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STAFF REPORT: REGULAR CALENDAR

Appeal No.:	**A-5-HNB-10-225**
Application No.:	**9-21-0488**
Applicant:	**Poseidon Water**
Agent(s):	See **Appendix A**.
Project Location:	State waters offshore of the City of Huntington Beach and areas within the City and the Huntington Beach Generating Station, Orange County.
Project Description:	Remove power plant infrastructure, remediate soil and groundwater contaminants, and construct a seawater desalination facility and water delivery pipeline(s).
Staff Recommendation:	**Denial.**

SUMMARY OF STAFF RECOMMENDATION

Poseidon Water (Poseidon) proposes to construct and operate a seawater desalination facility on about 12 acres of the approximately 54-acre site of the Huntington Beach Generating Station, in Huntington Beach, Orange County. The facility would use the power plant's soon-to-be retired cooling water intake to draw in up to 106.7 million gallons per day (mgd) of seawater to produce up to 50 mgd of potable water for purchase by, and delivery to, local water districts. Poseidon would then discharge

approximately 57 mgd of highly saline brine through the power plant's existing outfall pipe, which extends offshore approximately 1500 feet. The project would involve demolition and removal of fuel oil storage tanks and other infrastructure formerly used by the power plant, cleanup of soil and groundwater contamination at the site, and construction and operation of the desalination facility and a water supply reservoir that would serve the facility as well as provide an emergency water supply reservoir for the City. It would also involve installing and operating pipelines to deliver water to the local and regional water distribution systems in Orange County. Poseidon proposes to operate the facility for approximately 50-60 years.

Portions of the project are within the Commission's retained jurisdiction and portions are within the certified Local Coastal Program (LCP) jurisdiction of the City of Huntington Beach. This report provides recommended Findings regarding a coastal development permit (CDP) application within the Commission's jurisdiction and a de novo appeal of a CDP issued by the City, for which the Commission found Substantial Issue in 2010. This project raises significant and complex coastal protection policy issues under both the Coastal Act and the City's LCP, including conformity with policies that require protection of marine life, water quality, environmentally sensitive habitat areas, and policies meant to avoid or minimize hazards associated with sea level rise, floods, tsunamis, and geologic hazards. It also raises significant issues related to potential effects on environmental justice communities, although the lack of information about the ultimate buyer of, and cost for, Poseidon's water made it impossible to fully assess these effects. Understanding these issues, and the staff's recommendation for denial of this project, requires a basic understanding of the project's history.

BACKGROUND

Starting in 1998, Poseidon proposed to build desalination facilities in both Huntington Beach and Carlsbad that would be co-located with existing power plants that used several hundred million gallons per day of seawater to cool their generating units. At the time, co-location offered several benefits, including that the desalination plants could use the power plants' existing intake and discharge infrastructure, and the power plants' use of the seawater had already killed the marine life drawn into the intake, so using the same water for desalination would not result in additional impacts. The City of Huntington Beach reviewed various versions of the portion of the project in its jurisdiction, ultimately approving a CDP in 2010, which was appealed to the Commission. Meanwhile, Poseidon had submitted a CDP application to the Commission in 2006, which it updated in 2011. The Commission held a hearing on the combined CDP and appeal in 2013, at which time Commission staff recommended approval of the project with 21 special conditions. Most significantly, staff recommended eliminating the open ocean intake and requiring Poseidon to use subsurface intakes for its source water to avoid marine life impacts. Other recommended conditions required a minimum 100-foot buffer between the project and adjacent wetlands, development of a wetland mitigation plan, and various studies and plans to address seismic, flooding, tsunami, and other hazards. However, Poseidon withdrew its application prior to the Commission voting on the CDP.

Poseidon and Commission staff thereafter convened an outside, technical panel to review the feasibility of subsurface intakes. The panel concluded that most forms of subsurface intake were technically infeasible in this location, though found that one type of subsurface intake was technically feasible but not economically feasible due to the cost and time it would take to implement.

In the time since the project was first proposed, and since the Commission last held a hearing on it, circumstances have changed significantly. First, the State Water Resources Control Board amended the state's Ocean Plan to require power plants to phase out their once-through seawater cooling systems. The AES Huntington Beach plant is scheduled to stop using its once-through cooling system in 2023. Then in 2015, the State Board adopted the Desalination Amendment to the Ocean Plan, which significantly limits the situations in which desalination plants may use open ocean intakes and establishes the manner in which the State and Regional Water Boards determine the best available site, design, technology, and mitigation measures feasible for desalination facilities to avoid and minimize the intake and mortality of marine life. Pursuant to the Desalination Amendment and other law, the Water Boards have primary authority for regulating water quality and for the siting, design, and technology for desalination facilities as they relate to minimizing harm to marine life. Although the Commission may not take an action that conflicts with a Water Board determination regarding water quality, it otherwise retains its authority to review projects for Coastal Act and LCP consistency and to impose needed mitigation.

The second changed circumstance has to do with new understandings of the seismic, flooding, and other risks at Poseidon's proposed site. When Poseidon first proposed its facility at this location nearly 25 years ago, sea level rise projections were much lower and adaptation planning was in its infancy. Since that time, our understanding of the severity and consequences of climate change and sea level rise have grown exponentially, and the Commission and state have developed and issued numerous guidance documents recommending proactive assessment of risk and planning for adaptation. The state has also recently issued new guidance on seismic and tsunami risks, and these show that the risks at and around Poseidon's proposed site are much more severe than understood just a few years ago.

Staff acknowledge the need to develop new, reliable sources of water in southern California, and believe that well-planned and sited desalination facilities will likely play a role in providing these supplies. However, due to this project's fundamental inconsistencies with Coastal Act and LCP policies related to coastal hazards, protection and mitigation of marine life, and protection of wetlands and environmentally sensitive habitat, as well as its unclear but likely significant burdens on environmental justice communities, staff is recommending denial of the project.

COASTAL ACT/LCP ENVIRONMENTAL ISSUES & ANALYSIS

Coastal Hazards: Flooding, Sea Level Rise, Seismic Hazards

Poseidon's proposed facility would be located at a site within a low-lying area of Huntington Beach. Due to the fill placed in the 1950s to accommodate the Huntington Beach Power Plant, the site is slightly higher than the surrounding area. The site is about 1500' inland from the ocean and is adjacent to a flood control channel and within a flood zone and tsunami run-up zone. It is also located in a seismically active region within the Newport-Inglewood Fault Zone, and the whole site is underlain with loose sediments that respond easily to ground movement and can liquefy during an earthquake. Poseidon is proposing to use fill material to elevate its site so that the main buildings would be located at an elevation that is not expected to experience damaging flooding except in extreme, worst-case scenarios. However, the surrounding area is at an elevation where regular flooding could occur within a couple decades, and by 2050 to 2070, the surrounding area may be flooded regularly, making access to the site difficult. The low-lying nature of the surrounding area is illustrated in **Exhibits 3** and **4**, which show how some locations near the proposed project site are already below mean higher high water elevations and will become increasingly at risk with sea level rise. A system of flood channels and stormwater pumping/conveyance mechanisms currently protect much of the area from most flood events; however, these measures are inadequate to address expected sea level rise and increased storm-related flooding over the life of the project, and it is uncertain how the expected effects of climate change will be managed. In addition, the City's existing infrastructure was not built to withstand the magnitude of seismic events that we now know are possible in this region. Protecting the area surrounding Poseidon's site and ensuring the infrastructure Poseidon relies on is adequate to resist the area's anticipated seismic and flooding events will require substantial additional planning, funding, and development by surrounding property owners and by local, regional, and state agencies. It is likely that at least some of these adaptation measures will occur, but it is not possible at this point to determine what adaptation pathways will be feasible or carried out.

Building this project in this location is inconsistent with the type of sea level rise adaptation and risk-avoidance planning encouraged by the state and required by the Coastal Act. Poseidon's project is an expensive, interconnected piece of critical infrastructure that would provide public water – including emergency water supplies – and which must be able to operate during and after an emergency. This makes it crucial to site the facility in a location that is safe and is able to accommodate it for its full lifetime. Poseidon's chosen location, however, is likely to become isolated and difficult or impossible to access during coastal hazard events that are almost certain to increase in severity and frequency in the future. It is not necessary or feasible to guarantee that Poseidon's site will be absolutely safe and accessible at all times in order to find Coastal Act and LCP consistency. But it is appropriate—especially for expensive, public-serving infrastructure—to site and design a project to minimize the risks that the facility would face over its lifetime, including by determining whether there are potential adaptation measures that can address increased, future hazards. Here, Poseidon's project would have little to no adaptive capacity to address increased

hazards, as the project could not easily be moved on- or off-site, further raised, or provided with alternative access. It could also limit the City's ability to upgrade the adjacent flood control channel or otherwise adapt this portion of the City to rising sea levels and coastal hazards. For these reasons, the project does not conform to LCP and Coastal Act policies requiring that new development be sited in areas that can adequately accommodate it and where hazards are appropriately minimized.

Despite the seismic and flooding risks, Poseidon maintains that it should not be expected to construct and operate its facility using the stringent standards that apply to facilities meant to serve a critical emergency water supply role in a community during and after earthquakes, tsunamis, or other hazards, and that whose loss or damage could harm the public welfare or environment. Poseidon's proposed facility includes a water reservoir that would serve as an emergency supply for the City and is expected to operate during and after emergencies. The desalination facility would also store tens of thousands of gallons of hazardous chemicals that, if released, could cause significant adverse effects to human health, water quality, and nearby habitats. To conform with LCP policies requiring minimization of hazards and the use of appropriate building standards, Poseidon would need to construct its facility to the most stringent building standards. However, doing so would likely cause additional environmental effects related to the additional construction and operational measures needed to implement those standards, such as needing deeper foundations, larger construction footprints, additional dewatering, and others. In an April 12, 2022 letter to Commission staff, Poseidon indicated that it would be willing to build its facility to the standards that apply to some critical facilities, but not to the more stringent standards that apply to those expected to keep operating during and after a hazardous event. Poseidon has not yet submitted revised site plans or an analysis of the additional impacts that would occur due to constructing the facility to the more stringent standards and has stated the additional costs may be prohibitive, so staff has not yet been able to evaluate these effects or determine the feasibility or infeasibility of constructing to these standards.

Marine Life and Water Quality

Poseidon's project would also harm marine life and water quality by pulling in about 106.7 million gallons of seawater per day ("mgd") through a screened intake pipe and discharging approximately 57 million gallons of high-salinity brine per day into the ocean using high-velocity diffusers. These diffusers are needed to ensure the brine does not concentrate and sink to the seafloor where it would create a high salinity "dead zone" around the outfall. However, the velocity of the discharge exiting the diffusers is high enough to kill marine life in about 168 million gallons of the receiving waters each day. The facility, in total, would kill marine life in about 100 billion gallons of seawater per year, resulting in substantial losses of marine ecosystem productivity and reduced water quality, all of which would require significant mitigation. The Regional Water Quality Control Board determined that Poseidon's ongoing impacts to marine life would be equal to a loss of productivity from 423 acres of nearshore and estuarine waters each year.

The Regional Board also determined that Poseidon could offset this loss of marine life by providing mitigation in the form of more productive habitat that totaled 100.5 mitigation credits each year. Poseidon proposed, and the Regional Board imposed, mitigation measures to address these impacts through a project in the nearby Bolsa Chica Lowland Restoration area and at the Palos Verdes Restoration Reef site. However, this mitigation is far less than needed to ensure conformity to Coastal Act provisions. The Commission has already awarded credit to other entities for some of the Bolsa Chica mitigation, so cannot "double count" this work by also giving credit for it to Poseidon. The Bolsa Chica work is also expected to be of limited mitigation value in the long-term, as the site and the habitats within it were not designed to accommodate the levels of sea level rise that are now anticipated. Finally, new information about Palos Verdes shows that the proposed artificial reef in that location would be significantly less beneficial, more costly, and would take more time to implement than previously believed. Poseidon has also stated that it would be unable to provide most of its proposed mitigation before the facility starts operating and starts causing impacts to marine life. As a result, Poseidon's proposed project would face a significant mitigation deficit at the beginning of its facility operations that staff estimates could grow to equal a loss of more than four square miles of ocean productivity within the first 10 or 15 years of Poseidon's facility operations and that the deficit would still be about four square miles by Year 50 of operations.

In some cases where proposed mitigation is inadequate, the Commission can impose permit conditions requiring additional measures. However, staff does not believe that approach is appropriate here because the scale of the project's impacts is so large, as is the scale of the needed mitigation, and there are limited opportunities for large-scale wetlands restoration projects in the area that could feasibly be used as mitigation for Poseidon's project. It takes a long time to find, plan, permit, and construct these large-scale restoration projects, and converting a restoration project into a mitigation project adds another layer of complexity and more time to the overall project timeline. It is not appropriate for a project with impacts this significant to begin operating without mitigation occurring at or very near the same time. For Poseidon's Carlsbad desalination facility, which has somewhat smaller impacts, the Commission's 2008 approval required Poseidon to provide wetlands restoration as mitigation, though it did not require that the mitigation be available concurrently with the start of facility impacts. After many years of planning and permitting, Poseidon has still not started construction of this mitigation project as of April 2022. As a result, the Carlsbad plant has been operating for six years without mitigation in place, resulting in significant long-term losses to the state's marine resources, with a current cumulative total deficit of more than 400 acres of lost nearshore and estuarine marine life productivity not yet replaced – a deficit that will continue to grow until mitigation site construction is completed and the site eventually starts providing the expected amount of productivity.

For this Huntington Beach proposal, Commission staff has informed Poseidon of these concerns about mitigation deficits for several years, both through direct communication and through staff's coordination with the Regional Board during its review of Poseidon's mitigation proposal. Until very recently, Poseidon has not shown an interest in

addressing these issues and has stated that mitigation options other than those approved by the Regional Board were infeasible. However, starting in February 2022, Poseidon submitted a high-level summary of six new potential mitigation projects, with a more recent revised summary submitted on April 8, 2022, just two weeks before publication of this staff report. Staff has reviewed these documents and this staff report provides an initial assessment of mitigation suitability and potential credits available based on the limited information provided. This assessment, however, involves a high degree of uncertainty due to the lack of information about the design of most sites, about the expected performance of the various habitats being proposed, the timing of when sites would be constructed and mitigation credits would start to accrue, and importantly, the number of credits that might be expected from most of these sites. This assessment should therefore be viewed as preliminary and appropriately conservative.

Poseidon is currently asking the Commission to consider a suite of several projects to meet its mitigation requirements. These projects can be divided into near-term projects and future projects. Near-term projects are generally further along in the planning process and in a best-case scenario, could be permitted, constructed, and providing credit within 10 years of project initiation. Future projects are still in the conceptual phase and are thus many more years away from providing mitigation credit, if they move forward at all. As described in more detail in Section II.I of these Findings, after removing some non-viable proposed projects from consideration, the suite of available short-term projects includes five separate projects that have the theoretical potential to provide a total of about 90 mitigation credits, which is about 10.5 credits short of the total requirement. However, several of these projects raise significant concerns related to feasibility, lack of site control, and constraints on adapting to sea level rise. Furthermore, most of these mitigation projects would likely not be functioning and providing credit for up to about 10 years after the proposed start of Poseidon's operations. Thus, the actual mitigation deficit that would accumulate during that period would be much greater. It is possible that Poseidon could pursue one or more of the future projects, though these are too early in the planning stages to have enough certainty about when they might be constructed and how many credits they might provide. Even if all these projects are eventually constructed and provide a reasonable number of credits, it appears that Poseidon would have a substantial mitigation deficit – potentially growing to more than 600 credits within about 15 years of operations and then declining when the later projects can be brought online, but still resulting in a potential deficit of about 500 credits at the end of its proposed 50-year operating life. Therefore, even if all these projects are constructed, California could expect to experience many years of unmitigated losses of its marine resources. It is also significant that the scale of this mitigation program – potentially including up to seven individual projects – is unprecedented. The administrative burden of planning, permitting, monitoring, and ensuring condition compliance for these projects as part of a mitigation program would be substantially greater than any other existing mitigation programs managed by Commission staff.

The Coastal Act requires that marine resources and biological productivity of coastal waters be maintained and that maximum feasible mitigation be imposed for impacts to

those resources. Poseidon's proposed project would significantly diminish some of those marine resources, as it would cause, each year, a loss of marine life productivity in about 100 billion gallons of seawater, or about 423 acres of ocean and estuarine habitat. It is critical that a project with this scale of impacts has well-defined and thoroughly evaluated mitigation in place that can be expected to provide timely and appropriate mitigation beginning concurrently with, or very soon after, project operation. Poseidon's mitigation package does not meet this standard.

Environmental Justice

The Commission's Environmental Justice Policy was created to provide a framework for the agency to consider fair outcomes and include the voices of underserved communities whose households have been historically marginalized in the governmental review process and often disproportionately burdened by industrial development. However, in this case it was not possible to do focused outreach to underserved communities whose water rates may be affected by the project because Poseidon has not yet secured a buyer for the water and does not know where its water would be delivered.

Because Poseidon is not regulated by the California Public Utilities Commission, which approves project costs and sets rates for regulated public utilities, it would be up to Orange County Water District (OCWD) or other water agencies to negotiate with Poseidon over costs for water and to disclose any rate increases to its customers. OCWD has held public meetings to discuss non-binding term sheets that describe how Poseidon and OCWD plan to allocate project cost risks and set terms for the purchase of water. According to EJ groups, neither Poseidon nor its potential partners have reached out to many of its low-income or other ratepayers to let them know of the potential rate increases that could occur if this project moves forward. Without information on the extent to which the project would affect rates, or who would be affected, staff was unable to definitively analyze the potential burdens on specific environmental justice communities. This means that there are likely underserved populations that have been unable to participate in the process and that may be impacted by higher water bills well after a decision is made on this project – a scenario the Commission's Environmental Justice Policy was designed to avoid.

Despite the lack of available information, staff was able to identify some of the issues and concerns related to the project's impacts on nearby residents and potential ratepayers. For example, the proposed project location is in an area with a concentration of industrial development and a history of contamination problems. Area residents are concerned about adding more industrial development to an area already dealing with existing harm from a nearby wastewater treatment plant, power plant, partially remediated Superfund site, former oil tank farm, and former dump. They are also concerned about Poseidon's construction activities potentially stirring up and spreading existing contamination.

In addition, it is clear that costs for Poseidon's water would be higher than other current and planned sources of water. Although Poseidon has stated that its water would add

no more than about three to six dollars per month to the average water bill, the actual costs remain unknown, though would likely be higher. A 2018 study by a local water agency found that Poseidon's project would provide lower reliability at higher costs than about six other potential local or regional water supply projects. Likewise, a 2019 University of California study concluded that nearly all of the county's households are already connected to community water systems that provide high-quality, reliable water service, and that the "only plausible impact of [Poseidon's] Water on disadvantaged households in the county will be a decrease in affordability due to higher system rates." In sum, the project would likely have meaningful impacts on low-income ratepayers and other environmental justice communities, but the lack of information on eventual water costs made it challenging to fully assess these impacts. If the agreement is finalized, however, the water rate hike would disproportionately impact millions of low-income residents throughout OCWD's service area, the majority of which are people of color. Although proponents have cited additional jobs as a benefit, the lack of project-specific information available means that there is also no certainty EJ or low-income communities would experience this benefit.

Wetlands and Environmentally Sensitive Habitat

Before the project site was developed for a power plant in 1958, it consisted of dunes, tidally influenced wetlands, and freshwater marsh within the floodplain of the Santa Ana River. Of the original approximately 2,900 acres of wetland and marsh in the area, only about 190 acres remain today, including a half-acre wetland area on the project site that is just outside the development footprint and two larger restored wetlands a short distance away. These areas provide habitat for various species of concern, including some listed as endangered or threatened. The LCP requires the protection of wetlands and environmentally sensitive habitat areas and requires a minimum 100-foot buffer between new development and adjacent wetlands or sensitive habitat. A smaller buffer is permitted only if the site cannot accommodate the full buffer, the most sensitive species will still be protected, and the California Department of Fish and Wildlife reviews and concurs with the buffer. Poseidon's proposed project would cause noise, lighting, vibration, and possibly dewatering impacts from construction and operation that are expected to negatively affect species at the adjacent wetlands. Until recently, Poseidon has proposed having, at most, a ten-foot buffer between its development and the wetlands. In response to staff's stated concerns, it recently revised its facility layout to include an approximately 50- to 60-foot buffer by keeping an existing containment berm in place along the adjacent wetland. However, this would still be insufficient to protect the habitat value and species at the nearby wetland. Given site constraints and prior statements by Poseidon regarding the infeasibility of having a 100-foot buffer, it is not clear if this issue could be resolved simply by imposing a condition requiring a larger buffer.

Although the upland portion of the project site was filled decades ago, portions of the area were not maintained for several years and, as a result, some wetlands re-emerged. Sometime between 2009 and 2012, these wetland areas were destroyed without a permit, and the Commission then issued a notice of violation to the property owner. Although staff do not believe that Poseidon undertook these unpermitted

activities, the LCP states that wetlands that were degraded as a result of unpermitted activity shall continue to be protected. Thus, any permissible development in these areas must mitigate for the impacts to the wetlands that already occurred. Poseidon has expressed some willingness to address these issues and has identified some sites where mitigation could occur, including through restoration or enhancement of transitional wetland areas. However, the Commission has generally not accepted restoration of transitional wetlands as suitable mitigation for impacts to wetlands. As described above, the project already lacks adequate mitigation for marine life impacts, and it is not clear at this point where additional wetland restoration could occur. Because the proposed project has unmitigated wetland impacts and an insufficient buffer to protect nearby wetlands and habitat, staff recommends denial.

Coastal-Dependent Override Provision

As discussed above, staff is recommending that the proposed project be found inconsistent with various Coastal Act and LCP provisions. Generally, if a project is inconsistent with LCP or Coastal Act policies, and the inconsistencies cannot be addressed through mitigation, the Commission must deny a project. However, Coastal Act Section 30260 allows the Commission to approve a coastal dependent industrial facility, despite such nonconformities, if it meets a three-part test: 1) alternative locations are infeasible or more environmentally damaging; 2) denial of the permit would adversely affect the public welfare; and 3) the project's effects are mitigated to the maximum extent feasible. Application of this override provision is optional -- that is, if a project meets these criteria, the Commission may approve the project, but is not required to do so. If a project fails to meet any of the criteria, the Commission may not approve it.

Here, staff recommends that the Commission find the override provision does not permit approval of this project. First, although Section 30260 applies to the portion of the project in the Commission's jurisdiction, the LCP has a narrower version of the 30260 override that applies only to energy facilities, not coastal dependent industrial facilities. Thus, the override is not applicable to the land-based portion of Poseidon's project within the City's permit jurisdiction. In addition, staff does not believe that the desalination facility itself is a "coastal dependent" facility, because it does not need a site on or adjacent to the sea to function. Although the intake and outfall are coastal dependent, the desalination facility would be located approximately 1500 feet from the open coast and could function equally well regardless of its location adjacent to the coast. The Coastal Act's and LCP's protective policies may only be overridden in cases where a project truly needs a site on or adjacent to the ocean to function at all, which is not the case for this desalination plant, as demonstrated by other such facilities that have been planned or built in more inland locations.

In any event, staff recommends finding that the three tests of Section 30260 cannot be met, even if they were applicable to the whole project. Most importantly, denial of the project would not harm the public welfare. Many southern California water districts are seeking to develop new local or regional water resources and reduce their exposure to imported water. However, there are a variety of recycled water, reclamation, and

groundwater storage projects in various stages of planning and permitting that appear to be able to address Orange County's modest projected increases in water demand over the coming decades. As described in the Environmental Justice section above, water agency and academic studies have found that other water sources would be more reliable and less expensive than Poseidon's plant. Notably, despite being planned for more than 20 years, Poseidon still has not found a definite buyer for its proposed water. Orange County Water District (OCWD) has signed a non-binding term sheet with Poseidon to explore purchasing desalinated water, but any eventual purchase is contingent on Poseidon being able to obtain hundreds of millions of dollars in subsidies from Metropolitan Water District and that Poseidon provide specific expected costs for its water, among other things. OCWD also had not identified an immediate need for much of the water, with all its current, potential distribution options involving injecting a significant portion (from about 30% to 100% of Poseidon's total production) into the groundwater basin, where it would need to be extracted and treated again to be used in the area's drinking water supply system.

In addition, there are many remaining uncertainties that make it unclear when the project could begin operating, whether it could produce water at a cost that agencies could afford, and whether it would be able to operate at the capacity that Poseidon expects. Poseidon has not accounted for all the costs related to lack of mitigation, the need for using stricter building standards, and uncertainties with distribution systems. For example, local water districts have identified costs of up to several hundred million dollars to add new pumps, wells, pipelines, treatment systems, and other infrastructure in order to accommodate Poseidon's water into the regional water systems.

Further, desalination is one of the most energy intensive ways to obtain water, and the project's energy use would hamper state efforts to cut back on energy use and greenhouse gas emissions. The facility would also be in a low-lying, geologically unstable area where sea level rise, flooding, and tsunami and seismic risks are likely to render the site difficult to access or operate in an emergency, or even on a regular basis, in the future.

Due to the lack of a near-term need for the project, the likelihood that other water projects would be more reliable and cost-effective, the variety of uncertainties associated with the project, the project's unmitigated harms to marine resources and sensitive habitat, and its siting in a hazardous location, denial would not harm the public welfare. On the contrary, it appears that denial would focus water agencies on developing more cost-effective, energy-efficient, reliable sources of water and would help prevent environmental justice communities and ratepayers in general from being obligated to pay for the high but uncertain costs of this project.

Staff also recommends finding that the other two tests cannot be met because there is inadequate information to conclude that alternative locations are infeasible or more environmentally damaging, and the project's adverse effects have not been mitigated to the maximum extent feasible.

Staff Recommendation
For the reasons described above, and as described in detail in the proposed Findings, staff recommends that the Commission deny the proposed Project. The proposed motions and resolutions are on page 15.

Violation
Violations of the Coastal Act and/or Huntington Beach LCP exist on the subject property including, but not limited to, unpermitted clearing of vegetation, disking, grading, and draining of surface waters, all resulting in disturbance/destruction of approximately 3.5 acres of wetland habitat. The presence of wetlands on the site has been determined by the Commission's senior ecologist through site visits, photographic evidence, and forensic examination of Wetland Data Sheets included in the Final SEIR for the site. The Coastal Commission, in its August 2016 report to the California Energy Commission pursuant to Coastal Act Section 30413(d), confirmed that there were Commission-jurisdictional wetlands within the proposed project footprint.

These violations took place between 2009 and 2012 on the out-of-service tank farm portion of the AES Huntington Beach Power Plant, which is the site of the proposed Poseidon Water desalination plant. With this application, the applicant is not proposing to resolve these violations or to mitigate for the loss of wetlands resulting from the violations. Thus, violations remain on the subject property that will not be addressed or resolved by the Commission's action on this application. The Commission's enforcement division will address said violations as a separate matter.

TABLE OF CONTENTS

EXHIBITS

APPENDICES

I. MOTIONS AND RESOLUTIONS

A. DETERMINATION FOR APPEAL A-5-HNB-10-225

Motion:

> I move that the Commission **approve** Coastal Development Permit A-5-HNB-10-225 for the development proposed by the applicant.

Staff recommends a **NO** vote. Failure of this motion will result in denial of the permit and adoption of the following resolution and findings. The motion passes only by affirmative vote of a majority of the Commissioners present.

Resolution:

> The Commission hereby denies a coastal development permit for the proposed development on the ground that the development will not conform with the City of Huntington Beach's certified Local Coastal Program. Approval of the permit would not comply with the California Environmental Quality Act because there are feasible mitigation measures or alternatives that would substantially lessen the significant adverse impacts of the development on the environment.

B. DETERMINATION FOR CDP NO. 9-21-0488

Motion:

> I move that the Commission **approve** Coastal Development Permit 9-21-0488 for the development proposed by the applicant.

Staff recommends a **NO** vote. Failure of this motion will result in denial of the permit and adoption of the following resolution and findings. The motion passes only by affirmative vote of a majority of the Commissioners present.

Resolution:

The Commission hereby denies a coastal development permit for the proposed development on the ground that the development will not conform with the policies of Chapter 3 of the Coastal Act. Approval of the permit would not comply with the California Environmental Quality Act because there are feasible mitigation measures or alternatives that would substantially lessen the significant adverse impacts of the development on the environment.

II. FINDINGS AND DECLARATIONS

A. PROJECT DESCRIPTION AND BACKGROUND

Summary

Poseidon proposes to construct and operate a seawater desalination facility in the City of Huntington Beach, Orange County (see **Exhibit 1 – Area Map**, and **Exhibit 2 – Proposed Site Plan**). The facility would be located near the coast within the low-lying Southeast Huntington Beach area (see **Exhibit 3 – Area Elevations in Relation to Mean Higher High Water** and **Exhibit 4 – Area's Existing Low-lying Elevations**) on about 12 acres of the approximately 50-acre site of the Huntington Beach Generating Station, a power plant owned and operated by AES Huntington Beach Energy, LLC ("AES"). Poseidon expects the facility to produce up to 50 million gallons per day (mgd) of potable water for potential purchase and distribution by the Orange County Water District ("OCWD") or other local water districts. The desalination facility and an associated water storage reservoir would be located within an area of the power plant site currently occupied by retired fuel oil storage tanks and associated infrastructure formerly used by the power plant. The proposed project would use the power plant's existing intake and outfall pipelines, which will soon be retired by AES, to draw in seawater and to discharge the facility's high-salinity brine. Poseidon would install screens on the intake and diffusers on the outfall to reduce the project's adverse effects on marine life (these project components are detailed below in Section II.I – Marine Life and Water Quality). Poseidon's proposal also includes constructing and operating a water distribution system that would extend several miles inland, with approximately the first mile being within the City's coastal zone. The pipeline would be built and managed by either Poseidon or OCWD and would transport water from the desalination facility site to nearby water treatment or distribution systems owned or to be built by OCWD or other nearby water districts.

The project as currently proposed is a modified version of one that the City evaluated in a September 2010 certified Final Supplemental Environmental Impact Report ("FSEIR") and for which the City approved a CDP in September 2010. Later in 2010, the Commission accepted an appeal of that CDP and in November 2013 held a combined hearing on the de novo appeal and on Poseidon's application for the CDP needed for portions of the proposed project within the Commission's retained jurisdiction. However, Poseidon withdrew its application before the conclusion of that hearing, and the appeal has been held in abeyance since then while Poseidon addressed issues and requirements related to other necessary permits, primarily from the State Lands Commission and the Regional Water Quality Control Board ("Regional Board"). The currently proposed project also includes several modifications to the version of the project previously considered during the Commission hearing in November 2013, some of which were required by the State Lands Commission or the Regional Board, and others that Poseidon proposed in recognition of new policies and changed circumstances described later in these Findings under Project History and Changed Circumstances.

Project Description
The proposed project would involve several main phases:

Phase 1 – Demolish Existing Structures: The proposed project site is currently occupied by three large storage tanks that are about 200 feet in diameter and 40 feet tall, along with some smaller tanks, pipes, and other equipment formerly used by the power plant. The site is mostly surrounded by earthen containment berms covered with concrete that were originally constructed to contain any spills from the tanks. The tanks were used to store fuel oil for use by the adjacent Huntington Beach Power Plant but were emptied and retired in the 1990s. The soil and groundwater beneath the tanks contain undetermined levels of contaminants associated with the fuel oil formerly contained in the tanks and with the past several decades of the site's use as a power plant and industrial site. AES has been conducting soil and groundwater remediation at other locations within the power plant site, and Poseidon expects to conduct similar activities after first demolishing these tanks and other onsite infrastructure. Poseidon plans to remove most of the containment berms that surround the site or are internal to the site and would use much of the soil within those berms as fill material. Poseidon recently proposed keeping the berm on the east side of the site in place to provide part of the buffer required between its proposed development and adjacent wetland areas. Poseidon has not yet fully conducted the necessary sampling and testing activities because the size of the tanks prevents it from conducting the sampling and testing needed to fully characterize site contaminants beneath the tanks.

Phase 2 – Remediate and Prepare Site: Once the tanks are demolished, Poseidon would conduct sampling and testing followed by site remediation activities pursuant to a Remedial Action Plan that Poseidon is required to prepare for review and approval by the City. Based on preliminary test results from samples taken at the perimeter of the structures, Poseidon expects that its Remedial Action Plan would result in the need to remove up to about 18,000 cubic yards of soil containing petroleum and possibly other contaminants.

Following remediation, Poseidon would excavate much of the site to a depth of about 30 feet below grade to remove liquefiable soils and would then place compacted fill and structural supports to prepare the site for facility construction. Since publication of the City's 2010 EIR for the project, Poseidon has modified its proposed project to include removing most of the existing external containment berms around the site and using that earthen berm material and an unspecified volume of imported material as fill and to increase site elevations. The previous proposed elevations were generally between 10 and 12 feet NAVD88, and Poseidon now proposes to elevate part of the site to allow some of its key structures to have their finished floor elevations at between 14 and 16 feet NAVD88. As comparison, current high tides in the area, known as "King tides," currently reach about 7.0 feet NAVD88.

Phase 3a – Construct Facility: For the onshore facility components, Poseidon would construct the desalination facility and its associated structures. Some of the largest components would include a pretreatment structure about 400 feet long and 150 feet wide, a reverse osmosis building about 300 feet long and 120 feet wide, and a filter substation about 140 feet long and wide. The reverse osmosis building would house 14 separate reverse osmosis membrane units, with each unit able to produce about four million gallons of water per day (with one that would be kept in standby mode). The facility would also include a solids handling building, various pumps, generators, and electrical equipment, and other infrastructure needed to support the desalination process. Chemical storage on site would include various tanks that would hold up to 20,000 gallons of sulfuric acid, 10,000 gallons of caustic soda, 24,000 gallons of chlorine, 3,000 gallons of ammonia, and 5,200 gallons of fluorosilicic acid.

As part of its project, Poseidon also proposes to construct a 10-million-gallon water storage tank at the site. The tank would be about 250 feet in diameter by about 30 feet high and would be located in the northeast corner of the power plant site adjacent to the desalination facility. This tank would serve, in part, the role of the City's Southeast Reservoir, a facility the City has long planned at this site to provide an emergency water supply for nearby neighborhoods and development in this coastal part of the City in the event an earthquake on the underlying Newport-Inglewood Fault Zone were to cut off water that is now provided from infrastructure located further inland (see additional information below in Sections II.B and II.E).

For the facility's offshore components, Poseidon would use existing components of the power plant's existing once-through cooling system, which consist primarily of intake and outfall pipes approximately 14 feet in diameter that extend beneath the beach and seafloor and emerge in the water column offshore of Huntington Beach. The intake extends to about 1800 feet offshore and the discharge about 1500 feet offshore. The intake opening is several feet below the water surface at a location with about 34 feet of water depth, and the discharge is located in about 28 feet of water depth. Poseidon proposes two main changes to these existing structures – installing a wedgewire screening system on the intake and adding diffusers to the outfall. The Regional Water Board required the screen and diffusers as part of its April 2021 permit decision to ensure the proposed project would use the "best available design feasible" to minimize the intake and mortality of marine life, as required by Water Code Section 13142.5(b).

- **Intake screens:** Poseidon proposes installing a wedgewire screen system on the seawater end of the existing intake structure. These screen systems are cylindrical structures several feet in diameter and up to a couple dozen feet in length that are covered with screening material consisting of wedge-shaped wires with a one-millimeter slot between them. These screens are designed to reduce the entrainment, or intake and mortality of small forms of marine life, and are sized so that their intake velocities are 0.5 feet per second or less, which reduces the potential that fish or other marine organisms larger than one millimeter are trapped against the screen and injured or killed (see additional information in Section II.I below).

- **Diffusers:** Poseidon has proposed installing a multi-port diffuser at the end of the existing power plant outfall structure. The existing structure consists of a reinforced concrete pipe below the seafloor that ends at a vertical discharge tower that extends vertically and discharges power plant effluent into the water column. Poseidon would add diffusers to this system that would discharge Poseidon's effluent at an arc into the receiving waters at a high enough velocity to mix the high-salinity effluent into the water column. This approach is meant to allow Poseidon's discharge to meet provisions of the state's Ocean Plan, which requires that desalination brine be diluted so it does not affect benthic organisms and does not exceed two parts per thousand over ambient salinity levels outside a mixing zone extending no more than 100 meters from the discharge point.

Poseidon would install both components from an anchored barge, using divers and various support vessels over the course of several months.

Phase 3b – Construct Distribution System: Poseidon has proposed as part of its project constructing a water distribution pipeline that would connect the facility to one or more systems of nearby water districts. As evaluated in the project's 2010 FSEIR and as approved in the City's CDP, the pipeline would be routed along any of several routes within Huntington Beach and possibly within other nearby local jurisdictions (see **Exhibit 5 – Proposed Pipeline Routes**).[1] The largest pipeline would be up to 54 inches in diameter and would be pressurized to deliver water from the facility, which is close to sea level, to points inland and at higher elevations. Approximately the first mile of this pipeline would be within the City's coastal zone and is included in the City's CDP that is under appeal.

In 2018, Poseidon and OCWD agreed to a non-binding Term Sheet that assigns OCWD the responsibilities for designing, funding, constructing, operating, and maintaining any eventually selected distribution system, though the Term Sheet also allows Poseidon to finance and build the pipeline if OCWD concurs (see **Project History and Changed Circumstances** below for a more detailed description). OCWD is currently reviewing the proposed project to determine whether to purchase water from Poseidon, and if purchased, how OCWD would distribute the water.

OCWD is considering at least five distribution options, some of which were not evaluated in the project's previous CEQA review, so OCWD is now planning to conduct additional CEQA review to evaluate these options. All of the distribution options OCWD is considering would involve injecting between about 30% to 100% of Poseidon's water into the groundwater basin that OCWD manages as a drinking water supply for much of northern Orange County.[2] For all these proposals, the route of the proposed distribution pipeline within the coastal zone (and subject to this appeal) would remain

[1] See September 2010 City of Huntington Beach certified Supplemental Environmental Impact Report for Poseidon Water.

[2] See OCWD's July 6, 2016 Board meeting agenda for a more detailed description of the various options.

the same. However, each of these options would require additional infrastructure, such as new pump stations, pipelines, and injection wells to be built by OCWD or by its member water districts. These project components have not yet been fully identified and have not yet gone through CEQA review. To address OCWD's involvement and responsibilities for the eventual water distribution system, Poseidon has stated that it plans to assign relevant CDP permit requirements and conditions to OCWD rather than have OCWD seek its own CDP for constructing the pipeline.

Regarding the expected construction timeline, Poseidon anticipates the project's several phases – i.e., demolition, site remediation, and facility and pipeline construction – would take about two to three years to complete. However, several factors, including the above-referenced assignment to OCWD for planning, financing, and constructing the distribution system, the potential need for deeper or wider trenches or for alternative construction methods due to soil and water contamination and recently identified increased seismic hazards along the route, and likely limitations on construction to avoid avian breeding and nesting season, could extend the expected construction period (see Changed Circumstances and New Information below).

Phase 4 – Facility Operations and Expected Operating Life: Poseidon plans to operate the facility as a baseload water supply to continually produce approximately 50 million gallons per day ("mgd") of potable water for nearby water districts. This production rate could be modified slightly to reflect seasonal changes in distribution or to respond to different energy costs – for example, Poseidon could produce at a slightly higher rate during off-peak hours at night when electrical costs are lower and at a slightly lower rate during the more expensive peak hours.

Ongoing project operations would involve about 30 employees, and regular truck trips to deliver equipment, chemicals, and other materials, and to remove processing solids for delivery to a landfill. Offshore, Poseidon expects to clean the intake screens and remove marine life using a barge-mounted airburst system about four times a year. Marine life may also need to be removed from the interior of the intake pipeline, It is not clear how often this work would need to be done or what methods Poseidon might implement to accomplish any needed maintenance.

Regarding the project's proposed operating life, Poseidon's CDP application proposes that its facility be considered for a 50-year operating life. However, Poseidon's other reviews and approvals have been based on other expected operating lives – for example, the project's 2010 CEQA review anticipated the project having just a 30-year operating life, the 2015 Term Sheet between Poseidon and OCWD anticipated development of a 50-year purchase agreement for the project while the modified 2018 Term Sheet describes a 30- to 35-year purchase agreement, Poseidon's lease with AES is for up to 55 years, and the City's Franchise Agreement with Poseidon is based on an expected operating life of up to 60 years (i.e., a 35-year initial term with an additional 25-year renewal term). Additionally, during the Commission's previous November 2013 review of the proposed project, Poseidon requested that the Commission consider approving a permit for no more than 30 to 35 years (until

approximately 2050), so as to allow for reconsideration of the project at that time in recognition of the increased site risks expected to occur after that date due to sea level rise and other hazards (see Section II.A – Project History and Changed Circumstances below).

For purposes of these Findings, the analyses herein are based on the proposed project having an expected operating life in a range of 50 to 60 years, based on the 50-year proposal in Poseidon's CDP application and on the 60-year term of Poseidon's Franchise Agreement with the City. These are longer than the proposed 30- to 35-year operating periods previously evaluated in the Commission's 2013 review and represent a substantial change in circumstances for the project, based primarily on its increased and longer exposure to higher sea level rise projections and to several seismic or coastal hazards, including floods and tsunamis (see Sections II.G and II.H of these Findings). Recent Commission and California guidance documents also suggest that a longer period – up to about 100 years – be used as the basis for reviewing proposed major infrastructure or critical facility projects such as this, and this longer-term timeframe is also analyzed in relevant sections of the Findings for purposes of providing context and perspective.

Project History

Background: This proposed project has gone through several iterations during the past couple of decades, and the current proposal has been modified to reflect a number of changed circumstances and new policies or regulations developed over that period. Starting in 1998, Poseidon presented proposals to build desalination facilities in both Huntington Beach and Carlsbad. Both proposals were based on co-locating the facilities with existing coastal power plants that pulled in and discharged up to several hundred million gallons per day of seawater to cool their generating units. Poseidon proposed to use the water being discharged from the power plant to produce 50 million gallons per day (mgd) of potable water for distribution to local and regional water systems.

At the time, this co-location approach offered several benefits:

- The power plants' use of the seawater had already killed the marine life drawn into the intake, so using the same water for desalination would not result in additional marine life mortality.
- The higher temperature of the power plant discharge would allow the desalination facility's reverse osmosis membranes to operate more efficiently.
- The power plants' use of several hundred million gallons of seawater per day would provide sufficient water to dilute the approximately 50 mgd of high-salinity discharge from the desalination facility, thereby reducing potential effects of increased salinity in the marine environment.
- The desalination facility would be able to rely on existing intake and outfall structures instead of having to construct new structures.

However, since the time of Poseidon's original proposals, significant policy and regulatory changes, along with changed circumstances at, and new information about, its proposed Huntington Beach project site and the surrounding area have eliminated most of the above benefits. These changes have resulted in Poseidon needing to substantially modify its project from its original proposal.

City's CEQA and CDP Review: In 2002, the City of Huntington Beach started its initial review of the proposed project. The City conducted CEQA review for the as-then-proposed desalination facility that would be co-located and operating in conjunction with the adjacent AES Huntington Beach Generating Station. In December 2003, the City determined that the project's final Environmental Impact Report (EIR) provided inadequate review of a number of issues and areas of concerns and therefore declined to certify it.

Poseidon then re-applied to the City with a slightly modified proposal and the City conducted a second CEQA review. In September 2005, the City certified a Recirculated EIR and in February 2006 approved a CDP for portions of the project within the City's certified Local Coastal Program ("LCP") jurisdiction. That CDP was appealed to the Commission, which, in April 2006, found that Substantial Issue existed with respect to four issue areas of the LCP policies: 1) protection of marine life and water quality, 2) protection of environmentally sensitive habitat areas, 3) energy use and development, and 4) adequate public services. In May 2006, Poseidon submitted a CDP application to the Commission for the portion of its proposed project within the Commission's retained jurisdiction seaward of the mean high tide line, which included the intake and discharge pipelines of the power plant's existing cooling system. Commission staff deemed that application incomplete, and requested, among other items, that Poseidon conduct a site-specific offshore geotechnical investigation to assess whether alternative intake designs would minimize entrainment impacts and be the least environmentally damaging feasible alternative.

Before Poseidon provided sufficient information for Commission staff to deem that CDP application complete, Poseidon in 2009 again modified its proposed project by submitting to the City a proposed re-configuration of the project footprint within the power plant site, which required the City to conduct additional CEQA review. In September 2010, the City certified a Supplemental EIR (SEIR) and issued a new CDP for components of the project within its LCP jurisdiction, which was appealed to the Commission (see **Exhibit 6 – City of Huntington Beach CDP #10-014**). In November 2010, and in response to that appeal, the Commission found Substantial Issue existed with respect to the same LCP issue areas that were present in the 2006 appeal, as well as additional LCP policies related to protection of marine life, water quality, and wetlands, the facility's land use designation, public recreation, protection against seismic events and liquefaction, growth-inducement, and whether the project met the LCP's requirement for mitigation to the maximum extent feasible (see **Exhibit 7 – Commission's Final Adopted Findings on Substantial Issue**).

Commission Review: After the Commission found Substantial Issue with the City's issuance of Poseidon's CDP, Poseidon in 2011 amended its 2006 CDP application to the Commission to make the portions of the proposed project in the Commission's retained jurisdiction consistent with the version of the project the City had approved in 2010. Commission staff again deemed Poseidon's application incomplete largely due to the same information gaps identified in staff's initial 2006 incomplete letter, including the lack of the site-specific offshore geotechnical information needed to determine the feasibility of less environmentally damaging intake alternatives.

Poseidon continued to submit information meant to complete its CDP application, but it was insufficient to meet the Commission's permit filing requirements. Although staff continued to request the necessary information, Poseidon stated in a May 9, 2013 response letter that it believed it has satisfied all of staff's information requests. In June 2013, Commission staff discussed with Poseidon two options available to address the incomplete application – Poseidon could request a "completeness" hearing pursuant to Section 13056 of the Commission's regulations, during which the Commission would determine whether the application was complete, or the Executive Director could agree to file the application as complete, notwithstanding staff's view that more information was needed, and that staff would develop a staff recommendation based on the available information. Poseidon chose the latter option, and in July 2013, staff filed the application and began preparing a staff recommendation and proposed Findings for the Commission to consider at its November 2013 hearing. In October 2013, and in response to the increasing recognition of climate change and sea level rise hazards at and near its proposed project site, Poseidon further modified its proposed project by requesting that the Commission consider approving a CDP with a limited term of no more than 30 to 35 years – i.e., until about 2050.

At the November 2013 Commission hearing on the proposed CDP, Commission staff recommended approval of the proposed project with a number of Special Conditions. However, prior to the Commission's vote, Poseidon withdrew its application and the Commission continued the hearing on the de novo portion of the appeal of the City's CDP for the proposed project. Shortly after that hearing, Poseidon and Commission staff established an Independent Science and Technical Advisory Panel ("ISTAP") to address some of the issues related to the project's proposed intake method, as described below under **Changed Circumstances**. The ISTAP conducted its work through late 2015, ending shortly after Poseidon submitted in September 2015 a new CDP application for portions of its proposed project within the Commission's jurisdiction. In July 2016, Poseidon withdrew that application pursuant to an agreement with Commission staff and staff of the State Lands Commission and Regional Water Quality Control Board ("Regional Board") establishing a sequence for the three agencies to process and review the project.

Changed Circumstances and New Information

Since these earlier reviews, a number of changed circumstances and a great deal of new information have resulted in substantially different considerations for the Commission's current review. These include recently adopted state policies, updated studies on sea level rise and coastal erosion, and proposed modifications to Poseidon's project. These are briefly described below and then referenced later in other relevant sections of these Findings.

New Policies and Guidance:

- **State Ocean Plan Amendment to Retire Once-Through Cooling Systems:** Concurrent with many of the events described above, the State Water Resources Control Board ("State Water Board") in 2005 started developing an amendment to the California Ocean Plan meant to reduce the adverse effects of power plant once-through cooling ("OTC") systems like those Poseidon proposed to use for its desalination facilities ("OTC Amendment"). At their peak, the state's coastal power plants collectively could pull in more than 18 billion gallons per day of seawater, killing billions of fish, fish eggs, and larvae each year. In 2010, after conducting several expert review panels and several public workshops, and in recognition of the significant harm caused by these OTC systems, the State Board adopted an amendment to the California Ocean Plan that required these systems be phased out at most of the state's coastal power plants.[3]

  The State Board's amendment required the Huntington Beach Power Plant to comply with the new requirements no later than 2020, and in June 2012, AES, the owner of the Huntington Beach power plant, responded to the Amendment's requirements by applying to the California Energy Commission to convert the power plant to a closed-cycle cooling system. AES proposed replacing the existing power plant with a new facility with more efficient generating units that would not rely on seawater for cooling. AES projected that one of its existing units would end its use of seawater by 2019 and the other by 2020.[4] Also in 2012, AES converted part of its existing power plant into synchronous converters that do not require seawater for cooling. As a result of these changes, Poseidon's proposed project changed from one that would have relied almost entirely on co-located operations with the power plant to instead become a facility that would operate entirely as a "stand-alone" facility without reliance on power plant cooling water. These changes resulted in Poseidon losing several of the above-referenced benefits of co-location, with the most significant, for purposes of coastal resource protection, being that Poseidon would prolong the marine life

[3] The OTC Amendment and related information is available at: http://www.waterboards.ca.gov/water_issues/programs/ocean/cwa316/

[4] In 2020, the State Water Board approved an extension until the end of 2023 of the power plant's use of once-through cooling system. However, Poseidon would not be able to concurrently use the system, as the Regional Board's 2021 approval of Poseidon's project (described below) prohibited co-located operations. Further, Poseidon's expected two- to three-year construction period would likely not start until well after 2023, since the proposed project would first need to obtain the several other permits and approvals described herein.

impacts associated with the open ocean intake that were intended to be phased out by the OTC amendment, and would thus be solely responsible for avoiding, minimizing, and mitigating for the loss of marine life resulting from the use of the existing power plant cooling structure.

- **State Ocean Plan Desalination Amendment:** During the State Board's development of the OTC Amendment, it recognized that seawater desalination facilities that used the same types of intakes could cause the same types of significant adverse marine life effects that resulted in the OTC Amendment's eventual required phase-out of power plant once-through cooling systems. In 2007, the State Board started developing a separate amendment to the California Ocean Plan that would apply to desalination facilities ("Desal Amendment"). This Desal Amendment was meant to address the requirement of the state's Water Code Section 13142.5(b) that projects such as desalination facilities that withdraw seawater use the "best available site, design, technology, and mitigation measures feasible" to minimize the intake and mortality of marine life. During a several year period, the State Board staff convened expert panels and held numerous public and stakeholder workshops to develop the policy, which it adopted in 2015 (see additional information below).

  This amendment establishes specific requirements that the State and Regional Water Boards, in consultation with the Coastal Commission, use to review proposed seawater desalination facilities. A key component of the Desal Amendment is its direction that the Water Boards are to determine whether those facilities would use the "best available, site, design, technology, and mitigation measures feasible to minimize intake and mortality of all forms of marine life."

  The amendment also clarifies the shared jurisdiction of the Commission with the State and Regional Water Boards. Coastal Act Section 30412 establishes that the Water Boards have primary responsibility for the control of water quality and that, except under limited circumstances (which do not apply to this proposed project), the Commission is not to take any action that conflicts with any determination by the Boards regarding water quality. Coastal Act Section 30412 further specifies that Water Code Section 13142.5, which is the basis of the Desal Amendment, applies to both the Boards and to the Commission. In adopting the Amendment, the State Water Board determined, pursuant to Section 13142.5(b), that the Boards have the primary authority to establish the "best available site, design, technology, and mitigation measures" feasible for proposed seawater desalination facilities. The Boards have also acknowledged that the Commission has independent authority in certain aspects of these decisions, including for this Poseidon proposal the ability to evaluate and require mitigation in addition to that imposed by the Boards. For example, the findings in the Regional Board's 2021 approval of Poseidon's permit states that the Board "decision on the mitigation required under the Ocean Plan does not bar the California Coastal Commission (or any other agency) from requiring any additional mitigation necessary to satisfy the agency's program requirements."

These issues are further described in Section II.I – Protection of Marine Life and Water Quality.

- **Coastal Commission's 2018 Sea Level Rise Policy Guidance:** In 2018, several of California's resource agencies, including the Commission, adopted updated sea level rise policy guidance documents. This guidance built on the continuing work done by the International Panel on Climate Change ("IPCC) and identified expected sea level rise effects in California based on various projections developed through the IPCC regarding the timing and elevation increases expected over the coming decades. This was followed in 2020 by the state's adoption of "Making California's Coast Resilient to Sea Level Rise: Principles for Aligned State Action," and then in 2021 with a new provision of the Coastal Act, Section 30270, that directs the Commission to consider the implications of sea level rise in its decisions.

