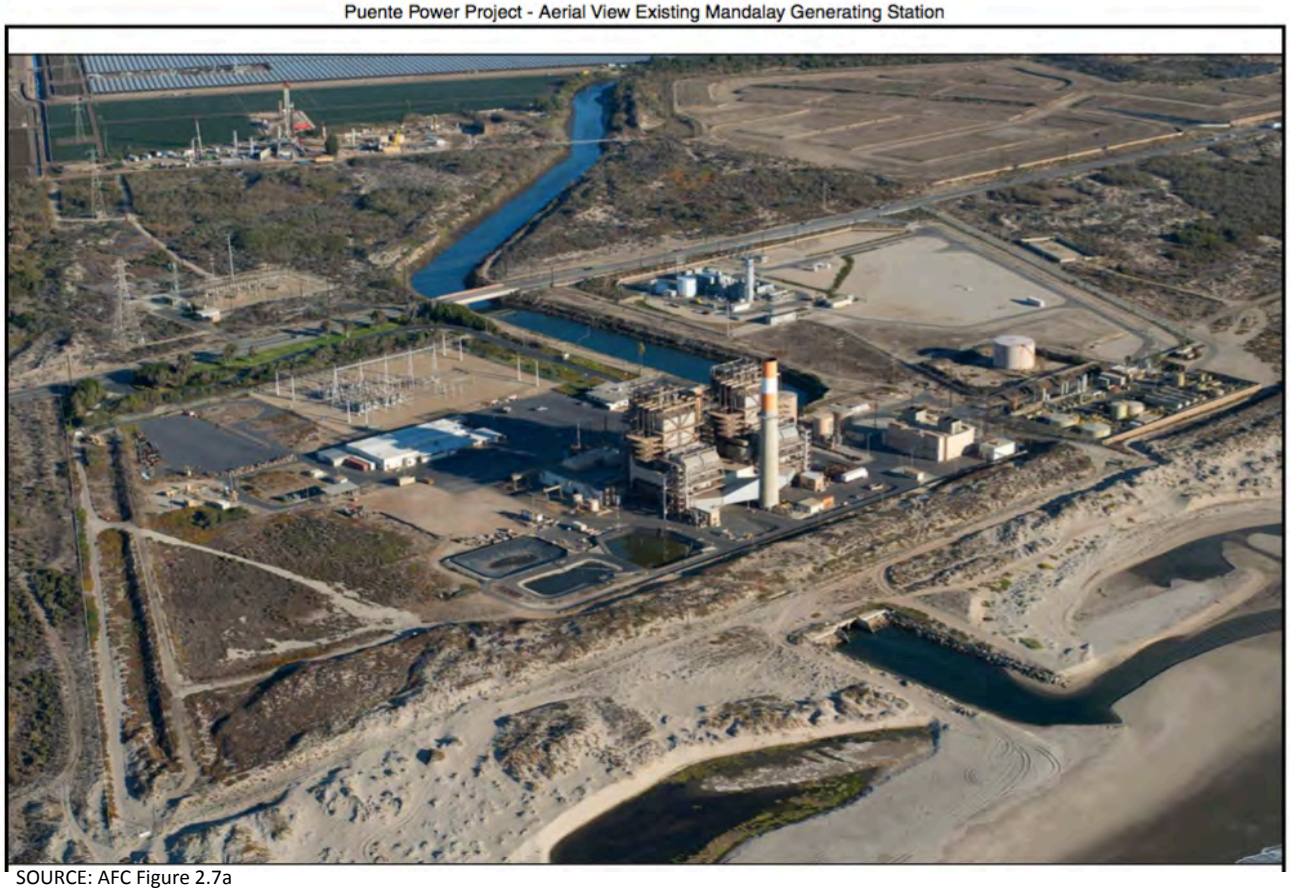


CALIFORNIA ENERGY COMMISSION-SITING, TRANSMISSION AND ENVIRONMENTAL PROTECTION DIVISION

SOURCE: AFC Figure 2.1-1

Exhibit 3
Application for Certification 15-AFC-01
NRG Puente Power Project
Site Plan