- **Coastal Commission's 2021 Critical Infrastructure Guidance:** In 2021 the Commission adopted its Sea Level Rise Planning Guidance for Critical Infrastructure, which describes how certain characteristics of critical infrastructure – such as its size, cross-jurisdictional nature, and the role it plays in providing important public services – make the adaptation planning process different than for other types of development. The document does not provide specific guidance on desalination facilities, but it recognizes that the concepts in the document apply to a range of infrastructure with certain characteristics, likely including desalination facilities that are integrated with other water systems, provide emergency water supplies, or have the potential to cause significant environmental impacts or social consequences if damaged by future hazards.

Recent Additional Information and Studies: There are also several new or updated studies and documents relevant to the Commission's review of the proposed project, including the following:

- **Independent Science and Technical Advisory Panel ("ISTAP"):** After the November 2013 Commission hearing, Poseidon and Commission staff developed an independent review process to identify whether various subsurface intake designs would be feasible at or near Poseidon's proposed project site in Huntington Beach. Staff and Poseidon agreed on a facilitator (Concur, Inc.) and a scope of work, and then jointly selected members to serve on the ISTAP.

  The ISTAP conducted its review in two main phases. During Phase I, the panel evaluated several different subsurface intake methods to determine whether they would be "technically" feasible for Poseidon to use at or near the proposed project site. Phase II involved a more detailed review of the intake options identified as technically feasible during Phase I and included economic evaluations of the expected costs of different intakes, "constructability" issues that would likely arise along the stretch of the shoreline closest to Poseidon's proposed facility site, and others. The ISTAP concluded at the end of Phase II that at least one alternative intake option – an offshore infiltration gallery – would be technically feasible, but that its costs and the time needed to design, conduct environmental review, obtain

permits, and construct the gallery would make it economically infeasible. Staff and Poseidon had considered conducting a Phase III to determine whether there may be feasible alternative designs that could be built further from the immediate vicinity of Poseidon's proposed facility site, but Poseidon declined to continue with that phase.

Along with its evaluations of intake design, the ISTAP's work led to better understanding of how coastal erosion and the beach dynamics along this section of the Orange County shoreline could affect Poseidon's project – for example, the importance of the ongoing beach nourishment work in northern Orange County described in Section II.H – Flooding & Effects of Sea Level Rise.

- **Coastal Storm Modeling System ("CoSMoS") 3.0 for Southern California:** This model, developed by the United States Geological Survey (USGS) and funded in part by the California Coastal Conservancy and Department of Fish and Wildlife, uses several sea level rise scenarios and other elements of coastal storms, such as tides and storm surges, to identify the extent of flooding and erosion at specific sites. The Commission has used the CoSMoS modeling and findings to support its guidance on how to incorporate climate change and vulnerability assessments into CDP reviews and LCP updates.[5] As detailed below in Sections II.G and II.H, the modeling shows Poseidon's site is in an area expected to experience significant effects of sea level rise, storm surge, and other climate change-related phenomena.

- **Poseidon/Orange County Water District Term Sheet:** Poseidon has been working since 1998 to find nearby water districts interested in purchasing its water. In May 2015, Poseidon and OCWD agreed to a non-binding Term Sheet that established several basic terms and conditions of a potential future water purchase agreement. In 2018, the two parties agreed to a modified Term Sheet that includes agreed-upon approaches to project construction, water cost calculations, water quality requirements, project financing, and other aspects of the overall proposed project. As described by OCWD, the Term Sheet is a "non-binding agreement setting forth the basic terms and conditions under which OCWD and Poseidon Water could negotiate more detailed contracts and legal documents to purchase the water from the desalination plant, should it be constructed." OCWD has described a number of steps it would need to accomplish as part of considering a possible water purchase agreement with Poseidon. These include Poseidon applying for, and receiving approval from, the Metropolitan Water District ("MWD") for an annual operating subsidy, negotiating parallel agreements with any cities or water districts who decide to purchase the water through OCWD, determining what distribution routes and additional infrastructure would be needed to deliver the water, agreements on constructing the distribution system, preparing an EIR for purposes of complying with CEQA, and ongoing public input into its decision-making processes.[6]

[5] More information on the CoSMoS model, the different study phases, and related publications and presentations, is available here: http://walrus.wr.usgs.gov/coastal_processes/cosmos/index.html

[6] See, for example, OCWD's Fact Sheet on the Term Sheet available at: https://www.ocwd.com/media/3189/ocwd-desal-term-sheet-fact-sheet-final.pdf

Despite the Term Sheet's non-binding nature, it serves as the basis for part of Poseidon's CDP application and project description. For purposes of the Commission's review, a key element of the Term Sheet is its division of responsibility between Poseidon and OCWD, with Poseidon being solely responsible for the permitting, financing, design, construction, and operation of the desalination facility and OCWD being responsible for financing, design, construction, and operation of the water distribution system (though it allows for Poseidon to construct the distribution system, if OCWD agrees). As noted above, the first mile of the distribution system is included as part of the CDP the City issued to Poseidon and that is under appeal to the Commission. Poseidon has stated that it intends to assign relevant provisions of its CDP to OCWD.

Another key element is that the Term Sheet contemplates funding the proposed project using a 50-year financing mechanism. During the Commission's November 2013 review of the proposed project, Poseidon had requested that the Commission authorize a permit for no more than 30 to 35 years (until about 2050), largely due to uncertainties about the effects of climate change and sea level rise on the project site beyond that date. This more recently proposed 50-year financing approach requires that project-related effects, hazards, and risks be assessed for a longer proposed operating life than was evaluated in the 2013 Commission staff recommendation.

- **2020 Urban Water Management Plans ("UWMPs"):** Starting in 2005, California required most water districts in the state to prepare an UWMP every five years that identifies their expected water needs and the expected needed supplies for normal, dry, and multiple dry years over the upcoming 25 years (see Water Code Section 10610 *et. seq*). Water Code Section 10631(h) requires each UWMP to include a detailed description that identifies all water supply projects and programs the water district needs to meet its total expected water use. This detailed description is to identify specific projects, the amount of water supply expected from each project, and the expected implementation timeline for each. Separately, Water Code Section 10631(i) also requires each UWMP to describe any opportunities for desalinating ocean, brackish, or groundwater as part of its supply or to clearly indicate that there are no such opportunities. Importantly, the Desal Amendment uses the current UWMPs to help determine whether the water needs identified in the Plans are consistent with, and allow conformity to, the Amendment's preference for using subsurface intake methods, where feasible, to provide source water for desalination facilities.

  The most recent UWMPs, covering the period from 2020 to 2045, were adopted by water districts in 2021. The Orange County area is covered by a series of "nested" UWMPs – one from the Metropolitan Water District ("MWD") which serves as the regional water wholesaler for much of Southern California, one from the Municipal Water District of Orange County ("MWDOC") that compiles the analyses of needed and expected water supplies on behalf of its 28 member water districts in or near

Poseidon's proposed service area, and separate UWMPs from each of those 28 individual water districts:

- **MWD:** The MWD's 2010 UWMP identified a projected water need of 56,000 acre-feet of seawater desalination through 2035, which represented the water expected to be produced by Poseidon's Carlsbad facility, which went online in December 2015. The current 2020 UWMP identifies a need for the same 56,000 acre-feet of seawater desalination through 2045. It identifies Poseidon's project as a "potential" water supply project, but not as part of MWD's needed supplies during that period.

- **MWDOC:** The MWDOC UWMP identifies a number of potential projects, including seawater desalination, water recycling, and others, that could provide over 100,000 acre-feet per year of additional water supply during the next 25 years. However, it specifically states that Poseidon's Huntington Beach project is not included in its lists of expected future water sources or projected future water supplies.[7,8]

- **Area water districts:** Of the current UWMPs for the 28 water districts in or near Poseidon's proposed service area, all but one state that they have sufficient supplies for normal, dry, and multiple dry years through 2045 without relying on seawater desalination. The one exception is the Laguna Beach County Water District, which states that it expects to need 1,000 acre-feet from either the proposed Poseidon or Dana Point facilities, whichever is more cost-effective.

  OCWD, Poseidon's current partner in the proposed desalination facility, is not required to prepare an UWMP, as it is primarily a supplier to its member agencies rather than individual customers. The MWDOC UWMP includes the expected water supplies needed for OCWD to serve its role in the regional supply portfolio and identifies the specific water projects that OCWD is planning on to provide the needed water supply for the region. As noted above, these projects do not include seawater desalination. Although OCWD does not prepare an UWMP, it has prepared a "Long-Term Facilities Plan 2014 Update," which identifies Poseidon's proposal as one of 17 projects on a "Focused Study List" that would provide more than 150,000 acre-feet per year if all were

[7] Regarding the Huntington Beach proposal, the UWMP states that "[u]nder guidance provided by DWR, the Huntington Beach Seawater Desalination Plant's projected water supplies are not considered in either Table 4-1 or Table 6-2 due to its current status within the criteria established by State guidelines." Table 4-1 identifies the specific existing and future water supplies MWDOC plans to rely on, and Table 6-2 identifies MWDOC's projected water supply sources, neither of which include Poseidon's project.

[8] The state's Ocean Plan requires that seawater desalination facilities, such as Poseidon's, that propose using an open water intake, must be sized to meet a specifically identified "need" for a particular volume of water. Although MWDOC has not included Poseidon's project as part of its expected or planned water supplies, the Regional Water Board cited Poseidon's inclusion in MWDOC's 2015 UWMP as one of several potential projects as the basis for an identified "need" for the up to 56,000 acre-feet the project would provide.

constructed. This document states, though, that projects on this list are not considered necessary to meet future OCWD needs but are identified as requiring continued study, with potential implementation based in part on cost/benefit analyses that are yet to be conducted. As noted above, OCWD will be conducting CEQA review to determine its proposed need, distribution options, and modifications to its existing water supply management methods.

Summary of Key Differences Between Previously Proposed and Current Project: The currently proposed project has been modified in several ways in response to the above-referenced changed circumstances and new information. Key modifications are summarized below.

- **Longer Proposed Operating Life:** Poseidon's current application is for a proposed project with a 50- to 60-year operating life, representing a significant increase from the 30- to 35-year operating life requested in the 2013 application.

- **Use of open water intake:** In 2013, Poseidon had proposed an open water intake for its facility, though Commission staff had recommended the use of a subsurface intake that would eliminate or reduce most of the marine life impacts that would result from the use of Poseidon's proposed method. Since then, the Regional Board has determined that Poseidon's proposed open water intake, if screened, would be the best available method for obtaining the facility's source water. Although Poseidon is now proposing to pull in 106.7 mgd (down from 127 mgd in 2013), use of this intake method would result in significant adverse impacts to marine life that must be mitigated. These aspects of the proposed project are described below in Section II.I.

- **Proposed grading to increase site elevation:** To address some of the increased hazards resulting from Poseidon's proposed longer operating life, Poseidon proposes placing additional fill at the facility site to raise much of the site elevation from the previously proposed approximately 10 to 12 feet to about 14 to 16 feet (NAVD88). Poseidon also proposes to remove most of the existing exterior berms from the site, to use much of the berm material as fill, and to construct new berms or other structures to provide protection from sea level rise, tsunami runup, and flooding. These proposed project components are described below in Sections II.G and II.H.

- **Changes to water distribution system:** Poseidon had previously proposed constructing and operating the water distribution pipeline needed to deliver water to nearby water districts. Poseidon's CDP that is under appeal continues to include the portion of the proposed pipeline that is within the coastal zone (approximately the first mile of the several mile long pipeline), but Poseidon's 2018 Term Sheet with OCWD now proposes that OCWD construct and operate the distribution system. OCWD is also considering different distribution options than were considered in the project's EIR, so OCWD will likely need to conduct additional CEQA review to complete the system.

B. Other Necessary Permits and Approvals

The proposed project is subject to several other approvals, including those described below. Several of the approvals Poseidon has already obtained will need to be modified because of changes to the proposed project since those approvals were granted, and several of the necessary future approvals would likely result in the need for Poseidon to modify the project as it is currently proposed herein – for example, Poseidon may need to modify or add to its currently proposed treatment systems to address water chemistry concerns in the regional water distribution system or to meet water quality requirements in the groundwater basin. Poseidon would also need to obtain proof of legal interest for several key elements of its proposed project, some of which the Commission would need prior to issuance of any approved CDP.

City of Huntington Beach: On September 20, 2010, the City, acting as lead agency under the California Environmental Quality Act (CEQA), certified a Subsequent Environmental Impact Report (SEIR) for the proposed project and issued a CDP for those portions of the proposed development within the City's Local Coastal Program jurisdiction. However, the project as currently proposed includes several significant differences from the project that was evaluated by the City for the SEIR and CDP:

- The City evaluated several potential intake screening systems and discharge diffusers, but determined that those components were infeasible, in part because the construction required to install them would disrupt power plant operations. The above-referenced Desal Amendment now requires that any open water intake be screened and that projects such as Poseidon's include a diffuser on the outfall. In 2017, the State Lands Commission conducted additional CEQA review for the proposed project and evaluated the currently proposed screens and diffusers that were required as part of the Regional Board's 2021 approval.[9] To not disrupt power plant operations, the screen and diffuser installation would be expected to occur after the power plant owner ends its use of the once-through cooling system, now scheduled for the end of 2023.

- The City's project evaluation was based on Poseidon constructing and operating the facility's water distribution system along any of several potential routes for use by several nearby water districts. Poseidon's current proposal would have OCWD construct and operate the distribution system along different routes and for different uses than evaluated in the City's EIR. OCWD plans to conduct its own CEQA analysis to identify preferred route(s) and water distribution (see also OCWD below). However, portions of the expected route within the coastal zone are expected to be the same.

[9] The State Lands Commission's environmental review was upheld by a court of appeal. See California Coastkeeper Alliance v. State Lands Commission (2021) 64 Cal.App.5th 36.

The City also provided Poseidon with the following approvals, some of which will need to be modified:

- **Entitlement Plan Amendment 10-001:** The City approved a September 2010 Entitlement Plan Amendment. The approval included a Tentative Parcel Map ("TPM") to address the proposed parcel exchange between the City and Poseidon to accommodate Poseidon's offer to include in its project a water storage tank that would serve a role as the City's long-planned Southeast Reservoir at the project site.

- **City's Franchise Agreement and associated easements for distribution system:** An October 2010 Franchise Agreement between Poseidon and the City of Huntington Beach allows Poseidon to construct and operate a water distribution system along any of several routes within City rights-of-way. In 2015, the City determined that the Poseidon/OCWD Term Sheet's assignment of distribution system responsibilities to OCWD would be subject to additional City review and approval and would be contingent upon Poseidon paying the franchise fee for the full term of the Agreement (which the City estimates to be approximately $5.8 million).[10]

  Additionally, because this Franchise Agreement applies to just those portions of the distribution routes within City rights-of-ways, Poseidon and/or OCWD will need additional approvals or proof of legal interest for those portions of the distribution system that would be constructed and operated on non-City property. The routes OCWD is considering involve additional landowners and easement holders for which property rights or approvals have not yet been obtained. The routes being considered could require additional approvals to construct or operate within a CalTrans right-of-way, within the jurisdiction of the Orange County Flood Control District, within a Southern California Edison easement, and others. While OCWD, as a public utility, may obtain the necessary legal interest through eminent domain, its ability to do so may be constricted to some degree because several of the potential easements are in areas controlled by other public utilities or agencies.

  Further, and as discussed later in these Findings, new information developed after the 2010 FSEIR suggests that pipeline construction along some routes will likely require more extensive construction-related measures than were evaluated in the FSEIR. For example, the above-referenced recent groundwater modeling conducted as part of the CoSMoS effort identifies very high groundwater tables along many of the routes that would likely require extensive dewatering and more extensive treatment of liquefiable soils, which could in turn mean wider or deeper trenches, larger staging areas, etc. than were evaluated in the previous CEQA review. These requirements could result in a larger project footprint or modification of the proposed routes, which may result in the need for additional CEQA review by OCWD, additional landowner approvals, and possibly a CDP amendment. Additionally, one section of the pipeline would be constructed adjacent to a landfill that is currently going through site remediation pursuant to a consent order with the

[10] See August 2015 letter from City of Huntington Beach to Orange County Water District.

Department of Toxic Substances Control ("DTSC"). As noted below, DTSC would likely require Poseidon to obtain review or approval of some aspects of the pipeline routing and construction along this section of the pipeline.

- **Owner Participation Agreement:** The project is subject to a 2010 Owner Participation Agreement (OPA) between the City and Poseidon that includes terms and conditions for use of property. However, City has also required that Poseidon enter an Amended and Restated OPA for approval by the City prior to issuance of the City's building permits.[11]

- **Water Purchase Agreement:** The City's 2010 approvals require Poseidon to enter into a water purchase agreement that provides the City with up to three million gallons per day (mgd) of water at a discount to the cost of water the City purchases from the Metropolitan Water District and that allows the City to purchase up to an additional 28 million gallons during declared water emergencies.

- **Property Exchange/Lease and Escrow Agreement:** A September 2010 Agreement between the City and Poseidon establishes an exchange of a Poseidon-owned parcel for a City-owned parcel within the AES power plant site. Once Poseidon purchases its facility site from AES, Poseidon would exchange one of the parcels with the City and then lease that parcel from the City for at least two years with an option to purchase thereafter. The Agreement is meant to accommodate the 10-million-gallon reservoir that Poseidon will use as the water storage component of its desal facility. After 35 years, the City would have the right to take possession of the reservoir.[12]

- **Huntington Beach Fire Department – Permit to Abandon Oil Well:** For sites in Huntington Beach such as Poseidon's that formerly included oil wells, the Huntington Beach Fire Department requires a permit to ensure that any abandoned wells are properly retired and sealed.

Orange County Water District: As noted above, OCWD has agreed to a 2018 non-binding Term Sheet with Poseidon that establishes the framework for potential terms of an eventual Water Purchase Agreement. The Term Sheet includes provisions that modify the previously proposed project – for example, it anticipates a 50-year project life rather than Poseidon's previously proposed 30- to 35-year operating life, and it establishes that OCWD would be fully responsible for planning, funding, constructing, and operating the selected water distribution system.

OCWD is anticipating preparation of an Environmental Impact Report to provide the additional CEQA review needed to address the changes to its water distribution system necessary to accommodate the water it might purchase from Poseidon. OCWD may

[11] See CDP Condition #4.c.

[12] This is further detailed in a June 19, 2015 letter from Poseidon to the City describing some of the financial elements of this Agreement.

sell some of the water for direct use by nearby water districts, though it is not yet clear which water districts would agree to purchase this water or what amounts would be involved. OCWD has noted that these districts would likely have to modify their existing distribution systems by changing pipes, modifying system hydraulics, adding pump stations, and other measures needed before being able to accept water from Poseidon's project.[13]

OCWD is also considering using all or some of the water it might purchase from Poseidon to recharge the groundwater basin OCWD manages to supply drinking water for its member agencies. This change in use may require Poseidon to further modify the treatment processes it uses to produce its water, as detailed in Section II.L – Groundwater Quality, which may prompt the need for additional review and authorization by the Regional Board and other agencies.

Santa Ana Regional Water Quality Control Board: Poseidon would be subject to several approvals from the Regional Board, including:

- **Waste Discharge Requirements / National Pollutant Discharge Elimination System ("WDR/NPDES") Approval and Determination of Conformity to Ocean Plan Amendment:** In April 2021, the Regional Board approved Order R8-2021-0011, which allows Poseidon to discharge effluent into the state's coastal waters and concludes that Poseidon's project would be consistent with requirements of the 2015 Ocean Plan Desalination Amendment referenced above.

- **Conformity to Santa Ana Basin Plan:** The Regional Board regulates both surface water and groundwater quality, in part, through administration of the Santa Ana Basin Plan. The proposed injection of Poseidon water into Orange County Groundwater Basin would be subject to review and approval by the Regional Board (see additional information and analysis in Section II.L – Groundwater Quality).

- **Construction Stormwater Permit and Industrial Stormwater Permit:** Poseidon would be subject to review and approval by the Board for these two permits, which are generally reviewed before the start of construction and the start of facility operations.

California State Lands Commission ("SLC") – Lease of State Tidelands: The power plant's cooling water intake and discharge structures that Poseidon proposes to use extend onto State tidelands and are subject to regulation by the SLC. The SLC issued a lease to the power plant owner, AES, that covers an area of tidelands about 300 feet wide and extends about 1700 feet offshore. In 2010, the SLC amended the lease to require AES, when it proposes to discontinue its use of cooling water for the power plant's cooling system, to apply to the SLC with a request that its lease obligations be

[13] See, for example, Water Issues Committee of the Orange County Water District, Considering Seawater Desalination Project Supplies, July 17, 2013.

assigned solely to Poseidon.[14] As noted above, AES is required by the state's Once-Through Cooling Policy to end its use of seawater by 2023, and AES has already constructed a replacement plant on site that would not rely on cooling water from the intake and discharge system. In 2017, the SLC certified a Supplemental Environmental Impact Report and approved a lease amendment to address Poseidon's proposal to modify the cooling system by installing intake screens and diffusers. Poseidon's proposed mitigation at the Bolsa Chica Lowland Restoration site and the Palos Verdes Reef Restoration area (see Section II.I below) would be subject to further SLC review.[15]

California Department of Parks and Recreation ("DPR") – Grant of Easement: AES has a grant of easement from DPR for the sections of the power plant intake and outfall structures buried beneath Huntington State Beach. Similar to the approach used by the SLC above, DPR in 2012 issued Poseidon a waiver allowing it to jointly use the power plant structures until AES ends its use of the cooling water system, at which time DPR would require Poseidon to obtain its own new or modified grant of easement. DPR would make an independent determination of whether to approve Poseidon's use of the structures and whether different or additional conditions are needed to allow the use.

Department of Toxic Substances Control ("DTSC") involvement: Poseidon's facility would be located within the AES power plant site, areas of which are subject to soil and groundwater remediation pursuant to DTSC requirements. The power plant locations that have been subject to cleanup are generally several hundred feet from Poseidon's development footprint. Recent results from onsite monitoring wells show evidence of seawater intrusion beneath the site, though show no regulatory exceedances of contaminants (other than TDS and chloride, which are indicative of seawater intrusion).

Part of Poseidon's proposed water distribution pipeline route within the coastal zone would extend along Hamilton Avenue in Huntington Beach. About 1,300 linear feet of the pipeline would be adjacent to the northern boundary of the Ascon Landfill ("Landfill"), which is currently undergoing remediation pursuant to a Remedial Action Plan approved by the Department of Toxic Substances Control ("DTSC").

The Landfill was active from the 1930s until the 1980s and was used to dispose of a variety of wastes, including substantial amounts of industrial and oil field wastes, construction debris, and various hazardous substances. Site evaluation and cleanup

[14] As described in the lease: "AES shall notify Lessor in writing prior to discontinuing its use of the Lease Premises in connection with the production of electricity using Once-Through-Cooling (OTC). Upon receipt of notification by Lessor, AES may apply to Lessor for approval of an assignment of its obligations under the Lease to Poseidon Resources. In considering AES application for approval of an assignment, Lessor will take into account Poseidon Resources' past performance and the likelihood that Poseidon Resources could and would carry out all obligations under the Lease as sole lessee. In the event that Lessor finds that there is a substantial probability that Poseidon Resources would not or could not carry out all such obligations, then Lessor may disapprove the assignment, in which case, at AES's option, the Lease would terminate or AES would remain as Co-Lessee."

[15] The proposed mitigation at the Palos Verdes Restoration Reef area may also require approvals from the Los Angeles Regional Water Quality Control Board.

started in 2003 pursuant to a Consent Order and subsequent Remedial Action Plans developed for the site. Site remediation is ongoing and involves excavating and removing some wastes, constructing various containment or barrier systems, capping some wastes in place, and other activities.

Poseidon's project EIR anticipated that Poseidon would excavate a nine- to 10-foot-deep trench along most of the pipeline route, including the area adjacent to the Landfill. There is a 30-foot setback along this boundary of the Landfill and DTSC believes trench excavation outside the Landfill's fenceline would likely not cause stability issues within the Landfill. Additionally, though, the groundwater table in this area is just a few feet below the ground surface, so the proposed trenching would require Poseidon to conduct extensive dewatering as part of its pipeline installation. The City's LCP identifies this area as being prone to liquefaction, and although Poseidon has not yet conducted soil tests along the route, the presence of liquefiable soils would likely require Poseidon to overexcavate soils within the pipeline trench, which would require additional dewatering.

Recent results from groundwater monitoring wells installed as part of the Landfill remediation project on both sides of Hamilton Avenue along Poseidon's proposed route show detectible levels of volatile organic compounds ("VOCs") and semi-volatile organic compounds ("SVOCs") that may have mobilized from within the landfill boundary.[16] While these concentrations are relatively low, they suggest that Poseidon's excavation and dewatering activities could result in mobilization of contaminants from the adjacent Landfill.

DTSC staff has expressed concern that the trenching and dewatering could mobilize contaminants and that the dewatering "drawdown" zone could extend to beneath the Landfill. Further, constructing a trench in this location could create a "preferential pathway" for groundwater movement, or conversely, could create a barrier that would change groundwater gradients, flow rates, or direction of flow, any of which could affect ongoing Landfill cleanup efforts in a manner not anticipated in the remediation plan.

DTSC has recommended Poseidon consider horizontal directional drilling instead of trenching or, if trenching is used, that it be done using any of several techniques to minimize the mobilization of contaminants. These could include placing a slurry layer within the trench, monitoring the soils and groundwater pumped from the trench for contaminants and conducting on- or off-site treatment as needed, installing sheetpiles along the trench, or others. The pipeline itself may need to be double-walled or include joints resistant to leaks. It is not clear how or whether any of these measures might result in the need for an increased construction footprint or extended pipeline construction schedule. The presence or mobilization of contaminants within Poseidon's construction area could also result in Poseidon needing to install additional protective equipment to ensure worker and public safety.

[16] See, for example, Geosyntec, Interim Groundwater Monitoring Report – September 2021, Ascon Landfill Site, Huntington Beach, California, prepared for the California Department of Toxic Substances Control.

DTSC has recommended that Poseidon develop a proposed pipeline trench dewatering plan for DTSC review that addresses these issues and provides for public and environmental safety. Depending on Poseidon's approach, it may need DTSC's approval for certain proposed construction activities or for particular contaminant management methods, such as its proposed soil/groundwater management plans, monitoring methods, coordinating construction with Landfill cleanup operations, or other similar measures. Similarly, and depending on the results of soil and groundwater testing Poseidon would later conduct at its facility site, Poseidon may need to implement similar measures there, given the proximity of power plant cleanup sites and Poseidon's much deeper excavations and much greater dewatering volumes there.[17]

California Division of Oil, Gas & Geothermal Resources – Site Plan Review: The project site is within an area containing abandoned oil wells and is within the City's Methane Mitigation District. As noted above, the existence of large storage tanks on the site has prevented soil and groundwater sampling within much of the project footprint, and their presence has likewise prevented a survey of potential abandoned wells. Poseidon would be required to submit a site plan review for review and approval.

State Water Quality Resources Board – Division of Drinking Water: Poseidon will need at least two permits – a Wholesale Drinking Water Permit and an Administrative Change to Retail Agencies' Drinking Water Permit – to allow the project's water to be used by local and regional water districts. These approvals are generally not granted until after a facility is constructed and operating to allow testing for determining conformity to drinking water quality requirements.

Federal Permits and Approvals: Poseidon would need to obtain several federal permits and approvals, including an encroachment permit from the U.S. Army Corps of Engineers pursuant to Section 10 of the federal Rivers and Harbors Act for any distribution pipeline crossings beneath tidal waters, and a Section 10/404 permit from the Corps for installation of the proposed intake screens and an outfall diffuser in coastal waters. Poseidon may also be required to obtain an Incidental Take Permit from the National Marine Fisheries Service ("NMFS") pursuant to Section 104 of the federal Marine Mammal Protection Act and Section 7 of the Endangered Species Act and may be subject to consultation with NMFS to determine conformity with Section 305(b) of the Magnuson-Stevens Fishery Conservation and Management Act. Based on preliminary review by NMFS, Poseidon's project may need to be modified further than currently proposed, including possible changes to the currently approved intake screen system.[18] Poseidon may also be required to obtain an "Incidental Take Permit" from the U.S. Fish & Wildlife Service for effects of its facility on sensitive or listed avian species in the environmentally sensitive habitat areas and wetlands of the adjoining Magnolia Marsh (see Section II.J). Review by these agencies would also likely involve Tribal Consultation with federally-recognized Tribes associated with the area.

[17] Commission staff personal communications with DTSC staff, March 8, 2022 through April 11, 2022.
[18] See, for example, the August 19, 2014 letter from NMFS to State Water Resources Control Board.

C. TRIBAL CONSULTATION

The Commission in 2018 adopted a Tribal Consultation policy meant to help establish meaningful and respectful consultation with California's Tribal governments and representatives.[19] The policy includes several guiding principles regarding communication with the Tribes, acknowledgement of Tribal interests and resources, and how to assess the effects Commission actions may affect Tribal interests. After Poseidon's July 2021 submittal of its CDP application, Commission staff sent letters to three Tribal governments known to have ties to the project area to determine if they would be interested in formal or informal consultation.[20] Staff followed up in January 2022 with additional offers to consult.

On February 10, 2022, staff met with an official representative of the Gabrielino-Tongva Tribe of the San Gabriel Band of Mission Indians, as well as members of other coastal tribes. The tribes raised collective anger at what they said was Poseidon's complete lack of outreach and consultation, which they found deeply disrespectful. The Tongva representative said the "native peoples are not being consulted and the tribal consultation process has failed throughout the entire process" (see also **Exhibit 8**, a February 11, 2022 follow-up letter from the Society of Native Nations). He said neither Poseidon nor any previous government agency reviewing the project have done any genuine outreach with their tribe and there had been no effort to build any kind of relationship. He was also disappointed that there was no effort to make the technical language about the project more accessible. As a result, he said the community does not understand the full impact and burden of the project.

The Tribal representative said Gabrielino-Tongva Tribal Chief Antony Morales does not support the project. The official said he believes Poseidon, as a private company, does not care about the connection between the ocean and the land and only believes in expansion and domination, not in restoration. He said the project will commodify the water and needs to be rethought. The representative would like to see the state create a council to ensure tribal consultation is properly conducted and cited Poseidon as an example of where that would have helped. He stated, "We need to make sure that tribal leaders have a seat at the table when it impacts our generations and care for our rivers and oceans."

Members of other tribes agreed and said consultation is not the same as consent. They also felt the proposed project was not good for the Pacific Ocean, which is considered sacred and would be damaged by the brine. They believe the earth is our mother and needs to be taken care of, not exploited. They also said the company has been using language that is fear-based to push the project forward and raised concerns that once Poseidon controlled the water it would control people.

[19] See Coastal Commission's Adopted Tribal Consultation Policy, August 8, 2018.

[20] See September 13, 2021 letters to the Chairs of the Juaneno Band of Mission Indians Acjachemen Nation, the Gabrieleno Band of Mission Indians – Kizh Nation, and the Gabrielino / Tongva Nation.

In a follow-up Tribal Consultation meeting on April 12, 2022 and call on April 13, 2022, Chair Morales again described the importance to his Tribe of the watershed and coastline in this area, stating that the waters that would be diminished by the proposed project, including the traditional waterways extending from the shore to the offshore islands are very sensitive, should not be commodified (that is, private developers should not be making profits off the Tribe's ancestral lands and waters), and would be poisoned by the project. He also voiced concern about further destruction of the area's marine life. water quality, and traditional village sites. He expressed alarm at the magnitude of the expected impacts to marine life and said that the project's effects would be "no different than an oil spill," except that they would occur continually during every year of the facility's operations.

Chief Morales also had questions about the role of the federal Clean Water Act and the requirements of its Section 401 in protecting these navigable waters from harmful discharges. As noted above, consistency with that Act would be addressed by the Corps of Engineers and the Regional Water Boards.

On February 22, 2022, Commission staff met with the Chair and another representative of the Gabrieleno Band of Mission Indians - Kizh Nation. They expressed several concerns about the project, particularly about the importance of the whole landscape that existed there before development – a meeting place of the ocean, salt marshes, freshwater systems, and dunes – that provided a rich source of food and other resources for the Tribe. The project site was located between two areas known to be significant to the Tribe – the higher ground of Bolsa Mesa and the mouth of the Santa Ana River. Because of that proximity, and because of the importance of this type of landscape to the Tribe, they believe it is likely that Tribal resources would be found during Poseidon's proposed ground disturbance and excavation, which would go deeper into previously undisturbed areas than occurred during other development already at the site and in the area. They, in fact, knew of areas very close by where important Tribal resources and objects had been found. Given the importance of the area, they asked that the Commission consider alternatives that would avoid or minimize disturbing the area, and that they be able to consult further if the project was to move ahead to address these concerns.

Commission staff have offered to hold follow-up meetings with all these representatives after publication and before the Commission's hearing. Any new and relevant information from those meetings will be provided in an Addendum prior to the hearing.

D. COASTAL COMMISSION JURISDICTION AND STANDARD OF REVIEW

Jurisdiction
The proposed project is located both within the certified LCP jurisdiction of the City of Huntington Beach and within the retained permit jurisdiction of the Commission, and Poseidon requires a coastal development permit (CDP) from each. Elements of the proposed project within the Commission's retained jurisdiction include installation, operation and maintenance of the intake screens, intake maintenance, and installation, operation, and maintenance of the diffusers on the outfall. These project components, including the withdrawal of seawater, the discharge of high-salinity effluent and various chemicals into ocean waters, and the resulting impacts to marine life and water quality, are detailed in Section II.I of these Findings. Poseidon's proposed mitigation at both Bolsa Chica and at the Palos Verdes reef restoration area are within the Commission's retained jurisdiction.

The landward elements of the proposed development, which include demolition of existing power plant infrastructure, remediation of the site, and construction and operation of the desalination facility and its processing equipment, storage tanks, filters, and offices, along with the first mile or so of the water distribution pipeline and a metering station, are within the City's CDP jurisdiction, as well as the Commission's appeal jurisdiction. On September 20, 2010, the City approved Coastal Development Permit 10-014 (see **Exhibit 6**), along with an Entitlement and Plan Amendment with a Tentative Parcel Map (TPM #10-130), Conditional Use Permit No. 02-04, Owners Participation Agreement, a Pipeline Franchise Agreement (Ordinance #3891) and a Property Exchange/Lease and Escrow Agreement. Previously, on September 7, 2010, the City had certified the Final Subsequent Environmental Impact Report (SEIR) for the project that included a number of mitigation measures.

Filing of Appeal with the Coastal Commission: Timely appeals of the City's CDP were filed, and the Commission thereafter found that the appeal raised a substantial issue of LCP conformity regarding protection of marine life, water quality, and wetlands, the facility's land use designation, public recreation, protection against seismic events and liquefaction, growth-inducement, and whether the project met the LCP's requirement for mitigation to the maximum extent feasible (see **Exhibit 7 – Commission's Final Adopted Findings on Substantial Issue**). In November 2013, the Commission held a *de novo* hearing on the appeal but continued the appeal to allow Poseidon to withdraw its CDP application for portions of the project in the Commission's jurisdiction and to then work with staff to develop additional information on alternative intake systems, as recommended by several Commissioners. Most of this additional information was developed through the above-referenced ISTAP and Regional Board review and is described in more detail in Section II.I of these Findings.

Commission Review for Federal Consistency: The proposed project would also be subject to the Commission's federal consistency review authority, as the proposed modifications to the intake and outfall structure would be subject to approval by the Corps of Engineers for Section 10/Section 404 permits. Additionally, Poseidon's currently proposed water distribution routes would involve installing pipelines beneath one or more flood channels within the City of Huntington Beach within the range of tidal influence and therefore subject to Corps of Engineers Section 10 permitting. Depending on the OCWD's decision about a final distribution route, the project may also include a crossing of the Santa Ana River, which would also require approval by the Corps.[21] The Commission's review herein for purposes of the project's coastal development permit will constitute its federal consistency review for the proposed project.

Standard of Review

For the *de novo* review of the appealed CDP that addressed the portion of the proposed project located within the City's permit jurisdiction, the standard of review consists of the policies of the City's certified LCP and the public access and recreation policies of the Coastal Act. For the portion of the project located in the Commission's retained jurisdiction, the standard of review consists of the policies of Chapter 3 of the Coastal Act. The Commission may also refer to the provisions of the certified LCP for guidance.

Although the project spans two jurisdictions and is being reviewed under two separate CDP applications, the development functions as a single, integrated project, and staff recommends that the Commission act on both decisions at one time. There are separate motions for the portion of the project in the Commission's appeal jurisdiction and the Commission's retained permit jurisdiction. The Commission must vote separately on each item.

[21] See April 24, 2014 email from Corps to Commission staff.

E. REVIEW OF A FACILITY PROVIDING "CRITICAL" SERVICES

Summary
Poseidon's proposed project includes an expectation and several requirements that it be able to provide a water supply to the City of Huntington Beach during and after emergency events, such as earthquakes. This would place the project in a category of "critical" or "essential" facilities that are expected to operate in the face of these emergencies. As described later in these Findings, in order to fulfill its expected role and to accommodate the relatively severe hazards at and near the project site, Poseidon would need to apply the stringent siting, design, and construction standards meant to ensure that "critical" facilities are able to continue operating.

Risk Analysis and Standards for Critical Facilities
The Coastal Act and LCP require that new development minimize risks from geologic, seismic, and other coastal hazards and assures structural stability over its expected lifetime. They also require that new development be sited in a location that is able to accommodate it. For the most part, these same hazards policies apply to all types of proposed development, including residential, commercial, public, and industrial structures. However, the analysis required under the policies will differ based on the type of proposed development because some types of development will cause more environmental harm and disruption to public welfare if they are damaged. Such projects may therefore require a particularly robust hazards analysis and different siting and design standards to adequately minimize risks.

For example, LCP Policy 10.1.4 requires that new structures be designed and built using appropriate engineering and building practices, such as those of the Uniform Building Code. As described in detail in Sections II.F and II.G of these findings, that Code applies different building standards and safety requirements, including "Structural Risk Categories," to a structure depending on its purpose and type, with the most stringent standards applying to structures that serve critical public functions, are expected to operate during and after earthquakes or other emergency events, or contain hazardous materials. Likewise, LCP Policies C1.1.9 and C10.1.19 and Coastal Act Section 30253 require that new development minimize risks to life, property, and human safety. The measures necessary to reduce risks will depend in part on the type of development being proposed and the magnitude of risks involved if the development is damaged or destroyed by coastal hazards. Similarly, LCP Policies C1.1.1, C1.2.3, and CZO Section 221.16 and Coastal Act Section 30250 require that new development be located in areas able to accommodate it, including that adequate public services are available to serve the development. For large, complex facilities that serve critical public safety or welfare needs, determining whether a particular location is appropriate and that there are adequate public services requires a more in-depth analysis than simply checking to ensure that the development can hook up to existing water, sewer, and power.

The Commission has recognized that large or complex infrastructure projects that provide public services or which could have significant consequences if damaged, require careful planning, siting, and design to ensure they are safe from coastal hazards. For example, the Commission's 2018 Sea Level Rise Guidance describes how critical infrastructure projects should be sited and designed with a precautionary approach that considers low probability but high-risk coastal hazards scenarios:

> "For critical infrastructure, development with a very long project life (e.g., 100 years or greater), or assets that have little to no adaptive capacity, that would be irreversibly destroyed or significantly costly to repair, and/or would have considerable public health, public safety, or environmental impacts, the [sea level rise] analysis should consider the "extreme risk aversion" scenario."

Similarly, the Commission's recently adopted Sea Level Rise Planning Guidance for Critical Infrastructure states that "several key characteristics of critical infrastructure – such as its size, cross-jurisdictional nature, and the role it plays in providing important public services – make the adaptation planning process different than for residential, commercial, or other types of development."[22] For example, "[w]hile damage to any development from sea level rise is significant in its own right, the consequences of inaction resulting in damage to critical infrastructure are far more significant given the role that these assets play and the services they provide to a community." Damage to water infrastructure could result in a loss of service, cascading effects on other emergency response efforts, as well as environmental damage if pollution is mobilized.

Here, Poseidon proposes to construct a large, complex, and expensive piece of water supply infrastructure that would be expected to operate during and after emergencies and that would become integral to the water supply systems of several nearby public water districts, requiring those districts to modify their treatment, delivery, and storage systems. However, Poseidon's selected site for the facility is subject to a variety of hazards, as described in the following sections of these Findings. Once built, the facility would have little adaptive capacity, as it could not easily be moved inland or elevated to avoid rising sea levels, groundwater tables, or tsunamis. Poseidon proposes to operate for 50 to 60 years (until about 2080 or beyond), during which the facility would be subject to the above hazards and that, unless built to withstand these hazards, could limit or eliminate the facility's ability to produce water. Its currently projected $1.4 billion construction costs, ongoing operating costs, and the costs for public water districts to modify their distribution and treatment systems (currently estimated to be between $200 million and $350 million) could be borne by water customers for many decades.

[22] The Infrastructure Guidance does not provide specific guidance on desalination facilities, but it recognizes that the concepts in the document are applicable to a broad range of infrastructure that share certain characteristics. It states: "While other assets, including power plants, gas pipelines, and desalination facilities, are not explicitly addressed, many described adaptation approaches could broadly apply to these types of infrastructure as well, because they share common characteristics with the infrastructure discussed in this Guidance, such as provision of public services, and a large, complex, and often cross-jurisdictional scale." It also notes that desalination facilities "would generally be considered critical facilities if, for example, they are integrated with other water systems, provide needed or emergency water supply to communities, or have the potential to cause significant environmental impacts or social consequences if damaged by future hazards."

For these reasons and the reasons below, the proposed project qualifies as a critical piece of infrastructure that warrants careful review, using a precautionary approach, to determine whether its proposed siting, design, and construction will adequately minimize risks to life and property, assure stability and structural integrity, and be adequately served by utilities, access roads, and other public services so that it may continue functioning for its full lifetime, including after emergencies. As noted above, the applicable standards include the Building Code's Structural Risk Categories ("SRCs"), and Poseidon's role in providing emergency water supplies would subject its facility to the most stringent of those categories, SRC IV, which is detailed in Section II.F below. Poseidon has contended that its proposed facility should not be held to these more stringent planning and design standards; rather, it claimed that it should be held to the standards applicable to general commercial structures, to structures that are not expected to operate during or after emergencies, or at most, to the SRC III standards that apply to "water treatment facilities for potable water." [23] However, based on its expected role, Poseidon's facility would be considered "critical" under any of several definitions and is subject to stringent design, siting, and planning standards.

First, Poseidon's facility is expected to operate during and after emergencies. The City's 2010 Final Subsequent EIR for the project included a mitigation measure requiring Poseidon to develop a plan to "ensure continuous facility operations and water delivery under earthquake emergency conditions."[24] The City's 2010 approval of Poseidon's CDP and its Conditional Use Permit also recognized the critical nature of the proposed facility, as the City's findings noted that Poseidon was expected to provide the City with a water supply during declared emergencies.[25] City General Plan Provision HAZ-P.14 (which is referenced in the LCP Policy 1-C 20) also requires that important public safety facilities such as this be sited, designed, and constructed so as to maximize continuation of key functions during and after seismic events.

Second, Poseidon has agreed to provide the City with a 10-million-gallon storage tank that would essentially take the place of the City's planned Southeast Reservoir and supply part of the 28 million gallons of emergency water the City expects Poseidon to provide. This Reservoir is meant to provide an emergency water supply to areas of the City along the coast if an earthquake on the Newport-Inglewood Fault Zone disrupts water supplied to this coastal area from areas further inland. At the time the City

[23] See, for example, Poseidon's February 4, 2019 letter to the Santa Ana Regional Water Quality Control Board regarding sea level rise and site hazards analyses (at Appendix OOOOO of the Board's Administrative Record for Order R8-2021-0011). See also Poseidon's April 12, 2022 memo, Analysis of Site Hazards Risk Category IV Project Modifications.

[24] See SEIR, page 4.2-11. See also SEIR Condition PW-4, which requires Poseidon to develop procedures "to ensure water delivery under earthquake emergency conditions is maintained."

[25] See City's September 2010 approval of CDP 10-014, which requires that Poseidon provide the City with a first right to purchase up to 28 million gallons of water during declared emergencies that affect the City's water supplies.

approved Poseidon's project, the City's Capital Improvement Program for 2009/10 through 2013/14 stated that the Southeast Reservoir was needed "[t]o meet citywide storage requirements and provide emergency storage for the area south of the Newport-Inglewood Fault and east of Bolsa Chica." The Reservoir continues to be a part of the City's planned water supply system, as it is included in the City's 2020 Urban Water Management Plan. Notably, it would likely be similar to the other City reservoirs, which are fully integrated into the City's water supply system) and are considered "critical" in the City's hazards planning [26]

Third, Poseidon's facility would store what the City considers to be "high quantities" of hazardous materials – up to 20,000 gallons of sulfuric acid, 10,000 gallons of caustic soda, 24,000 gallons of chlorine, 3,000 gallons of ammonia, and 5,200 gallons of fluorisilic acid. The City's current Local Hazards Mitigation Plan notes that these amounts would place the facility in the "high quantity" category of sites that store hazardous materials.[27]

Fourth, Poseidon's facility is considered "critical infrastructure" pursuant to principles described in the Commission's 2018 Sea Level Rise Guidance and its 2021 Critical Infrastructure Guidance. The facility would be a large, technically complex infrastructure project that would provide both baseload and emergency water supplies to the public, could have significant social and environmental consequences if damaged, and would tie in to a larger, cross-jurisdictional water system. As the Sea Level Rise Guidance states:

> "...[a] jurisdiction should determine criticality based on the relative importance of its various assets for the delivery of vital services, the protection of special populations, and other important functions, as well as the social, environmental, and economic risks associated with loss of or damage to such assets."

Here, the facility would be expected to serve as an integral part of the regional public water supply system. The changes needed to distribute the water would require extensive modifications to the existing public infrastructure owned by OCWD, other water districts, and local governments, which, as described below, is almost entirely designated as "critical" or "essential." Incorporating Poseidon's project into the regional water distribution system would require several water districts to "re-plumb" their existing distribution systems, to revise their chemical treatment methods, or to design and build new injection and extraction wells or other infrastructure components. Making these changes would result in some water district service areas becoming highly reliant on water from Poseidon's project and would make the service provided by Poseidon

[26] Despite, or even because of, the severity of the nearby hazards, the site appears to remain suitable for the Reservoir, as its purpose is to serve the immediate area with water if supplies are cut off from other sources further inland. It is also relatively straightforward to design and build a static storage tank to withstand the site's relatively severe seismic forces as compared to constructing an active, complex, desalination facility that can operate during and after an earthquake.

[27] See, e.g., the City's 2017 Local Hazards Mitigation Plan, Table 14.

essentially indistinguishable from the services provided by the other critical facilities owned and managed by these districts. Although Poseidon has contended that these other facilities are not necessarily built to the most stringent of the SRC standards, it appears that the other facilities largely predate the development of these standards and are not subject to the same degree of seismic, tsunami, and other hazards that Poseidon's facility would experience – for example, none appear to be built over a potential active earthquake fault (see Sections II.E and II.F for detailed analyses of these issues).

Fifth, various Local Hazard Mitigation Plans (LHMPs) and other documents identify facilities like the proposed project as being "critical." Local governments must prepare LHMPs in order to be eligible for certain funding from the Federal Emergency Management Agency (FEMA), which considers water facilities to be critical infrastructure.[28] There are several LHMPs that are relevant to Poseidon's proposed project, including one prepared by the City, one by Orange County, and one by the Municipal Water District of Orange County (MWDOC), which is the regional public water wholesaler for Huntington Beach and other nearby cities.[29] Their descriptions of "critical" facilities are described below:

- The City's LHMP is focused on the utilities and critical facilities owned by the City, which include all of the City's water reservoirs, though it also acknowledges that there are facilities not owned by the City that also constitute critical infrastructure.[30] The City's LHMP includes a number of mitigation actions and strategies meant to avoid and reduce hazards, including Mitigation Action 1.5, which states: "Avoid siting any new critical facilities inside hazard zones to the extent possible. Require all new critical facilities to be sited, designed, and constructed to minimize damage and ensure continuation of key functions during and after an emergency event. To the extent feasible, ensure that new facilities can remain usable and operational after an emergency, rather than designing them only to minimize loss of life."

- The Orange County LHMP identifies "critical facilities and infrastructure" as being public or private, and as being those "that provide important services to the community," including providing potable water, and "that need to be functional after an earthquake event."

[28] See, for example, the 2013 FEMA Fact Sheet – Critical Facilities and Higher Standards, and its 2013 Local Mitigation Planning Handbook, both of which include water treatment facilities as critical facilities.

[29] Poseidon has stated that its facility should not be considered "critical" because it is not identified in any of these plans; however, that appears to be primarily because the facility is not yet built. As noted below, Poseidon's similar facility in Carlsbad, once built, was included in relevant LHMPs as "critical."

[30] See City of Huntington Beach, Local Hazard Mitigation Plan, Public Review Draft, March 2017. This Plan states that "critical" facilities can be owned by public or private entities and identifies the non-City-owned Southern California Edison and Southern California Gas facilities as "critical."

- MWDOC's Plan describes critical facilities as "public infrastructure used to provide potable water to the public.... necessary to maintain public health and safety."[31] It includes the facilities owned by OCWD, including its pump stations, reservoirs, water storage tanks, water treatment plants, and potable water pipelines, all of which are included as "critical facilities."

The City is also certified under the federal government's "Tsunami Ready" Program, which defines "critical facilities" as including drinking water facilities and makes no distinction between public and private facilities.[32] Additionally, and as part of the Commission's sea level rise planning efforts, the City prepared a 2016 Coastal Resiliency Program, which was meant to establish some fundamental planning components for an LCP update being funded in part through a Commission grant. That document identified both public and non-public facilities as "critical" and recommended evaluating those proposed facilities using the highest sea level rise projections.

Finally, Poseidon's Huntington Beach facility would be a private project providing water to public water districts, similar to Poseidon's desalination facility in Carlsbad. That facility is considered "critical" by the San Diego County Water Authority,[33] the County of San Diego,[34] and is described as such by Poseidon.[35]

The above-referenced Poseidon April 12, 2022 memo describes the changes to its proposed project that would be required to meet SRC IV standards. They generally include modifications like making the building foundations deeper, thicker, and stronger, and adding various types of structural reinforcements, It may require Poseidon to select from more limited choices of construction methods or types of foundations it would use beneath some structures and may require some structures to be elevated slightly higher than currently proposed. For most structures, the memo identifies a need to increase the amount of concrete by about 10%, the amount of steel used by about 15%, and the number of supports used for piping, electrical equipment, and other components by about 35%. The memo does not provide any expected cost differences and does not state that Poseidon would find it infeasible to meet SRC IV standards.

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[31] See MWDOC, May 2019 Orange County Regional Water and Wastewater Hazard Mitigation Plan.

[32] See National Weather Service TsunamiReady Program certification requirements at https://www.weather.gov/tsunamiready/ .

[33] The SDCWA's 2019-2023 Business Plan and its Fact Sheet – Overview [n.d.]. identifies the facility as a critical local water resource.

[34] See, for example, the 2017 San Diego County Multi-Jurisdictional Hazard Mitigation Plan, and as defined in the County's April 2013 Integrated Floodplain Management Planning, which defines a "critical facility" as including both public and private potable water facilities.

[35] See, for example, Poseidon's March 18, 2020 press release titled "Carlsbad Desalination Plant Staff Take Extraordinary Step to Shelter in Place to Ensure Operational Continuity at Critical Facility," which describes the facility as a "critical regional facility."

Conclusion

For the reasons above, Poseidon's proposed facility is considered a critical piece of infrastructure for purposes of analyzing the project's consistency with relevant hazards policies. As described in the relevant analyses below, this means that it is appropriate and necessary to consider the risks posed by low risk but high probability sea level rise scenarios and seismic and tsunami events. It is also appropriate and necessary to carefully consider whether the proposed site and area can support a facility that is expected to operate and provide public water for many decades, including during and after geologic or other emergencies. These factors also warrant requiring the project to meet the most stringent design and engineering standards referenced in the Uniform Building Code (i.e., Structural Risk Category IV). As described elsewhere in these Findings, there is not an urgent need for the proposed desalinated water; however, this does not mean the facility should not be considered "critical" for purposes of hazards analysis. If it were built, water agencies and the City would rely on it and would likely forgo opportunities for other water projects. For purposes of analyzing whether it can be constructed consistent with Coastal Act and LCP policies, it clearly qualifies as a "critical" facility.

F. GEOLOGIC HAZARDS – SEISMIC

Coastal Act Section 30250 states, in relevant part:

> New residential, commercial, or industrial development, except as otherwise provided in this division, shall be located within, contiguous with, or in close proximity to, existing developed areas able to accommodate it or, where such areas are not able to accommodate it, in other areas with adequate public services and where it will not have significant adverse effects, either individually or cumulatively, on coastal resources.

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 Goal C1.1 states:

> Ensure that adverse impacts associated with coastal zone development are mitigated or minimized to the greatest extent feasible.

LCP Policy C 1.1.1 states:

> With the exception of hazardous industrial development, new development shall be encouraged to be located within, contiguous or in close proximity to, existing developed areas able to accommodate it or, where such areas are not able to accommodate it, in other areas with adequate public services, and where it will not have significant adverse effects, either individually or cumulatively, on coastal resources.