Puente Power Project - Aerial View Existing Mandalay Generating Station



SOURCE: AFC Figure 2.7a

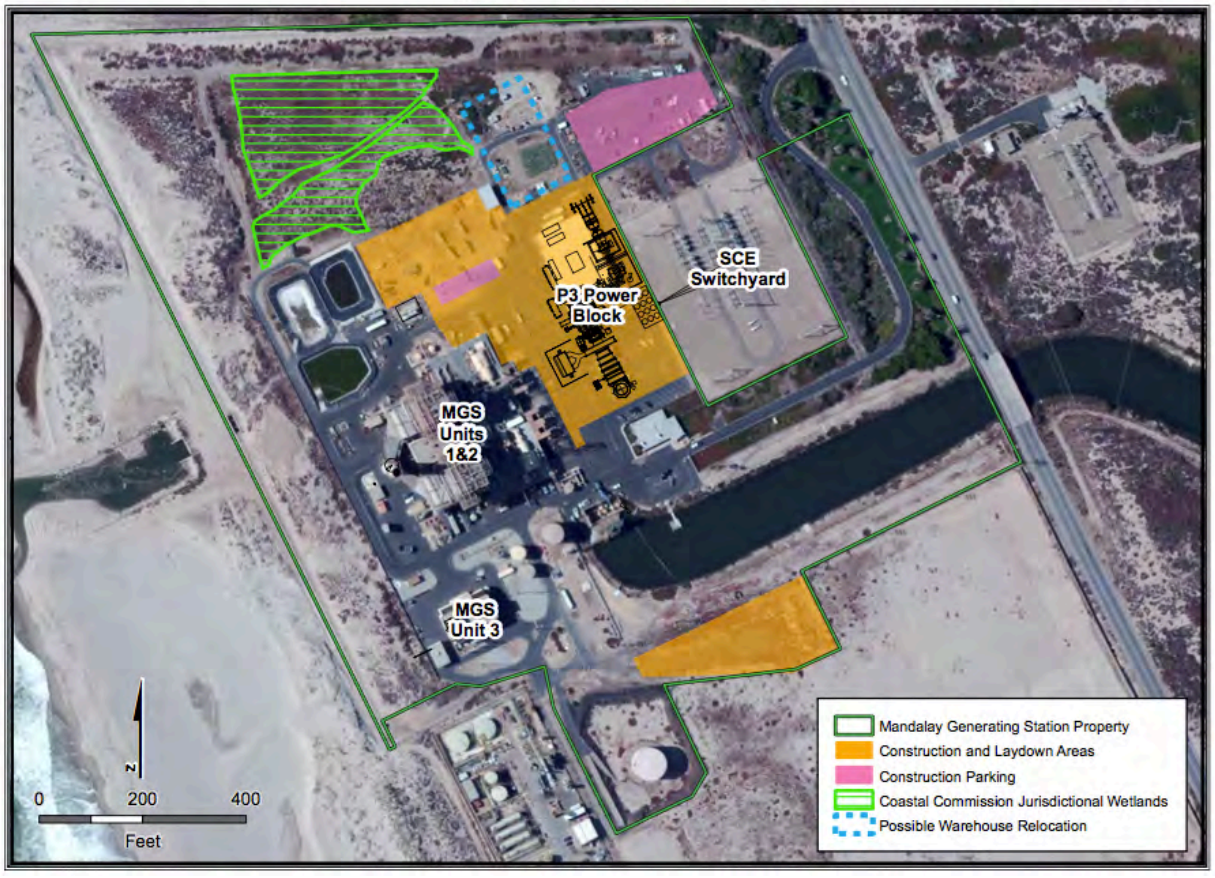
Puente Power Project - Aerial View of Simulation of the Puente Power Plant with removed MGS units 1 and 2 in 2022

SOURCE: Puente Power Project, Project Enhancement and Refinement, Demolition of Mandalay Generating Station Units 1 and 2 (TN 206698), Figure 1-1

Exhibit 4
Application for Certification 15-AFC-01
NRG Puente Power Project
Site Aerial Views - Existing & Simulated

Puente Power Project - Conceptual Site Reconfiguration 1

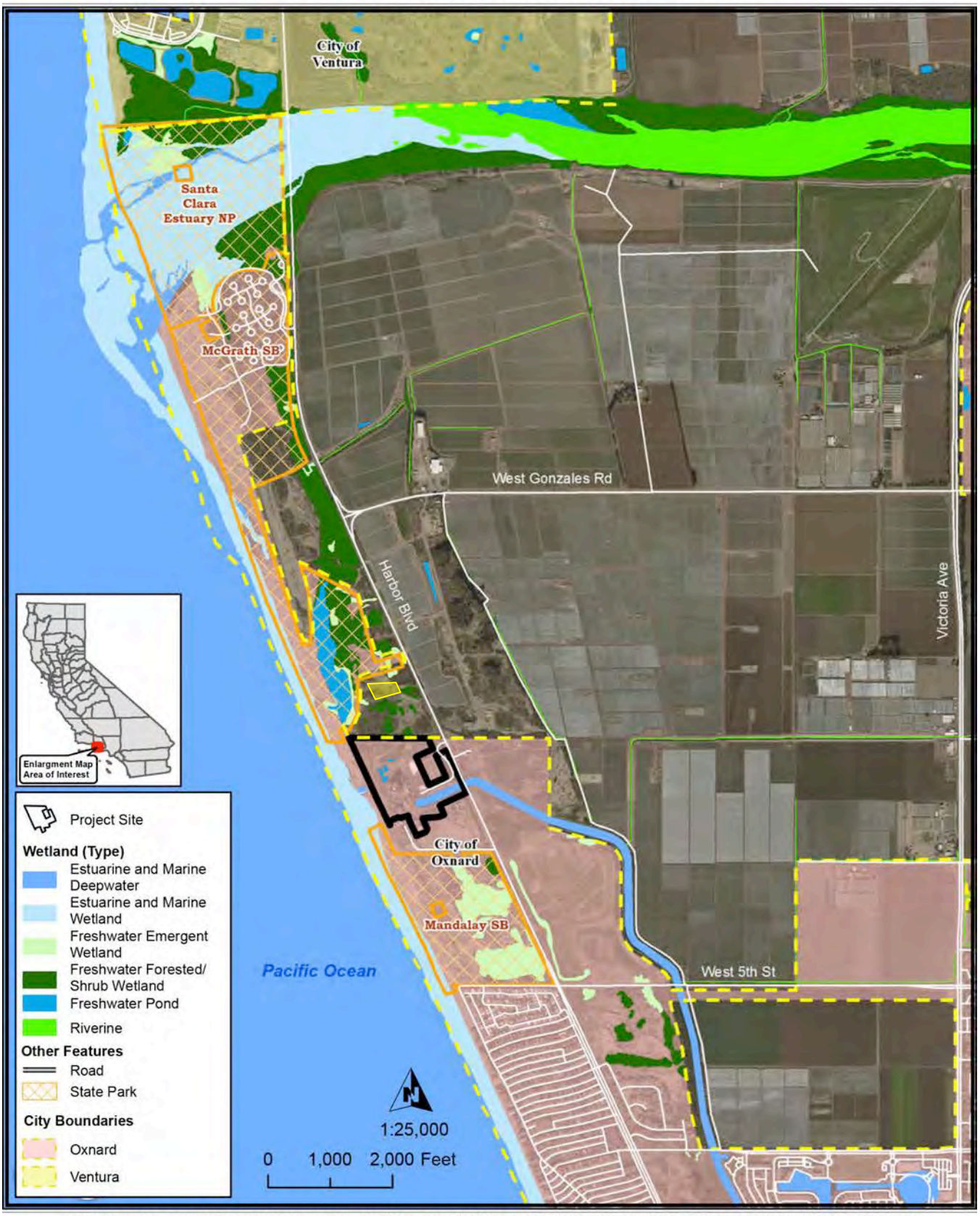
Puente Power Project - Conceptual Site Reconfiguration 2



Source: PSA Alternatives Figures 14 & 15

Exhibit 5
Application for Certification 15-AFC-01
NRG Puente Power Project
Site Reconfiguration Alternatives