LCP Policy C 1.2.3 states:

> Prior to the issuance of a development entitlement, the City shall make the finding that adequate services (i.e., water, sewer, roads, etc.) can be provided to serve the proposed development, consistent with policies contained in the Coastal Element, at the time of occupancy.

LCP Policy C 1.1.9 states:

> Minimize risks to life and property in areas of high geologic, flood (Figure C-33) and fire hazard through siting and design to avoid the hazard.
>
> New development shall be designed to 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 a protective device. (1-C 20)

LCP Policy C 10.1.4 states:

> Require appropriate engineering and building practices for all new structures to withstand ground shaking and liquefaction such as those stated in the Uniform Building Code.

Coastal Zoning Ordinance Section 221.16 states:

> Prior to the issuance of a Coastal Development Permit, the director shall determine that adequate public services and facilities will be available to serve the proposed development, consistent with the General Plan.

Summary

The proposed site of the facility, its offshore intake and outfall, its proposed pipeline route, and areas surrounding these project components are subject to several relatively severe geologic hazards, including surface fault rupture or displacement, ground shaking, liquefaction, and lateral spread. In the time since Poseidon first considered using this site for its facility about two decades ago, significant new information has been developed that demonstrates that these hazards are much more significant than previously realized – for example, the maximum expected magnitude earthquake has increased from about magnitude 6.9 to magnitude 7.5, almost an eight-fold increase in earthquake strength. The Commission's analysis shows there is a significant probability that the project could experience one or more of these severe hazards during its proposed 50- to 60-year operating life. For some of these hazards – liquefaction and lateral spread– the facility and surrounding area could be subject to even higher levels of hazard and risk than are currently present due to the increase in sea level expected during the next several decades.

The LCP requires that these geologic risks be minimized through siting and design measures and that critical or essential facilities such as the proposed project be located and built where they can not only resist collapse but can continue functioning and providing essential public services after an earthquake or tsunami. The LCP's policies also embody the principle that expensive, public-serving infrastructure should be planned and sited in a manner that fully accounts for hazards, using a precautionary approach, and ensures that the project will be able to function and serve the community in a cost-effective manner for decades to come. Here, the project as proposed is inconsistent with LCP provisions requiring that development be sited and designed to assure stability and structural integrity, to withstand groundshaking, and to ensure continued operations of critical facilities in the event of a seismic event.

Part of the LCP nonconformity is due to Poseidon contending that its project should not be held to the siting, design, or construction standards that apply to a critical facility, and instead providing a design and analyses that are based on its facility being subject to less stringent standards that apply to a commercial structure. As a result, Poseidon's information and analyses do not ensure that the proposed project conforms with LCP policies that require new structures be built to withstand expected levels of ground shaking and liquefaction, including that it is sited and designed to continue operating after an emergency. Although Poseidon may be able to redesign its facility to meet more stringent engineering standards, doing so would likely cause a variety of effects on coastal resources. For example, in an April 12, 2022 submittal, Poseidon identified some of the measures that would be needed to build its facility to SRC IV standards, including that it would require increased excavation depths and increased foundation structures. The full extent of these necessary measures, and the potential impacts they could have, have not yet been identified. Thus, the project as proposed is inconsistent with LCP policies related to minimization of seismic hazards. It appears that the project could be conditioned to meet more stringent (SRC IV) standards and thereby be brought into conformity with LCP standards related to seismic risk. However, without a more thorough design proposal and analysis of the environmental effects of that redesign, and given the other Coastal Act and LCP inconsistencies, there is no need to formulate a special condition at this time to require Poseidon to meet more stringent design standards.

The area around Poseidon's site is also more low-lying (as shown in **Exhibits 3** and **4**) and has older infrastructure that is at greater risk of failure during a seismic event or flooding. Thus, even if Poseidon could construct its facility using more rigorous structural standards that would allow it to withstand the site's seismic hazards, the surrounding infrastructure is not able to provide the access and support needed to allow Poseidon's facility to continue functioning in the event of an emergency. The project therefore is not sited in a developed area able to accommodate it or an area with adequate public services that can serve a critical facility such as this for its expected lifetime, as required by the LCP.

Background – Seismic Setting and Site Characterization

The proposed project site is within a seismically active region and is affected by several active fault systems.[36] The severity of the potential seismic events at the site results both from the activity of the various fault systems and from the characteristics of the substrate underlying the proposed project site. The site is within the former meander zone of the mouth of the Santa Ana River, an area which has accumulated deep

[36] Section 1613A.2 of the California Building Code defines an "active earthquake fault" as "a fault that has been the source of earthquakes or is recognized as a potential source of earthquakes, including those that have exhibited surface displacement within Holocene time (about 11,700 years) as determined by California Geological Survey (CGS) under the Alquist-Priolo Earthquake Fault Zoning Act, those included as type A or type B faults for the U.S. Geological Survey (USGS) National Seismic Hazard Maps, and faults considered to have been active in Holocene time by an authoritative source, federal, state or local governmental agency."

deposits of loosely consolidated alluvial and estuarine sediments, including sand, gravel, silt, and clay over the past several millennia. Those deposits are now more than 100 feet thick and are highly responsive to the ground movements resulting from seismic activity.

Earthquakes are the most commonly recognized seismic events. They are generally characterized using either of two measurements that identify the intensity or magnitude of the event. Earthquake intensity is described using the Modified Mercalli Intensity ("MMI") scale, which identifies the expected amount of damage resulting from an earthquake. The MMI scale uses Roman numerals on a scale from I (barely noticeable) to XII (catastrophic). Earthquake magnitude, which describes the amount of energy released by an earthquake, is expressed using the moment magnitude scale ("MMS"), with magnitudes denoted as a number followed by "M_W." The MMS is a logarithmic scale starting at 1.0 M_W, which denotes a barely noticeable earthquake, and ranges upward, with the strongest known earthquake measuring at 9.5 M_W on the MMS. Each increase of 0.2 – for example, from 7.0 to 7.2 – represents approximately a doubling of the energy released by an earthquake. The MMS is similar to, though has largely replaced, the well-known Richter scale.

Area's Hazardous Faults: The proposed site and surrounding area are subject to relatively high hazards and levels of risks from about a dozen earthquake faults:

- **Newport-Inglewood Fault Zone:** The most significant of the area's faults is the Newport-Inglewood Fault Zone ("NIFZ"), which includes the proposed project site and parts of Poseidon's proposed pipeline routes (as shown in **Exhibit 5**). The NIFZ, which is up to a mile wide and extends about 50 miles from Newport Beach to Los Angeles, consists of a series of known faults along with what geologists believe to be additional unknown and unmapped faults. Much of the NIFZ is not well-characterized due largely to the region's extensive development, which acts to obscure evidence of surface features – such as surface fault ruptures, areas of slumping or cracking, etc. – that are indicative of an active fault. Despite uncertainties about locations of some faults within the NIFZ and about its full range of expected seismic activity, the entire fault system is considered active.[37] The NIFZ is thought to be underlain by a single deep fault from which numerous other faults branch upward and diverge towards the surface in what is known as a "flower structure," resulting in a zone of faults that are connected at seismogenic depths.[38]

[37] See, for example, Tucker et. al, Refining the location of the coastal Newport-Inglewood fault with Structure from Motion photogrammetric models and shallow marine seismic profiling, Southern California Earthquake Center, August 2019, and Grant and Shearer, Activity of the Offshore Newport-Inglewood Rose Canyon Fault Zone, Coastal Southern California, from Relocated Microseismicity, Bulletin of the Seismological Society of America, April 2004.

[38] See, for example, Yang and Clayton, Understanding properties of active faults in Seal Beach by seismicity analysis, Publication #SO39-0022, American Geophysical Union Fall Meeting 2020, and Stock and Smith, Using Borehole Data as a Direct Measure of Stress Directions and Variability to help Constrain the Community Stress Model of Southern California, Report on SCED 2014 funding, project 14118.

With this type of fault pattern, a seismic event at depth can propagate through any number of fault pathways and result in different locations and types of surface expressions – i.e., fault rupture, ground shaking, liquefaction, etc., at any of many locations within the fault zone. This was evidenced most recently by the September 17, 2021 magnitude 4.3 earthquake that was centered below Carson, California on one of the many faults associated with the NIFZ.

In 1986, the California Geological Survey (CGS) designated several segments of the NIFZ as being within an Alquist-Priolo Earthquake Fault Zone, including a portion of the NIFZ's North Branch Fault about a quarter-mile inland from the proposed project site. One of the Poseidon's proposed pipeline routes runs directly through this designated Alquist-Priolo zone. The project site is also near the approximately eight-mile-long rupture zone of the geologically recent 1933 Long Beach earthquake, which was a 6.3 M_W event that resulted in significant loss of life and extensive property damage. Poseidon's proposed site lies between this designated Alquist-Priolo zone and the epicenter of the 1933 earthquake, which is located just offshore of the project site and that was believed to cause nearby ground shaking of VIII ("Destructive") on the MMI scale.[39]

More recently, the NIFZ was identified as being contiguous with the Rose Canyon Fault Zone, which underlies parts of San Diego and extends north to meet the NIFZ offshore of Orange County. This fault system is collectively referred to as the Newport-Inglewood-Rose Canyon (NIRC) fault zone. Recent studies have concluded that the two fault systems could rupture together and cause a much stronger earthquake than would result from rupture of faults in just one or the other of the NIFZ or Rose Canyon Fault Zone.[40]

At the time of Poseidon's initial 2002 proposal to the City, the City's 1996 General Plan – Environmental Hazards Chapter, identified the NIFZ has having an expected maximum earthquake of 7.0 M_W. More recent studies, however, have identified the potential for higher maximum earthquakes on the NIFZ. For example, the City's current General Plan identifies expected magnitudes of up to 7.4 M_W. A recent study concludes that an "end-to-end" rupture of the NIRC could produce an earthquake of 7.3 – 7.4 M_W.[41] Other reports calculate that the NIRC fault could generate an earthquake of up to magnitude 7.5 M_W,[42] an offshore magnitude 7.4 M_W

[39] See California Geologic Survey, The 1933 Long Beach Earthquake [n.d.]: https://www.conservation.ca.gov/cgs/earthquakes/long-beach

[40] See, for example, Sahakian et al., Seismic constraints on the architecture of the Newport-Inglewood/Rose Canyon fault: Implications for the length and magnitude of future earthquake ruptures, in Journal of Geophysical Research, March 11, 2017.

[41] See Sahakian et al., 2017.

[42] See City of Huntington Beach Draft Hazard Mitigation Plan, 2011.

earthquake,[43] and earthquakes capable of causing up to one meter of vertical offset.[44] The 2015 Third Uniform California Earthquake Rupture Forecast ("UCERF3") estimated a small (<0.3%) but non-negligible chance that the NIFZ could experience an earthquake greater than M_W 7.5 in the next 30 years.

The City's 2017 Local Hazards Mitigation Plan notes that a major earthquake on the NIFZ "could cause widespread damage in Huntington Beach, with an intensity as high as IX ("Ruinous") on the MMI." Other planning documents that reference these higher maximum credible earthquakes ("MCEs") include a 2007 report from the Orange County Sanitation District describing the area surrounding the Poseidon site as having an MCE of 7.5 M_W, a 2017 Los Angeles Metro report identifying an MCE of 7.5 M_W for a nearby project, and a 2019 Orange County Water District report on its nearby Groundwater Replenishment System that identifies an MCE of 7.3 M_W.[45]

- **NIFZ South Branch Fault:** The proposed desalination facility would be located directly above a mapped segment of the NIFZ's South Branch Fault (as shown in **Exhibit 9**). Although this South Branch segment has not been designated as "active" pursuant to Alquist-Priolo guidance, it is part of the overall NIFZ that is considered active and is believed to be the source of the 1933 Long Beach earthquake.[46]

  The City classifies the South Branch Fault as a "Category C" fault, which requires special studies and subsurface investigation for proposed developments such as Poseidon's. The South Branch Fault is less well understood than some other segments of the NIFZ, due largely to the extensive fill and development along the fault route that tend to mask surface expressions of faulting and make seismic investigations more difficult. When investigating the NIFZ for potential Alquist-Priolo designation, the California Geological Survey found sufficient evidence to designate the above-referenced nearby segment of the NIFZ's North Branch as active but noted that it had not been able to do so for other nearby segments, including the

[43] Grant, L., and Shearer, P., Activity of the Offshore Newport-Inglewood Rose Canyon Fault Zone, Coastal Southern California, from Relocated Microseismicity, Bulletin of the Seismological Society of America, Vol., 94, No. 2, pp. 747-752, April 2004.

[44] See Forrest, M., Rockwell, R., Grant, L., and Garth, E., Shattered Crust series – The Newport-Inglewood and Whittier-Elsinore fault zones, Southern California Earthquake Center, 1997.

[45] See, for example, the Orange County Sanitation District, Program Environmental Impact Report – Collection System Improvement Plan (SCH #2006101018), March 2007, the L.A. Metro's reference of a magnitude 7.5 MCE in its July 2017 I-710 Corridor Project Recirculated EIR/EIS, Section 3.10 – Geology/Soils/Seismic/Topography, and the Orange County Water District's identification of a 7.3 magnitude MCE in its April 12, 2019 Groundwater Replenishment System – Final Expansion, Geotechnical Design Report, prepared for Orange County Water District by Shannon & Wilson.

[46] See Shlemon, Roy, Late Quaternary Stratigraphic and Neotectonic Framework, Wastewater Treatment Plant Number 2, Huntington Beach, California, May 1994, prepared as Appendix A of Law/Crandall, Report of Fault Rupture Hazard Investigation Wastewater Treatment Plant No. 2, Huntington Beach California, June 1994.

South Branch, primarily because of the difficulty of identifying the necessary evidence of faulting due to the presence of the existing extensive development.[47]

More recent studies have identified evidence suggesting that the South Branch may be active[48] and identified high and low activity fault splays at the nearby Orange County Treatment Plant No. 2 that could extend towards or under the proposed Poseidon site. A 2007 study of another nearby proposed project described the South Branch Fault as "potentially active."[49] In 2010, the City's Beach and Edinger Corridor Specific Plan EIR, which is a planning document for an area of Huntington Beach near Poseidon's proposed site, discussed the hazards associated with the South Branch Fault and acknowledged its unknown potential for surface fault rupture. The City's 2011 Hazard Mitigation Plan described the South Branch Fault as "active," and identified critical infrastructure near that fault (e.g., schools, City facilities, Emergency Operations Centers) that may be subject to damage from seismic activity. A 2012 site assessment by AES, owner of the Huntington Beach Generating Station, identified the location of the South Branch Fault beneath the northeast corner of the power plant site, directly below Poseidon's proposed project footprint. AES stated that it would locate its new generating units so as to provide a 500-foot buffer between it and the mapped fault and suggested the need for additional fault evaluation during project design.[50] A recent review of the available literature on the South Branch fault concluded that while there was no specific evidence for recent (Holocene) activity on this fault segment, the methods of the studies that have been done to date are not sufficient to rule out Holocene activity.[51]

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[47] See Guptill, Paul, and Edward Heath, Surface Faulting Along the Newport-Inglewood Zone of Deformation, California Geology, July 1981, referencing Hart, E. W., Fault hazard zones in California: California Division of Mines and Geology Special Publication 42 Revised Edition, 1980. See also California Division of Mines and Geology Fault Evaluation Report FER-172: Southern Newport-Inglewood Fault Zone, Southern Los Angeles and Northern Orange Counties, October 30, 1985, which cited evidence of minor Pleistocene faulting nearby but noted that the South Branch Fault (or others nearby) may have produced "warping" rather than surface fault rupture.

[48] See Bender, E., et. al, Surface Motion Detection from a Small Aperture Geodetic Network, Southern Los Angeles Basin, from 97th Annual Meeting of Pacific Section American Association of Petroleum Geologists, 2001. The report explains that geodetic stations installed across a potential restraining bend along the south branch of the Newport-Inglewood fault zone appeared to be converging at a high rate. Assuming that surface motions accurately depict subsurface conditions, this may indicate that strain is accumulating at depth, which could indicate the South Branch Fault is active.

[49] See ENSR Corporation, Topic Report 6 – Geological Resources, for Woodside Natural Gas, Inc., OceanWay Secure Energy, August 2007.

[50] The South Branch Fault is shown at this location on the site plan prepared by AES Huntington Beach as part of its 2012 Application For Certification 2012-AFC-02 to the California Energy Commission, and in the Ninyo and Moore, Preliminary Geotechnical Report of December 2, 2011 that AES submitted as part of its Application For Certification.

[51] See Lettis Consultants International, Inc., Assessment of the Newport-Inglewood Fault Zone, AES Electrical Generation Facility, Poseidon Desalination Project, Newland Street and Pacific Coast Highway, Huntington Beach, California, May 13, 2020.

- **Other Regional Faults:** In addition to the NIFZ, other regional faults subject the site to potential seismic events and significant hazards. These include the Compton-Los Angeles Blind Thrust Fault, the Elysian Park Blind Thrust Fault, and the Palos Verdes, Whittier-Elsinore, Serra Madre-Cucamonga, and San Andreas fault systems and others.[52] The project site has been identified as subject to "Moderate to Heavy" damage from a 6.6 M_W earthquake on the San Joaquin Fault (which is approximately 2.2 miles from the site), and "Moderate" damage from earthquakes on any of several other faults, including a 6.8 M_W earthquake on the Peralta Hills fault (about 10 miles distant), a 7.5 M_W earthquake on the Puente Hills fault (19.5 miles distant), and a 6.8 M_W earthquake on the Whittier fault (20.7 miles distant).[53] A 2008 planning scenario showed that the project site would experience "severe" shaking from a 7.8 M_W earthquake on the San Andreas Fault originating almost 200 miles away.[54]

Earthquake probabilities: The City's 2017 Local Hazard Mitigation Plan uses the 2015 Third Uniform California Earthquake Rupture Forecast ("UCERF3")[55] to describe the probabilities of a substantial earthquake occurring on several of the above-described faults during the 30-year period between 2015 and 2044. Of nine regional faults, the San Andreas has the highest probability – about 20% -- to cause a greater than 7.0M**w** earthquake, which would cause "severe" shaking at the project site. The combined probabilities that just any one of these nine faults would cause that level event and the accompanying severe shaking during the next 30 years is about 30%.[56]

Seismic Hazards – Effects on Proposed Project

Poseidon's proposed site and the surrounding area are subject to several types of hazards from the above-referenced faults, including surface fault rupture or

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[52] See Magorian, D. Scott, Preliminary Review of Geotechnical Constraints and Geologic Hazards Poseidon Resources Orange County Desalination Project – North and West Tank Options, September 7, 2002, and Municipal Water District of Orange County, Orange County Regional Water and Wastewater Multi-Hazard Mitigation Plan, Orange County, California, February 1, 2012.

[53] See the 2012 Orange County Regional Water and Wastewater Multi-Hazard Mitigation Plan.

[54] See USGS and Southern California Earthquake Center "Southern California ShakeOut" scenario results at: https://earthquake.usgs.gov/learn/topics/shakingsimulations/shakeout/ . The Poseidon site was estimated to experience "severe" shaking under the Modified Mercalli Intensity index, which causes considerable damage in structures unless they are designed to resist that level or shaking.

[55] Field, E.H., Biasi, G.P., Bird, P., Dawson, T.E., Felzer, K.R., Jackson, D.D., Johnson, K.M., Jordan, T.H., Madden, C., Michael, A.J., Milner, K.R., Page, M.T., Parsons, T., Powers, P.M., Shaw, B.E., Thatcher, W.R., Weldon, R.J., II, and Zeng, Y., 2013, Uniform California earthquake rupture forecast, version 3 (UCERF3)—The time-independent model: U.S. Geological Survey Open-File Report 2013–1165, 97 p., California Geological Survey Special Report 228, and Southern California Earthquake Center Publication 1792, http://pubs.usgs.gov/of/2013/1165/;

[56] The combined probability that the site will experience an earthquake from just one of any of the eight faults is based on adding the individual probabilities, then subtracting the multiplied product of each pair of the probabilities.

displacement, ground shaking, liquefaction, and lateral spread each of which is discussed below. Additionally, and while a final route has not yet been selected, all the project's potential water distribution pipeline routes would be subject to similar hazards, including one of the possible routes crossing an Alquist-Priolo Earthquake Fault Zone.

The analysis below is based on review of the proposed project by the Commission's geologist and coastal engineers and identifies whether the proposed facility and its pipeline could be built and operated consistent with LCP provisions that require structures be built to withstand these seismic hazards and that critical facilities such as this can continue to function after a seismic event. In particular, LCP Policy C10.1.4 states: "[r]equire appropriate engineering and building practices for all new structures to withstand ground shaking and liquefaction such as those stated in the Uniform Building Code."

The Uniform Building Code includes various building and engineering standards that apply to different types of structures, depending on the type of structure and its proposed use. Facilities are assigned a Structural Risk Category I through IV, depending upon the relative risk to human health and safety, as well as environmental risk, if the structures were to fail or if they are needed to operate during and following an emergency event. The higher the risk category, the more stringent design standards must be applied to assure that the structure functions as designed and does not fail. For example, a higher risk category means that a structure may require a deeper or stronger foundation and walls or that it rely on particular building methods meant to resist higher loads than less critical structures might be expected to resist. The Structural Risk Categories provided in Table 1604.5 of the International Building Code include: [57]

- **Category I**: Buildings and other structures that represent a low hazard to human life in the event of failure, including but not limited to agricultural facilities, certain temporary facilities, and minor storage facilities.
- **Category II:** Buildings and other structures except those listed in Risk Categories I, III and IV.
- **Category III:** Buildings and other structures that represent a substantial hazard to human life in the event of failure, including but not limited to buildings allowing occupancy by more than 300 people, schools allowing occupancy by more than 250 people, power-generating stations, water treatment facilities for potable water, waste water treatment facilities and other public utility facilities not included in Risk Category IV, and buildings and other structures not included in Risk Category IV containing quantities of toxic or explosive materials that exceed certain maximum quantities and are sufficient to pose a threat to the public if released.

[57] "Speaking in Code: IBC Table 1604.5 Risk Category – Understanding How It Works," August 2020, at: https://www.fandr.com/wp-content/uploads/2020/07/Speaking-in-Code-August-2020.pdf

- **Category IV:** These are buildings that are considered to be essential in that their **continuous use is needed, particularly in response to disasters**. These include fire, rescue, ambulance and police stations, designated emergency shelters, facilities required for emergency response, power generating stations and other **public utility facilities required for emergency back-up of other Risk Category IV facilities, structures containing quantities of highly toxic materials exceeding certain volumes, water storage facilities and pump structures required to maintain water pressure for fire suppression.** [emphasis added]

Under these building standards, which are incorporated into the LCP, Poseidon's proposed facility would be classified within Structural Risk Category IV because the City expects Poseidon to be capable of operating after an earthquake, to provide water to the City in response to emergencies, and because Poseidon would store several tens of thousands of gallons of corrosive or hazardous materials. Further, and as described elsewhere in these Findings, the City is relying on Poseidon to provide the City's long-planned Southeast Reservoir, which is meant to provide an emergency water supply for the City's coastal areas if an earthquake cuts off water supplies from inland areas.

Poseidon's July 2021 CDP application stated that its facility should be considered a "commercial" structure, which would subject it to the requirements of Category II. More recently, Poseidon stated that it would construct its facility to Category III standards; however, Poseidon has not provided updated analyses that identify what specific facility modifications would be needed to address that change or that describe what changes would occur to coastal resources.

Additionally, Poseidon's selected project site is considered relatively unstable and highly responsive to earthquake forces and would be subject to the more stringent geologic standards applicable to structures proposed to be built on these types of underlying substrate. The deep sedimentary strata underlying the project site consist of both ancient river and flood plain deposits associated with the Santa Ana River and tidal flat/lagoonal deposits. Previous geotechnical studies and borings indicate the site is underlain largely by layers of silty sand and sandy clay (including high plasticity clay) to a depth of more than100 feet, and it is presumed that similar sedimentary deposits continue to bedrock at depths of 200 – 300 feet. The individual strata would likely be considered Soil Class D (sands) and E (clays) (of increasingly problematic Classes A through F); however, because the sediments include several liquefiable layers, the site is considered Site Class F for purposes of seismic ground-shaking analysis. The soil types present at the site often amplify the seismic characteristics of an earthquake compared to other soil types. The calculations described below that are used to determine what seismic forces a structure must resist incorporate the Soil Class of a site, and for a Soil Class F site such as this, would result in more stringent requirements than needed for a Class A through D site.

Seismic hazards – surface fault rupture and displacement: As noted above, the proposed facility would be located directly over the mapped trace of the NIFZ's South Branch Fault.[58] While this South Branch Fault is not currently designated as "active" pursuant to Alquist-Priolo Act provisions, it is part of the NIFZ, the entirety of which is considered active, as noted above. At present, the scientific evidence is not sufficient to rule out the potential for activity along the South Branch Fault.

Surface fault rupture or displacement on the South Branch Fault would represent a substantial hazard to the proposed project. While the underlying substrates do not lend themselves to surface fault ruptures, several studies have identified the potential that those substrates can be subject to significant amounts of vertical or horizontal displacement. The City's previous Environmental Hazards Program Provision I-EH-5 required that City prepare an ordinance to prohibit critical facilities such as Poseidon's from being built within a certain distance of active or potentially active faults. While the City did not adopt such an ordinance, it has identified appropriate buffers in several other documents – for example, its 2011 Earthquake Fault map includes a 200-foot Fault Trace Buffer Zone along all identified faults, including this South Branch Fault, and its 2017 Local Hazard Mitigation Plan notes the presence of the 500-foot buffer around that portion of the Newport-Inglewood Fault identified as active for purposes of the Alquist-Priolo Act. Either of those buffers, if applied to Poseidon's site because of the South Branch Fault being deemed active or potentially active, would render the site unusable as a location for this proposed project.

In 2010, the City FSEIR for the proposed project was inconclusive on the issue of fault rupture or displacement, as it stated that the South Branch Fault was considered "neither active nor potentially active," but also stated that a geological investigation the City had conducted for a different proposed project at the Poseidon site had identified the potential for surface fault rupture directly beneath the proposed desalination facility footprint.[59] The FSEIR addressed this uncertainty by requiring Poseidon, after it

[58] The existence and mapped location of the South Branch fault is based primarily on observed differences in groundwater quality and character, abrupt piezometric level differences and stratigraphic discontinuities in Pleistocene (>11,700-year BP) sediments between exploratory wells across the Santa Ana Gap. These observed offsets suggest the displacement of aquifers along a right-lateral, slip-strike fault (DWR 1966, 1968; Bryant 1985). However, due to the wide spacing of the wells used to infer the presence of the fault, its specific location remains uncertain.

[59] Regarding the South Branch Fault being considered "neither active nor potentially active," the FSEIR cited a 1995 study conducted at Bolsa Chica, about five miles away, as the basis for that determination. However, the FSEIR also referenced a 2010 Preliminary Review of Geotechnical Constraints and Geologic Hazards, conducted for Poseidon's proposed site, which stated that while nearby geotechnical investigations conducted in 2002 were inconclusive in determining whether this fault was active, surface fault rupture potential existed directly within the desalination facility's proposed footprint and within the footprint of the City water reservoir proposed to be built adjacent to the desalination facility. The City's September 7, 2002 Preliminary Review of Geotechnical Constraints and Geologic Hazards – Poseidon Resources Orange County Desalination Project stated that the site could be subject to surface fault rupture beneath the desalination facility and the then-proposed City water reservoir. The FSEIR recommended conducting further subsurface investigations to better characterize the site's seismic hazards.

removed the storage tanks from the project site, to conduct a subsurface fault investigation using methods approved pursuant to the California Geological Survey's Note 49: Guidelines For Evaluating the Hazard of Surface Fault Rupture, which provides recommended investigation techniques for determining potential surface fault rupture. These investigations generally use techniques such as exploratory trenching, borings, or other methods that can be used to directly observe strata of Pleistocene age. These techniques can be supplemented with cone penetrometer tests ("CPTs"), seismic reflection surveys, ground penetrating radar, or other indirect methods. However, some of these techniques are less accurate for sites like Poseidon's which is underlain by hundreds of feet of unconsolidated sediments. While this type of sediment can reduce surface displacement that would otherwise occur in areas with solid or more consolidated substrate, it can also mask the actual amount of displacement expected at the site. Note 49 suggests that for some projects, the necessary investigation be conducted both on and off the project site to better allow characterization of the fault. It also states that more detailed investigations should be made for critical facilities.

Later, the City's 2012 Hazard Mitigation Plan classified the South Branch Fault as active and included a 200-foot buffer zone around the Fault, including within Poseidon's site (as shown in **Exhibit 9**). Additionally, the California Energy Commission's 2011 review of the adjacent power plant acknowledged the presence of the South Branch Fault, identified the potential for surface fault rupture, and noted that its potential to affect the power plant was somewhat mitigated due to the power plant being located about 500 feet away from the mapped fault.[60] More recently, the City's 2017 Local Hazard Mitigation Plan continues to identify the NIFZ as an active fault system.

To better evaluate the potential for surface fault rupture or displacement at the site, Commission staff requested Poseidon conduct the geotechnical investigations necessary to determine the site's potential for these events. Poseidon stated it was unable to conduct the full set of investigations due to the presence of the retired storage tanks within the proposed project footprint, though it was able to conduct limited field work, including five CPT soundings, and provided several analyses to help identify the potential risk of surface fault rupture or displacement.

In 2013, Poseidon submitted modeling results from a "Structural Damage Threshold" analysis it conducted to determine how surface displacement associated with movement on the South Branch Fault could affect structures that would be built above the fault. The analysis was based on modeling of how a fault rupture at bedrock depth would propagate through the approximately 200 feet of sediments beneath the site, and how much surface displacement could occur. Poseidon's analysis assumed that the South Branch fault would experience 25% of the vertical displacement that could result from a M_W 7.1 earthquake on the main trace (North Branch) of the NIFZ located about one-half mile from Poseidon's site.

[60] See Application for Certification 12-AFC-02, Docket #TN66492, Ninyo & Moore, Preliminary Geotechnical Evaluation – Huntington Beach Generating Station, December 2, 2011.

The Structural Damage Threshold analysis used by Poseidon identifies likely ranges of damage to structures based on the ratio of the expected vertical displacement resulting from surface fault rupture to the length of an overlying structure subjected to that displacement.[61] For example, a 100-foot long structure expected to experience a six-inch vertical displacement would be assigned a ratio of 1/200, while a more damaging two-foot vertical displacement beneath that structure would result in a ratio of 1/50.

Using the dimensions of the structures proposed to be constructed over the fault, Poseidon concluded that surface fault rupture would result in a maximum vertical displacement of about 11 inches, which would result in a ratio of 1/277, which would suggest that fault rupture at the site could likely result in the facility experiencing wall cracking and temporary serviceability issues but not structural or frame damage. However, Commission staff's review of Poseidon's analysis revealed that it was based on several non-conservative key assumptions that individually and collectively could result in underestimates of potential displacement and damage. Staff determined that applying more conservative assumptions to Poseidon's analysis resulted in findings showing vertical displacement of up to about four feet, which would greatly exceed the threshold for structural damage.[62]

At sites such as this where development is proposed to be located over or near known faults, standard engineering and building practices generally call for the development to be set back a particular distance from the fault. This was done for the new AES power plant sited adjacent to Poseidon's site, as described above. In some cases, a setback may not be necessary – for example, with well-characterized faults that have expected displacements of less than 4 inches vertical or twelve inches lateral, it may be appropriate to build over the fault as long as structural mitigation, such as strengthened foundations, is included in the design.[63] For Poseidon's proposed project, however, this approach is not sufficient, as the South Branch Fault is not well characterized and even the non-conservative 11-inch displacement Poseidon derived from its modeling effort greatly exceeds the 4-inch vertical displacement limit in the above-referenced Guidelines. Moreover, Poseidon's analysis was based on a M_W 7.1 earthquake, though newer evidence suggests that events of up to or exceeding M_W 7.5 could occur along the NIFZ or larger NIRC system. Additionally, Poseidon's analysis appears to have only considered vertical ground displacement; no results were presented or discussed for horizontal (lateral) displacement, which is likely to be a major component of the total

[61] Salgado, R., The Engineering of Foundations, McGraw Hill, 2008. Poseidon described the ratios as:

Ratio:	**Amount of Expected Damage:**
Below 1/170:	Ultimate Limit State: structural damage likely
Between 1/170 and 1/300:	Serviceability Limit State: architectural damage likely (e.g., wall cracking
Above 300:	Unlikely to lead to either of the above.

[62] See the 2013 staff report for Poseidon's proposed project for a more complete description of these assumptions: https://documents.coastal.ca.gov/reports/2013/11/W19a-s-11-2013.pdf.

[63] See, for example, the 2010 Technical Advisory Committee Guidelines of California's Mining & Geology Board.

displacement along a slip-strike fault. Finally, as noted above, the location of the South Branch fault is highly uncertain. The fault may not occur in the mapped location, as assumed by Poseidon, and thus the fault rupture/ground displacement hazard may extend over a larger portion of the site. These considerations strongly suggest that building at this site should involve both a large setback (to address uncertainty in the location of the fault trace), such as the one used by the adjacent power plant, as well as appropriate structural mitigation that can accommodate large horizontal and vertical ground displacements. Poseidon has not proposed an alternative layout with a setback but has stated that such a setback would severely limit or eliminate the use of this site for a facility of Poseidon's proposed size. Poseidon has also not yet demonstrated that it can build its proposed structures to withstand displacements larger than those indicated in its non-conservative analysis, or what it would take to do so.

Poseidon's 2021 CDP application states that the design it had proposed in 2013 can accommodate possible fault rupture or displacement, even with the increases in earthquake severity identified since then. Poseidon's contention appears to be based on several non-conservative assumptions, including: 1) Poseidon does not consider the South Branch Fault to be capable of expressing as strong a seismic event as the more well-known North Branch Fault, and 2) Poseidon does not expect its facility to continue operating after a strong earthquake, but is planning to design it to experience some damage from earthquakes. The first assumption is supported by only limited evidence and is far from established, and no studies to date have provided constraints on how large an event could occur on the South Branch Fault. To provide a precautionary basis for evaluating the project Commission staff requested Poseidon modify its seismic calculations to reflect that the South Branch Fault could express the same earthquake intensity as the North Branch. Poseidon provided calculations that assumed the South Branch being capable of displacement at 25% of the North Branch, but declined to provide calculations for the 50%, 80%, or 100% displacement scenarios, stating that it was unnecessary to consider what it believed to be very low probability events. Poseidon stated it could build its facility to resist the calculated displacements, though it is not clear from the information provided whether its facility would withstand the maximum amount of displacement that could occur on the South Branch Fault or what additional design measures would be needed – such as larger, deeper or more heavily reinforced foundations – or what additional coastal resource impacts – such as more extensive grading, dewatering, or other construction activities – would occur as a result of the necessary structural measures.

Seismic hazards – ground shaking: Previous seismic hazards assessments of the project site and vicinity have provided multiple estimates of the ground shaking intensities that could occur during a large, local earthquake. The range in estimates reflects differing assumptions about earthquake magnitude and site soil characteristics, as well as use of different analysis methods. Estimated peak ground accelerations ("PGAs") (see above) at the site range from 0.54g (where g is equal to the force of

gravity) generated from a deterministic analysis of a M6.9 earthquake on the NIFZ,[64] to 0.74g, based on probabilistic analysis of the 2% in 50-year probability of exceedance (2,475-year recurrence interval) ground shaking at the site.[65] Previous estimates of the short-period (0.2 second) spectral acceleration (i.e., acceleration experienced by a building) during a design-level earthquake in the near site vicinity range from 1.0 - 1.6g.[66]

Given the range in previous ground-shaking estimates, staff requested Poseidon provide additional analyses to better characterize potential ground shaking at the project site. In its March 2013 report, Poseidon provided a site-specific seismic response analysis for a design-level earthquake – i.e., the event with a 2% probability of exceedance in 50 years (a 2,475-year return interval, known as the "Maximum Considered Earthquake" or "MCE"), which at the time was associated with a 7.02 M_w earthquake on the NIFZ. Following CBC and ASCE 7 procedures, Geosyntec first calculated a "bedrock" (Soil Class B) PHGA of 0.61g for the site using the 2003 USGS online Seismic Hazard Calculator, and then generated a set of site-specific ground motions (over a range of seismic wave periods) using the observed ground motion histories of recent large earthquakes and adjusting for the deep sediment profile occurring beneath the site. The resulting ground motion "spectrum" was then compared to a code-based minimum spectrum, corresponded to 80% of the calculated ground motions assuming Soil Class E, "soft clay" conditions, and the larger of the two spectra was selected for structure design. Based on this analysis, the recommended design spectral accelerations were 0.83g for short-periods (0.2 second) and 0.80g for long-periods (1.0 second), with a design peak horizontal ground acceleration (PHGA) of approximately 0.33g.

It should be noted that these "design" ground motion values do not necessarily represent the actual ground-shaking that could occur during a design-level or MCE event; rather, they have been lowered per CBC/ASCE procedures to levels expected to ensure that a structure does not collapse during an MCE event. For comparison, the "unadjusted" ground accelerations at the site during an MCE event are estimated to be 0.61 - 0.67g (PGA), 1.32 - 1.52 g (0.2 second period), and 1.06 - 1.22g (1.0 second

[64] Geosyntec, Geotechnical Hazards Report – Huntington Beach Seawater Desalination Project, prepared for Poseidon Resources, March 2013.

[65] See 2010 FSEIR for Poseidon, and Magorien, D. Scott, Updated Preliminary Review of Geotechnical Constraints and Geologic Hazards, Poseidon Resources Seawater Desalination Project, Huntington Beach, California, February 2, 2010.

[66] See, for example, the City's September 7, 2002 Preliminary Review of Geotechnical Constraints and Geologic Hazards – Poseidon Resources Orange County Desalination Project, by RBF Consulting; the 2010 Beach and Edinger Corridor Specific Plan EIR; the 2007 Village at Bella Terra EIR; the 2011 Ninyo & Moore Preliminary Geotechnical Report, December 2, 2011, submitted as part of the AES Application For Certification 2012-AFC-02.and the CEC's analysis for HBGS project.

period) for Soil Class D – E conditions.[67] An additional, contemporaneous point of comparison is provided by the California Energy Commission's 2014 analysis for the neighboring AES power plant, which identified substantially higher design spectral acceleration rates of 0.967g (0.2 second) and 0.958g (1.0 second), respectively. The reasons for the large difference in the ground-shaking responses between the AES and GeoSyntec analyses are not entirely clear but are likely related in part to using different soil class assumptions in the analyses. Regardless, the AES analysis provides a more conservative basis for the design of a similar facility (the power plant) in close proximity to the project site. While Poseidon's 2013 site-specific analysis appears to have conformed with then-applicable CBC and ASCE standards, the resulting design ground motions should be re-evaluated to account for new information about seismic hazards in the project area (see below), and in relation to the need for the facility to continue operating, not just avoid structure collapse, during the MCE.

Since submittal of the Geosyntec 2013 analysis, there have been significant changes in identifying likely seismic characteristics and hazards at the site and surrounding area. Several studies have identified the potential for the NIFZ to generate earthquakes of greater than M_W 7.4 – 7.5 (see above). Further, the City's 2017 LHMP identifies 28 different earthquake scenarios that would generate ground shaking in the City ranging from an MMI of at least VI ("Strong") to IX ("Ruinous"), with Poseidon's site identified as being subject to severe shaking. In recent years, the USGS has also updated its National Seismic Hazard Model and the ground motion hazard maps that provide the basis for the building code spectral acceleration maps.[68]

Poseidon's most recent submittal[69] includes output from the USGS Uniform Hazard Tool, which reflects ground motion hazards as evaluated through 2014, indicating that the previous bedrock PHGA of 0.61g remains valid. Poseidon did not repeat or revise the previous site-specific response analysis, but based on the bedrock PHGA, such an exercise may yield similar results as the 2013 study. However, it should be noted that the Uniform Hazard Tool on which Poseidon relied does not fully incorporate new information on the NIFZ that has emerged since 2014, including research indicating that an earthquake of up to M_W 7.5 is possible. It is reasonable to expect that ground accelerations at the site during such an event could exceed those anticipated from previous studies and require a more robust structural design.[70] Poseidon's 2020

[67] Based on the USGS Uniform Hazard Tool: https://earthquake.usgs.gov/hazards/interactive/, accessed February 16, 2022.

[68] The most recent comprehensive update of the National Seismic Hazard Model for the continental U.S. occurred in 2018, with several subsequent data releases. See https://www.usgs.gov/publications/2018-update-us-national-seismic-hazard-model-additional-period-and-site-class-data.

[69] See Geo-Logic Associates, Supplemental Assessment of Seismic Hazards – Huntington Beach Desalination Project, Huntington Beach, California, June 29, 2020.

[70] The 2013 Geosyntech report included a deterministic ground shaking analysis of an M_W 7.5 earthquake 0.01 km from the project site, but somewhat improbably arrived at ground accelerations (PGA = 0.58g) lower than those determined by the probabilistic analysis (PGA = 0.61g) for an M_W 7.02 earthquake 0.5 km distant. The apparent discrepancy is likely related to the analysis methods used rather than the actual degree of hazard.

supplemental seismic hazards assessment stated that any increase in the seismic hazard related to an M_W 7.5 earthquake could be accommodated by the current project design "without modification," but the basis for this conclusion is not provided and the design measures that would mitigate the increased hazard are not described.[71]

Another significant issue with Poseidon's seismic hazards analysis involves applying the appropriate structural design standards for Risk Category IV structures. Use of a lower Risk Category (II or III) would result in less stringent structural design that could leave the facility vulnerable to damage and service interruptions in the event of a major earthquake. For example, under the ASCE 7-22 guidelines and standards that are incorporated into the California Building Code, the Risk Category of a structure, along with the calculated design spectral accelerations, determines the "Design Category" to which the structure is assigned, which in turn determines the specific set of structural design standards that must be applied. Use of Risk Category IV for the Poseidon facility would place it in a higher, more stringent Design Category, and would result in a facility meant to resist ground-shaking hazards. Similarly, the Structural Risk Category determines the so-called "seismic importance factor (I)", which is used in calculating several important structural parameters. In this case, adding the 1.5x importance factor that applies to Risk Category IV structures would result in Poseidon's facilities being built in a manner that can withstand significantly higher seismic load and shear factors.

Seismic hazards – liquefaction: The proposed project site is within an area the City has designated as having "Very High" liquefaction potential (see **Exhibit 10 – Map of Liquefaction Potential in Huntington Beach**). As noted above, liquefaction-prone areas such as this project site are likely to experience earthquake intensities that are higher than those in similar, nearby non-liquefaction prone areas.

The FSEIR, citing geotechnical investigations done for other nearby projects, identified the top 10 to 16 feet of native soils in the area as being subject to liquefaction, though it also noted that it is difficult to apply characteristics from one site to another because the soil layers in this area of the City are interbedded and discontinuous. The FSEIR included results of a 2002 site-specific investigation done at one part of the project site showing that liquefiable soils extended to about 17 feet below the ground surface (bgs).[72] This is similar to conditions identified in the CEC's 2011 assessment for the adjacent power plant that showed liquefiable soils extending from five to 40 feet bgs at the power plant location.

Acknowledging that some geotechnical information would not be available while the storage tanks remain in place, Commission staff requested Poseidon provide additional evaluation of the site's liquefaction. Poseidon's March 2013 Geosyntec report, making use of both new and previous CPT data, identified two liquefiable zones, including a

[71] Geo-Logic Associates, 2020.

[72] GeoLogic Associates, Preliminary Geotechnical Assessment, Southeast Reservoir Site Acquisition, Huntington Beach, California, May 24, 2002.

four-foot-thick layer in the upper sediments and multiple layers at depth between 45 – 70 feet below ground surface. Based on these results and the ground shaking analysis described above, Geosyntec calculated that a M_W 7.1 earthquake on the NIFZ could result in up to about nine inches of vertical displacement due to liquefaction. Poseidon stated that this displacement could be avoided or reduced through measures such as strengthening structural foundations, soil "over-excavation" and recompaction, in-situ soil densification, injection grouting, or others, though the specific options available at this site may be limited due to the relatively high groundwater table and tidal influence on that groundwater. Geosyntec recommended, in part, that the facility be subject to a design measure that would require constructing a foundation system that could accommodate the expected amount of vertical displacement resulting from liquefaction.

It must be noted, however, that Poseidon's liquefaction analysis assumed a "design" PHGA of 0.33g taken from the site-specific ground-shaking analysis discussed above, and which includes several adjustments (reductions) in magnitude per the procedures for generating design ground motions. While the CBC and ASCE 7 standards allow for these reductions when determining ground motions for structure design, per the 2019 CBC, liquefaction analyses must use the true, unadjusted PGA associated with the Maximum Considered Earthquake (MCE) (the 2% in 50-year probability "Design Earthquake" at the site).[73] The ground motions that would occur during such an event, expressed as PHGA, would greatly exceed 0.33g, and thus would be expected to generate larger amounts of vertical displacement and differential settlement than calculated in Poseidon's liquefaction analysis. Thus, it is doubtful if a project design based on Poseidon's 2013 liquefaction analysis would be sufficient to prevent significant damage to the proposed facility, which would be inconsistent with the requirement that the facility continue functioning as a critical water treatment facility during and after the Design Earthquake. At the least, the liquefaction analysis would need to be updated, and the project design adjusted, prior to construction. Moreover, and as noted above, recent research suggests that the NIFZ may be capable of generating earthquakes of up to M_W 7.4 – 7.5, which could produce stronger ground-shaking, and potentially greater liquefaction-related ground displacement, than the M_W 7.1 event Poseidon evaluated. As noted above, Poseidon's 2020 seismic hazards update offered only unsupported statements that its current design could accommodate any additional hazard associated with a larger magnitude MW 7.5 earthquake. As a result, it is not clear whether the facility, as proposed, could continue functioning following a major earthquake, nor what additional level of structural mitigation would be needed to ensure continuous operations during and after such an event.

[73] Poseidon's own ground-shaking analyses indicate that the PHGA during the MCE would exceed 0.61g, assuming "bedrock" (Site Class B/C) conditions (GeoSyntec 2013; GeoLogic 2020). Based on the U.S. Geological Survey Uniform Hazard Tool, which provides probabilistic spectral response accelerations for a given site, the PHGA for the Poseidon site assuming more realistic substrate conditions ranges from 0.608g (Site Class D/E boundary) to 0.673g (Site Class D). See https://earthquake.usgs.gov/hazards/interactive/, accessed February 7, 2022.

The 2013 FSEIR identified the amount of fill then expected to be needed for the proposed project; however, that amount does not appear to include fill that may be needed to fully replace those soils removed or "over-excavated" to address the above liquefaction analysis. The area and depth of soils to be removed and either replaced or compacted to address liquefaction could range up to about 60-80,000 cubic yards. The FSEIR also anticipated that dewatering the excavation site could require sheet piling, use of perimeter wells, and other methods to ensure project dewatering does not affect adjacent wetland areas. In May 2013, Poseidon provided an analysis showing that the dewatering required to construct two of the proposed facility's structures – the pretreatment building and the intake pump station – would require dewatering of up to about 740,000 gallons per day and 1,280,000 gallons per day, respectively, for a total of about 85 million gallons over the several months of expected construction. As detailed in Section II.J – Wetlands, this dewatering, if at the scale described as needed to allow for these structural foundations, would likely cause adverse effects to the wetlands adjacent to Poseidon's proposed development footprint.

In its 2021 submittals, Poseidon proposes to support its facility using any of several different techniques, such as columns or pilings (i.e., "rigid grout inclusions with a load transfer platform," "auger cast piles," or "stone columns") or by using soil over-excavation and compaction, with final determinations to be based on future geotechnical investigations and structural engineer recommendations. Poseidon states that some of these techniques would require less dewatering than previously anticipated. However, with the potential for additional liquefaction described above, and the need for additional excavation and dewatering, the expected impacts would likely be more severe than previously identified.

Seismic hazards – lateral spread: Lateral spread can occur when soils on flat to gently sloping surfaces, above liquefiable soils. and adjacent to an unsupported slope move in response to a seismic event – essentially, a landslide occurring on nearly flat ground. The FSEIR's and Poseidon's geologic reports note that the site has "high potential for lateral spread", due to its soil characteristics, high groundwater levels, liquefaction-prone soils, and its location along the adjacent flood control channel.[74] As noted above, the Flood Control District is replacing the existing sheet piles along this section of the channel, though they are not designed to fully resist the area's expected seismic forces, and their failure could lead to lateral spread along the east side of Poseidon's site.[75] Further, the site's lateral spread hazards could increase with the higher surface water and groundwater levels expected with sea level rise.

[74] See Magorien, D. Scott, Preliminary Review of Geotechnical Constraints and Geologic Hazards Poseidon Resources Orange County Desalination Project – North and West Tank Options, September 7, 2002, and Magorien, D. Scott, Updated Preliminary Review of Geotechnical Constraints and Geologic Hazards, Poseidon Resources Seawater Desalination Project, Huntington Beach, February 2, 2010.

[75] See FSEIR, Appendix C – Updated Preliminary Review of Geological Constraints and Geologic Hazards, page 13. See also OC Public Works, Huntington Beach Channel and Talbert Channel Sheet Pile Repair (MA-080-20010602) Calculations, June 30, 2021, which identifies the Maximum Design Earthquake as having an expected Peak Ground Acceleration ("PGA") of 0.48g and notes that the selected design standard was the Operating Basis Earthquake with an expected PGA of just 0.22g.

The FSEIR's Mitigation Measure GEO-2 required Poseidon to conduct an in-depth site-specific analysis of the potential for lateral spread and to determine what measures will be needed to avoid or reduce this potential. As noted above, Poseidon has not yet been able to conduct the full required investigation with the retired storage tanks still in place. In response to Commission staff's request, however, Poseidon provided an initial analysis in the March 2013 Geosyntec report estimating that lateral soil spread on the site would range from about 15 to 38 inches. As with the liquefaction analysis, the lateral spread estimates were based on a PHGA of 0.33g, which, as discussed above, underestimates the ground motions that could occur at the site during the MCE. Thus, the lateral spread hazard may also be underestimated. As part of the aforementioned "Design Measure B, Poseidon proposed addressing this potential impact by having its structural and geotechnical engineers devise a structural foundation capable of accommodating up to 38 inches of lateral soil spread, using any of four methods, including over-excavation and recompaction of soils, in situ soil densification (including installation of stone columns), injection grouting, or deep soil mixing. Poseidon noted that its most likely choice would be either stone columns or pile foundations. It might also construct "buttress walls" of densely placed stone columns along those parts of its facility closest to the flood control channel to reduce potential lateral spreading towards the channel. However, Poseidon has not yet identified its selected approach or design.

Seismic Hazards – Analysis of LCP Conformity

Poseidon's proposed project site is subject to a variety of seismic risks that are generally well known, though not entirely quantifiable. These include surface fault rupture and displacement, ground shaking, liquefaction, and lateral spread. It appears that Poseidon's project, as currently designed to meet standards that apply to general commercial facilities, might assure basic structural stability, and somewhat minimize onsite risks to life due to collapse or other catastrophic damage. However, very significant risks remain due to the combined effect of these hazards and the fact that Poseidon proposes to build its facility on top of a potentially active fault, rather than leaving a buffer, as would be called for by the City's Hazard Mitigation Plan if additional evidence documented that the fault was active. Overall, the evidence does not demonstrate that the facility's siting or design standards would assure structural stability to the extent needed to allow Poseidon to continue operating during or after a major seismic event, as required by the LCP. As proposed, the project is thus inconsistent with LCP policy C 1.1.9, which requires that new development be sited and designed to assure stability and structural integrity and to minimize risks to life and property. It is also inconsistent with Policy C 10.1.4, which requires "appropriate engineering and building practices for all new structures to withstand ground shaking and liquefaction such as those stated in the Uniform Building Code."

Because the proposed project would need to function as a critical infrastructure facility expected to operate after an emergency, it would need to meet Structural Risk Category IV standards that apply to such structures. If Poseidon were to redesign its project to meet these standards, or the Commission were to impose a condition requiring these standards, then the project could be found to minimize risks to life and property from ground-shaking, liquefaction, and lateral spread hazards. Additionally, if Poseidon were

also to conduct a more precautionary fault rupture and ground displacement analysis with respect to a potential rupture of the South Branch Fault, and revise the project design to withstand the vertical and horizontal displacements projected by this analysis, it appears that the project would assure structural stability and minimize onsite risks to life and property and would also have a reasonable likelihood of being able to continue functioning in the event of a major seismic event. However, building the project as a Risk Category IV facility and more fully addressing ground displacement hazards would require Poseidon to make several substantial changes to its proposed project, such as designing stronger structures and providing more extensive foundations. This, in turn, could result in increased impacts to coastal resources. For example, these changes would involve increased construction activities to accommodate those changes, such as a longer construction period and increased excavation depths, additional truck traffic, and others. The increased excavation would require more extensive dewatering, which has the potential to harm adjacent wetlands. Providing an adequate foundation under Poseidon's currently proposed design would require excavating thirty feet of soil and placing stone pillars or injecting grout in the soil. Building to the more stringent standards would require even greater excavation and more significant foundations, which would place a large and essentially permanent, hardened structure in this area of former wetlands, thereby limiting future adaptation measures as groundwater and sea level rises in the area.

Siting a facility that needs such significant foundation and engineering work in a hazardous location is in tension with LCP Policy C 1.1.9, which requires that development be stable without contributing significantly to destruction of the site or surrounding area, and with Policy C 10.1.14, which encourages removal of encroachments in floodplains, rather than hardening the land in and adjacent to floodplains. In addition, Poseidon has previously questioned whether the project would be financially feasible if it were required to build to Category IV. For these reasons, the project as proposed is inconsistent with LCP standards, and imposing a condition requiring Poseidon to build to Category IV standards and to revise its design based on a more precautionary fault rupture/displacement analysis is: 1) premature, as the actual design, effects of that design, and ability for the design to actually address all geologic hazards (such as ground displacement) are not yet known; 2) unwise, as it would require an even greater project footprint and less opportunity for future adaptation on this parcel; and 3) unnecessary, as it would not be sufficient to resolve other Coastal Act and LCP consistencies..

Additionally, and perhaps even more importantly, even if Poseidon were to provide the information needed to show it could design and build a facility able to withstand seismic forces and continue operating, it is unlikely that the surrounding infrastructure Poseidon would rely on – e.g., roads, bridges, utilities – would be able to function after the expected Design Earthquake or even lesser earthquakes. Much of the surrounding infrastructure was built several decades ago under less stringent standards than would apply today and when the area's seismic hazards were believed to be much less severe than as understood today. For example, the area's roads and bridges were mostly built several decades ago, whereas the current Structural Risk Categories and current

knowledge of seismic hazards were developed within the last 10 years. Current seismic designs for bridges use a much higher standard than used previously for nearby bridges (i.e., based on an earthquake with a 5% probability of exceedance in 50 years).[76]

Further, even some recent modifications to nearby infrastructure features do not ensure that Poseidon could rely on them after an earthquake. For example, the recent sheet pile replacement along the adjacent Huntington Beach Flood Channel was designed to resist a significantly lesser level of ground shaking than would occur during the 2,475-year return interval MCE event evaluated by Poseidon.[77] Failure of nearby bridges, the flood channel, or other nearby roads, utilities or infrastructure components would adversely affect Poseidon's ability to continue operating after any of several seismic events, including some with much less force than that generated by the area's MCE or Design Earthquake. As noted above, the current Uniform California Earthquake Rupture Forecast identifies several nearby faults with probabilities of high or severe damage within the next 30 years.

Coastal Act Section 30250 requires that new development be located in developed areas able to accommodate it or in other areas with adequate public services, and LCP Policy C 1.1.1 encourages the same thing. The LCP also requires that, prior to issuance of a CDP, the City must find that adequate public services and facilities will be available to serve the proposed development. Together, these policies require that new development be located in an area where it can safely be accommodated and can serve its purpose for its expected lifetime. It is not necessary for LCP or Coastal Act conformity to determine, with absolute certainty, that a development can be continuously served by surrounding infrastructure for its lifetime. However, it is inappropriate to site a critical facility that is expected to serve emergency functions in a location where it is reasonably foreseeable that access to the site, or utilities that serve the site, could be cut off. With projects that serve the public, provide emergency functions, and store hazardous materials that could harm the environment and public if released, it is appropriate to take a precautionary approach to siting and hazards decisions. Here, the project is inconsistent with policies requiring facilities such as this to be sited in appropriate locations that can accommodate them.[78]

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[76] See, for example, the use by the California Department of Transportation (Caltrans) of both the deterministic and the probabilistic acceleration response spectral (ARS) curves with 5% probability of exceedance in 50 years, whichever is greater, as described in Endi Zhai, An overview of seismic ground motion design criteria for transportation infrastructures in USA, from Journal of Rock Mechanics and Geotechnical Engineering, Volume 3, Issue 3, September 2011.

[77] See Orange County Public Works, Huntington Beach Channel and Talbert Channel Sheet Pile Repair (MA-080-20010602) Calculations, June 30, 2021, which identifies the Maximum Design Earthquake as having an expected Peak Ground Acceleration ("PGA") of 0.48g and notes that the selected design standard was the Operating Basis Earthquake with an expected PGA of just 0.22g.

[78] Both the LCP and Coastal Act provisions regarding proper siting are relevant in this analysis since the onshore facilities may be cut off from surrounding services due to flooding or other geologic risks and the offshore components cannot operate if the onshore facility is not functioning. This is true for the seismic, tsunami, and sea level rise/flooding analyses.

G. GEOLOGIC HAZARDS – TSUNAMI

The LCP and Coastal Act policies listed above in the Geologic Hazards – Seismic section also apply to tsunami risk. In addition, LCP Policy C 10.1.19 states:

> Identify tsunami and seiche susceptible areas (Figure C-30), and require that specific measures be taken by the developer, builder or property owner during major redevelopment or initial construction, to prevent or reduce damage from these hazards and the risks upon human safety. Development permitted in tsunami and seiche susceptible areas shall be designed and sited to minimize this hazard and shall be conditioned to prohibit a shoreline protective device.
>
> [Note: "Figure C-30" referenced above is provided as **Exhibit 11** – Map of Huntington Beach LCP's Tsunami Runup Zone.]

Summary: Poseidon's proposed facility would be in an extensive low-lying area of Huntington Beach within the LCP's designated "Tsunami Runup Zone." At the time the LCP was developed and certified, expected tsunami runup elevations were about five feet for a 100-year event and 7.5 feet for a 500-year event. Since that time, and during the approximately 20 years Poseidon has been proposing to locate its facility at this site, technical understanding of the area's tsunami hazards has increased significantly. During that time, expected tsunami runup elevations have about doubled, with some studies indicating the runup could be up to several times higher, which would be at or above much of Poseidon's existing site. Although Poseidon has proposed constructing a "tsunami-resistant" facility by elevating most of its structures, some of its components would remain at or below some expected runup elevations and be subject to damage. It would also have a limited ability to adapt its facility to tsunamis that occur after substantial sea level rise. Additionally, the facility would be located within an extensive tsunami runup zone where nearly all the nearby roads, bridges, utilities, substations, and other infrastructure components Poseidon would rely on are at lower elevations and were not built to withstand tsunami forces. Poseidon would not have the ability to be sufficiently resilient to the effects of an extreme tsunami on this surrounding infrastructure. Therefore, and as described below, the project as proposed would not be consistent with several LCP and Coastal Act provisions.

Introduction and Background

Tsunamis result from events that displace large volumes of seawater, most commonly earthquakes, subsea landslides, or other phenomena. Although Poseidon's proposed project site is currently more than 1000 feet inland from the beach, its location within an extensive low-lying area would make it subject to significant tsunami hazards. The site is within a City-designated Tsunami Runup Zone that extends about a mile inland from the ocean shoreline (as shown in **Exhibit 11**). In 1996, when the City adopted the Tsunami Runup Zone designation, and in 1998, when Poseidon first considered this site for its proposed project, the City expected tsunami runup elevations to reach up to five

feet for a 100-year event and up to 7.5 feet for a 500-year event.[79] Since then, several studies have established that the site and surrounding area are subject to more severe tsunami risks with parts of the area around Poseidon's site subject to runup elevations up to several times higher, ranging from approximately 14 feet to 22.5 feet, and potentially as high as 32 feet. Several of the studies note that the bathymetry characteristics offshore of Huntington Beach combined with the extensive low-lying onshore area and the high concentration of people living and working in this area make Huntington Beach particularly vulnerable to tsunamis.

Physical Setting and Modeling

Tsunamis are rare but potentially very damaging long-period (tens of minutes) sea waves caused by an earthquake, submarine landslide, volcano, or other disturbance. Huntington Beach can be exposed to both distant ("far-field") tsunamis and locally generated ("near-field") tsunamis. The main far-field tsunami sources are from large submarine earthquakes that could occur within the North Pacific Ocean, including along the Aleutian Trench (Alaska to Kamchatka), off the coast of Japan, along the Peru - Chile Trench, and the Cascadia Subduction Zone. Near-field tsunami sources include the Catalina Fault, Newport-Inglewood Fault Zone, and the subsea Palos Verde Landslide, all of which are within a few miles of the proposed project site.

Huntington Beach has had no records of extreme tsunami inundation,[80] though this does not mean the City is not subject to damaging tsunamis. The lack of recorded observations of, and data about, tsunamis along all the California shoreline is due to records being available for a relatively short period – decades or a couple of centuries, at most – and mostly in areas such as ports, harbors, and river mouths where tide or water level gauges had been installed, not in open shoreline areas like Huntington Beach. However, geologic investigations can help extend the time record for tsunamis beyond the historic record – for example, a joint CGS USGS effort undertook reconnaissance work in 20 coastal wetlands to look for deposits that originated from past tsunamis.[81] This study did not conclusively identify deposits from prehistoric tsunamis, but recommended several sites for further data collection. It noted, too, that the potential for finding evidence of large far-field tsunamis in Southern California was relatively low due to many sites where evidence might exist being disturbed due to

[79] 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. There is a 45.3% probability of a 100-year or greater tsunami and a 11.3% probability of a 500-year or greater tsunami occurring over a 60-year timeframe.

[80] In tsunami science, "inundation" is generally used instead of "flooding" to describe the temporary, though sometimes prolonged, influx of water to an area resulting from tsunami runup, overtopping, and propagation.

[81] Wilson, R. E. Hemphill-Haley, B. Jaffe, B. Richmond, R. Peters, N. Graehl, H. Kelsey, R. Leeper, S. Watt, M. McGann, D. Hoirup, C. Chagué-Goff, J. Goff, D. Caldwell,[2] and C. Loofbourrow (2014) The Search for Geologic Evidence of Distant Source Tsunamis Using New Field Data in California. USGS Open-File Report 2013-1170-C; California Geological Survey Special Report 229.

development, and that "an absence of evidence for apparent tsunami deposits at many of the reconnaissance sites does not preclude the potential for those sites to contain evidence of past tsunamis."

Nevertheless, earthquakes from the Aleutian area, Japan, and the Peru - Chile area have generated tsunamis that have been observed along the Los Angeles and Orange County coasts. Recent observations include the 2010 Chile Tsunami, which caused minor flooding and surge for up to 24 hours at Seal Beach, wave amplitudes of 1 to 1.6 feet at Sunset Beach, 1.5 feet at Newport and 1.6 to 2.3 feet at Dana Point. The 2011 East Japan (Tohoku) Earthquake caused wave amplitudes forecast to be 1.7 feet at Huntington Beach and observed amplitudes at Newport and Dana Point of 1 and 2 feet respectively.[82] Tsunamis over the past 200 or so years have resulted in similar amplitudes, ranging from 1 to 3 feet.[83]

Due to the limited observations of tsunamis along the California Coast, much of the information about extreme tsunami events has come from modeling. The first detailed modeling of tsunami run-ups for Huntington and Seal Beaches, conducted in 1974, was based on a predicted earthquake originating from either the Aleutian or Peru - Chile Trench, which showed expected tsunami runups to be around 9.2 feet NAVD88 for a 100-year event and around 14.0 feet NAVD88 for a 500-year event.[84]

Since then, there has been a substantial increase in seismic and tsunami information as well as computing, modeling, and predictive capability. In 2009, the California Governor's Office of Emergency Services ("CalOES") and California Geological Survey ("CGS") released a series of State Tsunami Inundation Maps that were to be used for evacuation purposes and that depicted the maximum considered tsunami inundation considering both far-field and local tsunami sources. The 2009 State Tsunami Inundation Map for Huntington Beach included the project site and much of the surrounding area. More recently, CGS developed a new generation of probabilistic tsunami inundation maps, including a 2021 map for Orange County, which is described below and is used in staff's analysis.

Best Available Science on Tsunami Hazards

Current science on tsunami risk identifies three major components of tsunami hazards:

1) Possible tsunamigenic sources (e.g., earthquakes, landslides, etc.).
2) Propagation of tsunami waves; and,
3) Inundation and runup of tsunami waves into coastal areas.

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[82] See Wilson, R.I., L.A. Dengler, M.R. Legg, K. Long, and K.M. Miller. 2010. The 2010 Chilean Tsunami on the California Coastline, Seismological Research Letters, and Wilson, R.I. et al. 2013. Observations and Impacts from the 2010 Chilean and 2011 Japanese Tsunamis in California, Pure Appl. Geophys. 170, 1127–1147; DOI 10.1007/s00024-012-0527-z

[83] See Lander, J. P.A. Lockridge, and M.J. Kozuch. 1993. Tsunamis Affecting the West Coast of the United States 1806 - 1992. National Geophysical Data Center, NOAA.

[84] See Houston, J.R. and A.W. Garcia. 1974. Type 16 Flood Insurance Study: Tsunami Predictions for Pacific Coastal Communities. U.S. Army Engineer, Hydraulics Lab, Waterways Experiment Station Report H-74-3.

As previously mentioned, there can be a range of potential tsunamigenic sources for a particular location, based on its exposure to tsunamis generated from far-field or near-field events such as large submarine earthquakes and landslides. Earlier studies used a “deterministic” approach to determine the timing and likelihood of these events, where one or more sources were selected based on scientific and engineering judgement. The most recent effort to characterize tsunami risk uses an approach called Probabilistic Tsunami Hazard Analysis (“PTHA”). PTHA considers a much more comprehensive set of potential tsunamigenic sources and allows for inclusion of uncertainties and variability that ultimately can be used to estimate probability of occurrence – something not possible with a deterministic approach. It is similar to the process described in the seismic findings above used to identify earthquake probabilities on specific faults. PTHA allowed for the creation of probabilistic offshore tsunami wave heights for the entire California coast that can then be applied to offshore characteristics and used to model the extent of probabilistic inundation and runup.

To model inundation and runup, the state of the art is to use widely accepted two-dimensional hydrodynamic models that solve nonlinear shallow-water equations. These hydrodynamic models require massive amounts of computing power to simulate the physics of how water moves, with the quality of model outputs being highly dependent on the quality of the model inputs. For tsunamis, the most important input parameters for best simulating the flow of the tsunami over and through coastal landforms are elevation data and bottom roughness. Models that use accurate, high-resolution elevation data can best capture the hydrodynamic effects that smaller scale features like levees, floodwalls, berms, and channels might have on a tsunami’s extent, depth, and velocity.

Two recent efforts to characterize tsunami hazards in the State are 1) the ASCE 7-16 Tsunami Design Geodatabase developed in 2016 and 2) the PTHA maps initially developed in 2018 with support from CalOES and CGS. Both efforts use PTHA to develop probabilistic offshore tsunami characteristics that are then modeled using nearshore characteristics to identify potential extents of wave runup and inundation. While both efforts use similar modeling approaches, there are a few key differences in the models and in the ultimate purpose of using the modeling results.

Guidance provided by the ASCE 7-16 Minimum Design Loads and Associated Criteria for Building and Other Structures (“ASCE 7-16”) is an integral part of building codes in the United States and the State of California. It describes methods for how to determine loadings for structural design. Chapter 6 discusses Tsunami Loads and Effects. This chapter was a new addition in the 2016 edition of the ASCE standards and it was found to be of particular importance for coastal areas on the Pacific Rim where tsunami risk is highest. It establishes a Tsunami Design Zone (“TDZ”) within an area subject to inundation, describes an approach to determine whether tsunami loads would be of concern and, if so, describes how to determine the relevant tsunami loads for a given site. Chapter 6 also states that the 2,475-year ARP tsunami, identified through PTHA, should be used for structural design for facilities considered critical or essential.

ASCE 7-16 developed 2,475-year runup extents for several states including California, and these runup extents are available through a tsunami design geodatabase (TDG) and coastal maps. These runups can be used, in combination with elevation data, to "back out" flow depths and velocities at sites within the TDZ. The model for runup extent uses a relatively coarse model grid (~60m) and elevation data from a widely used NOAA digital elevation model (DEM) from 2010. Using ASCE 7-16's projections alone can be problematic for some locations, and ASCE 7-16 Chapter 6 details how site-specific modeling can be used to refine understanding of tsunami risk for certain projects. The ASCE 7-16 projections for California have been updated by the recently published ASCE 7-22 maps, which use higher resolution topography and smaller grid size developed as part of the CalOES/CGS PTHA analysis, as discussed further below. The proposed project site has complex topography with berms and flood channel levees and this higher resolution topography better accounts for these features.

The second recent effort, supported by CalOES/CGS, to understand tsunami risk, has undertaken PTHA for the entire California coast and for a range of return periods, allowing tsunami risks to be included in the California Seismic Hazard Mapping Act. The PTHA modeling used 10m grid spacing and was able to incorporate more recent elevation data as well as ground-truthing. CGS has released map products county by county, with the Orange County maps released in 2021. The maps depict an area's Tsunami Hazard Zone (THZ) based on a 975-year ARP tsunami event and on local topographic and bathymetric characteristics.

The State's PTHA effort modeled several ARP tsunami risks, including the 2,475-year ARP, that is roughly equivalent to the ASCE Tsunami Design Zone and the State 2009 Tsunami Inundation Zone maps. The 2,475-year ARP PTHA results are used in the ASCE 7-22 TDZ and were published on ASCE's Tsunami Design Geodatabase in December of 2022. The published inundation extent provides an independent check on the updated modeling undertaken by Poseidon's consultants. The following section describes Poseidon's modeling and how it compares with the 2,475-year ARP PTHA efforts.

Tsunami Hazards – Effects on Proposed Project

Poseidon's consultants, Moffatt & Nichol, conducted a tsunami inundation assessment for the site. As part of this assessment, they developed a site-specific model following the guidelines from ASCE 7-16, using a flexible mesh network allowing for variable resolution, with lower resolution offshore and higher resolution (1-3m) around some areas to capture ground features, such as the County flood control channels. The model used high resolution ground elevation data from the Orange County Department of Public Works for the area encompassing South Huntington Beach and Newport Beach and an older NOAA DEM for the rest of the model domain. The model was run for the ASCE Maximum Considered Tsunami which has a 2,475-year Average Return Period (ARP) with ocean water levels set at the Mean High Water datum.

One purpose for the tsunami modeling was to determine how Poseidon's proposed site grading could alter or worsen inundation elsewhere. Poseidon proposes to grade and elevate much of its project site, with finished floor elevations of some buildings at 14 to 16 feet NAVD88. The proposed water storage tank area would be graded to elevations of 9 to 10 feet NAVD88. To assess impacts to the site and the surrounding area, Poseidon modeled six different scenarios – both the existing and proposed topographies under current sea level, 1.6 feet of sea level and 3.3 feet of sea level rise. As noted below, much of the site will be flooded by an extreme tsunami and 3.3 feet of sea level rise, though and no scenarios with tsunamis and greater sea level were analyzed.

On-Site Effects: At the project site, Poseidon's model results show very little inundation of the project site from an extreme tsunami under current sea level rise conditions. For both the existing topography and proposed grading, most of the project site appears to be on high enough ground to remain out of the path of the tsunami, even when the water overtops PCH. The intake pump stations, particularly the southern intake pump, could experience shallow inundation (of less than a foot) that could persist for hours after the initial tsunami runup. This intake pump inundation is likely to be accompanied by tsunami-related debris, which could damage or block the pumps and could compromise functionality of the pumps beyond the immediate time of inundation.

With +1.6 feet of SLR, and a 2,475-year ARP tsunami, relatively shallow inundation (0-2 feet) is expected in the project area, largely on the western portion of the project area surrounding the proposed water storage tank. Poseidon recently proposed elevating some of the buildings proposed on this western part of the site, though that April 14, 2022 proposal was not accompanied by updated modeling. No inundation is shown on the proposed building pad (with elevations of 14-16 feet, NAVD88) as floodwaters around the pad appear to reach maximums of 11-12 feet, NAVD88. Poseidon's tsunami modeling for 1.6 feet of sea level rise show that the water levels will be below the elevation of any sensitive equipment but could cause inundation at the pump stations. Inundation of the western site could cause the product water pumps to be rapidly covered with 1-1.25 feet of water; the pump stations close to the seaward property boundary could experience inundation of 2 to 2.4 feet and floodwaters could take about an hour to recede. This, too, is likely to be accompanied by tsunami-associated debris that could damage or block the pumps for longer periods.

With +3.3 feet of SLR, the project site is expected to be inundated to just below the top of the proposed building pads where the key facilities will be constructed. Maximum inundation appears to reach between 13-14 feet NAVD88 around the building pad, within less than a foot of the proposed range of the finished floor elevations. Inundation at the pump station will worsen and as more of the surrounding areas are inundated, tsunami-associated debris could worsen damage and block the pumps for longer periods.

Poseidon did not model tsunami-related inundation for sea level higher than 3.3 feet; however, the trends for increased flood levels, more debris, and longer times for the water to recede could be expected to continue. Inundation water levels are significant concerns for tsunamis, but much of the extensive damage associated with tsunamis is caused by fast-moving water and water-borne debris. There is little discussion in the model of projected velocities, though it indicates that velocities could be high enough to cause scour around equipment or damage from debris-laden flows, including impacts to the pump stations. With 3.3 feet of SLR, inundation impacts from the 2,475-year tsunami would be severely destructive to the larger area, with much of the Southeast Huntington Beach area projected to be inundated and damaged due to water velocities and tsunami-borne debris. Poseidon's model showed maximum current speeds at the adjacent mobile home park to be up to 10 feet per second, suggesting highly destructive conditions with the potential to convey large debris to parts of the project site, including where the product pumps and vehicle access would be located. The project's storage tanks for ammonia and chlorine are also proposed to be adjacent to the proposed product pumps at about the same elevation; however, there was no discussion of the potential for tsunami flows to damage the chemical storage tanks or cause a chemical spill. The potential for damage would increase with more sea level rise.

Off-site Effects

While the model suggests the proposed project site would be minimally affected by tsunami inundation with sea level rise up to 3.3 feet and that building design measures can be used to avoid or reduce on-site tsunami-caused damage, Poseidon's modeling also shows that the surrounding areas, including the key access routes for emergency response vehicles and the locations of supporting infrastructure could be severely damaged or temporarily unusable during a 2,475-year tsunami under current mean high tide conditions and increasingly so with sea level rise. Under current conditions, model results show the modeled tsunami could overtop PCH and inundate the area around the adjacent decommissioned power plant, the lower lying mobile home park across Newland Avenue, and the nearby Magnolia wetlands. Moffatt & Nichol also looked at flooding of two access points to the site, the intersections of Newland St. and PCH and Newland St. and Edison Dr. The intersection of Newland St. and PCH is expected to drain faster with approximately 6 inches of water remaining an hour after the initial tsunami impact compared to Newland St. and Edison Dr. which is expected to have approximately a foot of inundation after the same amount of time. The model does not address the type or level of damage that could result in these areas from water-borne debris or the extent of off-site water-borne debris that could exacerbate damage to the Poseidon site. The model also shows that Poseidon's proposal to remove the existing containment berms to create elevated building pads would result in negligible to beneficial (additional flood storage capacity) effects on the inundation of these surrounding areas. However, with Poseidon's most recent proposal to keep the exterior berm on the east side of its site in place, it is unclear whether some of that benefit may be lost, as Poseidon did not provide updated modeling to show the effects of this proposed change.

With sea level rise, tsunami inundation to PCH and along Newland Avenue is expected to be more extensive and deeper, and inundation would last longer. With 1.6 feet of sea level rise, inundation on Newland Street and Edison Drive would take upwards of two hours to recede below six inches and under these conditions, it would be difficult or dangerous for vehicles to use these roadways due to high water velocities and drawdown during and following a tsunami event and due to the presence of debris that could be left as the waters recede.

The Moffatt-Nichol report expects that rapid access to the site would be available via PCH but does not account for scour, debris, and other damage from high currents that could make PCH untraversable long after the waters recede. Current tsunami models can show areas of inundation and drawdown but are not able to capture damage hotspots or areas where debris could concentrate. Given the roadways and mobile home park surrounding the project site, some debris is likely to include vehicles and mobile homes. Scour or damage to the roads and PCH could also occur. A USGS study effort, the Science Application for Risk Reduction ("SAFRR") on Physical Damages from a possible, non-extreme tsunami noted that, "flow over an elevated roadway (elevated in the sense that vortices can form on the downstream side) is assumed to cause scour damage."[85] The SAFRR Report provided an assumption that scour road damages could be backfilled within 4 days, at an average cost of $5 million per lane-mile. Damages to the surrounding area, debris, and roadway scour are all repairable. However, access to and from the Poseidon site could be greatly limited for several days or longer following a damaging tsunami. These impacts to access might limit the ability of the facility to provide essential water supplies as needed during an emergency.

Resources for debris clearing and access restoration might be limited immediately following a tsunami and the speed with which access would be restored to the project site would depend greatly upon the extent of damage throughout the city and the priority for restoring access to this site. Proximity to the AES power plant might increase the priority for reestablishing access to this area if that facility is operable; nevertheless, Poseidon's facility would likely need to operate somewhat independently for several days or longer before it could be easily accessed.

The Commission's coastal engineers reviewed Poseidon's model and compared it to the ASCE 7-16 unmodified analysis for a 2,475-year ARP. While the ASCE 7-16 model shows greater tsunami hazards at the site and surrounding area, the differences between the models could result primarily from the different resolutions used in the two models. Poseidon's analysis considers the same 2,475-year tsunami wave during present day mean high water as ASCE 7-16's TDG but employs a higher resolution model and uses higher quality elevation data. The model created by Moffatt & Nichol is also able to better capture important features for the flow of a tsunami event such as the flood control channels, berms, and roads than the ASCE 7-16 TDG. Thus, Poseidon's site-specific model is likely a better representation of the site's response to a tsunami than the ASCE 7-16 model, as is the ASCE 7-22 model.

[85] See SAFRR, Physical Damages, page 108.

Tsunami Hazards – Analysis of LCP Conformity

The proposed project is in an area with a high risk of inundation and damage from a tsunami. Tsunami modeling by the applicant, using high-resolution topographic information predicts that the proposed project can use site elevation to minimize inundation risks for a 2,475-year ARP tsunami event with up to the highest sea level rise the modeling analyzed, a 3.3-foot increase. Engineering options such as compliance with the design guidance in ASCE 7-16/ASCE 7-22 can combine with the siting measures to further reduce risks. Design measures typically include strengthening a structure's capacity for accommodating hydrostatic loads (pressure from high water levels) and impact loads from possible water-carried debris. However, to date, Poseidon has provided just limited information on the potential engineering options that would be used. As noted above, Poseidon's CDP application initially proposed using design standards applicable to "commercial" structures. They more recently stated they would build to Structural Risk Category III standard and provided a general description of what would be needed to build to the most protective Category IV standards, though they have not yet provided updated construction drawings. The pump stations will be sited in the area that could experience tsunami inundation under current sea level conditions and those potential risks would increase with greater sea level rise. With 3.3-feet of sea level rise, inundation would approach the base of processing tanks and with greater sea level rise, the tanks could be threatened. The extent to which sea level rise greater than 3.3 ft could affect tsunami risks was not analyzed in Poseidon's model. In addition, typical engineering design measures are focused largely on the integrity of structures on the site and do not address or ensure that the supporting services and infrastructure can continue operating during and immediately following a disaster.

The LCP requires that development have adequate services to serve the proposed development and, as a critical facility, the proposed development should be sited, designed, and constructed to minimize risk of damage and maximize continuation of key functions. The first consideration for LCP conformity is siting. Poseidon's modeling demonstrates that it can minimize (but not eliminate) inundation effects from a tsunami at the proposed location by raising the elevation of the site. This may protect the key facilities from tsunami-associated inundation but would not ensure that the site could function after a large tsunami. Facility components at or below the level of inundation could be damaged by debris and scour. More significantly, by siting the facility in an extensive, low-lying coastal area that is vulnerable to tsunami hazards, Poseidon cannot guarantee that its facility will be able to deliver critical drinking water supplies after a major tsunami event. Roadways and bridges many be damaged by debris or scour, making it difficult for workers, emergency personnel, or construction/repair workers to travel to and from the site. Water lines out of the site and utilities into or out of the site could be damaged, making it difficult to pump, process and distribute water from the site. Many of these factors are out of Poseidon's direct control, but by choosing a site with significant vulnerability to these hazards, Poseidon jeopardizes the ability of its facility to function after a tsunami.

The next consideration for LCP conformity is design and construction. As described above, the main design feature Poseidon has proposed to protect its facility in the event of a tsunami is to elevate the site and many of its structures above the expected inundation elevations. This will serve to protect most of its project components under most expected tsunami conditions. However, as described in detail above, some key facilities, including pumps, chemical storage facilities, and other components are proposed at lower elevations, exposing these facilities to potential inundation that could affect the facility's ability to function after a tsunami. Furthermore, Poseidon has not adequately addressed concerns related to damage and scour from tsunami debris and high velocity flows. At the site, this would involve designing and constructing the building to a higher standard as described in Section II.E – Critical Facilities, which could involve stronger foundations and walls that could resist the loads imposed by tsunami runups. However, these additional building requirements could result in additional impacts to coastal resources that have not been fully identified or assessed.

The project, as proposed, does not include sufficient measures to conform to LCP provisions regarding tsunami hazards. Its current design (which is not to Category IV standards) does not conform to LCP Policy C 10.1.4, which requires appropriate engineering and building standards, or Policy C 1.1.9, which requires the minimization of risks to life and property. Goal C1.1 also requires adverse impacts be mitigated or minimized to the greatest extent feasible, and in this case, Poseidon has not minimized impacts to the greatest extent feasible, as it has not designed to higher building standards. Because Poseidon did not design and analyze its facility as one meant to remain operational after tsunamis or other hazardous events, it is not clear how or whether Poseidon could design, construct, or operate its facility to allow for ongoing operations in the event of a tsunami.

More fundamentally, although Poseidon could likely address many of these concerns by incorporating feasible design and construction measures into its facility, it may not be able to rely on vulnerable infrastructure in the surrounding area. As described in the policy analysis for seismic risk, above, much of the surrounding infrastructure is low-lying and was not built to current safety standards. Siting an expensive, interconnected piece of public-serving infrastructure in this location would not conform to Coastal Act and LCP policies requiring that development be sited in areas able to accommodate it and where public services will be available. These risks should also be seen as cumulative risks given that the site is also subject to flooding, ground shaking, and other hazards and that the project would have a relatively high probability of experiencing any one of the many expected risks.[86] Therefore, and based on the above, the Commission finds that the proposed project does not conform to the above-referenced provisions of the LCP.

[86] Using the same combined probability calculations described elsewhere in these Findings, Poseidon would have a greater than 80% probability of experiencing any one of the following – a 100-year flood, a 100-year tsunami, or an earthquake of 7.0 M_W or greater – during a 50- to 60-year operating life.

H. COASTAL HAZARDS – FLOODING & EFFECTS OF SEA LEVEL RISE

The LCP and Coastal Act policies listed above in the Geologic Hazards – Seismic section also apply to flood risk. In addition,

LCP Policy C 10.1.14 states:

> During major redevelopment or initial construction, require specific measures to be taken by developers, builders or property owners in flood prone areas (Figure C-33), to prevent or reduce damage from flooding and the risks upon human safety. Development shall, to the maximum extent feasible and consistent with the Water and Marine Resources policies of this LCP, be designed and site [sic] to:
>
> a. Avoid the use of protective devices,
> b. Avoid encroachments into the floodplain, and
> c. Remove any encroachments into the floodplain to restore the natural width of the floodplain.

LCP Policy C 10.1.15 states:

> Maintain and upgrade, as appropriate, the County of Orange and the City of Huntington Beach's flood control systems in conjunction with the Santa Ana River Main Stem Project to minimize hazards due to flooding. To the maximum extent feasible, upgrading to the 100- year flood event should be accomplished through development setbacks and the removal of encroachments into the floodplain. Upgrades to the flood control system shall incorporate the best mitigation measures.

Coastal Act Section 30270 states:

> The commission shall take into account the effects of sea level rise in coastal resources planning and management policies and activities in order to identify, assess, and, to the extent feasible, avoid and mitigate the adverse effects of sea level rise.

Summary
The above LCP and Coastal Act provisions generally require that development proposed in areas subject to floods be sited to avoid flood hazards or to include measures that reduce the effects of these hazards. The LCP specifically requires that development in areas subject to flooding must avoid the use of shoreline protective devices and, to the extent feasible, avoid encroachment into the floodplain. The LCP also specifically supports the removal of encroachments into the floodplain. The LCP and Coastal Act further require that new development be located in areas able to accommodate it, including that it can be served with adequate public services.

Although most of the City's LCP provisions predate modern discourse and policymaking related to climate change and sea level rise, those provisions nonetheless directly address concerns about flooding and other hazards expected from sea level rise and climate change. The LCP's Environmental Hazards Chapter, completed in 1996, identifies the proposed project site as being within a City-designated Flood Zone (see

Exhibit 12 – City of Huntington Beach Flood Zones Map). The City's 2017 Local Hazard Mitigation Plan ("LHMP") also establishes FEMA-approved provisions to minimize the risk of hazards to the City's residents, infrastructure, and critical facilities, including by siting, designing, and constructing all critical facilities to continue operations in an emergency. FEMA has established that planning and siting for "critical facilities," which include water facilities such as the proposed project, should be based on avoiding risks from the 500-year flood event.[87] Additionally, the City's 2017 General Plan Update and its accompanying EIR established minimum development requirements based on FEMA regulations that require new development in flood hazard areas be designed to resist flood effects and minimize flood damage. All these non-LCP provisions can be used as context to interpret the extent to which flooding hazards need to be minimized pursuant to Coastal Act and LCP provisions that are the standard of review.

Furthermore, Section 30270 of the Coastal Act requires the Commission to identify, assess, and, to the extent feasible, avoid and mitigate the adverse effects of sea level rise in its actions. In line with statewide recommendations and goals, the Coastal Commission has released a variety of guidance for how to address sea level rise in the context of the Coastal Act. Most recently, Critical Infrastructure at Risk: Sea Level Rise Planning Guidance for California's Coastal Zone (adopted by the Commission in November 2021) notes that the nature of critical infrastructure – that it has a long lifespan, is large and made up of networked and interconnected assets, provides services on which the public relies, and so on – magnifies the potential consequences of sea level rise impacts and highlights the importance of careful and informed decision-making and adaptation planning. Recommendations in the Critical Infrastructure Guidance include evaluating the extreme (H++) sea level rise projection scenarios over the lifetime of the project to ensure that potential impacts are well-understood, and that new critical infrastructure will be sited and designed in a way that accounts for future sea level rise, and identifying possible adaptation options that may be necessary to address future impacts.

Poseidon's proposed project would not conform to several relevant LCP and Coastal Act provisions, due largely to Poseidon's selection of a site within an extensive, low-lying area of Huntington Beach expected to be subject to relatively severe effects of sea level rise and fluvial flooding during Poseidon's 50- to 60-year proposed operating life. Although the risks of flooding on the main proposed site of Poseidon's facilities will be relatively low due to the proposed elevation of the site by Poseidon, there will be some risk from the 500-year fluvial flooding event. More critically, the areas surrounding the proposed site are at lower elevations that would already be regularly flooded if it were not for existing floodwalls, pumping systems, and other flood-control measures. Even taking these existing protections into account, a tipping point for flood risk on surrounding roadways is likely in the range of three to four feet of sea level rise, where flood waters could potentially bypass the existing floodwall system. To maintain access to its facility over time, Poseidon would therefore rely on multiple public agencies and

[87] See, for example, FEMA Publication 543, Design Guide for Improving Facility Safety from Flooding and High Winds, January 2007.

utilities to plan, fund, and implement major changes to the local and regional infrastructure. However, it is not clear at this time what types of adaptation measures will need to be taken, whether they are feasible, or what resource impacts they could have. Further, Poseidon's facility itself, once built, would have limited ability to adapt to increasing hazards, as it could not easily be moved, elevated, or provided with different access points. Siting such a major infrastructure project in an area with known flooding risks that will worsen with sea level rise over the proposed functional life of the project and with no clear path forward for addressing worsening sea level rise impacts beyond the proposed project lifetime does not carry out the type of forward-looking risk management and planning called for by the Coastal Act and LCP.

Project Setting and Hazards Background

Poseidon's proposed site is located about 1,500 feet inland from the current open ocean shoreline within an extensive low-lying area of Southeast Huntington Beach. Much of Southeast Huntington Beach historically was tidal wetlands that extended approximately 0.5 to 1.5 miles inland,[88] including throughout the proposed project site, and the area has a long history of often severe flooding events. Most of these wetlands have since been drained, filled, or otherwise developed, including those that used to exist at the proposed site. Even with this development practice, large portions of the Southeast Huntington Beach have elevations near, at, or below the elevation of the current average daily higher tide (as shown in **Exhibits 3** and **4**), which reaches 5.3 feet NAVD88.[89] The highest seasonal tides— often called king tides—currently have elevations of about 7.3 feet NAVD88. Without the City and County's extensive system of flood channels, floodwalls, stormwater pumps, and other drainage infrastructure, large portions of Southeast Huntington Beach would be inundated by high tides under existing sea levels and tidal ranges. Poseidon's proposed site is slightly higher than the surrounding area – mostly ranging from about eight to 12 feet NAVD88 – though the site is serviced by roads, utilities and other infrastructure that traverse the surrounding, lower areas. For example, Newland Street near the proposed site ranges from six to 10 feet NAVD88.

Shoreline Change

The proposed project site is about 1,500 feet inland from Pacific Coast Highway which is fronted by approximately a 500-foot-wide sandy beach. This part of Huntington Beach has been protected for decades from coastal erosion by a sand replenishment program, without which the area's beaches would likely be significantly narrower and would

[88] Grossinger, RM, ED Stein, KN Cayce, RA Askevold, S Dark, and AA Whipple 2011. Historical Wetlands of the Southern California Coast: An Atlas of US Coast Survey T-sheets, 1851- 1889. San Francisco Estuary Institute Contribution #586 and Southern California Coastal Water Research Project Technical Report #589.

[89] The mean higher high water or MHHW tidal datum for the Los Angeles tide gage for the 1981-2001 National Tidal Datum Epoch is approximately 5.3 feet, NAVD88 and represents the average higher of the daily two high tides.

provide much less protection from the effects of sea level rise.[90] While it is highly unlikely that Poseidon's site would directly experience erosion in the foreseeable future due to beach narrowing, the protection the beach provides to the surrounding area and infrastructure, such as roads and bridges, would likely diminish with cessation or reduction of the sand replenishment program.[91]

For the seaward components of Poseidon's project – the portions of the power plant intake and outfall structures that are offshore and near-shore – beach erosion could cause the potential exposure of, and possible damage to, those structures. The intake and outfall structures are currently buried several feet beneath Huntington State Beach, though they include several access ports that extend upward to just a few feet below the current beach. Exposure of these ports or the intake and outfall pipes could result in damage to the structures, harm to marine life, and could adversely affect public access to the shoreline (see Section II.M – Public Access).

While this existing outfall is not new development, Poseidon proposes to use it for a new purpose and would add new development to it in the form of intake screens, diffusers, and riprap on the ocean floor needed to support these new components. The Coastal Act and LCP require that this new use and development not create or contribute significantly to the destruction of the site or surrounding area and not require the construction of protective devices. The furthest offshore components are not likely to require protective devices but the access ports under the beach, if exposed due to beach erosion, would potentially need to rely on a prohibited protective device for continued safety against damage. If the Commission were to approve this project, the approval could require a Special Condition that prohibited such devices and that required Poseidon to propose measures to address the exposed outfall if it occurs.

Present Flood Risks and Existing Conditions

Due to the low-lying nature of the area surrounding Poseidon's proposed site, flooding is and will increasingly be a concern. However, Poseidon's facility would be relatively safe from flooding hazards under current conditions in large part due to the siting of most of its buildings and structures on elevated building pads. Much of the current flood risk to the site and area is currently reduced through a network of flood protection and drainage infrastructure, though the risk is not eliminated, particularly for lower probability high consequence events such as a 500-year flood event.

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[90] See, for example, Orme et al., Beach changes along the southern California coast during the 20th century: A comparison of natural and human forcing factors, in Shore & Beach, Vol. 79, No. 4, Fall, 2011. This report notes that beach width in Southeast Huntington Beach increased due to beach nourishment by about 300 feet between 1947 and 2002, and states that "[t]he coast from Sunset Beach to Newport is thus an artificial system where repeated nourishment tends to maintain unnaturally wide beaches in the face of a long-term narrowing trend."

[91] This project is described in more detail in U.S. Army Corps of Engineers, Review Plan: Surfside-Sunset (Stage 13) San Gabriel River to Newport Bay Orange County, California for Design Documentation Report and Plans & Specifications, Revised September 9, 2014. Since 1963, the program has delivered a total of about 18 million cubic yards of sand during about a dozen different replenishment events occurring on an average of every five years, for an average replenishment rate of about 350,000 cubic yards per year.

In the 1960s, and in response to flood events of the previous several decades, the Orange County Flood Control District ("OCFlood") built the Huntington Beach Flood Control Channel, a portion of which runs along Poseidon's site. It was originally designed to convey a 10-year storm event but was later modified in the 1990s and 2000s to allow conveyance of a 100-year storm event with a design discharge of about 2,300 cubic feet per second ("cfs") at a water surface elevation of about nine feet NAVD88.[92]

The flood control channel is currently not designed to accommodate more than minor increases in sea level or higher flood flows. While OCFlood is conducting repair and maintenance projects along parts of the channel (for example, sheet pile replacement through CDP 5-20-0590-W), it has not identified any comprehensive plans to design or construct needed modifications to accommodate expected increased flows or higher tailwaters.

In December 2009, the Federal Emergency Management Agency ("FEMA") classified Poseidon's proposed project footprint as being within its "Zone X," category, which includes areas that are within the 500-year floodplain but are partially protected from the 100-year flood by levees.[93] The elevation of the top of the flood channel wall gradually increases from a minimum of around 12 feet at Brookhurst Marsh and is approximately 13 feet NAVD88 near the project site. The area of Poseidon's site between the flood control channel and the adjacent containment berm is within FEMA's designated 100-year floodplain and is currently connected by a culvert to the flood channel, which allows flood waters to reach the base of the current berm.

The flood channel is designed for the current 100-year flow event (caused by intense rainfall and stormwater discharges); however, most of the time, the flood channels are dominated by the flow of the tidal waters entering from the Pacific Ocean via the channel outlet and the Huntington Beach Wetlands system. Without the flood channel walls, the proposed site and surrounding area would be inundated during periods of high ocean water levels. The highest observed water level at the nearest active NOAA tide gauge (Los Angeles 9410660) is 7.7 feet NAVD88, below the current estimated 100-year return period ocean water level of 7.9 feet NAVD88.[94] Given the low-lying elevations around the project site (e.g., the facility entrance at Newland St. (2 to 10

[92] See November 13, 2018 Magnolia Tank Farm Draft EIR, Appendix H1 – Infrastructure Technical Report for Hydrology, Fuscoe Engineering, Irvine, California.

[93] See the December 15, 2009 FEMA Letter of Map Revision Determination Document, which applies to areas around the lower Huntington Beach Flood Channel adjacent to Poseidon's proposed site. The letter's Zone X designation for Poseidon's site describes the site as an area protected by levees from 1% annual chance flood, though it notes that "[o]vertopping or failure of any levee system is possible." The FEMA designation also notes that the level of protection provided by the levees relies on a local Emergency Action Plan and that any more stringent floodplain development standards developed by the state or local community would take precedence of the minimum requirements of the National Flood Insurance Program.

[94] NOAA Tides and Currents, 2018, Extreme Water Levels for Los Angeles Tide Station 9410660.

feet), the adjacent mobile home park (4 to 10 feet), and Pacific Coast Highway (8 to 10 feet)), access to Poseidon's facility would temporarily be blocked during times that high ocean water levels coincide with reduced flood conveyance, a failure in the flood channel walls, or lack of capacity from the series of pumps and stormwater conveyance features associated with the flood channel. To this end, the project would rely on OCFlood to maintain the flood channel walls and related stormwater infrastructure in order to ensure safe access to the site. As noted in Section II.F – Seismic Hazards, the channel's recent sheet pile replacement project uses design standards substantially less than those needed to resist the area's Maximum Credible Earthquake, further putting the project site at risk of flooding impacts in the event of damage to the flood channel walls. However, the existing system's capacity to handle a specific magnitude of event is unknown.

Future Flood Risks with Sea Level Rise

Sea level rise considered: Based on the current best available science on sea level rise projections for the State of California,[95] Huntington Beach could see as much as 6.4 feet of sea level rise under the H++ scenario for extreme risk aversion, 4.3 feet (medium-high risk aversion scenario), and 2.2 feet (low risk aversion scenario), during Poseidon's proposed 50- to 60-year operating life. Sea levels will also continue to rise at an increasing rate beyond the operating life of the proposed project, with up to 13.8 feet of sea level rise projected over the next 100 years under the H++ scenario, putting the site and any remaining structures at significantly increasing risk.

Statewide guidance from the Ocean Protection Council (OPC), the Coastal Commission, and other agencies recommend that agencies take a precautionary approach to sea level rise planning by avoiding relying on the lower projections in planning and decision-making processes. Further OPC recommends that agencies use the highest projections of sea level rise to inform decisions regarding important, long-term infrastructure projects like Poseidon's proposed project. The 2018 OPC State Sea-Level Rise Guidance specifically states:

> For longer lasting projects with less adaptive capacity and medium to high consequences should sea-level rise be underestimated, we suggest that decision makers take the more precautionary, more risk-averse approach of using the medium-high sea-level rise projections across the range of emissions scenarios. We further recommend incorporating the H++ scenario in planning and adaptation strategies for projects that could result in threats to public health and safety, natural resources and critical infrastructure, should extreme sea-level rise occur.

[95] The State currently recognizes the 2018 OPC State Sea-Level Rise Guidance and the related 2017 Rising Seas in California technical report as best available science on sea level rise for the state of California.

The Commission's 2018 Sea Level Rise Policy Guidance and recently adopted Critical Infrastructure Guidance integrate this statewide guidance by recommending that analyses use the extreme risk aversion scenario (H++) for projects with little to no adaptive capacity that would be irreversibly destroyed or significantly costly to repair, and/or would have considerable public health, public safety, or environmental impacts should that level of sea level rise occur. Critical infrastructure generally falls into this category because such assets have long lifespans, are often larger and/or include networked systems that extend beyond a single site, involve significant financial expenditures (including to develop, maintain, and upgrade structures), include potentially hazardous materials that could negatively impact the environment and public health if structures are damaged, or provide critical public services that would disrupt or risk people's lives if temporarily or permanently lost due to hazard impacts. As further described in the Critical Infrastructure Guidance, these factors combine to reduce adaptive capacity for these structures, and to make adaptation planning more complex, costly, and time-consuming. This does not mean that every project must be designed to be safe from the H++ scenario. However, critical infrastructure should be analyzed for the H++ scenario to understand what the associated impacts could be, particularly for new development, so that planners and decision-makers can understand and identify steps needed to adapt to this scenario if and when it occurs, including planning for how structures would be removed or otherwise adapted when they are no longer safe, so that the risks and benefits of critical infrastructure investments are fully understood.

Summary of past studies: Past studies focused on current and future flood risk with sea level rise illustrate the extensive flood risk of the low-lying portions of South Huntington Beach. At the local level, the City of Huntington Beach recently completed two studies that assess the expected effects on the City, including the proposed project site, from sea level rise and climate change. The City's 2014 Sea Level Rise Vulnerability Report identifies several severe consequences of sea level rise and climate change on Huntington Beach. The Report shows that areas adjacent to, and surrounding, the Poseidon site will experience short- and long-term inundation, though that Report's analyses and projections go just to 2050, so they only identify expected impacts at and near the project site during the first half of the project's proposed operating life. The City's 2021 update of a draft Sea Level Rise Vulnerability Analysis notes that the City's coastal development overall has low adaptive capacity and that over the short- to mid-term, some protection may be available through temporary flood protection measures, though these would not be expected to be sufficient for all areas or long-term. The report also notes that there is high hazard exposure to the stormwater and sewer infrastructure in the area surrounding Poseidon's site and notes that two critical facilities - the adjacent AES power plant and the nearby Orange County Sanitation District wastewater treatment plant – would be vulnerable to flood hazards with an increase in sea level of about 4.9 feet. It notes, too, that these two facilities, as well as nearby potable water infrastructure, have low adaptive capacity and that it may be a challenge to keep them functioning while implementing necessary adaptive measures for the surrounding areas. More recent groundwater modeling (described below) shows increased flooding hazards in much of the area, though this is not included in the aforementioned City studies.

In 2017, the City published its Local Hazards Management Plan, which describes the City's vulnerability to a number of different hazards, including sea level rise, flooding, and others. This Plan also includes mitigation measures the City identified as options to avoid or reduce its vulnerability to these hazards. The Plan is meant to ensure the City conforms to regulations of the Federal Emergency Management Agency ("FEMA") and make the City eligible for federal grants and other funding available through FEMA to help implement the identified measure. The Plan includes several recommended mitigation actions, including Mitigation Action 2.4, which states: "Discourage major new development and redevelopment efforts within the Sea Level Rise Hazard Zone." The City's General Plan shows this Hazard Zone extends to the Upper Magnolia Marsh next to Poseidon's site, though the analysis goes only to 2050, and this doesn't include longer-term sea level rise vulnerabilities.

High tide flooding: As previously discussed, large portions of South Huntington Beach are below both average and extreme high tides. The areas at risk of high tide flooding will increase with sea level rise, as will the potential for damage to occur as potential flood depths would increase. Because the effectiveness of the flood channel walls in the future is uncertain, it is clearer to describe the elevations of key facilities and infrastructure that would be below potential tide levels, understanding that the flood channel walls currently provide substantial flood protection.

Under present sea levels, Newland Street north of the Huntington Beach Flood Control Channel is already at low enough elevations to flood several feet during an average high tide. South of the project site, Newland Street could be exposed to approximately a foot of flooding during a 100-year return period ocean water level with one foot of sea level rise. With two feet of sea level rise, the site's access points on Newland Street will be below King Tide elevations. With three feet, Pacific Coast Highway near the project site will be at risk of flooding, and Newland Street at the project site would be below the average daily higher tide. With four feet of sea level rise, the flood channel walls that currently protect low-lying communities from flooding daily could become ineffective for the low-lying areas around the project site as surface overflow from the wetlands could flow to the north and south of the project site and the AES facility; Pacific Coast Highway will be below King Tide elevations. With five feet of sea level rise, the flood channel walls would have elevated risk of overtopping in areas during dry-weather conditions with extreme tide levels. With over six feet of sea level rise, the finished floor elevations of some of Poseidon's proposed facilities (14-16 feet, NAVD88) could start to become exposed to extreme ocean water levels.

Fluvial stormflows: Higher ocean water levels are expected to worsen flood risk during periods of intense storm flow through the OCFlood flood channels, as higher fluvial flows are required to displace higher water levels in the channels during high tides. While no site-specific modeling was conducted for Poseidon's analysis, previous modeling efforts for Huntington Beach Flood Control Channel were used to estimate the effects of sea level rise on fluvial flood risk. The existing 100-year flood elevations at Newland St. Bridge of approximately 9.6 feet NAVD88 are expected to increase to 10.6, 11, and 13.5 feet NAVD88 with 2, 3, and 5.5 feet of sea level rise respectively. As

previously mentioned, the top of the existing flood channel walls is approximately 13 feet NAVD88 at Newland St. Bridge. Based on the approximate figures presented by Moffatt & Nichol, it appears that overtopping of the flood channel walls could occur during a 100-year stormflow event with around 5 feet of sea level rise; however, typically flood control structures such as levees are designed to incorporate multiple feet of freeboard to account for uncertainty in flood estimates. However, this recent evaluation did not incorporate the likelihood that flood conveyance would be reduced due to blockages caused by debris being trapped within the channel and under bridges, which could result in increased upstream water elevations. The existing flood risk from more extreme events such as the 500-year stormflow event are also expected to increase with sea level rise. Likewise, scientific understanding of the effects of climate change on precipitation frequency and intensity are uncertain but suggest that the storms will become more intense and more frequent for California,[96] with the result being a 100-year stormflow (and other extreme storm events) could occur more frequently.

Groundwater: The surficial groundwater table at the project site and the surrounding area is brackish and is hydraulically connected to the ocean. Groundwater levels in the area are presumed to be primarily influenced by precipitation, evapotranspiration, and ocean water levels as well as by the City's drainage infrastructure. The project's 2013 EIR described a "shallow near-surface [groundwater table] with depths ranging from five to seven feet under the surface of the project site" where the project site was estimated to be "five feet above mean sea level". This is consistent with recent groundwater elevation observed at the nearby ASCON A-5 monitoring well at roughly 0.6 to 2.6 feet NAVD88.[97] The ASCON monitoring also suggests that groundwater currently flows in the north-northwest direction, suggesting the groundwater table lowers in elevation as it moves towards the lower-lying areas to the north of the Poseidon site. Sea level rise can cause groundwater shoaling where elevated ocean water levels increase the surficial groundwater levels in coastal areas potentially to the point where the groundwater can become "emergent" and seep from the ground as runoff.[98]

Groundwater is not expected to be emergent at the project site due its higher elevation. However, recently modeling by USGS suggests that groundwater could increasingly be at risk of being emergent in the lower-lying areas around the site, including the low-lying portions of Newland St, used to access the site. Emergent or extremely shallow

[96] See Swain et al., Increased Flood Exposure Due to Climate Change and Population Growth in the United States, in "Earth's Future," American Geophysical Union, Volume 8, Issue 11, November 2020.