Wetland Areas in Project Vicinity

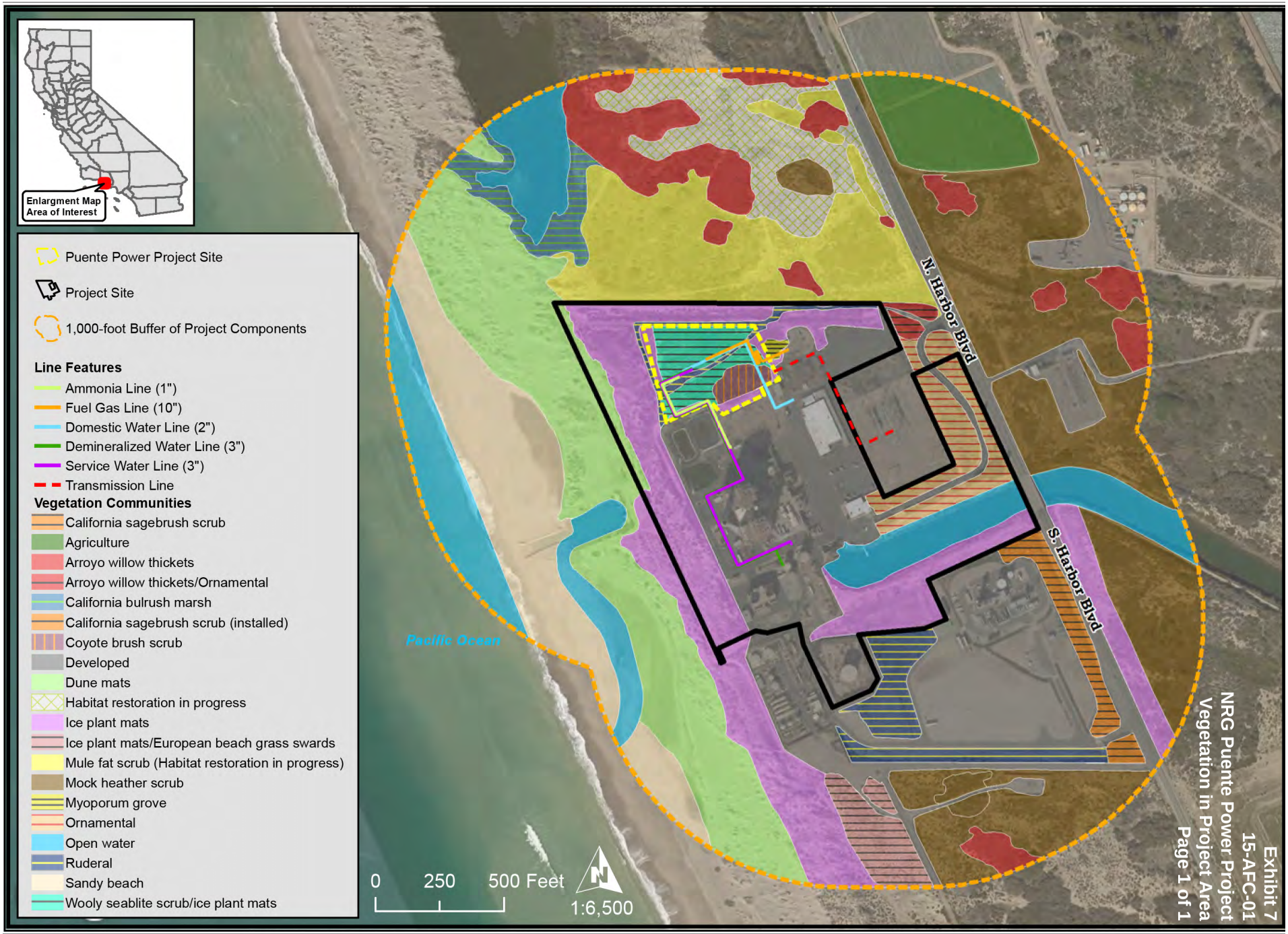


Source: PSA Biological Resources Figure 1

Exhibit 6
15-AFC-01
NRG Puente Power Project
Wetlands in Project Vicinity

BIOLOGICAL RESOURCES - FIGURE 3

Puente Power Project PSA - Vicinity Vegetation



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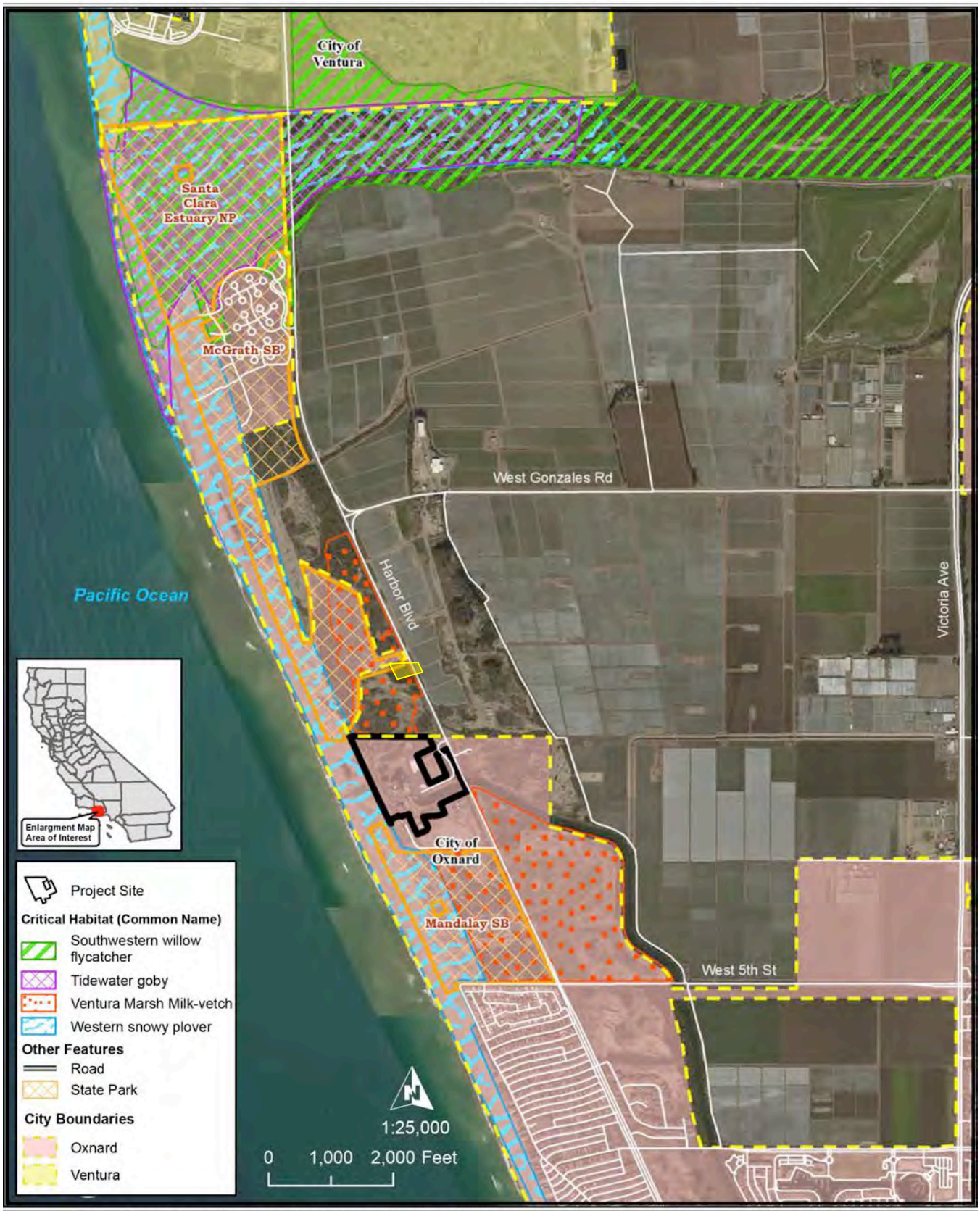
SOURCE: Puente Power Project (P3) 15-AFC-01, Figure 2.7-8 and Figure 4.2-2, Bing Aerial, and ESRI.