[97] The Ascon monitoring reports and other relevant documents are available at DTSC's EnviroStor site: https://www.envirostor.dtsc.ca.gov/public/profile_report?global_id=30490018

[98] See, for example, USGS, Projected groundwater emergence and shoaling for coastal California using present-day and future sea-level rise scenarios, August 2020, at: https://data.usgs.gov/datacatalog/data/USGS:5bd9f318e4b0b3fc5cec20edx

groundwater tables can further strain the City's drainage infrastructure, and potentially cause issues for foundations and buried pipelines (including the distribution pipelines proposed by Poseidon), if not designed for increased buoyancy forces, in addition to reducing the infiltration storage capacity of the area during storms. While these risks are likely manageable through upgrades to infrastructure and increased maintenance, they contribute to the elevated risk in the area and require solutions outside of Poseidon's control.

Probability of extreme events: During the Commission's 2013 review, when Poseidon was proposing a 30- to 35-year operating life, staff determined that the probabilities of the facility being affected by at least a 100-year or at least a 500-year flood during its then-proposed 30-year operating life were about a 1 in 4 chance and a 1 in 16 chance respectively. With the currently proposed operating life of up to 60 years, those probabilities increase to about a 1 in 2 chance of the facility experiencing a 100-year flood and about a 1 in 10 chance of it experiencing a 500-year flood. However, in the face of climate change, fluvial flood risk is likely to increase.

Table H-1 – Probability of given ARP events or larger occurring over a given project lifespan:

Lifespan (years)	Average Return Period (ARP)	
	100-year	500-year
30 years	26%	6%
60 years	45%	11%

Summary of future flood hazards: The Poseidon facility site would largely be protected from flooding hazards due to its relatively high elevation, but the access routes to the site, the distribution pipeline route, and surrounding areas face considerable flood risk both now and increasingly with sea level rise. While floodwalls presently provide protection from both high tide and fluvial flooding, elevated groundwater levels will still pose concern to buried infrastructure, foundations, and flood storage capacity to the low-lying areas surrounding the project site. The risk of most concern to the Poseidon site would be a catastrophic failure of the floodwalls in the Huntington Beach Flood Control Channel during an extreme stormflow event, which would result in the highest flood risk both at the project site, as well as the highest chance for damage from strong currents. Sea level rise will reduce the protective capacity of the floodwalls and increase the risk of overtopping, something already potentially plausible during a 500-year event.

In terms of the surrounding area, including supporting infrastructure such as roadways, a tipping point for flood risk is likely in the range of three to four feet of sea level rise (projected to occur as early as 2060-2070 under the H++ and medium-high projection scenarios), where flood waters could potentially bypass the existing floodwall system. With five to six feet of sea level rise (projected for 2070-2090), the freeboard in the flood control channel would be greatly reduced and at risk of overtopping during extreme events. As noted, in Moffatt & Nichol's vulnerability analysis, the area surrounding Poseidon's site would likely be significantly transformed by sea level rise and there is

great uncertainty as to how the region would adapt to such a dramatic change in conditions. Notably, sea levels will continue rising beyond the proposed operational life of the Poseidon infrastructure, further putting this area and proposed development at risk. Current best available science projects that sea levels will rise at an increasing rate, particularly in the latter half of this century, with 6.7-9.9 feet projected by 2100 (medium-high and H++ scenarios, respectively).

Poseidon's Plans for Addressing Coastal Hazards

Poseidon proposes to elevate much of its site to allow finished floor elevations for some of its structures at 14 to 16 feet NAVD88. This would place most of the site above expected sea levels for the facility's 50- to 60-year operating life. However, the surrounding lower elevation area, including roads and bridges providing access to the site and other supporting infrastructure are expected to be inundated during currently anticipated increases in sea level during that time. Some of these nearby areas are already vulnerable to flooding. For example, the facility's main access point at Newland Street and Edison Drive is partially protected by a floodwall and drainage system but is below the approximate 7.0-foot NAVD88 elevation of current "King tide" elevations.

With continued sea level rise beyond Poseidon's proposed operational lifetime, or if sea level rise ends up accelerating to more extreme levels, Poseidon has limited options to adapt its facilities to maintain emergency water supply to the City without relying on shoreline protection devices such as additional floodwalls or levees. Potential additional adaptation measures could include retroactively elevating sensitive processing equipment, adding additional ballast to vulnerable buried infrastructure and foundations, or dry floodproofing the exterior of structures to prevent floodwaters from entering areas with sensitive equipment.

However, it is out of Poseidon's control as to how the surrounding area might adapt to rising flood risk. The OCFlood and City infrastructure currently provides protection to both the site and the surrounding area, but the Commission is unaware of any concrete plans to adapt the area to significant sea level rise. Potential adaptation strategies that might be considered could include significant upgrades to the flood channel walls, creating or restoring natural flood storage capacity, large scale elevation of roads, infrastructure, and existing development, upgrades to City drainage and pumping infrastructure, or managed retreat. All these options will take significant planning time and resources to identify, develop, and implement, and no such broad scale detailed planning has been completed.

Importantly, the impacts of any of these larger scale adaptation strategies have yet to be analyzed under the Coastal Act and could feasibly have significant impacts on coastal resources. For example, raising floodwalls often has the effect of worsening flood risk both and up and downstream. Further, the proximity of Poseidon's site to the flood channel – within just a few feet – could limit adaptive measures that might otherwise be available to protect the surrounding area, contributing to concerns about the adaptive capacity of the proposed project and long-term adaptation implications for this area of Huntington Beach.

Consistency Analysis and Conclusions

Coastal Act Section 30253, which applies to the portions of the project within the Commission's jurisdiction, requires that new development minimizes risks to life and property in areas of high flood hazard, that it assures stability and structural integrity, and that it not require the construction of a shoreline protective device that would substantially alter natural landforms along bluffs and cliffs. Section 30250 requires that new development "shall be located within, contiguous with, or in close proximity to, existing developed areas able to accommodate it or, where such areas are not able to accommodate it, in other areas with adequate public services." Similarly, the LCP – which is the standard of review for portions of the project on appeal – requires that new development be designed to assure stability and structural integrity, that it minimize risks to life and property in areas of high flood hazard through siting and design to avoid the hazard, and that it not require protective devices. (LUP Policy C 1.1.9.) The LCP also states that new development should be located within or near existing developed areas able to accommodate it or, where such areas are not able to accommodate it, in other areas with adequate public services. (LUP Policy C 1.1.1.) A CDP may not be issued unless adequate public services and facilities will be available to serve the proposed development. (LUP Policy C 1.2.3; CZO Section 221.16.) Critical facilities—such as Poseidon's proposed project—must also be sited, designed, and constructed to be able to function after various hazardous events. (See Section II.F discussion of critical facilities.)

For the seaward components of Poseidon's project that are within the Commission's retained jurisdiction – the offshore portions of the power plant intake and outfall structures – the most likely adverse effects would result from beach erosion and the potential exposure of, and possible damage to, those structures. Those structures are several feet below the usual sand depths at the beach, though they include access ports that extend a few feet above the intake and outfall pipelines. Under extreme erosion events, these could be exposed and damaged by wave-borne debris. Were this proposed project to be approved, any permit would likely need to include special conditions to require monitoring of sand levels and identifying measures to be taken should they be exposed, including no future shoreline protective devices and adapting the structures to avoid further damage or impacts. However, given the other Coastal Act and LCP nonconformities identified herein, these conditions would not be sufficient to provide overall conformity of the project with the Coastal Act and LCP.

For the landward portion of the project within the City's LCP jurisdiction, potential impacts include inundation of some low-lying or buried project components, with the risks and hazards of that inundation increasing with the continued increase in sea level elevations. Poseidon has proposed some design measures, such as elevating much of its site and installing stormwater BMPs, to help reduce the risks of flooding and sea level rise. Specifically, Poseidon proposes to elevate much of its site to a level that would place its facilities above expected sea levels for the facility's 50- to 60-year operating life, and above most potential fluvial flooding scenarios. These measures, in combination with the existing, surrounding flood protection and drainage infrastructure, will assure stability and structural integrity for the main project buildings and

components and will adequately minimize on-site flooding hazards under almost all of the predicted sea level rise and fluvial flooding scenarios. However, the risk is not completely eliminated, particularly for lower probability, high consequence events such as a 500-year flood event. In addition, some pipelines would potentially be subject to risk from rising groundwater over time, and if the project were otherwise approvable, this risk could be addressed by imposing a condition that requires adaptive design to address that issue, such as adding ballast to buried infrastructure.

The larger risk for the proposed project relates to the fact that it would be located in a low-lying area where the infrastructure around the project site will be subject to increasing risk of flooding over the coming decades. Although Poseidon proposes to elevate its site in order to minimize risks of flooding in that location, the Commission's 2018 Sea Level Rise Policy Guidance describes how elevating development in this manner does not address the issue that such mitigation "may be of little long-term utility to the property owner if the supporting infrastructure, such as the driveways, roads, utilities or septic systems are not also elevated or otherwise protected." The Guidance notes that "the long-term options for adaptation should be considered as part of any permit action, to ensure that current development decisions are not predetermining resource impacts in the future." In the past, the Commission has denied proposals to construct large infrastructure projects on elevated building pads within flood zones. For example, in the case of a proposed wastewater treatment plant, the Commission found that:

> …adding this amount of fill at the project site will result in the [project] being confined to an 'island' with floodwaters all around during a flood event. During the 100-year flood event, these surrounding floodwaters would range from approximately two to five feet deep along Atascadero Road, the only vehicle access to the site. Therefore, in a 100-year flood, when equipment is at most at risk for failure, it would be difficult for plant operators to reach the site, potentially increasing the risk of a malfunction or sewer spill… In a 100-year flooding event, the [project site] would be an island, which doesn't conservatively minimize hazard risk as required by the LCP.[99]

It is not necessary or feasible to guarantee that Poseidon's site will completely avoid all risk of flooding and be accessible at all times in order to find Coastal Act and LCP consistency. Nor is it necessary at the time of any project approval to specify with certainty the future adaptation measures that will occur to protect the site and area from, or adapt the site and area to, sea level rise or other coastal hazards. However, it is appropriate—particularly for an entirely new, expensive, complex, and long-lasting infrastructure proposal that is meant to serve the public and provide an emergency water supply – to analyze the suite of risks that the facility will face over its lifetime and to determine whether there are reasonably feasible potential adaptation pathways that will adequately minimize risks, ensure protection of coastal resources, and provide continued access and services.

[99] See https://documents.coastal.ca.gov/reports/2013/1/Th23b-1-2013.pdf.

The state in general, and Coastal Commission specifically, have prioritized sea level rise adaptation planning, and they have issued numerous guidance documents calling for new development to be built with long-term safety and adaptation in mind, including understanding how proposed development will be addressed at the end of its functional lifetime or when hazards reach a point such that development is no longer safe or coastal resources are negatively impacted by the development. The existing and historical pattern of development is such that a number of critical facilities have been built in locations that are already or soon will be exposed to coastal hazards as a result of sea level rise and climate change. This situation has already resulted in the need for a variety of emergency and short-term responses that necessitate accepting a higher amount of risk and coastal resource impacts while a longer-term approach can be identified, developed, funded, and implemented. While this sort of phased adaptation planning is an appropriate approach – or in many cases the only option – for existing critical infrastructure, knowingly placing new critical facilities in locations that will be exposed to increasing sea level rise hazards is out of line with informed sea level rise planning and other statewide adaptation priorities. The Coastal Act was also recently amended to include a new provision – Section 30270 – that requires the Commission to identify, assess, and, to the extent feasible, avoid and mitigate the adverse effects of sea level rise in its actions. Coastal Act Section 30250 and the various LCP policies carry out these goals and requirements by requiring that new development be built in areas able to accommodate it and where there will be adequate public services available to serve the development over its lifetime.

Poseidon first proposed constructing its facility at this location more than 20 years ago at a time when sea level rise projections were much lower, expected hazards were less severe, and adaptation planning was in its infancy. However, much has changed since then in terms of the state's understanding of sea level rise and coastal hazards risks. The area around Poseidon's facility will be subject to a variety of flooding risks over the facility's proposed functional lifetime. It would also be an expensive, interconnected piece of critical infrastructure meant to provide public water (including emergency water supplies), and would need to be able to operate during and after an emergency, and would have little to no adaptive capacity, as it could not be moved or further elevated if needed. This all makes it crucial to site the facility in a location that is safe and can accommodate it for its full lifetime. Furthermore, it is critical to note that sea levels will continue to rise beyond Poseidon's proposed 50- to 60-year lifetime. Understanding what will happen to the proposed development at the end of its usable lifetime as sea levels continue to rise is key for ensuring appropriate long-term adaptation for the proposed project and site that minimize risks and protect coastal resources in line with Coastal Act requirements.

In this case, due to the various coastal hazard risks described in this and other sections of the Findings, siting Poseidon's facility in the proposed location will not minimize risks from coastal hazards and does not meet the requirement to site development in an existing developed area able to accommodate it or an area with adequate public services. Although the area is able to accommodate the proposed project at the present (though still with some risk), reasonably foreseeable sea level rise, flooding, and other

coastal hazards are likely to disrupt access and other services in the surrounding area over the coming decades and beyond. This will render it increasingly difficult or impossible to access and serve Poseidon's integrated facilities during and after episodic flooding or hazard situations, or even on a regular basis during high tides if higher amounts of sea level rise occur and surrounding flood control measures are not maintained and upgraded. Portions of the immediately surrounding area are already developed, and it is likely that the City will want and need to implement a variety of new and improved flood and sea level rise adaptation measures regardless of whether this project moves forward. However, siting an expensive, complicated piece of interconnected infrastructure in this location will significantly increase the need to upgrade and strengthen surrounding sea level rise and flood protection measures. None of these upgrades are certain to occur, and many of them could have coastal resource impacts that are unknown at this point. In addition, developing this site in a way that requires significant elevation would foreclose opportunities to remove existing encroachments into the floodplain or restore the area's historic wetlands, as called for by LUP Policies C 10.1.14 and 7.2.4, options which could also serve as pieces of an overall sea level rise adaptation strategy that is more focused on the use of nature-based adaptation strategies in line with a variety of statewide goals and recommendations.

The onsite flooding risks to Poseidon's proposed facilities would overall be relatively minor, though there would be some risk from significant (500-year) fluvial flooding. Risks to the surrounding area are much more significant, which in turn creates the risk that Poseidon would not be able to operate its facility during and after flooding or other hazard events. The state and Coastal Commission have emphasized the need to plan for sea level rise adaptation and to locate new infrastructure in locations where they will be safe for their expected lifetimes. Here, there are known risks of flooding that will grow more severe over the coming decades, and there is also significant uncertainty regarding how the City and state will adapt the area to address these risks. By siting a facility in this location, Poseidon would be relying on many future, unknown adaptation actions to keep its facility safe and functioning. Elevating this site and constructing the facility here would also reduce or preclude other adaptation measures, such as using some or all of the site for wetland restoration and flood control. For these reasons, Poseidon's proposed project is subject to too many risks and has too much uncertainty regarding its ability to remain safe and continuously operational to be found consistent with the Coastal Act and LCP policies described above.

Some of these policy inconsistencies could be partially or wholly addressed through conditions if the project were otherwise consistent with other LCP policies. For example, through conditions, Poseidon could be required to provide documentation of the 500-year flood level and design critical facility components to resist that flood event.[100]

[100] In July 2014, as part of the above-referenced CEC proceeding for the adjacent AES power plant, the Coastal Commission approved a recommendation to the CEC that it require the power plant be elevated above, or protected from, a 500-year flood event plus an additional 24 inches of sea level rise (which was the best available projection at the time for the expected 30-year operating life of the new power plant).

Conditions could also require that Poseidon provide documentation from local and regional agencies that its project is consistent with relevant emergency response plans, such as the City's Flood Management Plan. Conditions could also be included that require monitoring of groundwater levels and the addition of ballast or other features to address the effect that rising groundwater could have on buried pipelines or other project components. Other conditions could address the need to redesign the facility's proposed stormwater system. Finally, conditions could require Poseidon to submit a permit application for relocation or removal of any project components that are damaged or threatened with damage from coastal hazards during the expected operating life. This is only a partial list of potential special conditions, and even if these were all imposed, it would not fully minimize risks due to siting the facility in this low-lying area and would not bring the project fully into conformity with relevant LCP and Coastal Act policies, nor would it cure the areas of nonconformity identified elsewhere in these Findings.

I. MARINE LIFE AND WATER QUALITY

Coastal Act Section 30230 states:

> Marine resources shall be maintained, enhanced, and, where feasible, restored. Special protection shall be given to areas and species of special biological or economic significance. Uses of the marine environment shall be carried out in a manner that will sustain the biological productivity of coastal waters and that will maintain healthy populations of all species of marine organisms adequate for long-term commercial, recreational, scientific, and educational purposes.

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:

> 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…

LCP Goal C1.1 states:

> Ensure that adverse impacts associated with coastal zone development are mitigated or minimized to the greatest extent feasible.

LCP Policy C 6.1.1 states:

> Require that new development include mitigation measures to enhance water quality, if feasible and at a minimum, prevent the degradation of water quality of groundwater basins, wetlands, and surface water.

LCP Policy C 6.1.2 states:

> Marine resources shall be maintained, enhanced, and where feasible, restored. Special protection shall be given to areas and species of special biological or economic significance.

LCP Policy C 6.1.3 states:

> Uses of the marine environment shall be carried out in a manner that will sustain the biological productivity of coastal waters and that will maintain healthy populations of all species of marine organisms adequate for long-term commercial, recreational, scientific, and educational purposes.[101]

LCP Policy C 6.1.4 states:

> The biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes appropriate to maintain organisms and for the protection of human health shall be maintained and, where feasible, restored.

LCP Policy C 6.1.19 states:

> Prior to approval of any new or expanded seawater pumping facilities, require the provision of maximum feasible mitigation measures to minimize damage to marine organisms due to entrainment in accordance with State and Federal law.

Summary
The above Coastal Act and LCP policies generally require that marine resources be maintained, enhanced, and where feasible, restored; that entrainment be minimized to the extent feasible; and that the biological productivity of coastal waters be maintained and restored. They also require that special protection be provided to areas and species of special biological significance. The proposed project's adverse effects on marine life and ocean water quality would occur primarily within the Commission's jurisdiction and would therefore be subject to Coastal Act policies, though the City's, LCP's policies are largely supportive of, and consistent with, the applicable Coastal Act requirements. Additionally, because the onshore portion of Poseidon's facility is the source of the impacts related to marine life, analyzing consistency with both Coastal Act and LCP policies is appropriate.

Project operations would cause substantial and continual losses of marine life. Although the project's intake and discharge would use screens and diffusers meant to reduce impacts to marine life, they would still result in a loss of marine life equal to that produced in about 423 acres of ocean and estuarine habitat each year. Several of the proposed project's components – primarily the location, design, and technology Poseidon would use for its intake and discharge – have been approved by the Regional Board as meeting the state's Ocean Plan requirements for minimizing the intake and mortality of marine life, and the Commission concurs with the Board on those aspects of the Board's approval. However, while the Regional Board also approved several mitigation projects proposed by Poseidon, those projects do not provide sufficient mitigation to conform to the Coastal Act and LCP requirements that marine life be maintained, enhanced, and where feasible, restored, and that mitigation be provided to the maximum extent feasible.

[101] The LCP defines "coastal waters" as including "waters of the Pacific Ocean, streams, wetlands, estuaries, lakes, and other areas subject to tidal action through any connection with the Pacific Ocean."

The primary adverse effects on marine life and water quality resulting from Poseidon's project would occur due to Poseidon's use of an intake that would pull in about 106.7 million gallons of seawater per day and its use of diffusers that would eject approximately 57 million gallons of high-salinity discharge per day into the ocean at velocities high enough to kill marine life. This would degrade about 100 billion gallons of seawater per year to produce Poseidon's proposed 50 million gallons per day of drinking water – about an 18% efficiency rate, far below that of other sources of water supply. The intake screens and outfall diffusers Poseidon is required to install are meant to reduce marine life mortality as compared to what would result from an unscreened intake and an outfall without diffusers; however, the proposed project would still kill every year all the small organisms that make up the base of the ocean's food web equal to that produced in about 423 acres (about two-thirds of a square mile) of productive ocean and estuarine habitat

To address these impacts, Poseidon has proposed implementing several compensatory mitigation projects, primarily by conducting mitigation activities at the Bolsa Chica Restoration Area, in northern Orange County, that could occur before or within the first several years of its facility operations. These activities would not result in sufficient mitigation credits to adequately compensate for the marine life losses, so Poseidon has also provided descriptions of other potential mitigation activities it could conduct later in its operating years. As evaluated below, conducting these near-term and future projects cannot reasonably be expected to provide the full amount of mitigation Poseidon would need to compensate for its facility's adverse effects on marine life.

Additionally, Poseidon's proposed treatment methods would create a discharge more acidic than seawater and would thereby contribute to ocean acidification. Further, although Poseidon would need to maintain its intake system, it has not yet identified what methods it would use to clean the interior of its intake pipeline, which could be regularly "biofouled' by marine organisms growing on the interior surface. All known available methods are either infeasible to use in this system or would result in additional adverse impacts to marine life and water quality that have not been, and cannot yet be, analyzed because Poseidon believes its pipeline interior will not experience excessive biofouling and has therefore not yet identified any maintenance methods.

Overall, the proposed project's impacts would result in substantial losses of marine life, loss of marine ecosystem productivity, and reduced water quality, all of which would require significant mitigation. Thus far, however, and as detailed below, Poseidon's proposed mitigation is far less than needed to address these adverse effects and far less than needed to ensure conformity to Coastal Act and LCP provisions that require the protection of marine life and water quality and maximum feasible mitigation.

Background on agency authorities and joint review by staff of the Regional Board, State Lands Commission, and Coastal Commission

Coastal Act Sections 30230 and 30231 confer on the Commission authority to regulate impingement and entrainment impacts of processes that involve the intake of seawater. In 2013, Commission staff had recommended approval of the Poseidon project with a condition that would have required Poseidon's facility to use any of several types of subsurface intakes that would have minimized harm to marine life, consistent with these

Coastal Act Sections, unless Poseidon could show that those intakes were infeasible. Poseidon withdrew its application prior to Commission action, but the Commission recommended that Poseidon undertake a more complete independent analysis of the feasibility of subsurface intakes that could inform future Commission review of the project's impacts on marine resources. Thereafter, the Commission and Poseidon jointly convened an Independent Scientific Technical Advisory Panel, which issued reports detailing the technical, environmental, and financial feasibility of various intake systems. Although the reports found that certain subsurface intake systems were technically infeasible in this location, it found that others could be feasible but would have a variety of coastal impacts (e.g., on access, visual resources) and would be significantly more expensive than the currently proposed screened open intake, which might render them financially infeasible.

Subsequently, on May 6, 2015, the State Water Board adopted an amendment to the Water Quality Control Plan for the Ocean Waters of California (Ocean Plan) to address effects associated with the construction and operation of seawater desalination facilities (Desal Amendment). The Desal Amendment, which was established pursuant to the authority in Water Code Section 13142.5 and was approved by the U.S. EPA in 2016, was intended to provide a uniform, consistent process for permitting of seawater desalination facilities statewide. In adopting the Amendment, the State Water Board determined that for proposed seawater desalination facilities, the Boards have the primary authority pursuant to Section 13142.5(b) to establish the "best available site, design, technology, and mitigation measures" feasible to avoid the intake and mortality of marine life and to minimize adverse effects on water quality resulting from a facility's high-salinity discharge. This means that the Regional Board has the primary responsibility for determining questions regarding the intake and outfall for the proposed project, including the feasibility of slant wells, the appropriate screening technology for mitigating loss of marine life from the intakes, and the appropriate diffuser technology for minimizing impacts from the outfall.

Coastal Act Section 30412 establishes the respective roles of the Commission and Water Boards in relation to water quality, stating that the Boards have primary responsibility for water quality and that the Commission may not take an action that conflicts with a Board determination regarding water quality. However, Section 30412 also states that Water Code Section 13142.5(b), which regulates the intake of seawater for industrial purposes, applies to both the Boards and the Commission and that the Commission shall ensure that development does not frustrate this section. Pursuant to the Desal Amendment, Coastal Act Section 30412, and Water Code Section 13142.5, the Regional Board therefore has the primary authority to establish the "best available site, design, technology, and mitigation measures" to address a desalination facility's water quality-related impacts. However, the Commission has an integral role in coordinating with the Water Board on its determinations, and it retains its regulatory authority to ensure conformity to the Coastal Act, so long as that is not in conflict with a Board determination regarding water quality or water rights. Relevant here, the Commission has the authority to require additional mitigation to address the impacts of a desalination plant's marine life impacts, as needed to comply with the Coastal Act.

In March 2016, Poseidon submitted a request to the Regional Board for a determination of its proposed project's conformity to the Desal Amendment. Staff from the Regional Board, State Board, State Lands Commission and Coastal Commission then started the consultation established pursuant to the Desal Amendment to review the proposed project's conformity with the Amendment. In July 2016, Poseidon applied to the State Lands Commission for an amendment to its previous State Lands lease to accommodate several proposed changes to Poseidon's previous intake and discharge designs. The Lands Commission conducted supplemental environmental review for that process.

Between 2016 and 2021, the Regional Board, in consultation with the above agencies, conducted its review of Poseidon's proposal, which included extensive evaluation of submitted technical documents, independent third-party review of several aspects of the proposed project, and several public hearings and workshops. In April 2021, the Board's approval of Poseidon's project included the following findings:

- **Intake location and method:** One of the Desal Amendment's primary provisions is that the Board must consider whether subsurface intakes are feasible. This consideration involves evaluating different sites, intake methods, and technologies, and analyzing oceanographic, hydrologic, and physical characteristics at a range of locations to determine whether subsurface intakes can be used to provide all or part of a facility's source water. The Board determined that the proposed scale and location of Poseidon's proposed project made subsurface intake methods infeasible. The Board also evaluated other potential intake locations along the Orange County coastline but found that those locations were either unavailable to Poseidon or were infeasible for siting a subsurface intake.

  The Board also determined that Poseidon's proposed use of the existing, but soon-to-be-retired AES power plant once-through cooling system, if modified to include wedgewire screens with one-millimeter slots on the intake, was the best available and feasible site and method for Poseidon to minimize the intake and mortality of marine life. These screens are designed so that their intake velocities are no more than 0.5 feet per second, which minimizes the potential for impingement.[102] Their one-millimeter slot size helps reduce entrainment,[103] though by only about one percent compared to an unscreened intake.

[102] Impingement occurs when marine life large enough to avoid going through an intake screen are trapped against it due to the velocity of the inflowing water. California's Ocean Plan considers impingement to be minimized if intake velocities are at or below 0.5 feet per second, a velocity most species can swim against.

[103] Entrainment occurs when marine organisms small enough to pass through an intake screen are drawn into the intake system and pass through to the treatment facilities, where they are killed due to changes in pressure, salinity, temperature, chemical constituents in the water, or other stressors.

- **Discharge method:** The Desal Amendment also includes specific requirements applicable to desalination facility discharges. The State Board's development of the Desal Amendment included conducting and reviewing several studies and tests to determine the effects of various salinity concentrations on different life stages of species found in California's offshore waters. Some showed adverse effects to some species from salinity concentrations that were only slightly greater than that of ambient seawater (generally 32 to 34 parts per thousand, or "ppt"). To reduce the potential for these adverse effects, the Amendment establishes specific water quality limitations for desalination effluent – i.e., that the salinity be reduced to no more than two ppt over that of ocean water salinity at the edge of a mixing zone that extends no more than 100 meters from the discharge point. The Amendment also establishes preferred methods for a facility to meet these water quality limitations – either through co-locating the discharge with that of an existing wastewater discharge that will provide adequate dilution, or by installing diffusers on a stand-alone desalination discharge that will provide sufficient mixing for the discharge to meet the 2 ppt limit within 100 meters of the discharge point.

  Poseidon's proposed facility would discharge effluent with salinity levels of up to 65.5 ppt, or roughly twice that of ambient salinity levels in seawater. As detailed during development of the Desal Amendment, these salinity levels are substantially higher than levels shown to cause mortality or harm to many forms of marine life. The proposed discharge would also contain various concentrations of other treatment chemicals, such as chlorine, antiscalents, coagulants, metals, cleaning chemicals, and others that must meet limits for these contaminants established by the Regional Board. The Board also determined that Poseidon would need to install high-velocity diffusers to ensure the discharge would be well-mixed in the ocean water column and would conform to Desal Amendment provisions.

  Development of the Desal Amendment included review of studies showing that an unmixed brine discharge from a desalination facility would be much heavier than seawater and, if left unmixed, would sink to the seafloor where it would create a spreading "dead zone" with salinity levels too high for most organisms. The Amendment requires either that desalination discharges be adequately diffused into ocean waters within a relatively short distance from an outfall, with a stated preference that the discharge be co-located with other discharges to help reduce its salinity concentrations or that "stand-alone" discharges include diffusers that provide adequate mixing.

- **"Need" for water:** In recognition of the significant impacts that result from these types of intake and discharge designs, the Desal Amendment also requires the Board, when determining that subsurface intakes are infeasible, to determine whether there is a need for the proposed volume of water that would be produced from a facility using an open, screened intake. In this instance, the Board determined that one nearby water district, OCWD, identified a need for up to 50 million gallons per day of potable water, which is the amount Poseidon proposes to produce. The Desal Amendment requires the Board to make this "need" determination to ensure that subsurface intakes are not deemed infeasible based on

> a proposed project having production capacity greater than the amount that could be produced by subsurface intakes, but also in excess of an identified need for the proposed production volume. The Board's determination that the water was "needed" was not a determination that the water was critical or immediately necessary or that it was the only available new water source. Rather, the Regional Board viewed the concept of need broadly, deferring to various water agencies that see a general need to develop new, local, drought-proof water supplies over the coming years and view this project as one possible way to obtain such water.

In addition to the Regional Board finding that Poseidon's proposed project would include the best available site, design, technology, and mitigation measures available for the facility, the City of Huntington Beach and California State Lands Commission, in their CEQA environmental review processes, addressed alternative sites, designs, technology, mitigation measures, and a no-project alternative and found that subsurface intakes were infeasible or more impactful to the environment than the desalination plant as proposed. The Commission has considered information from the CEQA review process (including the 2010 subsequent EIR and 2017 supplemental EIR), 2014-15 ISTAP Reports, and the Regional Board's process (including its Section 13142.5 determination) and concurs with findings therein that the intake and outfall lines are sited and designed appropriately to minimize the harm that this type of project has on marine life. For this proposed project, the Commission accepts the Board's determination regarding the proposed project's measures to avoid and minimize the intake and mortality of marine life through its siting, design, and technology. These include primarily the Board's approval of the type and location of Poseidon's intake and discharge – i.e., Poseidon's use of the existing power plant cooling system with the addition of wedgewire screens on the intake and diffusers on the outfall, and the lack of feasible alternative intake and outfall systems.

The Regional Board also approved a package of Poseidon-recommended restoration projects – at the nearby Bolsa Chica Lowland Restoration area and at the Palos Verdes Restoration Reef site – to mitigate anticipated impacts to marine life. However, because the Coastal Act (and the LCP) has a different standard of review for mitigation than that of the Board, and with more recent information provided about both locations that would reduce the expected mitigation benefits at each, the Commission would need to add mitigation measures in addition to those approved by the Board to allow for the necessary Coastal Act and LCP conformity. This does not create a conflict with the Board decision. First, the Regional Board's order explicitly stated:

> "The Santa Ana Water Board's decision on the mitigation required under the Ocean Plan does not bar the California Coastal Commission (or any other agency) from requiring any additional mitigation necessary to satisfy the agency's program requirements in the course of reviewing the Project. All agencies retain their authority to require mitigation associated with their statutorily required approvals for projects such as the proposed Facility."

[104] See also California Coastkeeper Alliance v. California State Lands Commission, Case No. C088922, April 8, 2021 (upholding the CEQA alternatives analysis regarding infeasibility of subsurface intakes in unpublished portion of opinion).

(See Order R-8-2021-0011, Attachment G-55 (page 15).). Second, Poseidon would still be subject to the mitigation requirements imposed by the Board, along with any additional measures imposed by the Commission. Finally, the Commission has a long history of imposing mitigation necessary to address entrainment and impingement impacts that goes above and beyond what is required by the Water Boards, and it did this in 2007 when it approved Poseidon's Carlsbad desalination plant.

The primary issue over which the Commission is exercising its independent authority regarding protection of marine life and water quality is the mitigation that Poseidon must implement to be fully consistent with the Coastal Act. Although Commission staff worked in good faith with Poseidon and the Regional Board to develop mitigation that all parties could agree on, this did not occur. This is due, in part, to the two agencies' different standards of review under their respective authorities and the fact that the Board was only allowed to consider the mitigation Poseidon proposed and considered available, whereas the Commission may consider a broader range of measures needed to fully mitigate the proposed project's impacts. Additionally, the Board did not evaluate at least two types of adverse effects on marine life and water quality that are within the Commission's purview – the adverse effects resulting from ocean acidification and certain maintenance activities that Poseidon would need to conduct.

Impacts from the Intake and Discharge

Even with the structural and siting considerations noted above that are meant to reduce the proposed project's impacts on marine life, Poseidon's facility would cause substantial losses of marine life and of ocean productivity. The methods used to identify the type and scope of those losses – the Empirical Transport Method ("ETM") and the Area of Production Foregone ("APF") calculation – are described below.

As noted previously in the Project Background and Changed Circumstances, California has for several decades studied and improved its understanding of the kinds of effects caused by seawater intakes and outfalls. Most relevant have been studies conducted at coastal power plants that used seawater to cool their generating units. These studies found that pulling in millions of gallons per day of seawater resulted in a substantial loss of marine life and ocean productivity. Recognition of the extent and severity of those systems on the state's marine life led to retirement or retooling of most of those power plants and led to adoption of the Ocean Plan amendment that directed desalination facilities to use subsurface intakes where feasible, instead of intakes that would draw directly from the ocean water column.

As part of the state's efforts, regulatory agencies adapted several methods developed to identify impacts to marine life and used these methods to initially determine the type and extent of marine life losses resulting from power plant operations and then applied those methods to proposed seawater desalination facilities. To quantify the loss in marine productivity associated with Poseidon's facility, Commission and Water Board staff used these standard assessments – the Empirical Transport Method ("ETM") and a calculation of Area of Production Foregone ("APF") – provide a common "currency" the

agencies have used to identify the scale and type of marine life losses and lost nearshore ecosystem productivity these systems cause, and to help determine how much area and what type(s) of habitat are needed to provide compensatory mitigation for these losses. For Poseidon's project, Commission staff worked collaboratively with staff of the Regional and State Water Boards to develop the estimates for marine life impacts described below.

The ETM calculation is used to determine the proportion of organisms that have the potential to be entrained are actually entrained within an intake system. Each species has a different "source water area" – i.e., the extent of a water body from which they can be carried by currents to an intake location – based on where they originate, current speeds and directions, and the number of days it takes for a particular species to grow to a point that it is too large to be entrained or is able to swim away from the pull of an intake. The APF calculation identifies, in acres, how much lost ocean productivity the entrained organisms represent. For the most part, a small percentage of a species' population within a source water area is entrained – often less than one percent – however, that can represent a large loss of productivity if the source water area is large. For example, if the source water area for a particular species covers 10,000 acres and an intake pulls in just one percent of the entrainable larvae within that area, the APF for that species would be 10,000 acres X 0.01 = 100 acres. That is, the lost organisms represent those produced in 100 acres of ocean habitat. For some species, the APF can be further refined by identifying particular habitat types within the source water area where they originate – for example, basing the APF only on the area of rocky reef habitat within the overall source water area. The overall APF for a particular intake is generally calculated by considering the combined APFs for the primary species that are subject to entrainment.

Developing the information needed to conduct the ETM/APF analyses generally requires a year-long sampling effort in nearby coastal waters to identify the number and types of species subject to entrainment, followed by extensive modeling to determine the overall loss of productivity represented by the entrained species. Poseidon did not conduct its own entrainment study, but instead requested that the Regional Board rely on an entrainment study conducted in 2003-04 for the California Energy Commission's review of a proposed upgrade to the Huntington Beach power plant.[105] That study identified expected entrainment impacts for the power plant's larger intake volume, but the effects identified in that study are considered proportional to the effects expected from Poseidon's smaller proposed intake volume.

[105] MBC Applied Environmental Services, and Tenera Environmental, AES Huntington Beach L.L.C. Generating Station Entrainment and Impingement Study – Final Report, April 2005.

The study identified Poseidon's source water area – i.e., the extent of ocean and estuarine water in which marine life would be subject to entrainment – as extending several dozen miles up and down coast from Huntington Beach. This area encompasses a number of habitat types, including those within at least nine State Marine Conservation Areas (SMCAs) and State Marine Reserves (SMRs), which were established to protect unique species and habitats and to serve as a network of protected areas through which species could move. The study identified more than 50 species that would be subject to entrainment, with about a dozen of those species representing the vast majority of those entrained.

The Regional Board's review determined, even after finding that the intake location was the best available and feasible for Poseidon for minimizing entrainment and after and requiring Poseidon to install intake screens and diffusers, that, Poseidon's intake would entrain about 108 million individuals per year of the most prevalent identified species, along with an unknown but much larger number of other species, all of which provide various types of ecosystem value and some of which provide commercial or recreational value. The Board also determined that Poseidon's intake-related entrainment impacts would each year create an APF of 162.5 acres – that is, the loss of entrained organisms would be equal to those produced each year in 162.5 acres of productive ocean and estuarine habitat. In volumetric terms, Poseidon's daily intake volume of 106.7 million gallons would total almost 39 billion gallons of seawater each year. This would be equal to all the water in the "wedge" of ocean water from the entire 9.5 miles of the Huntington Beach shoreline to about one mile offshore (to the 40-foot depth contour), as illustrated in Figure 1 below.

[106] For these types of intake systems, the source water area does not represent the area in which all small organisms would be entrained, just the area from which any organisms have the potential to be entrained, due to being carried by ocean currents to the vicinity of the intake.

[107] The 108 million organisms identified in the study represent only a small percentage of the total planktonic marine life killed by these systems; however, the ETM/APF methods are assumed to allow these organisms to act as surrogates for all the other species of marine life that are entrained and killed. An underlying assumption is that by providing mitigation similar to habitat types from which the identified organisms originate or suitable for a broad range of marine species, it is thought that the other unidentified organisms from those habitat types would also benefit.

Figure I-1: Visual representation of Poseidon's annual intake volume:

The Board's review also concluded that the effects of Poseidon's high-velocity diffusers, which are necessary to disperse the facility's brine discharge, would cause even more significant impacts. The shearing and turbulence effects of those dischargers would cause mortality to marine life in about 168 million gallons of seawater per day, resulting in a discharge-related APF of 260.4 acres. Volumetrically, the 168 million gallons per day would total about 61 billion gallons of seawater annually in which marine life would be killed.

The combined volumetric effects of Poseidon's intake and discharge would kill the small marine life that serves as the base of the ocean's food web in about 275 million gallons per day, or about 100 billion gallons per year. This volume is approximately equal to extending the above-illustrated wedge of seawater offshore of Huntington Beach so that it stretched from the Port of Long Beach to Crystal Cove. This volume also represents a relatively inefficient use of seawater, as causing adverse effects in 275 million gallons of ocean water each day to produce just 50 mgd of drinking water represents an efficiency rate of only 18%, with 82% of the water either being wasted or diminished in quality.

The Board also determined that the project would result in additional, but comparatively minor marine life mortality due to the project's discharge increasing salinity levels in the ocean water column near the diffusers – equal to an APF of about 1.09 acres –and an additional impact – equal to a 0.014-acre APF – resulting from the construction activities Poseidon would employ to install its intake screens and the rock riprap needed to support those structures. The Board also allowed for a 1% reduction in Poseidon's total expected APF based on the Desal Amendment's recognition that projects using wedgewire screens provide a slight reduction in mortality when compared to unscreened intakes.

In sum, the Board determined that the total marine life mortality resulting from Poseidon's facility would cause an annual APF of approximately 423 acres – i.e., the annual loss of productivity represented by the marine life killed by the facility would require 423 acres of similarly productive ocean and estuarine habitat within Poseidon's source water area. As described above, Commission staff worked collaboratively with Board staff and Poseidon to develop these estimates of marine life mortality, and the Commission therefore concurs with the Board's finding that operation of Poseidon's facility would result in an annual APF of approximately 423 acres.

This would represent a significant loss of marine life each year, equal to that produced in about two-thirds of a square mile of nearshore and estuarine habitat. Not all desalination facilities result in this magnitude or loss to marine life. For comparison, the Doheny desalination facility being proposed by the South Coast Water District and recently approved by the San Diego Regional Water Quality Control Board, would produce about five mgd and have an APF of about 7.5 acres. Therefore, while Poseidon's project would produce 10 times as much drinking water as the Doheny project, it would cause more than 50 times the impact to marine life.

Without mitigation, Poseidon's effects on marine life would be inconsistent with Coastal Act and LCP policies that require the protection of marine life and maintenance of water quality. These impacts would not meet the requirements to maintain or enhance marine resources or to sustain the biological productivity of coastal waters as required by Sections 30230 and 30231, nor would they provide special protection to areas of special biological significance, such as MPAs. Likewise, the unmitigated impacts would violate LCP Policies such as C 6.1.2 and C 6.1.3 for the same reasons.

Importantly, because Poseidon's impacts are measured as an annual loss of marine life productivity, the mitigation needed to compensate for those losses must be sufficient to produce a similar amount of marine life during each year of Poseidon's facility operations. Additionally, because in-kind mitigation is generally not possible for these types of entrainment impacts, mitigation has typically been satisfied through creating or restoring tidal wetland habitat. This habitat is generally more productive per acre than the source waters in which the impacts occur – for example, rather than create 423 acres of new nearshore habitats, an applicant can create about 100 acres of wetland habitat types that would continually provide about four or five times the productivity of those nearshore waters. Poseidon is proposing a suite of restoration projects to provide

mitigation for the marine resource impacts associated with operation of its proposed desalination facility. However, as described below, the mitigation proposed by Poseidon would be inadequate to fully compensate for the project's impacts and thus is not in conformance with Coastal Act and LCP provisions.

Compensatory mitigation

To address the marine life impacts that would remain after implementation of the above-referenced reduction measures, the Regional Board evaluated compensatory mitigation projects proposed by Poseidon and determined how much, and what type, would be needed. To determine how much mitigation would be sufficient, the Board started with the 423-acre APF noted above and then developed mitigation ratios, based largely on the higher productivity expected from Poseidon's mitigation sites as compared to the productivity within the area of the facility's source water body. As described below, Poseidon proposed several types of mitigation at Bolsa Chica and offshore of Palos Verdes, and the Board developed different mitigation ratios for each. To adequately mitigate for the facility's annual impacts, the Board determined that Poseidon would need to provide 100.4 mitigation credits each year from what was expected to be the higher marine life productivity resulting from those mitigation activities as compared to the productivity in the facility's source water area.

The Coastal Act and LCP have different mitigation requirements and review standards than those the Regional Board applied under the Desal Amendment. For example, the Desal Amendment requires that a project use the best mitigation "available" to minimize the intake and mortality of marine life, whereas achieving Coastal Act and LCP compliance would require Poseidon to "maintain, enhance, and where feasible, restore" marine life and "mitigate to the maximum extent feasible."

While many mitigation proposals can be found fully consistent with both sets of these requirements, that is not the case with Poseidon's proposed mitigation projects. This is due in part to Poseidon presenting relatively limited mitigation options for the Regional Board's consideration – i.e., those that Poseidon believed to be "available," which were projects that had already been partially funded, reviewed, or designed by others.[108]

Importantly, and along with proposing a limited set of mitigation options, Poseidon also asserted to the Board that it would be economically infeasible for Poseidon to start implementing the necessary mitigation at the same time it started operating the desalination facility and causing marine life impacts. Poseidon stated that its project would be unable to receive financing needed for the project if it was first expected to complete the expected environmental review, permitting, contracting, and other activities needed to implement its mitigation projects before it started facility operations. Poseidon believed it would take from about seven to fifteen years to complete those efforts, and that that amount of delay would make it impossible to finance the facility. The Board then removed a condition from Poseidon's draft permit that would have required Poseidon to obtain all its mitigation permits before starting facility operations.

[108] The Board's practice is to evaluate mitigation proposals differently than the Commission, in that the Board largely relies on an applicant to propose mitigation options for the Board to accept or not, while the Commission is able to impose mitigation requirements more broadly.

However, this creates a substantial mitigation shortfall described below with the result being that the significant and inadequately mitigated losses to marine life would not be consistent with Coastal Act and LCP provisions requiring that marine resources be maintained and enhanced. Another conflict between allowable mitigation under the Coastal Act and under the Desal Amendment stems from Poseidon's request and the Board's agreement to allow Poseidon to receive mitigation credits for activities at Bolsa Chica for which the Commission has already awarded mitigation credits.

As currently proposed, Poseidon's mitigation offers do not meet Coastal Act standards, particularly with Poseidon's proposal at Palos Verdes described below, as there are other feasible and less damaging alternative locations and methods for the type of mitigation being proposed. In sum, the Commission agrees that the mitigation projects approved by the Board would be useful and beneficial to some degree, but they would not be sufficiently productive or long-term to adequately mitigate Poseidon's impacts. The analysis below describes Poseidon's currently proposed mitigation projects at Bolsa Chica and Palos Verdes, along with other potential mitigation Poseidon has presented to the Commission, with an evaluation of the expected mitigation benefits and concerns about each.

Bolsa Chica Wetlands: Poseidon's initial mitigation proposal primarily involved activities that would occur at the Bolsa Chica Lowlands Restoration Area, located in northern Orange County just a few miles north of Poseidon's proposed facility site. Bolsa Chica is one of the largest estuarine restoration projects in Southern California and has successfully provided hundreds of acres of valuable habitat types since its restoration conducted during the mid-1990s to mid-2000s. As part of its mitigation proposal approved by the Regional Board, Poseidon would conduct mitigation projects at several locations within Bolsa Chica, Poseidon proposed to enhance several areas of estuarine habitat within Bolsa Chica as well as conduct maintenance dredging of the ocean inlet that is needed to preserve much of the Bolsa Chica estuarine system. However, the Commission already awarded mitigation credits for many of those activities to the Ports of Long Beach and Los Angeles when Bolsa Chica was first constructed – and thus awarding those same credits again to Poseidon would be "double-counting."[109] In addition, Poseidon requested a crediting approach that is inconsistent with the approach the Commission applied when awarding credits to the Ports. These issues result in Commission staff preparing different credit calculations than those used by the Regional Board for the activities Poseidon has proposed at Bolsa Chica. Commission staff informed Poseidon and Board staff of this issue but the three entities did not fully resolve the differences. Nonetheless, the total credit calculations are relatively similar.

[109] The Commission awarded credits in three different approvals. In 1996, the Commission approved the Bolsa Chica Lowland Acquisition and Conceptual Restoration Plan (see CD-115-96). The approved Conceptual Plan called for the Ports of Los Angeles and Long Beach to provide $66.75 million to fund the state's purchase of 880 acres at Bolsa Chica, and for the U.S. Fish & Wildlife Service to restore approximately 344 acres of full tidal wetlands and 260 acres of managed/muted tidal wetlands. The Commission later approved a detailed Bolsa Chica restoration plan (see CD-061-01) and a modified plan (see CD-090-05). In sum, the Commission in those three actions awarded more than 700 credits for the restoration and ongoing monitoring and maintenance of Bolsa Chica.

As noted above, the Board used its own method to calculate credits and provided Poseidon with up to 59.2 credits for its five proposed mitigation projects within Bolsa Chica. Commission staff, avoiding double counting of credits, and using the calculation methods the Commission had used previously to determine the type and amount of credits at Bolsa Chica, determined that, Poseidon's proposed activities could receive up to 58.84 credits, as compared to the Board's calculation of 59.2 credits. Importantly, and as described below, most of these calculations include a caveat that they could be "up to" a certain number of credits, due to some limitations on mitigation potential at Bolsa Chica described below. The activities and available credits are summarized in Table I-1 and then detailed and compared below:

Table I-1: Comparing Board and Commission staff's credits

Proposed Bolsa Chica mitigation projects	**Regional Board credits**	**Commission staff proposed credits**
Inlet dredging	28 acres credit	15*
Restore up to 6 acres of Fieldstone property to subtidal habitat	Up to 4.5 acres credit	Up to 4.2 acres credit
Restoration of up to 1.2 acres of Oil pads/roads to subtidal habitat	Up to 1.2 acres credit	Up to 0.84 acres credit
Enhance tidal circulation in up to 125 acres of Muted Tidal Basin	Up to 15.04 acres credit	Up to 25 acres credit
Restore up to 23 acres of intertidal shelf vegetation	Up to 10.5 acres credit	Up to 13.8 acres credit
Total credits:	**Up to 59.2 acres credit.**	**Up to 58.84 acres credit**

*The credit for dredging would vary each year based on the areal coverage of eelgrass present during any year.

- **Proposed restoration/enhancement activities:** Poseidon's proposal included four restoration or enhancement projects – at the Fieldstone property, the Oil pads/roads, the Muted Tidal channel enhancements, and the Intertidal shelf. However, the Commission had already awarded mitigation credits for the habitat created or restored in these areas. The credits were provided to the Ports in two tiers – 1.2 credits for each acre of habitat within the Full Tidal Basin and 0.4 credits for each acre of habitat within the Muted Tidal Basin. These credits were based on an "ecosystem" approach – i.e., rather than requiring specific types or areas of particular habitat types, the Commission provided credits based on the overall expected productivity of the different habitats that would develop in the Full or Muted Basins. For example, the combination of open water, intertidal, and salt marsh habitat types expected to develop within the Full Tidal Basin were expected to provide an overall beneficial and productive estuarine system. The habitat types within the Muted Tidal Basin were expected to be similar, but

overall less productive due to the reduced tidal exchange. As reflected in the Commission's credit calculations, areas of the Muted Tidal Basin were expected to be about a third as productive as areas within the Full Tidal Basin.

For Poseidon's proposed projects in these areas, Commission staff calculated recommended credits based on the Commission's previous calculations. For the up to six acres of restoration at the Fieldstone property, staff recognized that changing that upland area to MTB could receive the same 0.4 credits the Commission had awarded for other MTB areas – i.e., 6 acres X 0.4 = 2.4. In addition, because Poseidon's newly restored or enhanced areas would benefit from the tidal flows resulting from Poseidon's maintenance dredging, that dredging provided an additional 0.3 credits for each acre that benefited (see additional detail below). For Fieldstone, this provided an additional 1.8 credits (6 X 0.3 = 1.8) for a total of 4.2 acres credit for six acres of restoration. Similar calculations for the other three sites resulted in 43.84 credits (as compared to the Board's 31.24 credits). Because these credits were based on new benefits to Bolsa Chica that had not been included in previous Commission credit calculations, they avoided the "double-counting" concern described above and allowed for a similar number of credits from both the Board and the Commission.

- **Proposed maintenance dredging:** Poseidon proposes to provide mitigation by continuing the maintenance dredging needed to keep the Bolsa Chica inlet open to the sea. The Commission had included this maintenance dredging in its previous credit calculations and several dredging events have occurred since the 2007 opening of Bolsa Chica's inlet; however, the funding provided to conduct this dredging had run out much sooner than anticipated. The Board determined that Poseidon could receive 28 credits for each year the inlet remained open or was kept open due to Poseidon's dredging.

  Because the Commission had already awarded credits for dredging activities, Commission staff determined that Poseidon could only receive credits for dredging activities that supported new habitat values or mitigation areas that were not part of the original Bolsa Chica restoration plan. Using this approach, Poseidon could receive credit for dredging to preserve the extensive eelgrass beds in Bolsa Chica that were not part of the original restoration plan or the Commission's previous credit calculations. Shortly after opening the Bolsa Chica inlet, CDFW planted a small experimental bed of eelgrass that has since grown to cover more than 100 acres within the Bolsa Chica Full Tidal Basin and that provides highly productive habitat that was not originally anticipated as part of restoration. Without regular flushing provided by an open inlet, these existing eelgrass beds would not persist, and thus dredging is needed to preserve these important habitats. Applying a 1:10 mitigation ratio that the Commission has used for similar preservation actions, Poseidon's dredging activity could receive one mitigation credit for every 10 acres of eelgrass present during any given year – for example, if, as shown in the table above, Poseidon's dredging to maintain an open inlet resulted in 150 acres of eelgrass, Poseidon would receive 15

credits. This credit amount would vary based on the actual eelgrass coverage during any year – for example, if the eelgrass covered just 50 acres, Poseidon might receive just five credits, whereas if the eelgrass covered 200 acres, Poseidon could receive 20 credits.