Puente Power Project PSA - USFWS Critical Habitat

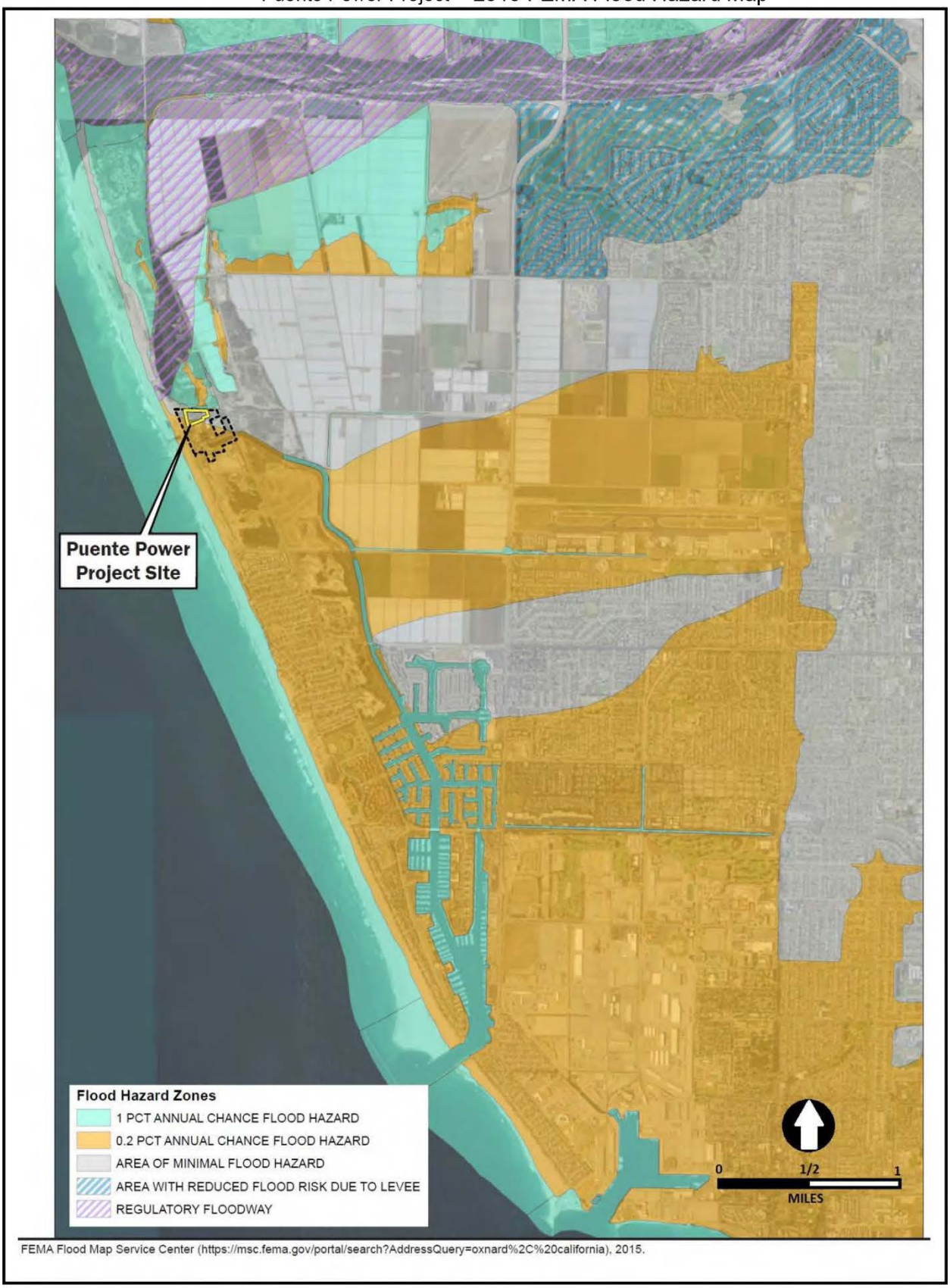


Source: PSA Biological Resources Figure 2

Exhibit 8
15-AFC-01
NRG Puente Power Project
Critical Habitat in Project Vicinity
Page 1 of 1

SOIL & WATER RESOURCES - FIGURE 4

Puente Power Project – 2010 FEMA Flood Hazard Map



FEMA Flood Map Service Center (https://msc.fema.gov/portal/search?AddressQuery=oxnard%2C%20california), 2015.

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SOURCE: COO 2015m

Exhibit 9a
15-AFC-01
NRG Puente Power Project
2010 FEMA Flood Hazard Map

SOIL & WATER RESOURCES - FIGURE 5

Puente Power Project – DRAFT Work Maps of FEMA Flood Coastal Hazards

The updated hazard boundary near the P3 site, above, is approximately 230 feet closer inland compared to the 2010 Effective FIRM. The additional hazard area is shaded in pink below.

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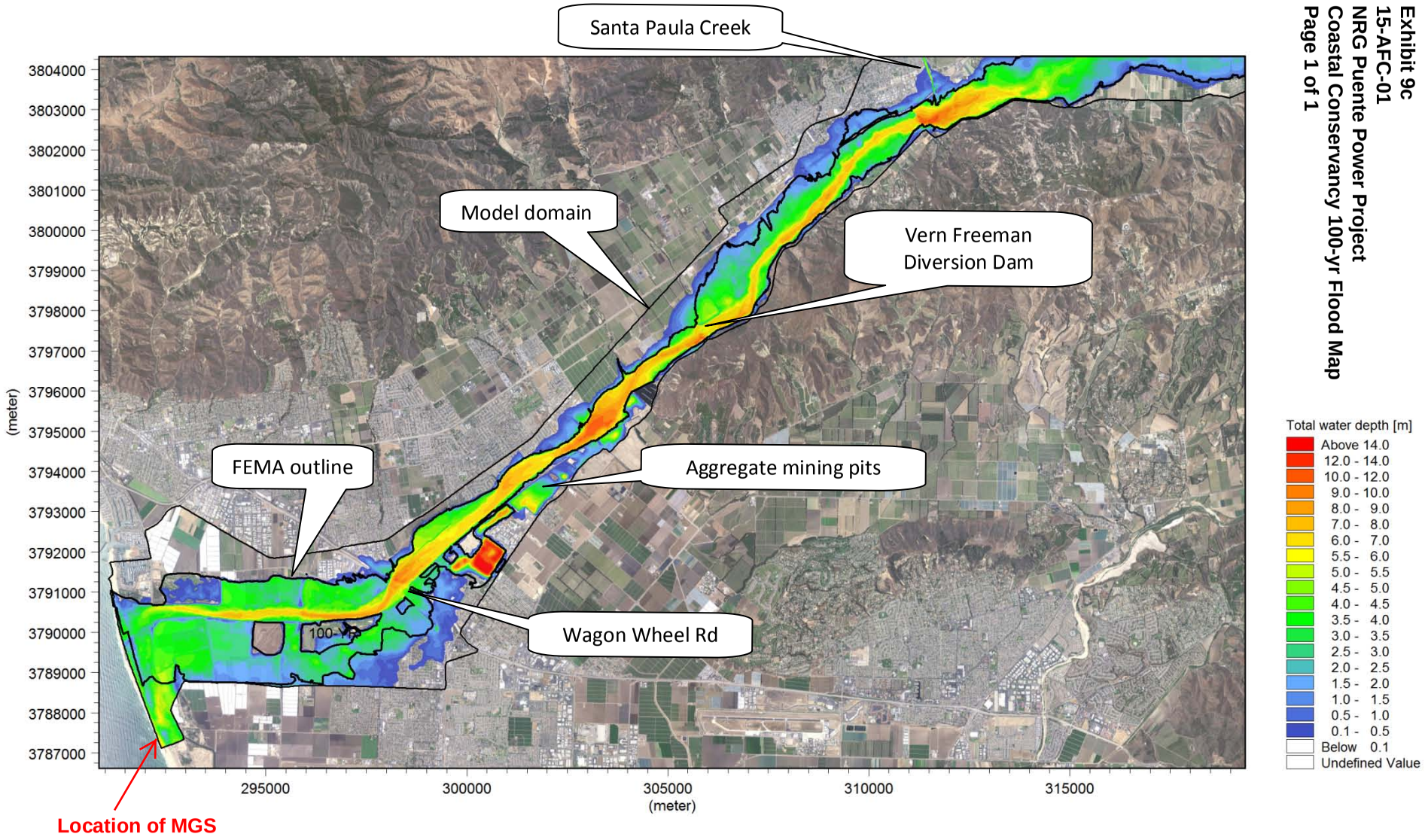
SOURCE: FEMA's Geoplatform (http://arcg.is/1OXJVRc) accessed March 12, 2016