- **Long-term mitigation viability at Bolsa Chica:** To be consistent with the Coastal Act, Poseidon would be required to fully mitigate impacts for the entire expected 50- to 60-year life of its facility. However, it is not clear whether the credits at Bolsa Chica would be viable for that period. The Bolsa Chica restoration project was not designed to accommodate today's expected increases in sea level resulting from climate change. The restored habitat that is currently in place will likely change significantly as sea level increases, and these changes make the long-term effectiveness of Poseidon's proposed mitigation actions highly uncertain.

  Bolsa Chica's 1990s design, including that of the inlet channel meant to provide a connection to the sea, anticipated that there would be no more than about half-a-foot of sea level rise over the next century, a figure now far below even the most conservative projections. Bolsa Chica was then, and is now, limited in how it could be modified to accommodate currently expected sea level increases. Much of Bolsa Chica and its surrounding area has experienced fairly severe subsidence due to oil production from beneath the area. Many of the neighborhoods and other development and infrastructure in and around the site are below current sea level. The berms surrounding much of Bolsa Chica that protect these areas are limited in how much they can be modified or moved further inland to accommodate sea level increases, again due to the surrounding development. Additionally, the area's groundwater table is at or very close to the ground surface, and so increases in sea level will likely result in inundation of nearby areas from below, even if they are protected by these berms.

  Along with both the expected and unknown physical changes to the site, Poseidon's proposed mitigation would be subject to competing interests in how the site is managed and modified. Bolsa Chica is managed by the eight-member Bolsa Chica Steering Committee and supported by the Bolsa Chica Land Trust. The two entities manage Bolsa Chica for multiple benefits, including providing various types of estuarine habitats, providing breeding/nesting areas for several

[110] With the annual variability in eelgrass coverage, the total credits would likely need vary during different years, based on a "rolling average" of the average amount of eelgrass present during a several year period.

See Jin and McCarthy, Bolsa Chica Wetlands Restoration Inlet Design, in Coastal Engineering, 2010.

[112] The Steering Committee includes representatives from the US Environmental Protection Agency, National Marine Fisheries Service, US Army Corps of Engineers, US Fish and Wildlife Service, California Department of Fish and Wildlife, State Lands Commission, State Resources Agency, and State Coastal Conservancy.

endangered or threatened bird species, and allowing for passive public access and recreation within part of the restoration area. Parts of Bolsa Chica also continue to serve as locations for ongoing oil development. Accommodating and balancing these multiple uses in an area with the above-referenced design limitations has created management challenges for the Steering Committee and has resulted in concerns about the future functioning of this ecosystem. As noted above, the caveat of "up to" a certain amount of credits reflects the likelihood that some of Poseidon's proposed mitigation actions may not be consistent with the managing agencies' desired types of habitat at a certain location within Bolsa Chica or with the management approaches that may be needed. This is further characterized below.

The Steering Committee and Land Trust recently conducted a study to identify what physical, operational, and management changes might be needed to allow Bolsa Chica to address its past performance issues related to problems with providing successful, productive habitat and to allow Bolsa Chica to continue functioning as a valuable estuarine habitat into the future.[113] This August 2021 study noted that some of the existing habitats within Bolsa Chica – for example, its important areas of salt marsh – would not be sustainable without significant intervention and changes to the existing management and physical characteristics of the area. The study recommended a "menu" of several short-term, mid-term, and long-term measures to address the expected changes that could result from climate change and sea level rise.

Several of these recommended measures would be inconsistent with Poseidon's proposed mitigation or would require substantial modifications to Bolsa Chica that could significantly reduce Poseidon's ability to conduct the expected mitigation. For example, the study recommended in the short term, that inlet dredging be done using a "small-scale" approach – i.e., more frequent and smaller volume dredging events rather than full inlet dredging. It is not yet clear how this modification would affect Poseidon's ability to conduct dredging in a manner consistent with the Board's approval, and implementing this dredging change could require the Regional Board to reassess and modify the performance standards it required of Poseidon. More significantly, the study recommends in the mid-term (from 2030 to 2060) implementing any of several substantial changes to the Bolsa Chica inlet system, including extending the existing jetties, reconfiguring the inlet, adding more active management for controlling tidal flow, and others. Over the longer term (from 2060 on), the study recommended that rising sea levels be addressed by increasing elevations within

[113] See Bolsa Chica Lowlands Restoration Project – Sustainable Alternatives Study, by Anchor QEA, August 2021.

[115] For example, the Board's approval included a performance standard for Poseidon's dredging operations based on the amount of tidal muting resulting from the build-up of sediment in and near the Bolsa Chica inlet. The recommended "small-scale" dredging approach would likely require a different threshold, which the Board noted could require additional review and approval by the Board.

Bolsa Chica through placing sediment over and within existing habitat areas. It also recommends considering adding another inlet at the north end of Bolsa Chica, changing the existing groundwater pumping regime within the area, and other substantial modifications. Several of these management actions would likely result in habitat conversions or loss or reduction of habitat types that would be in direct conflict with Poseidon's mitigation needs and requirements. Poseidon has stated it would address some of these expected changes by developing an adaptive management plan; however, it is not clear that the amount of adaptive management needed would be successful at a site whose design provides such a limited ability to adapt.

Fundamentally, because Poseidon would not have site control over its mitigation areas, any conflicts between Bolsa Chica management goals and Poseidon's mitigation may ultimately be resolved in a manner that would prevent Poseidon from meeting its required performance standards. Similarly, adaptations identified by the managing entities as necessary for Bolsa Chica to accommodate climate change may be different than those Poseidon needs for its mitigation to succeed.

In light of these concerns and in recognition of the problems Bolsa Chica would face with increasing sea levels, Commission staff informed Poseidon that the area would likely not accommodate or successfully provide the amount or type of mitigation Poseidon would need each year for the entirety of the life of the project to address its facility's adverse impacts or to allow for the required conformity to Coastal Act and LCP provisions. Although Commission staff developed the recommended mitigation credits described above that could be provided for Poseidon's proposals within Bolsa Chica, it was with the recognition that they would likely be fairly short-term, as climate change and sea level rise progressed and reduced or modified Bolsa Chica's habitat functions.

On April 22, 2022, just before publication of staff's recommended Findings, Poseidon provided a technical memorandum that outlined several "modest" adaptation measures Poseidon could implement at Bolsa Chica – such as modifying levees, changing the pumping regime, and adding sediment to elevate some areas – that it expects would allow the proposed mitigation projects to remain viable over the desalination facility's expected 50+ year operating life.[117] Commission staff has not yet conducted a full assessment of this memo, though

[116] We note that the Commission's approval of mitigation for Poseidon's Carlsbad desalination facility was based on a design developed by Poseidon and participating agencies that anticipated expected sea level rise increases and allowed them to be successfully accommodated in the overall site design. See CDP 9-14-0731.

[117] Moffat and Nichol, SLR Vulnerability Assessment for Bolsa Chica Mitigation Plan Elements of Poseidon, prepared for Poseidon, April 22, 2022.

> it appears that some of its descriptions of Bolsa Chica's characteristics and the expected effects of sea level rise and climate change are not consistent with other analyses provided through the above-referenced CoSMoS investigations, City of Huntington Beach planning documents, and other evaluations. Additionally, all these possible adaptation measures would require review and approval by the Bolsa Chica managing agencies, though they were apparently not involved in Poseidon's preparation of this memo.[118]

Palos Verdes artificial reef: Poseidon's current mitigation proposal includes constructing an artificial reef at the Palos Verdes Restoration Reef project, located offshore of the City of Rancho Palos Verdes in Los Angeles County. The current Restoration Reef project is meant to restore rocky reef habitat that was affected by contaminants discharged nearby or were buried by underwater landslide or excess sedimentation.[119] Restoration work completed thus far consists of several rock modules placed within an approximately 40-acre area within a somewhat larger area leased for this purpose to the Southern California Marine Institute by the State Lands Commission.

Poseidon's proposal would involve constructing artificial reef modules like those already constructed through the existing Restoration Reef project and within the same State Lands lease area that accommodated that project. Poseidon suggested to the Board that using an existing reef design and this same location would allow for mitigation to occur more quickly because the existing project had already gone through CEQA review, had an approved lease, and had an approved reef design suitable for the site. The Regional Board awarded Poseidon 41.3 mitigation credits for its proposal to construct reef modules in a 41.3-acre area within the Restoration Reef lease area. This credit calculation was based on Regional Board staff assuming the expected productivity of the artificial reef would be similar to shallow-water reefs elsewhere in Southern California.

After the Board's approval, however, additional information became available that showed Poseidon's proposal would likely not provide the expected amount of productivity, would require a new reef design, and would take much more time to complete than anticipated. A review of the available footprint showed that most of the area that might be available for Poseidon's artificial reef within the existing Restoration Reef area would be in deeper water and further away from existing natural reefs, which would likely result in less productivity than was considered in the Board's mitigation calculation. Most of the remaining shallow area within the lease footprint is already covered with rocky habitat, which makes it unsuitable for siting of an artificial reef. The deeper sites that are proposed are too deep to support kelp -- an important driver of productivity in shallow reefs. This would decrease the amount of mitigation credit

[118] April 25, 2022 Commission staff personal communication with State Lands Commission staff.

[119] More detailed information about the project is available at: https://www.oxy.edu/academics/vantuna-research-group/palos-verdes-reef

provided by the reef, although it is unclear by how much. Importantly, unlike the shallower areas where the existing Palos Verdes reef is located, most of the available deeper area is covered with several feet of soft sediment, which creates less stability for placement of rock and increases the likelihood that the rock will sink below the seabed. This requires a different reef design that incorporates more and/or larger rocks to provide some additional stability and to ensure the rest of the proposed reef remains above the seafloor surface. Further, the CEQA review completed for the Restoration Reef project identified these deeper areas as being unsuitable for the then proposed reefs, due largely to the depth and the additional sediment, so Poseidon's proposal would likely require additional CEQA review, including analyses to determine how much productivity would be expected at these deeper sites and to identify whether there were better alternative sites available. This would likely significantly delay the start of construction and consequently the date when mitigation credits are available.

Finally, even if the uncertainty created by the issues raised above could be addressed, the artificial reef design used in the Restoration Reef project included at least one feature that, pursuant to previous Commission decisions, would result in much less than the 41.3 credits currently requested by Poseidon. The Restoration Reef modules are separated by sand channels several dozen feet wide, which result in a relatively low ratio of rock area to sand area within the 41-acre mitigation area. Poseidon has contended that the full width of the sand channels add heterogeneity to the rocky reef habitat that increases the overall productivity of the reef and should be provided with full mitigation credit. The Commission agrees that designing an artificial reef to include rock modules separated by sand channels can improve the overall habitat value of the reef. However, in previous decisions, including for the SONGS mitigation reef, the Commission has only awarded mitigation credit based on the area of rocky substrate, not for the surrounding sandy substrate. While the sand immediately adjacent to reef habitat likely accumulates slightly higher habitat value due to the presence of the reef as compared to sand further away, it does not provide the full value of the actual reef habitat and should not be included in the crediting.

After Commission staff raised the concerns discussed above with Poseidon, Poseidon submitted a memo by its consultant based on data collected from the first year of monitoring on the existing Palos Verdes reef. The intent of the memo was to use data from the existing reef to demonstrate that deeper reefs were as productive as shallower reefs and that reefs lacking giant kelp were as productive as reefs that supported giant kelp. The Commission reviewed the memo, but for several reasons does not agree that the data and analysis presented supported the conclusions drawn by Poseidon.
First, the memo refers exclusively to data collected at rocky reef modules located in waters shallower than those targeted for the proposed Poseidon artificial reef, so the data may not be relevant to conditions at the deeper locations. Additionally, the memo includes data from just the first year after reef installation, so may not represent long-term trends. The memo also focuses exclusively on a single metric for productivity – fish biomass – which is known to be highly variable year-to-year and heavily influenced by fish attracted to new structures in the marine environment from nearby natural reef areas. Finally, the memo does not acknowledge the significant benefits kelp provides to

marine biological productivity. Kelp is a direct food source and provides nursery and refuge habitat for a wide variety of fish and invertebrates, and by increasing by orders of magnitude the surface area of habitat provided by a reef due to it extending a canopy through the water column to the ocean surface. The memo, by focusing on limited productivity metrics, short-term datasets, information collected from areas not representative of the likely locations of Poseidon's proposed artificial reefs, and ignoring key features and benefits of kelp forests, fails to adequately demonstrate that Poseidon's deeper reefs would be as productive as those in shallower waters that are capable of supporting kelp.

Further, Poseidon has not provided information about what changes would be required to the existing artificial reef design to accommodate the increase sediment depts at the deeper sites. At this very least, this would likely require substantially greater amounts of rock to be acquired and placed to allow for the reef base to sink into the sediment. It may also require some type of additional structural modification to ensure the rock stays in place. The greater amounts of rock would also result in a longer construction period and higher GHG emissions due to the additional work needed to transport and place the rock. Finally, the alternatives analyses that would be required pursuant to CEQA and the State Lands Commission's leasing determination would likely determine that there are better locations for an artificial reef meant to provide highly productive habitat.

Based on the significant uncertainties described above related to feasibility and crediting of the proposed artificial reef, the Commission at this time cannot find that the proposed mitigation project would provide any mitigation credit for Poseidon's project. If Poseidon nonetheless implements this project and the Regional Board and other involved agencies identify through monitoring the amount of productivity made available, the Commission could later consider providing credits commensurate with that productivity increase.

Mitigation shortfall and potential additional compensatory mitigation: In sum, for the two projects approved by the Board to satisfy Poseidon's 100.4-acre mitigation credit requirement, the Commission finds that it is appropriate to consider up to 58.84 annual mitigation credits for Bolsa Chica, though this amount of credits would likely not be fully achieved due to the site constraints noted above and would likely be available for only a portion of Poseidon's expected 50- to 60-year operating life, due to the expected sea level rise-induced changes at Bolsa Chica described above. As described above, Poseidon's current Palos Verdes proposal is not an acceptable mitigation site at this time. As a result, Poseidon has only about half the mitigation it would need to compensate for losses to marine life, and a significant portion of that mitigation is not likely to be viable over the entire life of the project. Additionally, this shortfall does not take into account the approximately 14 acres of mitigation required for impacts to onsite wetlands as described in Section II.J, so Poseidon's total immediate and near-term shortfall of about 50-60 acres is actually somewhat greater.

Starting in February 2022, Poseidon submitted several brief descriptions of additional possible mitigation activities for Commission staff's review. Poseidon stated that it was not proposing these activities as part of its project, but that these were mitigation activities the Commission might consider requiring Poseidon to implement in the event of a mitigation shortfall. On April 13, 2022, Poseidon provided an additional description (see **Exhibit 13**) of the quantity and type of potential mitigation credits available at several sites, with some of the proposed credits meant to address its facility's expected adverse effects on marine life and others meant to address the facility's direct wetland fill of about 3.5 acres, as described in Section II.J of these Findings. These potential projects are described below, followed by an initial analysis of each.

- **South Los Cerritos:** This site is a few miles north of Poseidon's facility site and covers about 100 acres within the several hundred acres of the Los Cerritos Wetlands complex, which is a remnant of the habitats that used to exist at the mouth of the San Gabriel River. The Los Cerritos Wetlands Authority ("LCWA") has been working for several years to develop a restoration plan that would improve tidal connections to much of the site and provide several types of estuarine, wetland, and other habitats.[121] The LCWA is currently considering a 30% design plan for the site and will be working with a Technical Advisory Committee, Tribal advisory group, and consultants to prepare a 65% design. The site is currently proposed for restoration under two phases, with Phase 1 involving about 40 acres in which various habitat types would be provided, including a mix of riparian, subtidal, marsh, and transitional wetland habitats. Poseidon proposes obtaining 19.98 mitigation credits towards either its marine life impacts or its direct wetland impacts and 3.47 mitigation credits for its direct wetland impacts (described in Section II.J of these Findings).[122] Phase 2 would involve similar habitat creation or restoration in an approximately 60-acre area.

  Although the South Los Cerritos restoration project promises to significantly improve wetland habitat in the Long Beach area, it poses challenges as a mitigation site. Converting a planned restoration project into a compensatory mitigation project is not a trivial task. In general, sites intended for restoration have much more flexibility in how they are implemented and managed into the future. Mitigation projects meant to address the impacts caused by a particular facility generally require much more extensive design evaluation, development of performance standards, monitoring, and other components to ensure that the mitigation site is functioning as intended to make up for lost resources. For example, unanticipated changes – such as one intended habitat becoming another type of habitat – may not be of concern at a restoration site, but may cause problems at a mitigation site that is expected to provide a certain amount or type of ecosystem productivity. This kind of change

[121] The LCWA is a Joint Powers Authority (JPA) whose member agencies are the State Coastal Conservancy, Lower Los Angeles and San Gabriel Rivers and Mountains Conservancy, and the Cities of Long Beach and Seal Beach.

[122] The Commission has generally not awarded mitigation credits for transitional wetlands, as Poseidon is proposing. These transitional areas may have value as buffer areas or for future conditions, but are not appropriate under current practice for full mitigation credits.

could result in a permitted project not meeting required performance standards or could require more disturbance to "correct" the site's unexpected shifts in habitat. As stated above, sites used for mitigation also generally require far more monitoring and active management than restoration sites, and it is not yet clear whether the LCWA would be interested in making the modifications to its planned design and management in order to accommodate Poseidon's mitigation needs. In a letter to Commission staff, staff from the Coastal Conservancy (which is a member of the LCWA) indicated that they were interested in considering funding from Poseidon for the projects but expect to retain full decision-making and management authority of the site. While an understandable approach, this means that, similar to Bolsa Chica, Poseidon would not have site control for these projects, thus introducing a significant amount of uncertainty into the project's ability to provide consistent mitigation over the life of the project.

Additionally, the Commission understands that the currently proposed Phase 1 restoration plan has little to no tidal connectivity to the site, so at least some of the proposed restoration may not happen or would be less productive than expected. Additionally, the San Diego Regional Water Quality Control Board recently approved the use of roughly half the site's potentially available credits for another project, so it is possible that Poseidon would not be able to obtain the full number of credits available. Regarding the Phase 2 area, the Commission understands that the restoration plan for that area is currently conceptual in nature and is not expected to be implemented for about a decade. During that time, the current conceptual proposal may go through substantial modifications to address changes resulting from climate change, new information generated by ongoing sampling or monitoring at the site, or other issues that change our understanding about the site's characteristics, all of which increase the uncertainty about the eventual disposition of the site and the number of credits that may be available. Given the limited tidal connection included for Phase 1, the Commission does not find that this project is appropriate for mitigation for loss of marine life. It may, however, be appropriate to consider Phase I as mitigation for Poseidon's on-site wetland impacts described in Section II.J of these Findings. Assuming a sufficient tidal connection is established during Phase 2, this site could be considered for mitigation credit, although the lack of site control and the long-time frame for construction make it difficult to predict how many credits the site can support and when those credits would become available.

- **Upper Los Cerritos:** This site, near the South Los Cerritos site, was also part of the historical wetlands complex at the mouth of the San Gabriel River. It has been used in the past for farming, landfills, and other development and is currently used for oil operations. The proposed mitigation actions would involve restoring, enhancing, or preserving up to about 150 acres of tidal wetlands and buffer habitat.

  Restoration at this site is proposed to occur in two phases. Phase 1 would involve purchase of credits from the Upper Los Cerritos Mitigation Bank that is expected to provide about 20 credits for a mix of habitat types. In 2018, the Commission approved CDP #9-18-395 for the property owner, Beach Oil Minerals, LLC, that

allows for decommissioning and consolidating most of the existing oil facilities and submittal of plans for further regulatory approval of a proposed wetlands mitigation bank covering about 68 acres of the site and a restoration plan covering about 75 acres on a different area of the site. The Bank itself was reviewed by the Commission in February of 2021, resulting in authorization for the Commission's Executive Director to become a signatory. The Bank and its approved credits are expected to be finalized soon and could begin construction soon thereafter to restore about 20 acres of tidal salt marsh, rehabilitate about seven acres of tidal salt marsh, and preserve about 30 acres of tidal salt marsh. Phase 2 would occur on the southern half of the site, once the existing oil operation is fully decommissioned and removed over an estimated twenty-year period.

On April 11, 2022, Poseidon presented Commission staff with a letter from the property owner stating that the owner would be willing to enter into an agreement to sell to Poseidon all the mitigation credits from the expected mitigation bank and to work with Poseidon to permit and implement a restoration plan that could serve as mitigation for Poseidon. The letter noted that if an agreement is reached, it could accelerate the expected time needed to remove and remediate the oil facilities to allow restoration to occur more quickly.

The proposed mitigation bank may be completed within the next few years, and Poseidon has proposed it receive about 21 credits if it implements the above-referenced agreement with the landowner. Commission staff believe there could be up to about 19 credits available at the site, though they would be generated over several years rather than being fully available when the bank starts operations. The longer-term restoration plan remains conceptual and highly dependent on the timing of the expected oil facility consolidation, decommissioning, and remediation, followed by the work need to prepare the site for restoration. Even with the non-binding expression of interest by the landowner, this site remains highly uncertain as a mitigation option for Poseidon at this point.

- **Newland Marsh:** This site encompasses about 44 acres just inland of Poseidon's facility site. Most of the site is a degraded remnant of the coastal salt marsh that formerly covered hundreds of acres in the Southeast Huntington Beach area. The site currently includes several habitat types, including open water, salt panne, alkali march, freshwater marsh, willow scrub, unvegetated salt flat, coastal scrub, and ruderal. Although largely degraded, it currently provides habitat for at least two listed species – the Belding's Savannah Sparrow and the California Least Tern. The site is bifurcated by the Huntington Beach Flood Channel, which also determines much of the site's hydrologic character.

  The Huntington Beach Wetlands Conservancy ("HWBC") recently purchased the site using funds made available from several agency funders. HWBC has produced a 30% design of a proposed restoration plan that would modify the Marsh to restore or enhance several types of habitats, provide the hydrology needed to produce a muted tidal regime, and convert about 14 acres of upland areas to any of several of the above habitat types or to non-tidal transitional wetland habitat. The restoration

would rely on a system of tide gates to provide tidal flows within parts of the restored areas and to reduce the potential for excessive inundation up until about a two- or three-foot increase in sea level. Poseidon believes it could receive up to about 20 mitigation credits at this site to offset its marine life impacts and about eight credits to offset its direct wetland impacts.

Commission review shows that this site could provide some beneficial mitigation, though with limitations. The site is close to Poseidon's facility, so implementing this restoration plan would likely provide some areas of habitat types that would bring additional marine life productivity into the nearby nearshore ocean waters where Poseidon's impacts would occur. Additionally, with a restoration plan already under development, Poseidon may be able to implement mitigation more quickly here than in some of the other sites being considered.

However, the site and plan also raise several concerns. Its hydrology would rely largely on the flood channel, which is likely to be managed for its primary purpose – conveyance of flood waters – instead of being managed in a way that is adequately supportive of the proposed habitats within. This increases the uncertainty as to Poseidon's ability to meet mitigation performance standards within the site. The flood channel also conveys urban runoff that could lead to trash or contaminants entering the site, which further increases the uncertainty of the site's ability to provide successful mitigation. The site would also be managed to provide a muted tidal flow rather than full tidal flow, which is another characteristic that could lead to lower productivity. Another area of concern is that some of the funding mechanisms HBWC used to purchase the site either prohibit the use of the Marsh for project-specific mitigation such as this, or require that any such mitigation proposal go "above and beyond" the conceptual restoration plan that served as the basis for the funding approval. To allow use of the site for project-specific mitigation, Poseidon may need to either refund all or part of the state/federal funds used for the purchase or revise the currently proposed 30% design to incorporate more areas of mitigation.

Finally, this proposal also raises concerns about site control. Poseidon provided an April 19, 2022 letter from HBWC expressing an interest in allowing the site to be used for Poseidon's mitigation needs; however, HWBC stated that it expected to maintain control of all aspects of the site and project and to keep the same site design currently proposed in its 30% restoration plan.

- **Pond 20:** This site is in South San Diego Bay, about 100 miles from Poseidon's project site. It consists largely of a former salt pond near the mouth of the Otay River and is the subject of a proposal by the Port of San Diego to reestablish about 77 acres of salt marsh habitat to serve as a wetland mitigation bank. The project would involve breaching existing berms and grading and excavating the site to reconnect it with natural tidal flows and to establish mid- to high salt marsh habitat. In April 2021, the Port completed an EIR and has submitted a Port Master Plan Amendment to the Commission and is now awaiting review and approval of the proposed mitigation bank by the Interagency Review Team. Poseidon proposes to obtain 64.84 mitigation credits to address its marine life impacts and 11.64 mitigation credits for its direct wetland impacts (described in Section II.K below).

There are several concerns with this proposal. First, its distance from Poseidon's facility and the source water within which Poseidon's impacts to marine life would occur makes it unlikely that the Pond 20 site would provide mitigation benefits to adequately offset Poseidon's impacts. The distance from the source water body also makes Pond 20 an unacceptable mitigation site under the Ocean Plan, as the Ocean Plan requires that mitigation occur within the same source water body as Poseidon's project impacts. Additionally, although the service area for the Pond 20 Bank is not yet finalized, it is not likely to reach as far north as Huntington Beach. If that is the case, credits from this bank would not be eligible to mitigate impacts in Huntington Beach.

Mitigation shortfall: As described below, Poseidon would continue to have a substantial mitigation shortfall even if Poseidon was able to implement these additional, possible mitigation options in a manner allowing for their use as compensatory mitigation. Several of these proposals remain conceptual, with little or no certainty about the type of habitats that would be developed, the measures it would take to allow these habitats to be successful and productive, and the amounts of credits they might generate. All of them would create a shortfall because of the delay between Poseidon's proposed start of facility operations and the time the sites provide the expected mitigation, Poseidon's proposed schedule would have facility operations start several years, and in some cases many years, before most of the proposed mitigation would be in place. As detailed below, and in terms of the APF, this would result in a long-term shortfall of several square miles worth of lost nearshore productivity after just a few years of facility operations and the shortfall would continue for the operating life of the project. If based on the currently expected mitigation credits, the shortfall would be several hundred mitigation that would continue for the life of the project.[123] This issue of delayed mitigation and the resulting shortfall is similar to the current situation at Poseidon's Carlsbad facility, which has been operating since 2016 without any of the required mitigation in place. With that project, the Commission determined the annual marine life productivity lost from a APF of 113 acres due to Poseidon's facility operations would require successful performance of about 66 acres of high-quality restored estuarine habitat. After six years of operating without the mitigation in place, the sum of unmitigated losses totals, in APF terms about 565 acres, and in terms of mitigation, almost 400 acres.[124]

[123] Of the mitigation projects identified above, Poseidon expects to start inlet dredging up to about four years before it starts facility operations and expects that the other projects will take at least five years to design, obtain the necessary permits, and be constructed. Although starting the dredging before facility operations start will build up a few credits, the yearly facility impacts and the delay in the other mitigation projects would create a shortfall of at least 379 credits. This shortfall would remain even after the other mitigation projects were completed and started providing successful mitigation.

[124] See August 5, 2008, Condition Compliance Report for proposed Marine Life Mitigation Plan – Poseidon Resources (Channelside) LLC – Carlsbad, Addendum to CDP E-06-013 Condition Compliance Report.

To provide a reasonable expectation of how many credits might be available, the Commission considered a full set of mitigation options, including those approved by the Regional Board and those recently presented by Poseidon. Table I-2 below shows the number of credits available consistent with the Coastal Act and past Commission decisions. As described above, these mitigation options are divided into near-term projects and future projects. Near-term projects are generally further along in the planning process and in a best-case scenario, could be permitted, constructed, and providing credit within 10 years of project initiation. Future projects are still in the conceptual phase and are thus many more years away from providing mitigation credit, if they move forward at all. Several projects, including the South Los Cerritos Phase I project, the Palos Verdes Reef and Pond 20 Mitigation Bank are included but listed with zero credits or credits "To Be Determined," for the reasons described above. The remaining suite of available short-term projects includes 5 separate projects that have the potential to provide a total of about 90 acres of mitigation credits, which is about 10.5 acres short of the total requirement. Several of these projects raise significant concerns including related to feasibility, lack of site control and sea level rise design constraints. Furthermore, most of these mitigation projects would not likely be functional and providing credit for at least 10 years after the proposed start of Poseidon's operations. Thus, the actual mitigation deficit that would accumulate during that period would likely be much greater.

Table I-2: Summary of potential mitigation credits

Project Name:	Poseidon's proposed credits:	CCC staff recommended credits:	Notes:	Uncertainty Factors:
Near-term (within 10 years):				
Bolsa Chica dredging	28	15	Credits would vary based on presence of eelgrass.	a, d
Other Bolsa Chica	31	43.8		a, d
Newland Marsh	20	12	Reduction for muted versus full tidal.	a
S. Los Cerritos, Phase 1	20	0	No tidal connection available for Phase 1. May be appropriate for mitigating Poseidon's onsite wetland impacts (see Section II.J).	a, b
Upper Los Cerritos, Phase 1	21	19	Credits would not all be immediately available, but would accrue over time.	
Total near-term:	120	89.8		
Future projects (not available for 10+(?) years):				
Palos Verdes Reef	43	TBD	Highly uncertain, unable to calculate expected credits.	see text
Pond 20	65	0	Too far from impact area.	see text
S. Los Cerritos, Phases 1 & 2	45	27.5	Includes ~ five acres credit for ecosystem "lift" provided from Phase 1.	a, b?, c
Upper Los Cerritos, Phase 2	58	24	Speculative.	c, d
Total Near-term and Future:	331	~141.3	**These totals do not account for accumulated deficit and temporal loss (see Exhibit 14).**	

Uncertainty Factors:
a: lack of site control
b: little or no tidal connection
c: current design conceptual only
d: sea level rise design constraints

To help illustrate this point, **Exhibit 14 – Mitigation Shortfall Scenario**, presents one possible scenario of likely implementation timelines for the desalination plant as well as the proposed mitigation projects included in Table I-2. The purpose of **Exhibit 14** is to demonstrate how the likely timing of Poseidon's possible mitigation options lines up with its facility's expected impacts to marine life. **Exhibit 14** is based on several assumptions, including:

- The timing of the expected credits is based primarily on Poseidon's 2021 testimony at the Regional Board hearings where it stated that it expects the review, permitting, and implementation of most mitigation proposals to take anywhere from about five to 15 years. Poseidon also stated that it expected it could complete facility

construction about four years after receiving all its permits and achieving financial close. The timeline used in the table includes a somewhat more generous assumption that the near-term mitigation projects could be reviewed, permitted, and constructed at Year 4 of facility operations and would be fully successful and start providing mitigation credits five years later (Year 9 of operations). For the two Phase 2 projects at South Los Cerritos and Upper Los Cerritos, the timeline assumes those would be completed and start providing credits after Year 15 of facility operations.

- Given the increased uncertainty of future projects, including Phase 2 of both the Upper Los Cerritos and South Los Cerritos projects, the Commission applied a 50% uncertainty factor to the credits Poseidon had proposed for each, in recognition that there could be significant changes to project designs or site conditions in the intervening years.
- Based on commitments Poseidon provided to the Regional Board, dredging of the Bolsa Chica inlet would commence as soon as Poseidon completes its financial close for the desalination facility, which would provide up to about four years of mitigation benefits from dredging before the facility's impacts begin.

The results of this reasonable best-case scenario show that when Poseidon would start facility operations, there would be a small "overage" of mitigation credits that would immediately start to decline to reach a deficit of about -300 credits at Year 5 of operations and reach a maximum deficit of more than -600 credits by Year 14. The deficit would then start to decrease, as Phase 2 projects started providing credits, to about -300 credits, but would then increase again as the effects of sea level rise start to reduce credits at Bolsa Chica. Under this scenario, Poseidon would stay in deficit for the entirety of its operating life, reaching a deficit of about -500 credits at Year 50. Expressed as an APF, this deficit range of -300 to -600 credits would be roughly equivalent to about two to four square miles of unmitigated productivity removed from the nearshore waters of Orange County.[125]

At Year 7, the other projects (other than the two Phase 2 projects) would start providing credits and would reduce the deficit at Year 10 to about 300 credits, equal to about three years of unmitigated facility impacts, or an APF of more than two square miles. At this point, the Phase 2 projects would start providing credits so that the "extra" mitigation they provide would "zero out" the mitigation credit shortfall by about Year 15 of facility operations – that is, Poseidon's annual impacts would then start to be matched and exceeded by all the mitigation projects. This assumes that: 1) all these mitigation projects meet the above timelines; and 2) all projects are fully successful at the expected time and continue to be fully successful for the remaining period of Poseidon's operations (another 35 to 45 years).

[125] This APF shortfall is calculated by assuming an average 1:5 mitigation ratio for all the mitigation projects, so that the 300 credit shortfall would represent about 1,500 acres, or just over two square miles and the 600 credit shortfall would be about 3,000 acres, or more than four square miles of nearshore and estuarine waters.

However, this Year 15 period is also about the same time that Bolsa Chica is expected to go through significant adverse impacts due to climate change and sea level rise, and when it will likely require substantial changes in its design and management – for example, new or modified inlet structures, changes to berm and infrastructure configurations, etc. As a result, the approximately 50 credits Poseidon expects it to provide could decline, potentially creating a mitigation shortfall again. The timing and manner in which changes at Bolsa Chica could affect Poseidon's proposed mitigation credits is highly uncertain. If Bolsa Chica is managed to adapt to changing conditions, it is possible that Poseidon could maintain credits for more years than shown in this scenario. This would reduce the credit deficit faster and potentially even eliminate it before the end of the 50-year period shown on the table. However, the opposite is also true – habitat conversions or management changes at Bolsa Chica could happen sooner than the 15 years illustrated in this scenario, thus increasing the credit deficit. These results also assume that there are no unresolved conflicts between Poseidon's need to manage the sites to provide mitigation credits and the need of the other involved entities to manage the sites for multiple purposes – for example, that Poseidon is able to fully implement the channel enhancements at Bolsa Chica without interfering with endangered species nesting sites that may be in the same area.
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There are also several pragmatic concerns. This analysis assumes that Poseidon would conduct simultaneous environmental and permitting review for most of the sites, and then implement up to 10 different mitigation projects, each with its own site characteristics, performance standards, monitoring requirements, reporting obligations, and other standard elements required for regulatory agencies to ensure compliance with permit conditions. The effort and coordination needed to implement all of those efforts would be enormous. Planning and permitting for the two linked projects included in the mitigation program for Poseidon's Carlsbad facility required a large team made up of Poseidon personnel, consultants, several agency staff, a Science Advisory Panel, and others working for over 10 years to get the project ready to construct. Simultaneously planning and then managing ten proposed mitigation projects would be exponentially harder and more expensive.

This speaks to the impracticality of such an approach, but more importantly suggests that the immense scale of Poseidon's impacts to marine life – 423 acres of lost marine life productivity each year and mortality to the marine life in 100 billion gallons of ocean water each year – makes it essentially impracticable to meet Coastal Act and LCP policies, which require that marine resources be maintained, enhanced, and where feasible, restored, and that uses of the marine environment be carried out in a manner that will sustain the biological productivity of coastal waters. To find this type and scale of impact consistent with these policies, it is critical that a project has well-defined mitigation identified and able to be implemented with, or shortly after, a project's impacts start. Without that approach, and without a mechanism for fully making up for the mitigation shortfall that would result, the project would not ensure that the state's marine life productivity would be maintained, enhanced, or where feasible, restored.

The mitigation package Poseidon has proposed is also not consistent with relevant Coastal Act and LCP policies requiring maximum feasible mitigation. The amount of planning needed for all elements of Poseidon's currently proposed and potential mitigation, with the exception of proposed dredging at Bolsa Chica, is far behind the planning, construction, and operation schedule for the desal facility, even though Poseidon has been aware of the Commission's mitigation concerns for many years. Even the dredging and restoration work proposed at Bolsa Chica, which has had more time for planning due to the Regional Board's several year review and approval process, carries significant risks related to feasibility and long-term viability. If Poseidon's project is authorized, the inevitable result would be many years of unmitigated losses to marine life, if not a permanent loss. As a result, Poseidon's proposed project does not maintain, enhance, or restore marine resources, nor does it achieve the requirement to provide maximum feasible mitigation, and is thus inconsistent with the marine resource protection policies of the Coastal Act and LCP.

Acidification effects

Discharges from reverse osmosis desalination facilities, such as this proposed project, are generally more acidic (i.e., have lower pH) than the ambient ocean water they treat to produce drinking water. These facilities must chemically "buffer" their source water by raising and lowering its pH at different steps in the pretreatment and treatment processes to protect the reverse osmosis membranes and other facility components from damage. The effluent resulting from these treatment methods creates a waste stream that is more acidic than its source water, unless a final treatment step is included to modify the effluent pH.

Numerous studies are showing that acidification of ocean water caused by global climate change is already causing significant adverse effects to populations of shellfish and other organisms.[126] Because pH is measured on a logarithmic scale, a relatively small numerical change in pH can represent a significant change in acidity. For example, a change from pH 7.9 to 7.8 represents an approximately 30% increase in acidity.

While ambient pH levels in ocean water and in Southern California's coastal waters normally vary due to seasonal differences, upwellings, or other phenomena, the overall trend shows a substantial increase in acidity. In response to these adverse effects and to reduce future adverse effects, California developed the 2018 Ocean Acidification Action Plan and helped establish an interagency, interdisciplinary, and interstate panel to investigate the effects of acidification and identify possible actions to reduce its impacts on the state's marine life and coastal waters.

[126] See, for example, Kelly, Ryan, and Meg Caldwell, Why Ocean Acidification Matters to California, and What California Can Do About It: A Report on the Power of California's State Government to Address Ocean Acidification in State Waters, Center for Ocean Solutions, March 2012, and Wittmann, Astrid, and Hans-O Portner, Sensitivities of extant animal taxa to ocean acidification, Nature Journal of Climate Change, 2013.

The pH-related requirements of the state's Ocean Plan predate these more recent concerns about ocean acidification. The Ocean Plan requires that discharges from industrial facilities, beyond a relatively small "mixing zone," be between 6.0 and 9.0 pH units and that they not differ from the receiving ocean water by more than 0.2 pH units. Poseidon's 2010 SEIR identified its expected ambient source water pH to range from about 8.0 to 8.2, and anticipated that the facility's discharge would have a pH of about 7.3.[127] This discharge pH would be within the Ocean Plan's 6.0 to 9.0 allowable range but would exceed the Ocean Plan's limit of no more than 0.2 pH units difference from ambient pH levels. Poseidon's 2021 approval from the Regional Board required Poseidon to keep its discharge pH within the Ocean Plan's allowable range, but Poseidon has not identified any modifications it has made to its treatment system that would allow it to meet these Ocean Plan standards.

Importantly, monitoring data from Poseidon's desalination facility in Carlsbad, which uses treatment methods similar to those proposed in Huntington Beach, show that the pH of Poseidon's effluent often differs from the pH of the source waters by more than 0.2 pH units. For example, more than half of the 2021 sampling events (27 of 46, or 59%) showed a difference of more than 0.2 units.[129] At that facility, Poseidon is able to use flow augmentation to dilute its effluent and thereby reduce this exceedance to some degree before the diluted effluent reaches the point of compliance in nearshore waters; however, the Desal Amendment prohibits this flow augmentation option at the proposed Huntington Beach facility.

It is not clear what measures Poseidon would need to incorporate into its project to ensure conformity with the Ocean Plan pH requirements and to minimize adverse effects to marine life, as required by both the LCP and Coastal Act. It would most likely require Poseidon to include an additional treatment method to its currently proposed treatment train that would allow the pH of its effluent to more closely match that of the receiving waters in the ocean. To allow for conformity, the Commission could impose a Special Condition requiring Poseidon to submit a CDP application for any proposed modifications, such as additional treatment methods, different chemical use, or other changes that could result in modified effects on coastal resources. However, given the other areas of Coastal Act and LCP nonconformity identified in these Findings, such a Special Condition would not be adequate to allow the proposed project to be fully consistent with relevant Coastal Act and LCP provisions.

[127] See 2010 SEIR, Appendix N.

[128]

[129] This is based on comparing sampling data from the facility's monitoring station M-001, which represents Poseidon's undiluted effluent, and its monitoring station M-002, which represents the Poseidon effluent after it is co-mingled with flow augmentation volumes and prior to discharge to the ocean.

Placement of fill in coastal waters

The project would involve placing diffusers, wedgewire screens, riprap, and other solid materials in the ocean, which constitutes "fill" material under Section 30233 of the Coastal Act. The Commission therefore needs to consider the project's consistency with the allowable use, alternatives, and mitigation tests of Section 30233(a). Under the first prong of the test, the diffusers and other materials are allowable uses in the water, as they are aspects of the intake and outfall pipelines, which themselves are coastal dependent industrial development (see Section II.O of these Findings regarding Section 30260 override and discussion of coastal dependency). Concerning the alternatives test of Section 30233(a), the Regional Water Board has already determined that the wedgewire screen and diffusers are the best available designs to mitigate the impacts that the intake and outfalls would have related to mortality of marine life. In that sense, they are the best, least damaging alternatives for carrying out the functions they are designed to accomplish, if the project were to be approved and move forward.

There is also the separate question of whether there is an alternative to the overall project that would obviate the need for placing any fill in the water. As described in Section II.O, it is not clear whether alternative locations for this project are infeasible or more environmentally damaging. As described above, the Commission accepts the Regional Board's determination regarding the lack of feasible alternative intake and outfall systems for this proposed project, so there is not an alternative desalination project of this scale that would prevent the need for wedgewire screens. However, it is more evident that there appear to be less environmentally damaging alternative methods with which to provide any additional, necessary water for the region, and therefore avoid the need for any "fill." Some water districts have identified a need for significant new water sources and have identified desalination as one way of being able to provide local, drought-proof water supplies to diversify their water portfolios. However, multiple studies have shown that Orange County is not expected to need much additional water in the coming decades and that there are various, less expensive, and less environmentally damaging alternative ways to obtain additional water or to reduce water use. Thus, although there is not one, specific identified alternative to this project that would fulfill most of its objectives and identified needs and that is clearly feasible, there is also insufficient evidence to find that there is no feasible, less environmentally damaging alternative to placing fill in the ocean for the proposed project. Due to the lack of definitive information on this issue, the Commission does not rely on this prong as a basis of denial. However, additional information regarding feasible alternatives—or lack thereof—would be needed if the project were to be approved in the future.

Regarding the third test of Section 30233(a) related to mitigation, the diffuser and screening would be installed for the purposes of mitigating the project's impacts. However, the screens provide no more than a modest reduction in impacts (about 1%) and the diffuser itself would have significant impacts related to the high velocity discharge of brine, and as described above, the overall proposed project has inadequate mitigation for its marine life impacts. There is therefore inadequate mitigation for the proposed project-related fill.

Impacts from intake maintenance

Another element of Poseidon's proposed project that is not yet fully identified or evaluated is the need for Poseidon to maintain its intake system. Reviews by both the Regional Board and State Lands Commission addressed maintenance of Poseidon's proposed wedgewire screen installation but did not identify how Poseidon would maintain the interior of the intake pipe, which could require ongoing maintenance to address marine "biofouling" of the system. The measures needed to maintain the structure could involve additional adverse impacts to marine life and water quality beyond those currently identified and analyzed.

Hard structures within the marine environment almost always serve as a substrate for the growth of marine life. For several reasons, this proposed project's intake pipe and screens provide what are considered "ideal" conditions for many forms of marine life:[130] 1) the interior of this 14-foot diameter pipeline provides large amounts of substrate on which organisms can attach and grow; 2) the continuous flow of water through the intake provides a constant stream of food and dissolved oxygen for the attached organisms; 2) that same flow removes the organisms' waste products; 4) the screens limit the number of predators inside the system; and, 5) the reduced light inside the structure precludes or reduces the growth of algae on the attached organisms that might limit their growth. Additionally, the one millimeter "slots" on the wedgewire screens reduce by only about one percent the number of planktonic and larval organisms that are able to pass through the screens and then attach and grow on the pipe interior. These factors result in a relatively high growth rate for marine life within the structure.

This growth on the pipeline interior can both restrict water flow through the intake and lead to amounts of the organisms' waste products that need to be removed during the desalination facility's treatment processes. Power plants that use this type of structure typically prevent this marine growth by using chlorine treatments or remove marine growth using "heat treatments" – i.e., they regularly re-direct heated water from their generating units that would normally be discharged through their outfall through the intake for several hours. This heated water flow creates temperatures inside the intake high enough to kill the organisms attached to the intake's interior and then flow ejects the remains out the intake opening. The current power plant owner, AES, reports needing to conduct these heat treatments up to every six to eight weeks. However, these treatments will end in 2023 with the power plant's retirement of its once-through

[130] See, for example, Rajagopal and Jenner, Biofouling in Cooling Water Intake Systems: Ecological Aspects, in Operational and Environmental Consequences of Large Industrial Cooling Water Systems, Springer, 2012; Kasama, Hiroko, Tackling the Biofouling Challenge, from Global Water Intelligence, Volume 12, Issue 4, April 2011; and Saeed, Mohamed, G.F. Al-Otaibi, G. Ozair, and A.T. Jamaluddin, Biofouling Potential in Open Sea and Adjacent Beach Well Systems, from Desalination & Water Reuse, Volume 15/1, 2005; Satpathy, K.K., A.K. Mohanty, Gouri Sahu, S. Biswas, M.V.R. Prasad, and M. Slvanayagam, Biofouling and its control in seawater cooled power plant cooling water system – a review, in Nuclear Power, Pavel Tsvetkov (ed.), Intech Open Publishing, August 2010; and Knox-Holmes, B., A. Hassan, E. Williams, and I. Al-Tisan, Fouling Prevention in Desalination Plants, presentation at Second Gulf Water Conference, Bahrain, 1994.

cooling system. With this loss of heat treatments, Poseidon would need to develop an alternative method for clearing its intake that conforms to Coastal Act and LCP policies meant to protect marine life and to prevent water quality degradation.

To clear the wedgewire screens, Poseidon has proposed using an "air-burst" system attached to the screen that it would operate as needed to loosen much of the attached marine life. Poseidon would also remove and manually clean the screens up to about six times per year, which would involve anchoring a barge nearby and deploying divers to remove and reattach the screen. However, Poseidon has not identified how it would clean the pipeline interior. All the known methods for doing so appear to be infeasible, unavailable, or would involve additional, but as-of-yet unquantified impacts to marine life and water quality.

Methods used elsewhere to clear desalination intake structures include: 1) killing the interior marine life by using chemicals, such as high doses of chlorine, copper, bromine, ozone, or other compounds; 2) installing mechanical systems that use balls made of different materials or "pigs" – lozenge-shaped cylinders that are sized just slightly smaller than the intake – that are run through the pipeline and scour the interior surface to remove marine growth; or 3) painting the interior of the structure with antifouling paint containing biocides (which is an alternative form of chemical treatment). Facilities that construct new intakes can generally incorporate one or more of these methods into the structural design or facility operations. However, the size of this existing Huntington Beach intake structure – about 14 feet in diameter and 1,500 feet long – suggests these alternatives are not feasible. Regarding chemical treatment, the Regional Board's Order prohibits Poseidon from using chemical methods to clean the intake. Even if allowed, using chemical methods at this facility would require a substantial "dosing" to be effective, as this intake holds about 1.8 million gallons of seawater, so killing the marine life within would require a substantial amount of chemicals to be applied and discharged on a regular basis. Using a chemical method would also likely require Poseidon to significantly modify the structure – for example, by installing chemical feedlines, adding structures at the intake opening to prevent the "dosed" water from escaping from the pipeline into the nearshore waters, etc. If pulled in and treated within the facility, these chemical dosing methods could also result in water quality discharges that exceed the facility's NPDES permit requirements, while also reducing the efficiency of, or requiring changes to, the facility's pre-treatment system. The antifouling paint approach is used on new structures, and would be difficult, if not infeasible, to use on an existing structure of this size. Regarding mechanical treatment methods, the cleaning balls described above are used to clear only small diameter structures, such as the condenser tubes within a power plant that are no more than a few inches in diameter. The aforementioned "pigs" are used in larger diameter pipes, though generally for those no more than a couple of feet in diameter.

Commission staff requested Poseidon provide its proposed cleaning and maintenance method(s), noting that Poseidon's test intake and screen system at its Carlsbad desalination facility had experienced severe fouling problems.[131]

Poseidon had recently confirmed this problem at its Carlsbad facility, which until recently had used cooling water from the co-located Encina Power Plant to produce its desalinated water. In June 2020, the power plant ended its use of cooling water and its treatment of that water, and Poseidon became a "stand-alone" desalination facility. In anticipation of that closure and as part of the San Diego Regional Water Quality Control Board's 2019 renewal of Poseidon's NPDES permit, the Board required Poseidon to install wedgewire screens on its intake, as required by the state's Ocean Plan. Prior to installing those screens, Poseidon requested that it be able to install a pilot facility near its existing intake to test how those screens would function in a marine environment. Poseidon's December 2021 letter stated that during the approximately four years of co-located operations, marine growth within the intake was never more than about one-inch thick; however, the cessation of the power plant's treated once-through cooling water flows, led to a "sudden and unforeseen significant increase" in marine growth within the desalination facility's intake to about six inches thick. This amount of marine growth required Poseidon to shut down production to allow divers to scrape off and remove marine growth from about 200 lineal feet of a 280-foot intake pipe, which resulted in a week-long shutdown.

Poseidon's nearby screen testing facility experienced similar biofouling problems. The December 2021 letter states that test results from that facility indicate that installing the required wedgewire screens on Poseidon's full-scale facility would require cleaning every three to six months to remove about 30,000 cubic feet of marine growth annually. This amount of cleaning would result in shutting down the facility for about two months each year, which, among other things, would prevent "Poseidon from meeting its water delivery and debt financing covenants."

In response to staff's inquiry, Poseidon initially directed staff to the description of maintenance operations in the 2017 State Lands Commission Final Supplemental Environmental Impact Report and Lease Agreement; however, that document did not describe or evaluate any methods for cleaning the pipeline interior. On April 13, 2022, Poseidon submitted a memo describing some differences between the Huntington Beach and Carlsbad systems – i.e., a six- to eight-foot diameter pipeline in Carlsbad versus a 14-foot diameter pipeline at Huntington Beach – and noting that oceanic conditions were different at the two locations – Carlsbad being in an estuarine environment and Huntington Beach being in a nearshore, open ocean environment. Poseidon also described experiences at similar systems elsewhere in the world and stated that they generally found that marine life growth within the pipes would reach a "steady-state" growth of just several inches, not full blockage. The memo also included

[131] See Poseidon's December 22, 2021 letter to the San Diego Regional Board describing intake feasibility concerns due to the high amount of biofouling within the intake systems.

an analysis showing that the interior of Poseidon's intake pipeline could experience up to about 25 inches of growth without affecting the water flows or velocities the facility would need. The memo concluded that Poseidon did not expect to need to conduct maintenance of the pipeline interior.

While the memo suggests there may not be an issue for Poseidon with marine growth within the pipeline, the existing power plant has been treating the inside of the pipe with heated water to kill marine growth for the past several decades, which suggests that there has been an ongoing need to control growth in the intake pipe. There is no certainty in believing that this need for treatment would end if Poseidon were to start using the intake for its own purposes. While Poseidon may not need to clean the pipe interior as often as did the power plant, it is not clear that the facility could operate for its full operating life without conducting some type of maintenance to control marine growth on the pipeline interior. If the need for maintenance were to arise, the various methods used to clean the intake would likely require Poseidon to apply for an amendment to any CDP issued by the Commission for this proposed project, since the coastal resource impacts of the methods have not been described or evaluated. Given the large diameter and length of the Huntington Beach pipeline, any needed cleaning would likely involve a large amount of marine growth, and any cleaning methods – including those mentioned above would likely result in some type of resource impacts.

With the current lack of information about what methods Poseidon proposes to use and the uncertainty about what adverse effects and mitigation measures might be needed, it is not possible at this time to find that the project conforms with Coastal Act or LCP policies regarding the protection of marine life and water quality. The Commission might be able to impose a Special Condition requiring Poseidon, prior to issuance of a CDP, to identify the proposed methods, expected impacts, and necessary mitigation measures to address these expected marine life and water quality effects, and to apply for a CDP amendment if those methods would involve different development or different impacts than already analyzed. However, given the other areas of project nonconformity to the Coastal Act and LCP, such a condition would not be adequate to allow for project approval.

Conclusion

While Poseidon's proposed project would include several measures meant to reduce its impacts to marine life and water quality, the project would still result in substantial losses of marine life and marine ecosystem productivity. The mitigation proposed thus far as part of the project would be far short of that needed to mitigate these losses to the extent feasible. From the documentation provided, it appears that other mitigation that Poseidon is considering would not be sufficient to adequately mitigate the full suite of impacts, as much of it is too uncertain at this point or would come to fruition many years after Poseidon proposes to start operating its desalination facility and causing the impacts. As a result, the proposed project does not conform to relevant Coastal Act and LCP policies, as described above.