Notes: lower reach; inner black outline denotes the FEMA restudy RAS predicted inundation extents; projected coordinates in WGS1984 UTM11N.

cbec eco engineering

Santa Clara River Levee Setback Assessment

Existing conditions Q100 comparison to FEMA mapping

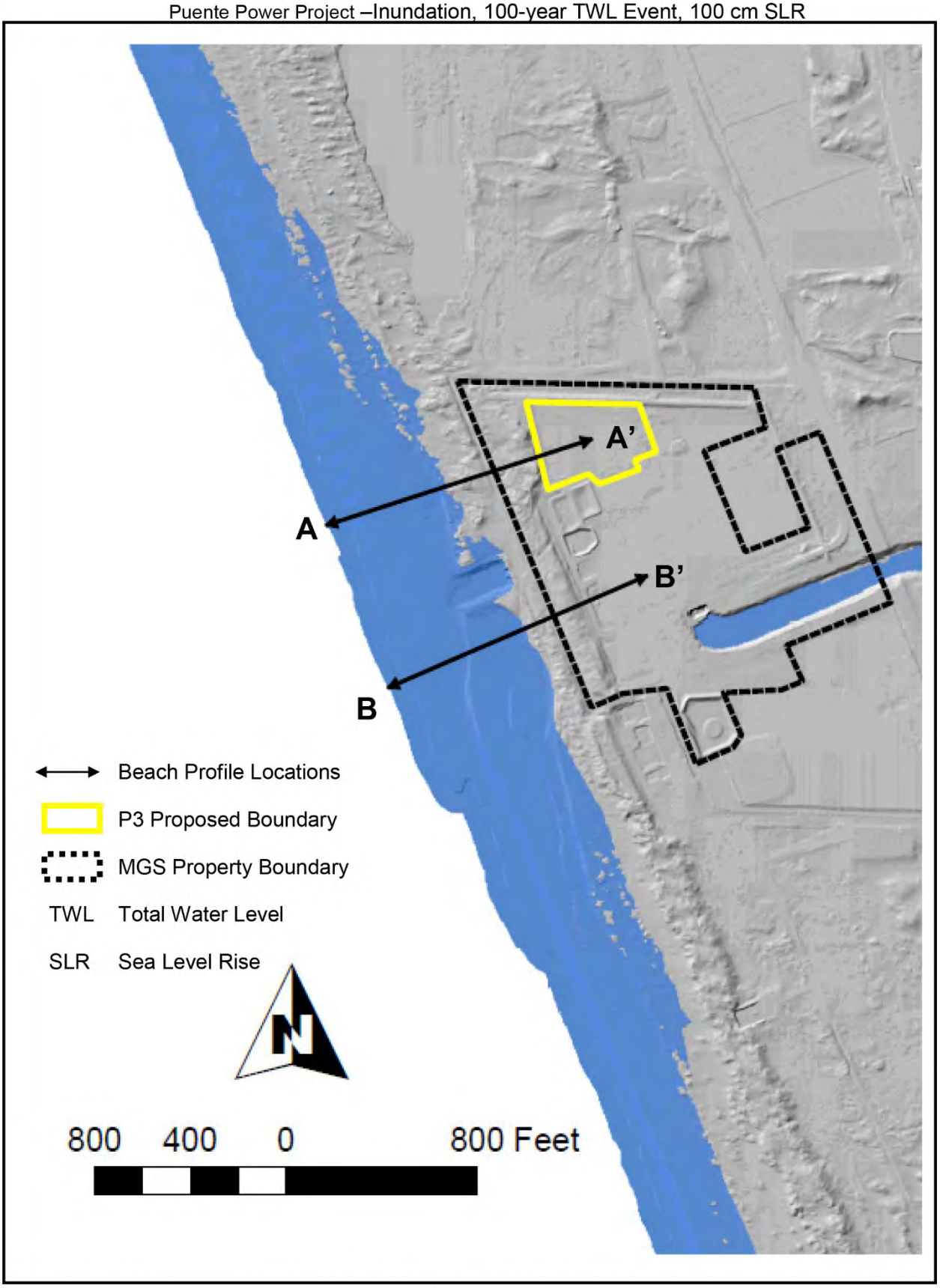
Project No. 09-1005	Created By: AMS	**Figure 6b**

Proposed NRG Site with existing Coastal Flooding Hazards from a Large El Niño Wave Event

Adapted from Revell (2015).

SOIL & WATER RESOURCES - FIGURE 12

Puente Power Project –Inundation, 100-year TWL Event, 100 cm SLR



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SOURCE: USGS CoSMoS 3.0 (http://walrus.wr.usgs.gov/coastal_processes/cosmos/socal3.0/index.html) accessed March 21, 2016

Exhibit 10a
15-AFC-01
NRG Puente Power Project
PSA (CoSMoS 3.0) Sea Level Rise Map

Combined Coastal Erosion, Flooding and Wave Impact Hazards in 2030

Combined coastal hazards by 2060 for all sea level rise scenarios

Source:
Revell (2015)

Exhibit 10b
15-AFC-01
NRG Puente Power Project
City of Oxnard
Sea Level Rise Maps

GEOLOGY AND PALEONTOLOGY - FIGURE 7

Puente Power Project (P3) - Tsunami Inundation Map

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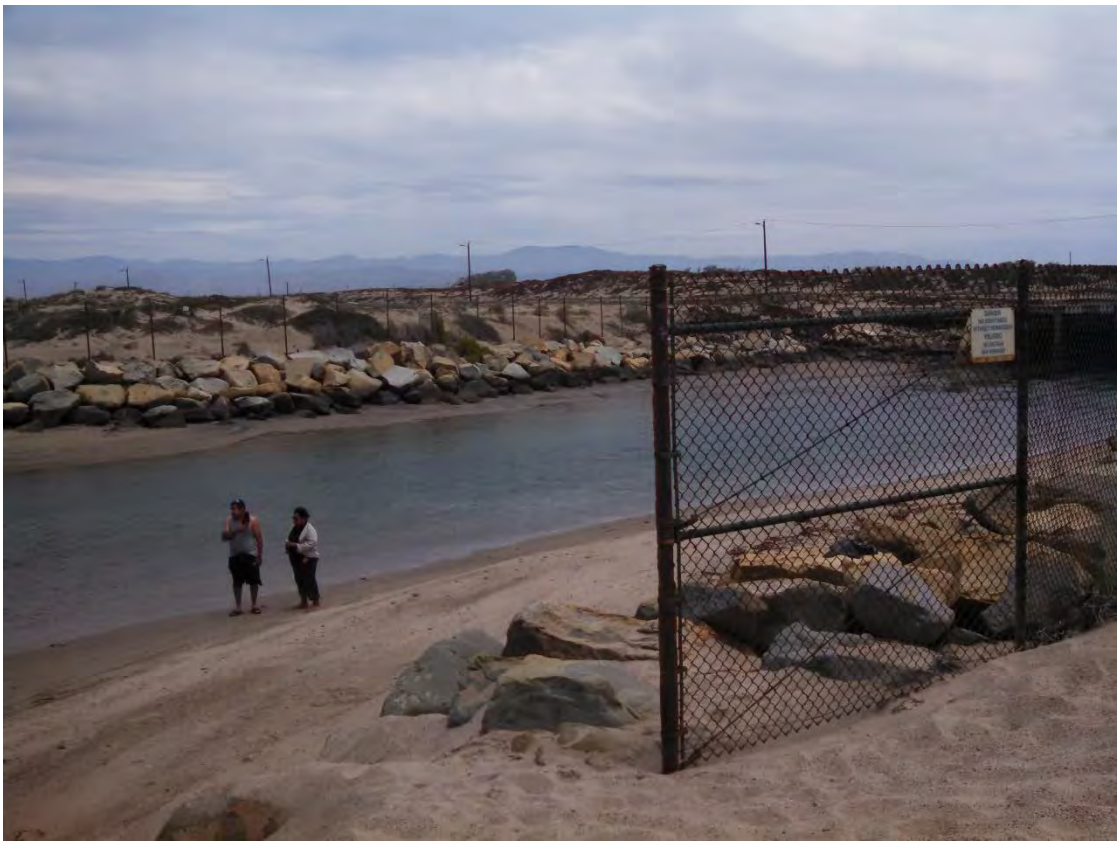
SOURCE: NRG 2015a

Exhibit 11
15-AFC-01
NRG Puente Power Project
Tsunami Hazard Map - CGS 2009

Barriers to Lateral Beach Access Due to Wastewater Outfall



Source: C. Williamson, City of Oxnard