J. WETLANDS AND ENVIRONMENTALLY SENSITIVE HABITAT AREAS

LCP Policy C 6.1.4 states:

> The biological productivity and the quality of coastal waters, streams, wetlands, estuaries, and lakes appropriate to maintain organisms and for the protection of human health shall be maintained and, where feasible, restored.[133]

LCP Policy C 6.1.20 states:

> Limit diking dredging, and filling of coastal waters, wetlands, and estuaries to the specific activities outlined in Policy 30233 and 30607.1 of the Coastal Act and to those activities required for the restoration, maintenance, and/or repair of the Municipal Pier and marina docks. Conduct any diking dredging and filling activities in a manner consistent with Section 30233 and 30607.1 of the Coastal Act.[134]

LCP Policy C 7.1.2 states, in relevant part:

> Environmentally sensitive habitat areas shall be protected against any significant disruption of habitat values…

LCP Policy C 7.1.3 states:

> 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 C 7.1.4 states:

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[133] The LCP defines "coastal waters" as including: "waters of the Pacific Ocean, streams, wetlands, estuaries, lakes, and other areas subject to tidal action through any connection with the Pacific Ocean."

[134] Coastal Act Section 30233 allows wetland fill only for certain types of development, including coastal-dependent industrial facilities, but only if there are no feasible less environmentally damaging alternatives and only when feasible mitigation measures have been provided to minimize adverse environmental effects.

Coastal Act Section 30607.1 states: Where any dike and fill development is permitted in wetlands in conformity with Section 30233 or other applicable policies set forth in this division, mitigation measures shall include, at a minimum, either acquisition of equivalent areas of equal or greater biological productivity or opening up equivalent areas to tidal action; provided, however, that if no appropriate restoration site is available, an in-lieu fee sufficient to provide an area of equivalent productive value or surface areas shall be dedicated to an appropriate public agency, or the replacement site shall be purchased before the dike or fill development may proceed. The mitigation measures shall not be required for temporary or short-term fill or diking if a bond or other evidence of financial responsibility is provided to assure that restoration will be accomplished in the shortest feasible time.

> Require that new development contiguous to wetlands or environmentally sensitive habitat areas include buffer zones. Buffer zones shall be a minimum of one hundred feet setback from the landward edge of the wetland, with the exception of the following:
>
> A lesser buffer may be permitted if existing development or site configuration precludes a 100 feet buffer, or conversely, a greater buffer zone may be required if substantial development or significantly increased human impacts are anticipated. In either case, the following factors shall be considered when determining whether a lesser or wider buffer zone is warranted. Reduced buffer zone areas shall be reviewed by the Department of Fish and Game prior to implementation.
>
> a) Biological significance of adjacent lands: The buffer should be sufficiently wide to protect the functional relationship between the wetland and adjacent upland.
> b) Sensitivity of species to disturbance: The buffer should be sufficiently wide to ensure that the most sensitive species will not be disturbed significantly by permitted development, based on habitat requirements of both resident and migratory species and the short and long term adaptability of various species to human disturbance.
> c) Susceptibility of parcel to erosion: The buffer should be sufficiently wide to allow for interception of any additional material eroded as a result of the proposed development based on soil and vegetative characteristics, slope and runoff characteristics, and impervious surface coverage.
> d) Use existing cultural features to locate buffer zones: The buffer zones should be contiguous with the environmentally sensitive habitat areas and make use of existing features such as roads, dikes, irrigation canals, and flood control channels where feasible.

LCP Policy C 7.1.5 states, in relevant part:

> Notify County, State and Federal agencies having regulatory authority in wetlands and other environmentally sensitive habitats when development projects in and adjacent to such areas are submitted to the City.

LCP Policy C 7.2.7 states:

> Any areas that constituted wetlands or ESHA that have been removed, altered, filled or degraded as the result of activities carried out without compliance with Coastal Act requirements shall be protected as required by the policies in this Land Use Plan.

LCP Policy I-C 8(c)[135] states, in relevant part:

> For proposed projects within the Coastal Zone, utilize the development review/environmental review process to accomplish the following:
>
> 1. Examine each development's potential to affect habitat. To the maximum extent feasible project impacts on habitat shall be minimized through avoidance. In the event mitigation is necessary, mitigation shall be provided on-site if feasible or within the general vicinity if on-site mitigation is not feasible. Determine the necessity for Mitigation Agreements or other coordination with the California Department of Fish and Game, California Coastal Commission and/or federal agencies to obtain necessary permits for developments that appear to affect habitat.
> 2. Permit resource dependent and incidental public service related land uses within wetlands and environmentally sensitive habitat areas only if consistent with the following Coastal Act policies: Section 30233 and Section 30240.[136]
> 3. Require improving the natural biological value, integrity and function of coastal wetlands and dunes through native vegetation restoration, control of alien plants and animal, [sic] landscape buffering and development setbacks.
> 4. …
> 5. Review any development proposed for non-wetland areas to ensure that appropriate setbacks and buffers are maintained between development and environmentally sensitive areas to protect habitat quality…

Coastal Zoning Ordinance Section 221.10 states, in relevant part:

> As a condition of new development adjacent to a resource protection area, which includes any wetland, environmentally sensitive habitat area (ESHA), associated buffers, land zoned coastal conservation, as the same are defined in the City's Local Coastal Program, an applicant shall comply with the requirements listed below…
>
> D. Street lighting, exterior residential lighting and recreational lighting adjacent to resource protection areas shall not significantly disrupt habitat values within the resource protection areas…
>
> I. Uses allowed adjacent to designated wetlands and environmentally sensitive habitat areas shall ensure the continuance of the habitat value and function of preserved and restored wetlands and ESHA.

[135] This policy and all the policies in the Implementation Programs portion of the LCP are not binding policies that constitute the standard of review for CDPs. However, they may be used to interpret other LCP policies—such as all the ones listed above—that are the standard of review.

Coastal Zoning Ordinance Section 221.22 states:

> As a condition of development adjacent to environmentally sensitive habitat areas delineated in the General Plan and, for development in the coastal zone, environmentally sensitive habitats identified in the Local Coastal Program, a minimum 100-foot buffer from the edge of the habitat as determined by a site specific biological assessment area shall be provided. In the case of substantial development or significantly increased human impacts, a wider buffer may be required in accordance with an analysis of the factors identified in subsections A through C of this section. If the existing development or site configuration cannot accommodate a 100-foot buffer, then the buffer shall be reviewed by the California Department of Fish and Game and designed to:
>
> A. Protect the functional relationship between wetland and adjacent upland;
> B. Ensure that the most sensitive species will not be disturbed significantly by permitted development, based on habitat requirements of both resident and migratory species, and the short- and long-term adaptability of various species to the presence of human beings; and
> C. Allow for interception of any additional material eroded as a result of the proposed development, based on soil, vegetation, slope and runoff characteristics, and impervious surface coverage.

Summary

The LCP's wetland and ESHA protection policies require protection of biological productivity and other ESHA/wetland functions and values. The findings below separately assess two types of adverse impacts that would result from the proposed project: 1) direct wetland impacts within the proposed project footprint, and 2) indirect impacts to nearby ESHA/wetland areas expected to result from facility construction and operations. Poseidon's proposed project would not conform to several LCP policies that apply to both types of these impacts.

Background – Standard of Review

The LCP and Coastal Act generally require protection of biological productivity and other habitat functions and values of areas considered to be Environmentally Sensitive Habitat Areas ("ESHA") and wetlands. Coastal Act Section 30107.5 and the LCP (CZO Section 216.04) define ESHA as "any area in which plant or animal life or their habitats are either rare or especially valuable because of their special nature or role in an ecosystem and which could be easily disturbed or degraded by human activities and developments." Coastal Act Section 30121 and the LCP define wetlands as lands "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." Section 13577(b) of the Commission's regulations further defines wetlands 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." It goes on to state that the upland boundary may be defined by vegetation, in which case it is "the boundary between land with predominantly hydrophytic cover and land with predominantly mesophytic or xerophytic cover."

The Huntington Beach LCP includes a definition for wetlands, which states:

> "Wetlands are lands transitional between terrestrial and aquatic systems where the water table is usually at or near the surface or the land is covered by shallow water. For purposes of this classification[137], wetlands must have one or more of the following attributes:
>
> 1. At least periodically, the land supports predominantly hydrophytes; or
> 2. The substrate is predominantly undrained hydric soil; or
> 3. The substrate is non-soil and is saturated with water or covered by shallow water at some point during the growing season of each year."

The LCP wetland definition does not provide a standard for wetland hydrology. However, as noted above, Section 13577 of the Commission's Regulations defines wetlands 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…."

One of the key considerations in the Commission's review is that wetlands, as defined and regulated through the Coastal Act and LCP, are "one-parameter" wetlands – i.e., wetlands can exist where there is any one of the three attributes – hydrophytic vegetation, hydric soils, or hydrology. These "Commission-jurisdictional wetlands" differ from those regulated by other entities, such as the federal Army Corps of Engineers, which generally require that areas considered to be wetlands must have all three attributes.

Direct Wetland Impacts

Background: Before the site was initially developed for power plant construction in 1958, it consisted of dune habitat, tidally influenced wetlands, and freshwater marsh within the floodplain and former meander channels of the Santa Ana River that extended for several miles along this part of the Huntington Beach shoreline (see **Exhibit 15 – Historic and Current Wetlands**). Of the original approximately 3,000 acres of coastal wetlands in this area, only a small fraction remains – for example, the immediate area around Poseidon's proposed site includes only about five percent of its original wetlands.[138]

[137] Cowardin, et al., Classification of Wetlands and Deep-Water habitats of the United States, United States Department of Interior, Fish and Wildlife Service, December 1979.

[138] See, for example, Coastal Conservancy, Huntington Beach Wetlands Exhibits and Access Trail Staff Recommendation, Project No. 11-040-01, September 22, 2011, and Brophy, et. al, Insights into estuary habitat loss in the western United States using a new method for mapping maximum extent of tidal wetlands, PLoS ONE 14(8), August 2019, at: https://doi.org/10.1371/journal.pone.0218558.

While most of this area has been developed or disturbed, wetlands have re-emerged and wetland characteristics have reappeared in some parts of this historical wetland area, including parts of Poseidon's proposed location, due in part to the area's relatively high groundwater table, the continued presence of hydric soils beneath much of the area, and the presence of wetland vegetation in and adjacent to the project site that provides an ongoing seed source.

More specifically, while Poseidon's site had been filled and surrounded by berms several decades ago to provide a containment area for the power plant's fuel oil storage tanks, those tanks have been out of service since the mid-1990s and the bermed areas had not been maintained as containment areas for several years. As a result, and as has happened at many locations along the coast, wetlands re-emerged in the filled area, providing habitat and ecological functions. These wetlands met the Commission's one-parameter definition and became subject to applicable LCP and Coastal Act provisions, including requirements to avoid or mitigate for impacts.

Wetland Determination: Neither of the City's first two CEQA reviews for the project – conducted in 2003 and 2005 – identified wetlands within the project site. However, during a January 26, 2009 site visit, the Commission's geologist took a number of photographs within the proposed project footprint that showed areas of what appeared to be wetland vegetation, including some areas of mature vegetation, indicating that it had been present at the site for many years. The photographs also showed areas of ponded or standing water, again suggesting the presence of wetland characteristics. Weather records earlier that month for Huntington Beach showed only minimal rainfall (less than 0.20"), further supporting the indication that the photographed areas were wetlands supplied by the underlying groundwater, not just water ponding from a recent rainstorm.

In June 2009, Commission staff ecologist Dr. Jonna Engel visited the site along with representatives from Poseidon and AES. Dr. Engel identified several areas within the project footprint that had wetland indicators, including obligate plant species[139] and secondary indicators of wetland hydrology, including soil cracks, salt crust, and water marks. These on-site wetlands, although separated from the larger, adjacent wetland complex by containment berms, continued to provide several important wetland functions, as evidenced by the hydrophytic vegetation identified on site that is used by sensitive species and by the ponding and waterfowl use observed by Commission staff. Dr. Engel then requested that Poseidon conduct a wetland delineation to identify the type and extent of any wetland areas at the site.

In May 2010, the City issued a third Draft Supplemental EIR ("SEIR") for the proposed project, which again did not identify or acknowledge the potential presence of wetlands at the proposed project site. That draft document included a December 2009 technical memorandum from Poseidon's consultant that concluded there were no Commission-

[139] Obligate plant species are those which are found almost exclusively (i.e., 99% of the time) within wetlands.

jurisdictional wetlands on site. In a June 2010 comment letter on the Draft SEIR, Commission staff stated that the description of site conditions in the SEIR and the technical memo was not consistent with conditions identified during the previous year's site visit, that their conclusions regarding the non-presence of wetlands were based on a delineation approach the Commission had specifically rejected for a nearby proposed project with similar characteristics, and that the documents therefore did not adequately or accurately portray the presence of wetlands at the site.[140] Staff recommended the City address these shortcomings in the Final SEIR.

However, the Final SEIR again stated that the site did not include wetlands because the site did not provide wetland hydrology and because the species of hydrophytic vegetation recognized under the Coastal Act as indicators of wetlands were not growing as hydrophytes. Nonetheless, the Final SEIR included Wetland Data Sheets that Poseidon had provided from a delineation it had conducted in 2009. Those Wetland Data Sheets identified conditions at 18 sampling locations within the project footprint. The Final SEIR also included a memorandum that provided Poseidon's suggested interpretation of these data, which was based on the above-referenced delineation approach that the Commission had previously rejected. Commission staff's review of these Data Sheets showed that all 18 sampled sites met the primary indicator the Commission uses to determine the presence of hydrophytic vegetation, and that 14 of the 18 sites met an additional secondary indicator for hydrophytic vegetation (see additional details below in the Analysis section). The Final SEIR therefore did not properly evaluate the presence of Commission-jurisdictional wetlands at the proposed project site and the likelihood of the project to cause direct adverse wetland impacts.

Shortly after the City's September 2010 certification of the SEIR and subsequent issuance of a CDP, the Commission determined at its November 2010 Substantial Issue hearing that additional on-site evaluation was needed to make a conclusive wetland determination. Commission staff requested another site visit to evaluate site conditions and the potential presence of wetlands; however, Poseidon did not grant permission until July 2012, when Dr. Engel again visited the site and found that the areas she had previously identified as exhibiting wetland indicators had recently been graded and all vegetation removed. The grading and vegetation removal was apparently conducted by the power plant owner and is the subject of a separate and currently unresolved enforcement action by Commission staff.[141]

During the Commission's November 2013 review of Poseidon's proposed project, Commission staff provided a "post-mortem" wetland delineation as part of its recommended Findings to the Commission (see **Exhibit 16**). Because the wetland features had been removed without benefit of a permit and without benefit of a conclusive wetland delineation, Commission staff used available photographic evidence and Poseidon's Wetland Data Sheets to determine that at least 3.5 acres within the

[140] See CCC-09-CD-03 & CCC-09-RO-02, 2009.

[141] See the Violation Findings in Section II.P below.

project footprint met the definition of Commission-jurisdictional wetlands. Subsequently, in 2015, the U.S. Fish and Wildlife Service ("USFWS"), which uses a wetland definition similar to the Commission's, identified about seven acres within the project footprint as wetlands and included those wetland areas in its 2015 National Wetland Inventory.[142]

During this time, the California Energy Commission ("CEC") was reviewing a proposal by AES to modify the adjacent power plant. That proposal included using the Poseidon project footprint for parking and equipment staging. In the Coastal Commission's August 2016 report to the CEC pursuant to Coastal Act Section 30413(d), the Commission confirmed that there were wetlands within the project footprint. It recommended that the CEC use Commission protocols to conduct a wetland delineation and determination and to require mitigation at an approximately 4:1 ratio for any direct wetland impacts.[143] In May 2017, the CEC approved the new power plant at the site, but declined to adopt the Commission's recommendations, stating that the CEC's record included a November 2012 wetland delineation provided by AES that showed no wetlands on the site. This delineation, however, was conducted after the July 2012 Commission staff visit where Dr. Engel found that the areas she had previously identified as exhibiting wetland indicators had recently been graded and all vegetation removed.

Nonetheless, and even with the subsequent power plant construction activities at the site, some of the previous wetland habitat values and wildlife uses re-emerged and continued. For example, AES noted in early 2017 the presence of shorebirds within the Poseidon site footprint, as well as a burrowing owl burrow and a killdeer nest, along with use of the site by various raptors (including peregrine falcon, American kestrel, and sharp-shinned hawk), and photographs showed re-emergence of hydrophytic vegetation.[144]

LCP Analysis for Direct Impacts to Onsite Wetlands: The proposed project is subject to a number of LCP provisions related to wetland protection. Two key provisions are LCP Policy C 7.2.7 and CZO Section 221.07, which require that wetlands that were removed or altered without benefit of a CDP, such as the ones on site, continue to be subject to other relevant LCP provisions as if the wetlands still existed. The LCP also requires that adequate mitigation be required for the lost productivity resulting from their removal and provides direction for determining the type of mitigation

[142] See 2015 AES Corporation, Petition to Amend Application For Certification, page 5.2-2, and Figures 5.2-1a and 5.2-1b, which identifies the area as follows: "Figures 5.2-1a and 5.2-1b show the locations of these protected areas in relation to the Amended HBEP and the offsite construction storage area. Figures 5.2-2a and 5.2-2b include data from the United States Fish and Wildlife Service's (USFWS) National Wetland Inventory (NWI) (USFWS, 2015c)."

[143] See Coastal Commission's "Section 304103(d) Report for the Petition to Amend Application for Certification #12-AFC-02C – proposed Huntington Beach Energy Project by AES Huntington Beach Energy, LLC ("AES")", submitted to California Energy Commission on August 15, 2016.

[144] See March through May 2017 Monthly Compliance Reports for AES power plant, available at: https://efiling.energy.ca.gov/Lists/DocketLog.aspx?docketnumber=12-AFC-02C

needed. LCP Policy I-C 8(c) establishes that where avoidance is not possible, mitigation is to be on site, if feasible, or within the general vicinity. It also requires mitigation elements such as restoring native vegetation, controlling invasive plants, and providing buffers and development setbacks to improve the natural biological value, integrity, and function of coastal wetlands. Further, these are to be implemented consistent with LCP Policy C 1.1, which requires that adverse impacts associated with development in the coastal zone be mitigated to the greatest extent feasible. The LCP also includes Policy C 6.1.4, which requires wetland restoration where feasible, and Policy C 7.2.4, which encourages the restoration and expansion of existing marsh habitats near flood channels. Absent Poseidon's proposed development, the project site would be a likely candidate for wetland restoration once the retired storage tanks are removed and site cleanup is completed and could be used to benefit the functions of the adjacent flood channel.

At the time of the Commission's 2013 hearing on Poseidon's project, Poseidon offered to address the violation by mitigating for the wetland losses. As noted above, Commission staff recommended that Poseidon be required to provide mitigation at a 4:1 ratio for the 3.5 acres of wetlands that would be filled for project development. To date, Poseidon has not proposed adequate mitigation for this impact or violation. Despite the Commission's 2015 adopted findings concluding that the site contained Commission-jurisdictional wetlands, Poseidon's 2021 CDP application states that Poseidon does not agree that there are or were wetlands on site.

Furthermore, Poseidon has until recently asserted that providing additional mitigation is infeasible. As part of its 2020 and 2021 proceedings at the Regional Board, Poseidon asserted that it was not able to identify any available mitigation sites in the area other than the two Poseidon had proposed the Board accept as mitigation for Poseidon's marine life impacts – i.e., at Bolsa Chica and at the Palos Verdes Reef site (see Section II.J above).[145] At the time, Commission staff identified several appropriate sites that appeared feasible and available to Poseidon, including the nearby 45-acre Newland Marsh, which is about a quarter-mile inland from Poseidon's site and located along the adjacent flood channel. Poseidon informed the Regional Board in January 2021 that it considered Newland Marsh to be infeasible as a mitigation site. The marsh has since been acquired by the Huntington Beach Wetlands Conservancy and slated for restoration. In a February 2022 submittal to the Commission, Poseidon proposes that it would now consider that site for mitigation. However, as noted in Section II.J, there are several concerns to be addressed before the Commission could consider whether this site would provide suitable mitigation. While the site appears to provide a suitable location for Poseidon's required mitigation acreage for direct wetland impacts, it is not clear at this point that it would be available within a reasonable time to provide the necessary mitigation. Section II.J also describes another potential site within the South Los Cerritos restoration area, several miles north of Poseidon's proposed facility site. Poseidon provided a February 11, 2022 memo describing these sites and several others as being potentially available to mitigate for its facility's impacts to offshore

[145] See Poseidon testimony at Regional Board hearings, 2020 and 2021.

marine life and water quality. However, it generally proposed that it receive credits for transitional wetlands within those sites, a type of habitat for which the Commission has generally not awarded full mitigation credits. It appears that some appropriate credits may be available at the South Los Cerritos Phase 1 site.

The LCP requires protection of wetlands, including ones that have been removed, altered, filled, or degraded as the result of unpermitted activities. Here, even though it does not appear that Poseidon was responsible for the unpermitted development in the wetlands, the LCP requires that if Poseidon's project was approved and the construction was allowed on this area of former wetlands, it would need to mitigate for the loss of the wetlands Commission staff's 2013 recommendation for Poseidon's project included a detailed Special Condition that would have required Poseidon to provide 14 acres of mitigation at up to two sites within 10 miles of the project site that met several location and biological parameters and to develop a mitigation plan that included specified performance standards and monitoring protocols.[146] It was the Commission's expectation after the 2013 hearing that Poseidon would work with Commission staff to identify and develop a comprehensive mitigation proposal to fully address the onsite wetland impacts as well as impacts to marine life discussed in Section II.J. However, in the intervening nine years, Poseidon did not identify potential mitigation sites for the onsite wetland impacts and did not agree to provide the necessary mitigation, despite the Commission's 2015 conclusion that Poseidon's site includes wetlands that would be filled and must be mitigated. As noted above, until just recently, Poseidon contended that there were no feasible mitigation sites that would meet the identified criteria. Its most recent submittals of February 2022 now suggest that some sites it previously identified as infeasible might be suitable, but this recent information is not sufficient to determine the type and amount of mitigation credit that might be available and how quickly mitigation could be available. Thus, without the needed mitigation, the proposed project is inconsistent with the above-referenced provisions of the LCP.

Indirect Impacts to Offsite Wetland and ESHA

As noted above, the project site is within an area of formerly extensive dunes, coastal wetlands, and marsh habitat that extended for several miles along this part of the coast within the former migration zone of the mouth of the Santa Ana River. Of the original approximately 2,900 acres of wetland and marsh areas, about 190 acres remain. These are collectively known as the Huntington Beach wetlands ecosystem. About 120 acres have been restored by the Huntington Beach Wetlands Conservancy ("HBWC") through funding by the State Coastal Conservancy, the National Oceanic and Atmospheric Administration's Montrose Settlements Restoration Program, various CDP mitigation requirements, and via a multi-agency agreement meant to provide restoration, flood control, and other benefits.

[146]See https://documents.coastal.ca.gov/reports/2013/11/W19a-s-11-2013.pdf.

Poseidon's proposed development is near or adjacent to three distinct wetland/ESHA areas that remain of the historic wetlands ecosystem. These include the Magnolia Marsh and the Upper Magnolia Marsh, which have been restored,[147] and an approximately 0.5-acre marsh/ESHA area within Poseidon's project site, though just outside the proposed project's development footprint. Magnolia Marsh, approximately 800 feet away from Poseidon's proposed development, is an approximately 40-acre area that was restored to a tidal coastal wetland and provides primarily subtidal and low marsh habitat with vegetation and other habitat characteristics used by endangered, threatened, or sensitive species, including the Belding's Savannah Sparrow, Least Ridgway's Rail, and California Least Tern (see **Exhibit 17 – Huntington Beach Wetlands: Vegetation Communities** and **Exhibit 18 – Sensitive Species Habitats**). The restoration included removing pilings between the marsh and the adjacent Huntington Beach Flood Control Channel to provide some additional flood storage capacity in the County's flood control system, as well as construction of a pier and viewing platform that allows for public access and passive recreation in the marsh. Upper Magnolia Marsh, which is about 300 feet from Poseidon's project footprint, provides about 1.6 acres of wetland/ESHA that HBWC restored pursuant to a mitigation requirement of a City CDP.[148] Restoration was done in accordance with CDFW standards and included grading to allow the return of tidal flow, removal of invasive or non-native vegetation, along with replanting to provide nesting habitat for the Belding's Savannah Sparrow and for restoration of Southern Coastal Salt Marsh habitat for use by the above-referenced listed and sensitive species.[149] Upper Magnolia Marsh now provides subtidal, intertidal, and upper marsh habitat. The third area – the approximately 0.5 acres of wetland/ESHA on Poseidon's site and immediately adjacent to Poseidon's proposed development footprint – includes salt panne and pickleweed, two habitat characteristics important to the endangered Belding's savannah sparrow.[150] Poseidon's proposed project would result in several types of indirect impacts to the nearby wetland/ESHA, including the potential dewatering of wetland/ESHA habitat during project construction and adverse effects on sensitive species known or potentially occurring in these habitat areas due to noise, vibration, and lighting during project construction and operation. These impacts would result, in large part, due to

[147] Coastal Development Permits and other actions issued for these restoration efforts include the Commission's CDP 5-08-061 to the HBWC (August 2008), CDP 5-09-225 to Orange County Public Works (June 2010), City of Huntington Beach, April 10, 2007 Mitigated Negative Declaration 05-05 and Appeal of Coastal Development Permit No 05-07, March 17, 2008 Memorandum of Understanding between the City of Huntington Beach and the Huntington Beach Wetlands Conservancy, and March 2007 Huntington Beach Wetlands Conceptual Restoration Plan, prepared by Chambers Group, Irvine, CA.

[148] See City of Huntington Beach CDP #2006-005, February 2008.

[149] See Memorandum of Understanding Between the Huntington Beach Wetlands Conservancy and the City of Huntington Beach, February 2008.

[150] Poseidon has not yet acknowledged that this area includes wetlands; however, similar to the above-described onsite wetlands that would be filled and directly affected by the project, the Commission in its 2014 report to the Energy Commission described the area as containing wetlands. This area is additionally identified as wetlands on the above-referenced National Wetland Inventory maps.

Poseidon's proposed project not providing an adequate buffer between the proposed development and the nearby sensitive habitats that would be sufficient to avoid or minimize these impacts and that would conform to the LCP's buffer requirements. These impacts are each discussed below.

Adverse Effects of Construction Dewatering: Poseidon's preliminary geotechnical tests identified liquefiable soils to a depth of about 20-30 feet below grade. To reduce the potential for liquefaction, Poseidon plans to remove the top approximately 30 feet or more of soil from its project footprint and then replace it with some combination of compacted fill, stone columns, or other structural supports.

This proposed excavation and fill would require extensive dewatering that could adversely affect nearby wetland/ESHA unless Poseidon implements specific dewatering techniques that avoid or minimize the expected impacts. Monitoring results from nearby monitoring wells on the power plant site show that groundwater levels beneath the project site are near the ground surface and fluctuate with tidal levels in the adjacent flood control channel, indicating that the groundwater beneath the site is responsive to and directly connected to the groundwater in the adjacent wetlands and nearby channel.

Poseidon has proposed using a conventional perimeter well system to dewater the excavated area. The 2010 SEIR stated that dewatering during construction is highly unlikely to affect nearby wetland/ESHA because the radius of influence of the dewatering wells is expected to extend no further than the project site boundary. The SEIR did not include evidence supporting this statement, in part because the City had limited ability to collect the site-specific data needed for such support.

Subsequently, however, in May 2013 Poseidon provided more detailed documentation of the dewatering it expects would be required during construction of two of the facility's larger structures – the pre-treatment building and the intake pump station. Poseidon estimates excavation for the pre-treatment building would require dewatering at a rate of up to 740,000 gallons per day for a total of 45.1 million gallons and that the intake pump station would require dewatering at a rate of up to 1,280,000 gallons per day for a total of 39 million gallons over the expected construction period. If done concurrently, the total dewatering rate would be up to about 2.02 million gallons per day. Poseidon estimated that dewatering would cause a "cone of depression" – i.e., reduced groundwater levels – in an area extending about 225 feet from the dewatering pumps. This area of reduced groundwater levels would therefore extend into about two acres of the nearby salt panne and wetland habitat, as well as into the open water of the adjacent flood control channel.

Poseidon anticipates that it would conduct more detailed geotechnical investigations after it demolishes and removes the storage tanks to provide a more accurate estimate of expected dewatering volumes and potential impacts. However, based on the currently available data, which show that the soils underlying the project site are relatively permeable and that groundwater levels beneath the project site respond to tidal fluctuations in the adjacent channel, the planned excavation and dewatering would

likely result in water levels being lowered beneath the wetland/ESHA. The project does not yet include mitigation measures needed to prevent dewatering of the adjacent wetland/ESHA or needed to ensure conformity with the LCP, including Sections C 6.1.4, C 7.1.2, and C 7.1.3.

To ensure protection of these areas from dewatering resulting from project activities, the Commission could impose Special Conditions that would require Poseidon to conduct a detailed geotechnical investigation to better identify the rate of dewatering needed and the extent of the expected drawdown area, and to then propose structural measures (e.g., sheetpiles) and/or temporal measures (e.g., limiting the pumping rate and timing) to prevent the drawdown area from extending to within nearby wetlands. However, given the above-described subsurface characteristics at the site, limiting the pumping rate would likely not allow for sufficient dewatering required for construction to occur. Poseidon would likely need to propose additional, as-of-yet unspecified structural measures as part of a revised project description and revised CDP application to identify the additional development that would be needed to implement dewatering in a way that avoids wetland impacts. However, with the LCP nonconformity described elsewhere in these Findings, Special Conditions to address this issue would not be sufficient for the proposed project to be fully consistent with other applicable LCP provisions, so there is no need to identify a specific condition to address this issue at this time.

Adverse Effects of Noise and Vibration: Poseidon's construction activities and its long-term operations would generate noise levels that are expected to adversely affect nearby sensitive bird species unless reduced through structural or timing mitigation measures. Excessive noise can adversely impact sensitive species by reducing foraging, breeding, nesting, and other activities near the noise source, masking vocalizations used to attract mates or establish territories, and interfering with calls used to warn of approaching predators.[151] Noise can also reduce the number of nesting species and change the composition of avian communities.[152]

Although measuring noise and the "loudness" of sounds is somewhat subjective, the Commission and other resource agencies have identified several thresholds to avoid or reduce potential noise-related impacts on various types of wildlife. These thresholds generally identify acceptable levels of sound as measured in decibels ("dB"), which represent units of pressure generated by a sound. Decibels are measured on a logarithmic scale, so that a sound 10 dB higher than another is considered twice as

[151] See, for example, Barber, et. al, The costs of chronic noise exposer for terrestrial organisms, Trends in Ecology and Evolution, Volume 25, No. 3, 2022; Dooling, R.J., and A.N. Popper, The Effects of Highway Noise on Birds, prepared for California Department of Transportation, 2007; Halfwerk et. al, Negative impact of traffic noise on avian reproductive success, Journal of Applied Ecology 48: 210-219, 2011; Kight, C.R., and J.P. Swaddle, How and why environmental noise impacts animals: an integrative, mechanistic review, Ecology Letters 14: 1052-1061, 2011.

[152] See, for example, Francis et. al, Noise Pollution Changes Avian Communities and Species Interactions, Current Biology 19: 1415-1419, 2009.

loud, and one that is 20 dB higher than another is considered four times as loud. There are also variations of this standard decibel scale, such as the A-weighted decibel scale, or dBA, which emphasizes the frequencies of sounds that are within the human hearing range, and VdB, which is a measure of noise and vibration levels that travel through the ground. Noise can also be described in terms of the loudest instantaneous sound generated by a sound source, or L_{max},[153] or as the long-term average sound generated on an hourly or daily basis.

The effects on wildlife resulting from a given type of noise or suite of noises can vary due to the specific set of frequencies generated and whether the sound is predictable or not – e.g., whether it is continuous or intermittent, whether it is from a stationary or moving source, etc. The effects would also vary by species, by individual physiology, and by the specific frequencies a species responds to or is most reliant on to function. Methods of observing the effects of noise on a species or individuals may also take different forms. Commonly observed effects are behavior changes, such as flushing, abandonment of nests, and louder vocalizations to overcome the noise. Effects can also be presumed by noting the absence of species in habitats where they would otherwise be expected.

The 2010 SEIR identified two main types of noise expected from Poseidon's project:

- **Construction-generated noise:** For the construction phase of the project, the SEIR provided several estimates of expected noise levels from different types of construction equipment ranging from 77 to 85 dB at a 50-foot distance from wetland/ESHA areas, though it also noted generally that noise during demolition activities would likely be somewhat higher. The SEIR also stated that expected groundborne noise and vibration levels from construction equipment would be up to 75 VdB at a 100-foot distance,[154] though it did not identify the likely higher vibration levels that would occur during the pile driving phase of construction.
- **Operational noise:** The SEIR stated that the loudest operational noises would be generated by pumps located inside or outside the facility. The loudest outside pumps had expected noise levels of 103 to 106 dBA at the pump itself, while the loudest indoor pumps would generate noise at 108 dBA, though the SEIR noted that noise from pumps inside buildings would be reduced by 20 dBA due to being within an enclosure.

The SEIR evaluated the project's expected noise-related effects on what it described as the closest sensitive receptors, which included nearby residences, schools, and parks. These receptors range in distance from several hundred feet to about 2,500 feet from the expected sources of noise due to project construction and operations. The SEIR determined that noise-related effects at these locations would be less than significant, as the range of construction and operational noises identified above – i.e., from about 77 dB to 108 dBA – would be attenuated to acceptable levels at those distances.

[153] L_{max} represents the loudest sound recorded over 1/8 of a second.

[154] Very low VdB levels can be imperceptible, but levels of around 100 VdB and higher can cause structural damage.

Nonetheless, the City's CDP included a condition that required Poseidon to conduct a noise study during the project design stage to ensure that noise levels at the nearest residential property line (approximately 1,500 feet distant) would be no more than 5 dBA greater than existing nighttime ambient noise levels at that property.

However, neither the SEIR nor the City's CDP evaluated the effects of project-generated noise and vibration within the much closer wetland/ESHA complex, which includes habitat adjacent to the project site used by, or available to, the endangered Belding's Savannah Sparrow, California Least Tern, Light-footed Ridgway's Rail, and other avian species expected to be adversely affected by noise from Poseidon's project. To help determine appropriate maximum noise levels that would protect these species and allow conformity to the LCP, Commission staff contacted CDFW staff for guidance on acceptable disturbance and noise levels and mitigation measures for construction projects such as Poseidon's that occur near habitat areas used by sensitive avian species.[155] Both CDFW and the USFWS have developed and implemented recommended measures on a number of such projects, and the agencies' work with CalTrans has resulted in a detailed set of thresholds for use in identifying potential "take"[156] of sensitive species.[157] These thresholds range from lower dB "masking" threshold levels, which are the noise levels that prevent or reduce communication among individuals, to higher dB "hearing damage" threshold levels that result in direct injury to individuals of the species. The CDFW and USFWS recommendations generally identify potential harm or "take" when those species experience noise levels above ambient and greater than about 60 dB. Mitigation measures employed by both agencies include requiring that applicants conduct monitoring to ensure sound levels remain below thresholds known to result in take, conduct nesting surveys and ongoing monitoring to identify and avoid potential adverse effects to nesting birds, and ensuring that any noise-generating activities that exceed those thresholds do not adversely affect key activities of those species, such as breeding, nesting, and foraging. Breeding and nesting season runs from about February 15 to September 1 for most birds and from January 1 to August 31 for raptors and wading birds. Additionally, several bird species, including the Light-footed Ridgway's Rail, are known to be particularly sensitive to vibration, and the CDFW specifically prohibits certain activities, such as pile driving, during their nesting season due to their relatively high levels of both noise and vibration.[158] The adjacent wetland/ESHA is likely used year-round by these sensitive species, so the necessary noise limits would need to be in place continually.

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[155] Commission staff personal communication with CDFW staff, September 19 and October 18, 2013, November 6, 2017.

[156] Section 3(18) of the Federal Endangered Species Ac defines "take" as "to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture, or collect, or to attempt to engage in any such conduct." Section 86 of the California Fish and Game Code defines "take" as to hunt, pursue, catch, capture, or kill, or attempt to hunt, pursue, catch, capture, or kill."

[157] See, for example, Dooling, Robert, and Arthur Popper, The Effects of Highway Noise on Birds, prepared for California Department of Transportation, September 2007.

[158] Commission staff personal communication with CDFW staff, October 18, 2013.

As noted above, the SEIR identified expected project-generated noise levels only at locations several hundred feet further from Poseidon's site than the adjacent wetland/ESHA used by these species. Nonetheless, Commission staff was able to use the data provided in the SEIR to identify expected noise levels at these nearby habitat areas. Sound is known to decay with distance, with each doubling of the distance from a sound source making the sound a quarter as loud.[159] This equates to a reduction of about six decibels for every doubling of distance from the sound source. The resulting decibel level at a particular distance also depends on whether there are sound reflective surfaces or barriers that would increase or decrease the amount of sound reaching a particular location.

Table K-1 below illustrates the results of applying the Inverse Square Law to the construction equipment noise levels identified in the 2010 SEIR. The first two columns provide the type of equipment and expected decibel levels at 50 feet that were identified in the SEIR. The third through fifth columns show the expected decibel levels at 100-, 200-, and 500-foot distances, which are approximate distances between Poseidon's proposed construction activities and the nearby wetland/ESHA:

Table K-1: Expected noise levels

Type of equipment	**Noise levels during construction**			
	dBA at 50 feet	**dBA at 100 feet**	**dBA at 200 feet**	**dBA at 500 feet**
Crane	81	75	69	61
Dozer	82	76	70	62
Excavator	81	75	69	61
Grader	85	79	73	65
Other equipment	85	79	73	65
Paver	77	71	65	57
Roller	80	74	68	60
Tractor	84	78	72	64
Truck	80	74	68	60

These results show that much of the expected project construction would generate noise within the adjacent wetland/ESHA at levels expected to adversely affect sensitive species. Additionally, and based on the analyses provided in the City's EIR for the project, some of Poseidon's operational noise levels are expected to be substantially higher than 60 dB at the nearby wetland/ESHA areas, resulting in long-term adverse noise effects in these areas.[160]

[159] This is established through the Inverse Square Law, which states that the intensity of an unobstructed sound moving outward from a source will decrease with the square of the distance from the source.
[160] See, for example, Table 4.5-7 in the City's EIR, describing the project's expected operational noise levels.

The noise levels in Table K-1 are largely confirmed by similar analyses done during the California Energy Commission's ("CEC's") review of the adjacent AES power plant expansion. The CEC's review included sound modeling and monitoring to determine ambient noise levels and expected project noise levels for the retooled power plant, and some of that information can be applied to Poseidon's project. The CEC analysis identified ambient nighttime noise levels at several nearby locations, including two within the Magnolia Marsh close to Poseidon's project footprint.[161] From a September 2012 noise survey conducted by AES, CEC staff calculated that long-term average ambient levels at the two sampling locations in the marsh closest to Poseidon's site – i.e., about 500 feet and 1,000 feet from the nearest part of Poseidon's project footprint – were 54 dBA and 61 dBA, respectively. CEC staff also calculated average expected power plant construction noise levels at these sites as 63-64 dBA and 71-72 dBA, respectively, with average expected pile driving noise levels calculated to be 57-58 dBA and 67-68 dBA, respectively. When these results are adjusted to include the distance range of the wetland/ESHA near Poseidon's project footprint, they show that Poseidon's expected construction noise levels would be as high as about 80 dBA in the closest wetland/ESHA and pile driving noise would be about 76 dBA in those areas.

AES also provided a site plan showing existing sound contours in and near the project site (see **Exhibit 19**).[162] The contour shapes suggest that some of the noise generated during power plant operations was attenuated before it reached the wetland/ESHA areas closest to Poseidon's site due to the distance from the power plant and due to the presence of intervening structures, such as the storage tanks on Poseidon's site; however, with Poseidon proposing to remove those tanks early in its construction process, their attenuation benefits would no longer exist.

The CEC staff noted that noise levels from AES's project construction, although lower than Poseidon's expected noise levels, could nonetheless discourage sensitive species from using the nearby habitat areas, could adversely affect their breeding or nesting behavior, and could also adversely affect foraging behavior, reproductive success, population density, and community structure.[163] It also noted that while avian species may be more sensitive to noise during breeding and nesting season, several types of adverse effects identified above could occur any time of year due to the relatively high noise levels expected from either project construction or operation. The review further noted that cumulative sound from Poseidon's project and from the power plant project could create a significant adverse noise impact at monitoring locations several hundred

[161] Available at the California Energy Commisison's docket for Huntington Beach Energy Project: https://www.energy.ca.gov/powerplant/combined-cycle/huntington-beach-energy-project

[162] See AES, Huntington Beach Energy Project (12-AFC-02) Additional Responses to Jason Pyle's Data Requests, Set 1 (#1-16), with specific reference to that document's Figure DR Pyle 6-1 Estimated Sound Level Contours: Both HBEP Block 1 and Block 2 at Full Load – Facility Sound Only, January 17, 2013.

[163] See California Energy Commission, 12-AFC-02 Preliminary Staff Assessment – Biological Resources, October 2013.

feet further into these nearby wetland/ESHA areas[164] and could cause a significant impact by disturbing nesting birds or causing them to abandon nests and suitable habitat.[165]

The CEC analysis identified a "typical noise threshold" of 60 dBA as capable of interfering with avian communication and noted that noise from the power plant construction could be high enough to discourage birds from nesting in the area. It also acknowledged that bird species occupying this particular habitat area may have adjusted to slightly higher ambient levels, but nonetheless recommended a 60 dBA maximum sound level at the wetland/ESHA receptors. It also recommended a number of measures that could reduce potential noise impacts, including placing temporary or permanent sound barriers, locating noise-generating activities away from the wetland/ESHA areas, reducing the number of noise-generating activities that occur simultaneously, and others.

In July 2014, the Coastal Commission approved a 30413(d) report for submittal to the CEC that concurred with several of the CEC staff's proposed conditions at that time, including a requirement that AES implement a Wildlife Noise Monitoring Plan that prohibited sound levels in the Magnolia and Upper Magnolia Marshes from exceeding 8 dBA above ambient levels or 60 dBA (hourly average), whichever is greater. The Commission additionally recommended that the CEC require that sound levels within 100 feet of active nests in the two marsh areas (as identified through required nesting surveys) not exceed 65 dBA. The Commission also recommended that no pile driving activities be conducted between February 1 and August 31 of any year. These recommendations were meant to ensure conformity to the LCP. The USFWS also recommended similar mitigation measures for the CEC to include in any project approval, including that the entire wetlands adjacent to that project be considered a sensitive receptor and that the project include design features, such as a solid sound wall or fence, to maintain noise levels at or below ambient conditions.[166]

Since that initial CEC review, however, AES modified its project so that the new power plant is much closer to the Magnolia Marsh wetland/ESHA – rather than several hundred feet away, it is now just a few dozen feet from those habitat areas. The CEC approved this modified layout without modifying its previous noise analyses and without requiring the buffer distance needed for LCP conformity, though the relocated power plant design now includes a 50-foot high sound wall between the power generating

[164] See California Energy Commission, 12-AFC-02 Preliminary Staff Assessment – Noise and Vibration, October 2013.

[165] From California Energy Commission, Preliminary Staff Assessment for 12-AFC-02, Huntington Beach Energy Project, Section 5.2, October 2013.

[166] See September 10, 2012 letter from USFWS to California Energy Commission regarding Application for Certification 12-AFC-02.

equipment and the adjacent wetland/ESHA.[167] As noted in Section II.A of these Findings, Poseidon had included in its 2021 CDP application a proposed sound wall that would be immediately adjacent to the onsite wetland, but later removed it from the proposed project based on Commission staff's concerns that would take the form of development within an area required to serve as a wetland/ESHA buffer and that it could act as a shoreline protection device, preventing the adjacent wetland/ESHA from moving in response to climate change and sea level rise. Poseidon had not provided a description of the proposed sound wall or described its expected effectiveness, so along with it and other project components encroaching into the buffer, it was not clear what benefits it might have provided or what additional impacts it might have caused (see also the discussion below of Commission staff's previously proposed Special Condition in 2013 requiring a Noise Mitigation Plan). Without the necessary buffer, and with no proposed relocation of the sound wall to a site further within Poseidon's project footprint, the proposed project would cause significant noise impacts that would adversely affect the wetland/ESHA in a manner inconsistent with the above-referenced LCP policies.

The modified power plant location that is now closer to the wetland/ESHA also increases ambient noise levels in these areas and, when combined with noise from Poseidon's project, would represent a greater adverse cumulative impact to these areas and species.[168] With the CEC's previously identified ambient noise levels of about 55-65 dBA in the wetland/ESHA, Poseidon's expected construction noise levels of up to about 79 dBA would have represented an increase of up to almost 20 dBA, or a quadrupling of noise over those ambient levels. Similarly, the vibration levels Poseidon's project construction would have generated in the wetland/ESHA would have been significantly higher than ambient since most of Poseidon's project site closest to those areas is occupied by retired fuel tanks and the site was largely devoid of vibration sources. To allow for LCP conformity, Poseidon would need to address both its own individual impacts and the cumulative impacts being imposed on the wetland/ESHA.

As noted above, Poseidon's demolition of the retired storage tanks during the initial phase of the project would generate noise louder than ambient conditions and would also result in removal of structures that now partially attenuate noise levels from elsewhere on the project site and from the power plant. During construction, equipment operation would result in damaging levels of noise in the nearby wetland/ESHA, and some of the pile driving needed to place sheet piles for foundation dewatering would

[167] The CEC declined the Coastal Commission's recommendation to include BIO-9 as a condition, stating that "the weight of evidence in this proceeding is that bird hearing differs from that of human beings," and "the low frequencies typical of construction activities would not adversely impact wildlife species." See Presiding Member's Proposed Decision, September 2014, page 5.1-31. As noted above, more recent studies show that noise at much lower levels than generated by the power plant construction and operation causes adverse impacts to numerous terrestrial and avian species. Additionally, this is not consistent with the CDFW guidance the Coastal Commission has relied on in numerous decisions.

[168] Cumulative noise levels are calculated using "decibel addition," or the addition of logarithmic values. For example, two noise sources that each generate 70 dBA combine to result in a noise level of 73 dBA, which is about half again as loud as just one of the sources.

occur within about 100 feet of the wetland/ESHA. Keeping the berm in place would likely reduce to some degree the adverse effects of these project components on the nearby wetland/ESHA, but with Poseidon's proposal to increase its site elevations, the top of the berm would be only about seven to nine feet higher than the nearby proposed building foundations, which would not be high enough to provide adequate attenuation of project noise or vibration.

Project Lighting: Although the project site is near other sources of artificial light, particularly the nearby power plant, Poseidon's project would represent a new source of 24-hour lighting closer to parts of the adjacent wetland/ESHA that serves as habitat for several sensitive species. With Poseidon's current proposal to elevate its structures higher than they were proposed in 2013, the project's light and glare would extend even further into the nearby wetland/ESHA, thereby creating a more significant impact on the species than before. Unless mitigated, the current proximity and elevation of the light sources would likely cause adverse artificial night lighting impacts in areas that are currently subject to somewhat less night lighting.

Most animal species perceive light differently than humans. Light visible to humans is, within a wavelength range from approximately 380 nanometers (nm) to about 740 nm, which is on the electromagnetic spectrum between infrared radiation, with longer wavelengths and ultraviolet radiation, with shorter wavelengths – both of which can be seen by various animal species. The most common measure of light intensity, or the amount of light falling on a specific area, is known as "footcandles," ("fc") which express the intensity of light on a surface, as weighted for the spectral sensitivity of the human eye. This places more emphasis on wavelengths that humans see best and less on those that animal species can see, which limits our ability to assess the impacts of light on wildlife species.[169]

Light plays a pivotal role in biology and creates the potential that artificial light will create significant impacts on plants and animals. Adverse impacts from artificial night light can take several forms including light trespass or spill, and glare. Light trespass occurs when unwanted artificial light spills onto an adjacent property lighting an area that would otherwise be dark,[170] and glare is created by light that shines horizontally.

One of the most important roles of light for both plants and animals is regulation of their biological clocks or circadian rhythms on a daily, weekly, seasonal, and annual basis. Animals typically fall into one of several patterns of daily activity, with diurnal animals active during the day, nocturnal animals active at night, and crepuscular animals active at dawn and dusk. Daily behavioral activities such as sleeping, foraging, eating, moving, and resting occur at different times for different animals such that a single

[169] Rich, C. & T. Longcore (Eds.) 2006. Ecological Consequences of Artificial Night Lighting. Island Press, Washington. 458 pgs.

[170] Chepesiuk, R. 2009. Missing the Dark: Health effects of light pollution. Environmental Health Perspectives. v. 117 (1): A20-A-27

habitat is partitioned into temporal niches regulated by light. Introducing artificial night lights to an area will change the ambient setting and may adversely impact animals. Likely effects of artificial night lighting on mammals include avoidance, disorientation, disruption of foraging patterns, increased predation risk, disruption of biological clocks, increased mortality on roads, and disruption of dispersal movements through artificially lighted landscapes.[171]

In addition to daylength and light intensity, wavelength of light is a factor in the regulation of the biological clock. Blue light gives a physiological signal to humans and other organisms that it is daytime; when artificial night lights include light in the blue wavelength range, circadian rhythms can be disrupted. Blue wavelengths are present in virtually all artificial light sources, so their elimination requires special lights or filters which appear amber.

The effects on species from adding light to the night environment can range from a moderate disruption to a significant risk to survival, particularly with artificial light during the dawn or dusk hours for many species. Many nocturnal animals rely on relatively low levels of light at night – for example, just 0.001 fc under clear starry skies, or as little as 0.0001 fc under overcast night skies.[172] Under brighter conditions, such as a full moon, nocturnal prey species may stay under cover and nocturnal species may not actively hunt as much.[173]

Night lighting can also adversely affect species' migration, particularly at this location, which is within the footprint of the Pacific Flyway, which is used by more than 60 species of waterfowl, raptors, shorebirds, and songbirds known to regularly migrate along this part of the state, often by traveling at night and stopping for a time by inland and coastal creeks, wetlands, and other habitats on their northward spring and southward fall migrations. The wetlands adjacent to the proposed desal plant may be used by migratory birds as a stopover site because these and the surrounding Huntington Beach wetlands would be attractive to migrating birds that need to rest.

Artificial night lighting in the area of the proposed desal plant has the potential for night migrating birds to become confused and attracted to the lights. Once drawn into an artificial light source a number of negative outcomes including mortality can occur; birds may crash into something, circle the light source becoming exhausted, or become confused and drawn off course. Although the area around Poseidon's project site currently has other sources of artificial light, particularly that emitted from the nearby power plant, Poseidon's facility would represent a new artificial light source to the closest areas of wetlands and ESHA and would represent an additional cumulative impact to species dependent on those areas. As noted above, Poseidon's proposal to elevate its site would put at least part of its facility's lighting above the level of the existing berm, thereby limiting the berm's usefulness in attenuating the adverse effects of lighting on the nearby wetlands.

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[171] Rich & Longcore. 2006. Op Cit.

[172] Rich & Longcore. 2006. Op. Cit.

[173] Ibid.

To address these adverse impacts from artificial night lighting, the Commission could impose a Special Condition requiring Poseidon to develop a lighting plan that ensures the use of the latest artificial night lighting fixtures and illumination technology to reduce the sky glow, glare, and light trespass from its facility, and other measures such as those consistent with the standards of the Illuminating Engineering Society of North America (IESNA) that provide best design practice minimums for areas with particularly sensitive natural resources. However, as noted elsewhere in these Findings, the other areas of Poseidon's nonconformity with the Coastal Act and LCP obviate the need to develop a specific condition at this time.

Inadequate Buffer to Allow LCP Conformity

As noted above, many of the project's indirect impacts to wetland/ESHA areas would result from it having an inadequate buffer between its development footprint and those areas. LCP Policy C 7.1.4 requires that buffers be sufficiently wide to avoid significant impacts to the most sensitive species using wetlands and establishes a minimum buffer width of at least 100' between a proposed development and the habitat unless otherwise allowed by CDFW.[174] The policy allows wider buffers to be imposed if the development is substantial or involves significant increases in adverse effects. It allows for a buffer of less than 100 feet if site configuration precludes a 100-foot buffer, CDFW reviews and concurs with the smaller buffer, and the buffer is still sufficiently wide to ensure that the most sensitive species will not be significantly disturbed. The policy establishes that buffer widths are to be based on the biological significance of the wetland area and the sensitivity of species to disturbance. It also requires that buffers be used to intercept material that may be eroded into a wetland area due to proposed development.[175] Poseidon's project would clearly be substantial, as it consists of about

[174] The LCP defines "buffer" as: "Open space that horizontally separates and protects environmentally sensitive habitat areas from development areas. Buffer areas should be contiguous with the sensitive habitat but are not in themselves a part of the environmentally sensitive habitat area to be protected. A typical buffer standard width is 100 feet, but this width may vary depending on the species and habitat to be protected. Buffers may contain limited trail usage and other non-substantial structures such as interpretive signage that serve to reduce the impact of human activities on wildlife. Public trails should not be constructed where construction could have significant adverse affects [sic] on the environment or where public access could have significant adverse impacts on habitat."

[175] Additional buffer requirements in the Zoning Code's Section 221.22 are: "As a condition of development adjacent to environmentally sensitive habitats delineated in the General Plan and, for development in the coastal zone, environmentally sensitive habitats identified in the Local Coastal Program, a minimum 100-foot buffer from the edge of the habitat as determined by a site specific biological assessment area shall be provided. In the case of substantial development or significantly increased human impacts, a wider buffer may be required in accordance with an analysis of the factors identified in subsections A through C of this section. If the existing development or site configuration cannot accommodate a 100-foot buffer, then the buffer shall be reviewed by the California Department of Fish and Game and designed to:
A. Protect the functional relationship between wetland and adjacent upland;
B. Ensure that the most sensitive species will not be disturbed significantly by permitted development, based on habitat requirements of both resident and migratory species, and the short- and long-term adaptability of various species to the presence of human beings; and
C. Allow for interception of any additional material eroded as a result of the proposed development, based on soil, vegetation, slope and runoff characteristics, and impervious surface coverage."

11 acres of industrial development that would result in ongoing noise, vibration, and lighting effects in the nearby wetland/ESHA. The biological significance of these areas is high, as they are occupied by and serve as suitable habitat for several listed species as noted above.

Poseidon's site is currently separated from the wetland/ESHA by a 60-foot wide earthen berm that would provide some, but not all, of the protections expected of the buffer required by the LCP.[176] Poseidon's 2013 proposal would have maintained this berm and its buffer functions, but its 2021 CDP application initially proposed removing the berm and extending the project footprint to within just a few feet (from about zero to 10 feet) of the adjacent ESHA/wetland area. That proposed project description and layout would have involved development within what would otherwise be a minimum 100-foot buffer, including roads and parking, a stormwater conveyance system, a security fence, and some relatively minor infrastructure, most of which would require lighting and would be noise-generating sources during construction and/or during project operations.

Commission staff expressed concerns to Poseidon about this proposed zero- to 10-foot buffer being inconsistent with LCP buffer requirements and not acknowledging the determinations provided by CDFW that a buffer of at or greater than 100 feet would be needed to protect some of the protected species in the nearby wetland/ESHA.[177] In response to staff's concerns about the inadequate buffer, Poseidon in April 2022 modified its proposal to keep much a portion of the existing berm along the eastern side of the project in place and to move some of the proposed development – mainly the parking and the stormwater system – to other locations on the site. It proposed keeping the access road in place, though stated it would limit its use to emergency purposes. As a result, the berm would provide a 60-foot buffer between the proposed development and the wetlands, This is still less than the LCP's required 100-foot minimum horizontal buffer width, and with Poseidon planning to elevate its site to within a few feet of the top of the berm, some of the berm's expected buffer functions would remain limited.

LCP Consistency Analysis for Impacts to Offsite Wetlands and ESHA

The 2013 Commission staff recommendation included several proposed Special Conditions that would have required Poseidon to redesign its facility to provide a sufficient buffer, to incorporate measures that would have reduced noise, light, and other sources of disturbance in nearby wetland/ESHA, to conduct nest surveys, and to limit certain activities – such as pile driving – to times of the year outside of breeding/nesting periods.[178]

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[176] Additionally, as described in the approved Entitlement Plan Amendment for the project (see Section II.A of these Findings), the City identified the berm as providing part of the needed setbacks to protect surrounding land uses.

[177] See, for example, the November 21, 2017 email from CDFW's Jennifer Turner recommending buffers of from 300' to 500' to protect nearby sensitive avian species.

[178] The noise limitations that would have resulted from staff's recommended Special Condition at that time were also meant to allow conformity to LCP Policy C 2.6.6, which states: "Promote public access to

Requirements such as these are consistent with the approaches taken by the City and the Commission in other nearby projects. For example, the City has cited the 60 dBA threshold as causing adverse impacts to avian species and has prohibited noise- and disturbance-generating construction activities adjacent to the Magnolia Marsh during the Belding's Savannah Sparrow breeding season, which runs between mid-February and early August.[179] Similarly, the Commission, in recognition of these potential noise-related adverse effects, allowed construction activities for the Magnolia Marsh restoration project only between September and March.[180] In nearby Bolsa Chica, the Commission conditioned its approval of a bridge construction project by requiring noise levels to not exceed 65 dBA within 100 feet of any active nests (see the Commission's May 2013 approval of CDP 5-12-191). The Commission also generally requires that permittees conduct nest surveys to identify any active nests within 300 feet of a construction site and to prohibit noise levels greater than 65 dBA at the nest sites if those nests are active.[181] These conditions are largely consistent with guidance provided by both CDFW and USFWS, pursuant to LCP Policy I-C 8(c), which calls for coordination with these agencies on such matters.

As noted above, Poseidon in 2021 modified its proposed project to replace its previously proposed 60-foot buffer with a buffer of about 10 feet, which would increase the indirect effects of its project on these wetland and ESHA habitats. Its 2021 CDP application included a proposed soundwall, which Poseidon has since removed from the project description, as it would have represented disallowed development within the required buffer area. Poseidon had not provided detailed drawings of the soundwall or analyses of what noise reductions it would be expected to produce, so it was unclear what level of reduced impacts it would have provided. It is also not clear what results would accrue from keeping the existing berm in place and elevating much of Poseidon's proposed development to about the same elevation. Based on the sound modeling done as part of the project's SEIR and during the CEC's review of the nearby power plant, Poseidon's current proposed project would create noise disturbance far in excess of what would cause adverse impacts to the species and habitats in these nearby wetland/ESHA areas. Poseidon has not justified how its proposed, approximately 60-foot buffer would ensure that the most sensitive species will not be disturbed significantly by permitted development, or that the Department of Fish and Wildlife has reviewed and approved this buffer width, as required by the LCP. Without a minimum 100-foot buffer, the proposed project is inconsistent with LCP policies related to wetland and ESHA protection.

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coastal wetlands for limited nature study, passive recreational and other low intensity uses that are compatible with the sensitive nature of these areas." The lower noise levels would have benefited public use of public viewing platform and trails in the adjacent Magnolia Marsh area, which were provided through funding by the California Coastal Conservancy.

[179] See, for example, City of Huntington Beach CDPs #2006-005 and #PW-08-003, both for nearby sidewalk replacement projects.

[180] See CDP #5-08-061 for the Huntington Beach Wetland Conservancy.

[181] See, for example, CDPs 5-12-191 and 5-12-268, both issued to the City of Huntington Beach.

Conclusion

The development, as proposed, would result in significant adverse effects to wetland/ESHA areas, and would therefore not conform to the relevant LCP policies noted above. If properly conditioned, the project may be able to conform to those LCP policies. However, it is unknown whether there is adequate space on the project site to include the necessary buffer while still retaining all proposed development, or whether the project footprint would need to be reduced to accommodate the required buffer; whether there is a feasible offsite location to mitigate the onsite wetland impacts; or whether mitigation measures – such as a soundwall – would have their own impacts that would need to be evaluated. In addition, with the other areas of LCP and Coastal Act nonconformity identified in these Findings, those conditions would not be adequate to allow the full required conformity to the LCP and Coastal Act, so it is not necessary to precisely describe the conditions that might bring the project into conformity with wetland/ESHA policies.

K. Energy Use and Greenhouse Gas Emissions

LCP Goal C1.1 states:

> Ensure that adverse impacts associated with coastal zone development are mitigated or minimized to the greatest extent feasible.

LCP Policy C 8.3.1 states:

> Promote the use of solar energy and encourage energy conservation.

Coastal Act Section 30253(d) states:

> Minimize energy consumption and vehicle miles traveled.

Summary

Poseidon's proposed project would use substantial amounts of electricity. While the facility itself would generate few, if any greenhouse gas emissions, its electricity use would result in indirect emissions of about 68,000 tonnes of CO_2 equivalents ("CO_2e") during its initial years of operation. While Poseidon is proposing several technological measures meant to reduce its electrical use as compared to a non-mitigated baseline and is proposing to purchase credits and offsets to address most of these indirect emissions, its proposed approach to do so, as outlined in a 2017 "Energy Minimization and Greenhouse Gas Reduction Plan" ("GHG Plan"), could fall far short of minimizing its energy use and the resulting emissions to the extent feasible and would not meet the "net zero" emissions goal the Commission has used for similar projects that have relatively high electrical usage.

Background

The construction and operation of major water, energy, telecommunication, and transportation projects can significantly increase emissions of greenhouse gases ("GHG"). These emissions exacerbate climate change caused by global warming and contribute to ocean acidification which, in turn can cause significant adverse impacts to coastal resources of California. The Coastal Act has a number of provisions that provide authority to take steps to reduce climate change and to adapt to the effects of global warming. These include the Coastal Act's public access and recreation policies (Sections 30220 and 30211), marine resource and water quality policies (Sections 30230 and 30231), the environmentally sensitive habitat area protection policy (Section 30240), and the coastal hazards policy (Section 30253(1) and (2)). Further, Section 30253(4) requires, in part, that development minimize energy consumption, and Section 30270 requires the Commission to mitigate the adverse effects of sea level rise. The LCP also has a policy encouraging energy conservation, as well as policies protecting marine life, habitat, and other coastal resources.

In adopting the state's 2006 Global Warming Solutions Act, the California Legislature found:

> Global warming poses a serious threat to the economic well-being, public health, natural resources, and the environment of California. The potential adverse impacts of global warming include the exacerbation of air quality problems, a reduction in the quality and supply of water to the state from the Sierra snowpack, a rise in sea levels resulting in the displacement of thousands of coastal businesses and residences, damage to marine ecosystems and the natural environment, and an increase in the incidences of infectious diseases, asthma, and other human health-related problems. (California Health & Safety Code, Division 25.5, Part 1).

The Act resulted in the California Air Resources Board (CARB) adopting statewide GHG emissions limits and rules and regulations to achieve the maximum technologically feasible and cost-effective GHG emission reductions. Strategies that the state has pursued for managing GHG emissions include reducing petroleum consumption in the California economy, improving transportation energy efficiency (fuel economy), and providing alternatives to petroleum-based fuels. AB 32 also establishes protocols for offset measures that are used to mitigate for emissions, requiring that such measures be "real, quantifiable, permanent, verifiable, additional, and enforceable."

Climate change covers a broad range of impacts that can occur due to GHG emissions, such as increased sea level rise, changes in the frequency, intensity or occurrence of heavy precipitation and droughts, changes in the frequency and intensity of extreme temperature events, and changes in ocean water chemistry. California's 2006 Climate Change Impacts Assessment, 2009 Climate Adaptation Strategy and 2013 Indicators of Climate Change in California reports, and reports by the Intergovernmental Panel on Climate Change (IPCC Reports in 1990, 1995, 2001, 2007, 2013, 2014, and 2022) and various climate research centers (such as the Pew Center on Global Climate Change and the Heinz Center), and the Commission's own 2018 Sea-Level Rise Policy Guidance recognize that within the coming century potentially severe impacts could occur in the areas of sea level, water resources, agriculture, forests and landscapes, and public health. Many of these effects will impact the coastal zone and resources specifically protected by the Coastal Act, including impacts to air quality, species distribution and diversity, agriculture, expansion of invasive species, increase in plant pathogens, alteration of sensitive habitat, wildfires, rising sea level, coastal flooding, and coastal erosion. In addition, absorption of carbon dioxide by the ocean leads to a reduction in ocean pH with concomitant consumption of dissolved carbonate ions, which adversely impacts calcite-secreting marine organisms (including many species of phytoplankton, zooplankton, clams, snails, sea stars, sea urchins, crabs, shrimp, and others). The most direct impacts of global warming focused on the coastal zone are sea level rise and its associated impacts, ocean warming, and ocean acidification (see also the discussion of Poseidon's acidification impacts in Section II.I – Marine Life and Water Quality).

Effects of Poseidon's project

Poseidon's facility operations would result in significant indirect GHG emissions resulting from the electricity purchased to run the plant and to distribute the produced water. Poseidon estimates that its facility's baseline electricity use would be just over 30 megawatts and would total about 266,000 megawatt hours per year, which at the time Poseidon developed its proposed GHG Plan would generate about 68,000 tonnes of CO_2 equivalents ("CO_2e") each year. The energy intensity of seawater desalination – i.e., the amount of energy needed to produce a particular amount of potable water – is substantially higher than other common methods of water production – for example, it is about four times higher than water recycling, which has become an increasingly important supply in California,[182] and is higher than that of the State Water Project, which moves water hundreds of miles to what would be the area served by Poseidon's water. As noted in a recent Pacific Institute study, these are both far more energy intensive than other water sources, such as the continual state efforts to reduce per capita water consumption, many urban efficiency measures, and conservation.[183] The most recent IPCC report specifically states that desalination facilities that rely on electricity generated by fossil fuels would be "maladaptive" – i.e., they would exacerbate the adverse effects of climate change and reduce our capacity to adapt to it.[184] California is moving toward creating all of its electricity through means other than fossil fuels, but at the present time still relies on fossil fuels for a significant percentage of its overall electricity production. Thus, Poseidon would also continue to rely on that electricity, though may purchase offsets, as described below. Poseidon's project would also result in emissions during construction and from vehicle use during facility operations that Poseidon estimates would contribute another approximately 10,000 tonnes of CO_2e during the facility's construction period and its operating life.

Poseidon has proposed as part of its project several technological measures, such as the use of energy recovery devices within its facility, some components of "green" building design, and others, that would reduce the above baseline electricity use. The indirect emissions resulting from that electricity are expected to be reduced over time, as suppliers of electricity rely more on renewable energy sources and less on fossil fuels. For facility operations, Poseidon anticipates that its electricity supply would be provided by Southern California Edison (SCE), which is implementing the shift from fossil fuels to renewables in its energy production portfolio. SCE is also offsetting part of the CO_2e it generates through various offsets or credit purchases, so Poseidon's indirect emissions would primarily be those generated from SCE's fossil fuel-based

[182] See, for example, Powers Engineering, Assessment of Energy Intensity and Greenhouse Emission Mitigation of Proposed Poseidon Huntington Beach Desalination Plant, January 2022. This report compares the "energy intensity" of different water sources – that is, the amount of electricity needed to treat and transport water – and shows potable re-use uses about 1,055 kWh/AF, water transfers from the Colorado River and State Water Project at 2,223 and 2,817 kWh/AF respectively, and Poseidon's seawater desalination facility at 4,748 kWh/AF.

[183] See Szinai, et al., The Future of California's Water-Energy Nexus, Pacific Institute, September 2021.

[184] See Intergovernmental Panel on Climate Change, Climate Change 2022 – Impacts, Adaptation and Vulnerability, 2022.

electrical production and for which SCE has not mitigated through offsets or credit purchases. Poseidon's 2017 GHG Plan estimated that about 75% of SCE's electrical generation was from fossil fuels, but that the percentage would continue to decrease as SCE moved towards the state's goal of having 50% renewable electricity production by 2030. Most recently, Poseidon announced in February 2022 that it had signed a Memorandum of Understanding ("MOU") with the Orange County Power Authority to investigate whether it would be possible for Poseidon's facility to use 100% renewable sources of electricity;[185] however, this MOU does not include commitments or assurances that the facility would use any of these sources.

Poseidon expects its facility to use about 30 megawatts on a continual basis, for a total electricity use during each year of operations of about 260,000 megawatt-hours. The total indirect annual emissions resulting from Poseidon's electrical use would depend both on how much electricity the project uses and what sources of energy (fossil fuels, wind, sun, etc.) are used to generate the electricity supplied to the project. Poseidon's GHG Plan estimates that gross indirect GHG emissions from its first year of purchased electricity would initially be about 68,000 CO_2 metric tonnes per year.

Poseidon's GHG Plan also includes other measures that Poseidon believes would make its desalination facility operations "net carbon neutral." The GHG Plan is similar to the one the Commission approved as part of Poseidon's Carlsbad desalination facility, although it includes one important improvement. In the GHG Plan for the Carlsbad facility, Poseidon proposed an offset credit for the reduced emissions Poseidon expected from its project reducing water imports from Northern to Southern California. This proposed credit constituted the single largest proposed emission reduction measure for the project. However, the Commission found it would not result in the necessary reductions. Consistent with that finding, Poseidon has removed this proposed credit from its GHG Plan for the Huntington Beach facility.

The specific measures in Poseidon's GHG Plan range from minor to major. Several of the proposed measures are uncontroversial and would likely result in relatively modest energy savings (and modest reductions in GHG emissions). For example, using a "green" building design and employing solar panels on the facility's roof would reduce Poseidon's use of GHG-generating electricity purchased from utilities or other sources, though likely by no more than a small fraction of the facility's expected 30 mWh demand. Poseidon's primary proposed mitigation measure involves purchasing offset credits from various programs, such as the Climate Registry or other entities, that have been approved by CARB as appropriate for meeting the state's GHG reduction goals. The proposed GHG Plan also includes an annual reporting and "true-up" process to ensure its ongoing operations and indirect emissions are accurately accounted for and reflect the changes in project operations and the ongoing emission reductions anticipated from electricity providers.

[185] See February 22, 2022 Memorandum of Understanding between Orange County Power Authority (OCPA) and Poseidon Resources (Surfside) LLC.

Significantly, though, the GHG Plan includes a provision that could result in Poseidon falling far short of "net carbon neutral" status. The Plan states that Poseidon would buy only those offsets that are "reasonably available," which it defines as costing no more than $10 per metric tonne (in 2015 dollars, adjusted for inflation).[186] However, according to the 2022 Powers study referenced above, the most recent 2021 and 2022 costs for offsets range from about $30 to $60 per tonne, so it appears that this provision could result in substantial under-mitigation of the indirect emissions resulting from Poseidon's electricity use. For example, if applied to Poseidon's currently expected annual indirect emissions of 68,000 tonnes, the $10 per tonne cap would total about $680,000, which if applied to offsets currently valued at $30 or $60 per tonne, would purchase only about 15% to 30% of the amount needed to fully offset those emissions.[187]

Based on current emission rates,[188] paying the full amount of either $30 or $60 per tonne of emissions would increase the cost of Poseidon's water by about the same $30 or $60 per acre-foot, which would represent about a one or two percent increase in the overall cost. Importantly, as emission rates decline due to the increasing use of renewable energy sources to provide utility energy portfolios, the amount of offsets needed for each megawatt hour of electricity would also be reduced. Poseidon does not describe the basis for this proposed $10 per credit cost cap. This cost would add less than two percent to the expected cost of Poseidon's water,[189] which would have about the same effect on water costs as a $0.01 increase per kilowatt/hour in the cost of Poseidon's electricity, which would be a normally expected cost of doing business.[190] By including this unsupported cost cap, Poseidon's facility could result in tens of thousands of tonnes of unmitigated indirect emissions each year, which would cumulatively exacerbate the adverse effects on coastal resources noted above and

[186] This provision would apply if Poseidon was not able to purchase sufficient offsets from CARB-recognized providers.

[187] The study also noted that recent critiques of the available offset programs had identified several issues that could result in offsets not being as effective as expected in creating actual emission reductions. It also noted that Poseidon could use the same funds it would need to purchase offsets to provide more directly beneficial mitigation that would result in measurable, local benefits, such as funding local solar photovoltaic systems and battery storage systems in Southern California. The City's 2010 CDP acknowledged that Poseidon could accommodate about 39,000 square feet of solar panels at its facility, which could provide a small amount of the facility's total annual electrical use.

[188] Southern California Edison's current emissions rate is roughly 500 pounds of CO2e for every megawatt of electricity. See, for example, the Edison Electric Institute database referenced in Morning Consult's "New Database Shows California's Edison International Had Lowest Average Emission Rate in 2019," June 30, 2020.

[189] At a currently estimated cost of $2900 per acre-foot for Poseidon's water and at the above-referenced energy intensity rate 4,748 kWh per acre-foot, the proposed cap would add about $47.48 per acre-foot, or about 1.6% to the cost.

[190] Due to the energy intensity of seawater desalination, a relatively small increase in electrical costs translates to a substantial increase in the cost to produce the water – for example, a $0.01 increase in the cost of electricity per kilowatt-hour can generate an approximately $50 per acre-foot increase in water costs.

would further contribute to the now ubiquitous adverse consequences of climate change caused by GHG emissions.

Conclusion

Poseidon's project, as proposed, would result in significant, cumulative adverse effects due to its indirect greenhouse gas emissions. As described in Poseidon's submitted GHG Plan, the project would include several mitigation measures that would reduce its overall electricity use and therefore its resulting indirect emissions as compared to the expected unmitigated baseline levels. However, the GHG Plan also proposes to mitigate the remaining indirect emissions by purchasing only some of the offsets needed to reach "net zero" emissions or to ensure that the adverse effects resulting from the facility's indirect GHG emissions would be mitigated to the extent feasible. But for the other areas of Coastal Act and LCP nonconformity identified in these Findings, the Commission could impose a Special Condition that removes this provision from Poseidon's proposed Plan or that requires Poseidon to directly reduce its expected emissions by developing renewable energy sources to provide electricity for its facility. This would help address the proposed project's GHG-related impacts, but the project would still be very energy intensive, which is in conflict with LCP Policy C 8.3.1 and its requirement to encourage energy conservation. It is more efficient and results in fewer environmental impacts when water is produced in a manner that does not require so much use of energy, rather than try to obtain more offsets for the impacts of producing that energy. Given the likelihood that the project would not achieve full mitigation for GHG emissions and the lack of evidence of maximum feasible mitigation, this aspect of the project is inconsistent with LCP Goal C 1.1 and other Coastal Act and LCP policies that require mitigation to address impacts to marine life, habitat, and other resources that are affected by emissions of GHGs (e.g., Section 30250, 30230, LCP Policies 6.1.1, 6.1.3).

L. GROUNDWATER QUALITY

LCP Policy C 6.1.1 states:

> Require that new development include mitigation measures to enhance water quality, if feasible and at a minimum, prevent the degradation of water quality of groundwater basins, wetlands, and surface water.

Summary

The LCP requires that new development prevent the degradation of water quality in groundwater basins and, if feasible, enhance the water quality of those basins. Of the several distribution options the Orange County Water District ("OCWD") is considering for its possible purchase of Poseidon water, all involve injecting different amounts of that water into the groundwater basin beneath Huntington Beach. As described below, water from Poseidon's project as currently proposed has the potential to degrade the water quality of the groundwater basin, or at least to delay the improvement of it, in violation of this LCP provision. Although recent studies have identified ways for Poseidon to modify its proposed treatment methods to avoid degrading the groundwater basin's water quality, Poseidon recently clarified that it does not plan to modify those treatment methods. Accordingly, there is insufficient information to find that the project, as proposed, is consistent with this LCP provision.

Background

Unlike Poseidon's earlier version of its proposed project from 2013, which involved selling various amounts of water to several area water districts for direct distribution and use, the currently proposed project would instead have OCWD purchase the majority of Poseidon's water and then directly distribute some to member agencies and inject the remainder into the groundwater basin that underlies much of northern Orange County, including within and under the coastal zone in Huntington Beach (see **Exhibit 20 – Map of Orange County Groundwater Basin**).[191] The distribution options OCWD is currently considering would inject anywhere from 15 to 50 mgd, or from 30% to 100% of the water it might purchase from Poseidon each year into the basin where it would be stored for future extraction, treatment, and distribution.

OCWD has managed this groundwater basin for the past several decades to provide a drinking water source for use by OCWD's member agencies and to reduce seawater intrusion into the basin. OCWD's District Act requires that OCWD improve and protect groundwater quality for the benefit of its member agencies, which share the groundwater as a "common pool" resource that they contribute to and benefit from

[191] As described in OCWD's March 20, 2017 letter to the Regional Board, OCWD has not agreed to purchase Poseidon's water and has not determined the specific distribution options for the water. However, OCWD is the only potential purchaser Poseidon has identified, and the two entities have developed a Term Sheet that contains expected terms of any future Water Purchase Agreement (see additional information in Section II.A – Project Description). OCWD's confirmation of its interest in possibly purchasing the water served as the basis for the Regional Board's required "need" determination pursuant to the Ocean Plan's Desalination Amendment Section III.M.2b.(2).

through economic incentives, pumping limits, and other controls managed by OCWD. One of those member agencies is the City of Huntington Beach, which pumps water from the basin to provide part of the City's municipal water supply.

OCWD manages the basin through a variety of facilities and management practices, including recharge basins, injection wells, seawater intrusion barriers, pumping and monitoring facilities, management of pumping rates, and other measures. One of OCWD's major facilities is its Groundwater Replenishment System ("GWRS"), which provides advanced treatment of treated wastewater to produce 100 mgd of water used to recharge the groundwater basin. The GWRS uses a combination of microfiltration, reverse osmosis, and disinfection to create a high-quality product water that, along with imported water OCWD purchases from the Metropolitan Water District ("MWD"), provides most of the water OCWD uses to recharge the groundwater basin. OCWD is considering several options for using Poseidon's product water, all of which would involve injecting some amount of Poseidon's water into the groundwater basin to replace part of the water it produces from the GWRS or purchases from the MWD for groundwater recharge (as described in Section II.A – Project Description).

Injection of Poseidon water into the groundwater basin would also be subject to requirements of the Water Quality Control Plan for the Santa Ana Region Basin ("Basin Plan").[192] The Basin Plan is administered by the Regional Water Board and provides the regulatory underpinnings meant to ensure surface water quality and groundwater quality in the area is not degraded. The Basin Plan establishes a number of beneficial uses and water quality objectives that are to be met in the waterbodies of the Santa Ana Basin, including groundwater basins and specific "zones" within the basins. Many of the OCWD's groundwater management measures, such as the production of relatively high-quality water from the GWRS, result from Basin Plan requirements.

Importantly, the LCP and the Basin Plan share a similar regulatory standard – the LCP requires that new development "prevent the degradation" of groundwater quality, while the Basin Plan incorporates the "antidegradation" requirement found in state and federal water quality standards, which is meant to ensure that waterbodies continue to maintain the level of water quality needed to support their designated beneficial uses.[193] For purposes of these Findings, and because the LCP does not define "degradation of water quality," the Commission is relying on the similar and applicable "antidegradation" standard used in the Basin Plan to evaluate Poseidon's conformity to this LCP provision.[194]

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[192] The Regional Board initially adopted the Basin Plan in 1994 pursuant to requirements of the state Water Code and the federal Clean Water Act. The Board has since amended the Plan several times to ensure ongoing compliance with provisions of the California Water Code. The Basin Plan, its amendments, and other relevant documents are available at the following Regional Board website:

[193] See 40 CFR § 131.12.

[194] The Commission's reliance on the Basin Plan also ensures conformity with Coastal Act Section 30412(b), which provides that the Commission is not to take any action that conflicts with a determination by State or Regional Water Boards in matters relating to water quality.

The Basin Plan uses this antidegradation standard as one of the water quality objectives for the overall groundwater basin and in the two specific subbasins or "management zones" in the basin that could receive Poseidon water – the Main, or Orange Zone, a portion of which lies within and beneath the Huntington Beach coastal zone, and the Irvine Zone. Several of the Plan's water quality objectives are meant to limit the input of specific chemical constituents, such as chloride, boron, and others, into the Basin's groundwater and to provide mechanisms for determining whether that groundwater would have the "assimilative capacity" to incur higher concentrations of those constituents while still supporting the required designated beneficial uses. The Plan also establishes that allowable concentrations of various constituents are based in part on "controllable water quality factors," which in this case could include selecting water sources that would reduce or at least maintain the existing levels of chemical burden in the Basin. The Basin Plan requires that if receiving water has no remaining assimilative capacity for a particular water quality constituent, proposed discharges to that receiving water must not exceed the water quality objective for that constituent.[195] These water quality objectives serve as thresholds to ensure that the Basin Plan's designated beneficial uses are met – that is, the Plan presumes a water body can support its designated beneficial uses when it is meeting its water quality objectives. The Basin Plan establishes that the beneficial uses to be supported by waters within the two zones that could receive Poseidon water are Municipal, Agricultural, Industrial Service Supply, and Industrial Processing. Many of OCWD's groundwater management measures, including its injection of high quality water from the GWRS into the basin, are meant to ensure conformity to Basin Plan requirements.[196] The Regional Board has not yet made a determination as to whether injecting Poseidon's water into the Basin would meet Basin Plan requirements, though it noted in its April 2021 approval of Poseidon's NPDES permit that any such proposed injection would be subject to additional Regional Board review and approval.[197]

Effects of Poseidon's project and necessary mitigation measures: In June 2016, OCWD released a study that examined the expected quality of the water it plans to purchase from Poseidon and evaluated how Poseidon's water would affect groundwater quality in the basin.[198] The study compared the expected quality of Poseidon's water with the quality of two of the OCWD's other main water sources, the GWRS and the MWD, and identified their comparative levels of total dissolved solids ("TDS"), sodium, chloride, and boron. The study found that Poseidon's water would have higher

[195] See, for example, the January 2004 Regional Board Resolution R8-2004-0001 – Resolution Amending the Water Quality Control Plan for the Santa Ana River Basin to Incorporate an Updated Total Dissolved Solids (TDS) and Nitrogen Management Plan for the Santa Ana Region.

[196] OCWD's management of the basin is also subject to provisions of California's 2014 Sustainable Groundwater Management Act, as implemented pursuant to Water Code Sections 10727.2, 10727.4, and 10727.6.

[197] See Regional Board's April 2021 Order No. R8-2021-0011 and NPDES No. CA8000403.

[198] See Trussell Technologies, Inc., Technical Memorandum: Review of Proposed Water Quality Requirements for the Huntington Beach Desalter, prepared for Orange County Water district, April 13, 2016.

concentrations of TDS, sodium, and chloride than water from the GWRS and higher concentrations of boron than water from MWD. The study also evaluated several likely operating scenarios in which OCWD would inject various volumes of water from those sources into the basin.[199] It determined that injecting Poseidon's water into the basin under these scenarios would result in higher levels of several contaminants as compared with water injected from the GWRS and MWD only. The study also found that injecting 50 mgd of Poseidon's water would result in 38% more TDS, 136% more sodium, 396% more chloride, and 3% more boron than injecting 100 mgd of GWRS – that is, using half as much Poseidon water as GWRS water would result in significantly more chemical burden in the groundwater basin. This increased chemical burden would represent anywhere from several dozen tons up to about 20,000 tons per year of these constituents being introduced to the groundwater basin, resulting in degradation of basin water quality.

The 2016 OCWD study did not attempt to determine whether injecting Poseidon water would conform to Basin Plan requirements, though the study's conclusions provide evidence that water produced using Poseidon's currently proposed treatment methods, if injected into the Basin, would worsen the groundwater quality, and could result in failure to meet several Basin Plan water quality objectives. For example, the study noted that the currently expected boron levels in Poseidon's water would "substantially increase the importation of boron into the basin," and recommended that the OCWD's eventual purchase agreement with Poseidon include a requirement that Poseidon produce water with lower boron concentrations.[200]

Injecting Poseidon's water into the basin would also result in an increase in loading of Total Dissolved Solids compared to TDS loading in other water sources that OCWD uses to recharge the basin. As noted above, the Basin Plan includes specific water quality requirements for zones within the groundwater basin, including the two groundwater zones where OCWD has considered injecting Poseidon's product water – the Orange and Irvine Zones, which cover essentially the entire seaward end of the groundwater basin. The Basin Plan establishes a maximum objective for TDS of 580 mg/L in the Orange Zone and 910 mg/L in the Irvine Zone. However, OCWD's most recent Groundwater Management Plan 2015 Update shows that existing TDS levels are 610 mg/L in the Orange Zone and 940 mg/L in the Irvine Zone, both of which exceed the maximum water quality objectives noted above and result in the zones having "no

[199] Scenario 1 involved sending 15 mgd of Poseidon water to the basin for seawater intrusion control and injecting a blend of 35 mgd of Poseidon water and 100 mgd of GWRS water in areas of the basin used for drinking water. Scenario 2 involved sending 36 mgd of Poseidon water for seawater intrusion control and injecting a blend of 14 mgd of Poseidon water and 100 mgd of GWRS water into areas of the basin used for drinking water. Scenario 3 involved injecting 50 mgd of Poseidon water to areas of the basin used for drinking water.

[200] The Basin Plan states that "boron concentrations shall not exceed 0.75 mg/L in groundwaters of the region as a result of controllable water quality factors." The 2018 Poseidon/OCWD Term Sheet would allow for boron concentrations of up to 1.0 mg/L. This relatively small difference could translate into several dozen tons of additional boron being introduced each year to the Basin groundwater supply.

available assimilative capacity for TDS."[201] This 2015 Update notes that water produced by the GWRS for injection into the basin has TDS concentrations that average just 50 mg/L and that using the GWRS as the primary water source for basin recharge is expected to result in the basin's overall TDS concentrations declining over time.[202] For comparison, Poseidon's expected product water quality would have TDS concentrations of between 350 and 500 mg/L. Although these concentrations are below the above-referenced objectives and might be determined by the Regional Board to be consistent with the Basin Plan, the higher TDS loading from Poseidon's water could significantly extend the time it would take to lower the TDS levels in the basin to meet the identified objective needed to support its designated Municipal beneficial use. Some OCWD member agencies have raised concerns that, along with Poseidon's water potentially violating the Basin Plan, the higher chemical burden in Poseidon's water could also increase their own water quality treatment costs and potentially violate NPDES permit conditions for discharges associated with their treatment facilities.[203]

The OCWD study also identified more stringent product water requirements OCWD could include in an eventual Water Purchase Agreement with Poseidon to reduce the expected groundwater degradation resulting from Poseidon water, including:

- Adding a requirement for maximum allowable bromide concentrations;
- Reducing the maximum boron limit from 0.75 mg/L to 0.4-0.5 mg/L;
- Adding a limit for chlorine residual and chlorinated water;
- Increasing the required concentration for calcium;
- Including a Silt Density Index requirement to reduce the potential for well plugging; and,
- Adding parameters to ensure corrosion control and aquifer stability.

More recently, the Irvine Ranch Water District("IRWD") stated that injecting Poseidon water into the Basin would result in water quality degradation.[204] Studies conducted on behalf of the IRWD determined that injecting Poseidon's water into the Basin would increase levels of boron, TDS, and chloride under any of several injection/pumping

[201] Page 8-5 of the Plan states: "When a newly determined ambient level is equal to or greater than the established objective, that management zone does not have an 'assimilative capacity.' This means that the quality of the groundwater in that zone is determined to be incapable of successfully assimilating increased loads of TDS or nitrates without degrading the water quality. Conversely, when an ambient level is lower than the established objective, that management zone has an assimilative capacity and is determined to be capable of receiving modest inputs of TDS without exceeding the water quality objective."

[202] See Orange County Water District Groundwater Management Plan 2015 Update, Final Draft June 17, 2015, provided by Poseidon as part of its CDP application submittals.

[203] See, for example, a July 6, 2016 letter from Irvine Ranch Water District to OCWD, and a July 27, 2017 letter from Irvine Ranch Water District to the State Lands Commission.

[204] While this determination would ultimately be up to the Regional Board, the IRWD's December 4, 2019 letter to the Board states that injecting Poseidon water into the Basin "would be a contravention of the State Water Resources Control Board Anti-Degradation Policy (Resolution No. 68-16)."

regimes, including a determination that reducing boron concentrations in Poseidon's water to no more than 0.25 mg/l would allow it to match the average boron concentration of water from the OCWD Groundwater Replenishment system that OCWD is currently injecting into the Basin.[205] This would presumably allow for conformity to the Basin Plan's antidegradation requirement and would address the Plan's requirement that allowable concentrations of various constituents in the Basin are based in part on "controllable water quality factors," which in this case would include selecting water sources that would reduce or at least maintain the existing chemical burden.

Importantly, both OCWD and IRWD identified treatment methods Poseidon could use to avoid or reduce the potential for groundwater degradation in the Basin. They noted that different types of water treatment were more effective at reducing certain water quality constituents and examined other desalination projects elsewhere in the world to identify how they were designed to meet particular water quality requirements and specifications. Their studies found that the constituents of seawater having the greatest influence on determining which treatment methods a facility should use were TDS, chloride, bromide, boron, and sodium. They noted, for example, that the reverse osmosis membranes Poseidon is proposing to use are highly effective at removing magnesium and sulfate, less efficient at removing sodium and chloride, and even less effective at removing boron. Other treatment methods, such as ion exchangers and full or partial "second pass" through those membranes, could further reduce concentrations of those constituents.[206] One study noted that the OCWD's GWRS produces its relatively high quality water by combining all three treatment processes mentioned above – microfiltration, reverse osmosis, and disinfection – and stated that Poseidon could "reasonably achieve" the required Basin water quality objectives by modifying its proposed treatment processes to include these or other similar methods. However, Poseidon stated in its July 2021 CDP application that it would not be proposing any changes to its treatment methods to address these concerns.[207]

[205] See, for example, Thomas Harder and Company, Evaluation of Potential Water Quality Impacts from Proposed Injection of Desalination Seawater in the Orange County Groundwater Basin (2016 – Ongoing), for Irvine Ranch Water District, Trussell Technologies, Technical Memorandum – Boron Mitigation for Seawater Desalination, November 26, 2019, and Thomas Harder and Company, Technical Report on Evaluation of Potential Effects of the Proposed Seawater Desalination Project (Hydrogeologic Modeling), November 27, 2019.

[206] See for example, Soil/Water/Air Protection Enterprise, Desalination White Paper: Reverse Osmosis Product Water Quality Issues and Present Regulatory Status, for Environment Now, August 24, 2006, which describes how boron concentrations can be reduced by adjusting the pH and then pumping water through the membranes a second time ("second pass" treatment) or through ion exchange methods.

[207] Additionally, the DesalData database provided by Global Water Intelligence ("GWI") describes Poseidon as planning to use a "single-pass" system – i.e., it would send water once through its treatment process – rather than use a "double-pass" or "partial double-pass," either of which would remove more of the constituents that remain in the water after a single-pass treatment. See GWI's DesalData, 2022.

In addition, OCWD studied other potential effects of using Poseidon water for injection into the basin or for direct delivery to member agencies. It determined that these options could require additional injection wells, changes to OCWD's management of its seawater intrusion barriers meant to protect the groundwater basin, or other structural or management changes, any of which could require additional modifications to Poseidon's operations or to the Basin Plan.[208]

LCP Conformity

Based on the above, although Poseidon's currently proposed project would increase the chemical loading of the Orange County groundwater basin, making it harder for the basin to achieve its water quality objective, it appears that Poseidon's water might, strictly speaking, conform to the Basin Plan's and LCP Policy C 6.1.1's requirements to prevent groundwater degradation by meeting the Plan's water quality objectives. However, given the uncertainty of how the water would be used, what volume may be injected into OCWD's groundwater basin, and the potential effects to water quality within the groundwater basin as well as to the surrounding water districts, the Commission does not have enough information to find that the project, as proposed, is fully consistent with this LCP policy. The LCP policy sets an antidegradation standard as the minimum, but also requires that new development include measures to **enhance** water quality, if feasible. Accordingly, even if the project would provide water that met minimum standards for chemical constituents under the Basin Plan, it appears that it would not help achieve Basin Plan objectives as quickly as may be feasible. To make a finding of conformity, the Commission would need to adopt a Special Condition to ensure Poseidon's project would protect groundwater from degradation and enhance water quality, if feasible. For example, a Special Condition might require that, prior to any injection of this project's water into the Basin, Poseidon submit documentation from the Regional Board showing that the expected quality of Poseidon water to be injected into the groundwater basin would conform to requirements of the Basin Plan. Given these uncertainties, and the fact that the Regional Board—which is the primary state agency with responsibility for regulating water quality—has not yet determined whether injection of Poseidon's water would or could meet Basin Plan requirements, there is insufficient evidence to determine that the proposed project conforms with LCP Policy C 6.1.1.

Further, as described above, at this time, Poseidon's recent CDP application clarified that Poseidon is not proposing any modifications to its proposed treatment methods. However, if the project were to be approved and Poseidon were to finalize a term sheet with OCWD, it is possible, if not likely, that OCWD would request that Poseidon alter its process to reduce the concentrations of certain contaminants. This could result in the need for Poseidon to propose modifying its facility, including by adding or expanding structures at the facility site, using and storing additional or different chemicals at the facility, possible changing the facility's discharge in a manner that could require a new or revised NPDES permit from the Regional Board, or making other changes that could

[208] See, for example, OCWD's Workshop #3 – Distribution of Poseidon Resources Ocean Desalinated Water, presentation to OCWD Board of Directors, July 6, 2016.

change the project's footprint, operations, or its potential effects on coastal resources. These modifications would likely result in the need for a new or modified CDP application. Additionally, some of these potential modifications would likely be subject to Regional Board review and approval to ensure the proposed injection of Poseidon's product water into the groundwater basin conforms to Basin Plan requirements. Because of the Coastal Act and LCP policy nonconformities identified elsewhere in these Findings, and because a condition addressing this issue could require unknown project changes and potential impacts that have not been considered, there is no need to precisely identify a special condition to address the groundwater issue at this time.

M. PUBLIC ACCESS AND RECREATION

LCP Policy C 2.5 states:

> Maintain and enhance, where feasible, existing shoreline and coastal resource access sites.

LCP Policy C3.1 states:

> Preserve, protect, and enhance, where feasible, existing public recreation sites in the Coastal Zone.

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.

Summary
The proposed facility would be built within an industrial site about one-half mile from the shoreline where public access is not available and not warranted. However, some aspects of the project would cause adverse effects on public access to the shoreline and on public recreation, though these could likely be minimized through Special Conditions, if not for the project's other areas of nonconformity to Coastal Act and LCP policies. Regarding public access, vehicular traffic during project construction would increase and could interrupt traffic on streets used for public access to the shoreline. Regarding recreational opportunities, construction and operation of the facility's seawater intake and discharge system would be expected to result in de minimis reductions in public recreational fishing opportunities, and the potential future exposure of components of that system on the beach could adversely affect both public access to the beach and public use of the beach for recreation.

Public access to the shoreline
Poseidon expects that the proposed project would involve about two to three years of demolition, remediation, and construction activities at the facility site. According to the 2010 project SEIR, construction traffic, including worker access, equipment delivery, and transporting fill material to and from the site, would occur along several local thoroughfares, including three main arterial roads used for public access to the shoreline – the Pacific Coast Highway (PCH), Newland Avenue, and Beach Boulevard. The SEIR estimated that the maximum traffic generated during demolition, remediation, and construction would be up to about 225 trips per day, though it did not identify the location for the additional parking that would be needed during the construction period. Based on the City's August 2009 traffic study, the SEIR identified existing traffic volumes along Beach Boulevard as up to 69,000 average trips per day, and it noted that

project construction traffic would represent only a small percentage increase of this total and would not result in a decreased Level of Service ("LOS") on nearby roads. Nonetheless, the SEIR included a mitigation measure that would require Poseidon to prepare a Traffic Management Plan that includes measures to ensure traffic congestion and delay are not substantially increased. Measures would include limiting pipeline construction to one side of any roads, submitting a truck routing plan for City and County approval that minimizes adverse effects from truck traffic, and requires coordination with other nearby construction projects. Poseidon's 2021 CDP application stated that there would be about 21 more days of construction due to the additional grading now proposed. For facility operations, Poseidon would provide about 30 parking spots within its facility site, which would avoid potential impacts on nearby parking used for access to the shoreline.

Construction of much of the proposed project's water distribution system within the coastal zone would take place along several roads used for public access to the shoreline, primarily Newland Avenue and Hamilton Avenue in Southeast Huntington Beach. Poseidon's previous 2013 proposal would have had pipeline construction occur concurrently with facility construction; however, the 2018 Term Sheet between Poseidon and OCWD contemplates that OCWD might implement pipeline construction rather than Poseidon. This could occur under a different timeline as OCWD has not yet conducted CEQA review or obtained permits that may be needed for what could be a different pipeline route than anticipated in Poseidon's CEQA document. Regardless, the expected pipeline construction within the coastal zone would disrupt traffic along several nearby streets used to access the shoreline.

Poseidon's 2010 SEIR contemplated that pipeline construction would occur over a period of between about 500 and 600 days; however, this may now take longer to accomplish, as the increased hazards identified in Sections II.E, and II.H are likely to require additional construction measures to address potential liquefaction, increased groundwater elevations, and needed dewatering within the pipeline route. These activities may also cause increased disruption to public access, as they may require wider trenching than the one-lane trenches contemplated in the 2010 SEIR and may overall create the need for a larger construction footprint to allow room for additional equipment, wider or deeper trenches, additional dewatering methods, etc.

There are several changed circumstances since the City certified the 2010 SEIR. As described in Poseidon's 2021 CDP application, there is a different set of projects now expected to occur at about the same time as Poseidon's construction, which would likely result in different cumulative effects on traffic and public access in the area. Poseidon's application states that the change in effects would be minor; however, it does not provide the full traffic analysis provide in the project SEIR and in other more recent CEQA reviews done for nearby projects. For example, although it appears to use different types of analyses than Poseidon, a 2019 EIR for the nearby Magnolia Tank Farm project shows significant increases in traffic on some of the key streets and intersections around Poseidon's site that would be used during Poseidon's construction.

Poseidon's SEIR shows 13,000 average daily trips on Magnolia Street close to the Tank Farm site, while the Tank Farm EIR shows up to about 15,000 average daily trips near that location. Similarly, Poseidon's SEIR shows about 3,000 average daily trips along Hamilton Avenue, where much of the distribution pipeline within the coastal zone would be installed, whereas the Tank Farm EIR shows from about 13,000 to 17,000 average daily trips along that route.

Unless mitigated, traffic generated by Poseidon's project would likely cause adverse effects on public access to the shoreline, though those effects could be avoided or reduced through development of an appropriate Traffic Management Plan. But for the other areas of Coastal Act and LCP nonconformity described in these Findings, the Commission could impose a Special Condition ensuring that such a Plan be developed and that it ensure maximum access to the shoreline.

Public Recreation - Recreational Fishing

The project as proposed would create de minimis impacts to recreational fishing due to installation and maintenance of the facility's offshore intake screens and diffusers and due to the effects of its effluent being discharged into coastal waters about 1500 feet offshore. Installation of the offshore equipment would require a barge and support vessels operation near the intake and discharge site for up to several months, creating a zone within which fishing would not be available. During maintenance activities each year, a similar zone would be established, though for shorter periods. Regarding the discharge, the Regional Board's approval of Poseidon's project allowed for a Zone of Initial Dilution ("ZID") of up to 100 meters around the discharge to allow the effluent to mix adequately into the receiving seawater. The effluent is expected to meet water quality objectives at the edge of this ZID, though it would likely exceed certain parameters within this zone. Fish passing through the ZID would likely have little exposure to higher levels of contaminants or may be able to avoid those areas entirely. Fish that might otherwise be attracted to the incidental habitat provided by the intake and discharge structures may avoid the area, which would likely result in a minimal reduction in the potential for areas within the ZID to provide a productive fishing opportunity.

There may also be a slight reduction of adult fish in the project's source water area due to the marine life mortality caused by the project's intake and discharge, as described above in Section II.I. The facility would kill fish larvae and other small organisms in about 270 million gallons of seawater each day. However, because the methods required by the state's Ocean Plan to evaluate and describe that impact are based on the amount of productivity lost in the ocean's food web rather than the effects the losses might have on the numbers of adult fish, it is not clear whether or how much recreational fishing would be affected. Other assessment methods used to determine how these planktonic losses affect adult fish populations generally identify a relatively small reduction of adult fish from planktonic losses at this scale. This is primarily because the fish larvae most commonly entrained in these systems are from species that produce thousands or millions of larvae in order to have just a few fish that survive to adulthood and a reproductive age. Additionally, the predominant species identified in

the studies used to determine Poseidon's productivity losses are, for the most part, not sought in recreational fishing. Therefore, while the loss of these organisms represents a substantial reduction in productivity, it would not be expected to cause more than a minor effect on the number of fish available to recreational fishers. Finally, and as noted in Section II.I, because Poseidon's intake would be screened to avoid the impingement of adult fish, it would not be expected to cause direct losses of those larger fish.

Public recreation – future exposure of project structures on the beach
Poseidon's project could also reduce both public access to the shoreline and public recreation on the beach due to parts of its intake and discharge pipelines that are several feet below the beach being exposed during a short- or long-term episode of beach erosion. As noted above in Section II.H, sea level rise and climate change are expected to increase the frequency and severity of wave energy and beach erosion, and there is uncertainty as to whether Orange County's current beach nourishment program would continue or how it would address these expected increases. While there is also uncertainty about whether these erosion events would expose the pipelines or the access ports that rise above them, such exposure could reduce the availability of nearby portions of the beach for public access. While the Commission could potentially address this through imposition of a Special Condition requiring Poseidon to immediately respond to any exposure, the proposed project would still not conform to other Coastal Act and LCP policies identified in these Findings.

Conclusion
The development, as proposed, would result in minor reductions in public access to the shoreline and de minimis reduced opportunities for recreational fishing. While the Commission could impose Special Conditions that would avoid, minimize, or mitigate these effects, they would not allow the project to be fully consistent with the Coastal Act and LCP policies evaluated elsewhere in these Findings.

N. ENVIRONMENTAL JUSTICE

Coastal Act Section 30604(h) states:

> When acting on a coastal development permit, the issuing agency, or the Commission on appeal, may consider environmental justice, or the equitable distribution of environmental benefits throughout the state.

Section 30604(h) provides for the Commission to evaluate environmental justice considerations when making permit decisions. As defined in Section 30107.3(a) of the Coastal Act, "environmental justice" means "the fair treatment and meaningful involvement of people of all races, cultures, incomes and national origins, with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies."[209] Section 30107.3(b)(4) states that environmental justice includes, "[a]t a minimum, the meaningful consideration of recommendations from populations and communities most impacted by pollution into environmental and land use decisions."

In March 2019, the Commission adopted an environmental justice policy ("EJ Policy") to guide and inform its implementation of Section 30604(h) in a manner that is fully consistent with the standards in, and furthers the goals of, Chapter 3 of the Coastal Act and certified local coastal programs. The EJ Policy further articulates environmental justice as the following:

> The term 'environmental justice' is currently understood to include both substantive and procedural rights, meaning that in addition to the equitable distribution of environmental benefits, underserved communities also deserve equitable access to the process where significant environmental and land use decisions are made.

Ensuring access to the Commission's proceedings means making sure that those who are affected by proposed development have a meaningful and equitable opportunity to voice concerns in an open and transparent public process. Substantively, the EJ Policy describes how the Commission will work to ensure equitable access to the coast, support measures that protect existing affordable housing, and ensure that environmental justice communities are not disproportionately affected by climate change, water contamination, overuse or diminished environmental services. Opponents of the proposed project have raised procedural concerns, including participation in the decision-making process and access to project information. They

[209] Coastal Act Section 30013, which provides that the Commission is to advance the principles of environmental justice and equality, references California Government Code section 65040.12(e), which defines "environmental justice" as "the fair treatment of people of all races, cultures, and incomes with respect to the development, adoption, implementation, and enforcement of environmental laws, regulations, and policies."

have also raised substantive concerns about the project's impacts on communities of color and low-income communities in Orange County, including the impacts from higher water bills on ratepayers and exposure to cumulative industrial impacts from existing and proposed development on nearby residents and recreational visitors. Project proponents, meanwhile, have asserted the project would benefit the region by providing a reliable source of water during emergencies and increasing jobs and economic opportunities for low-income communities. The Commission addresses these concerns in this section.

Identifying Communities of Concern

The Commission's EJ Policy was created to provide a framework to consider fair outcomes and requires staff to reach out to and include the voices of environmental justice community members[210] who have been historically marginalized in the governmental review process and whose households have been disproportionately burdened by environmental hazards often stemming from industrial development. The goal is to make sure these voices are thoughtfully considered by the Commission during the process. In this case, however, while staff can reliably analyze impacts to communities immediately surrounding the proposed physical development in Huntington Beach, the information necessary to do focused outreach to underserved communities potentially impacted by the production and distribution of the desalinated water is unavailable because the applicant has not secured a buyer. Without additional information on the extent to which the project would affect rates for end users, staff is unable to definitively analyze the potential burdens on specific environmental justice communities. Based on the limited information available, staff conducted initial, focused consultation with community members and groups. However, there are likely more underserved communities that are unable to participate in the process because they are currently unaware of the project and its potential impacts on their households. These underserved populations may be impacted by higher water bills well after a decision is made on this project – exactly the scenario the Commission's EJ Policy was designed to avoid.

For these reasons, staff focused its scope on the project location in Huntington Beach, as well as rate payers in the Orange County Water District (OCWD), which has a non-binding term sheet with the applicant but has not committed to purchasing the water.[211] If the agreement is finalized, the project would likely impact EJ communities in OCWD's service area, which serves most people in Orange County. In this section, staff used socioeconomic, demographic, and environmental indicators to identify communities of concern as well as the environmental burdens among them in order to evaluate the distribution of the project's environmental burdens and benefits and cumulative patterns. Staff evaluated various quantitative and qualitative sources of information for the OCWD

[210] In this staff report, the terms "underserved communities" and "environmental justice communities" are used interchangeably with the term "communities of concern." All these terms refer to low-income communities, communities of color, and other populations with higher exposure and/or sensitivity to adverse project impacts due to historical marginalization, discriminatory land use practices, and/or less capacity to mitigate adverse impacts.

[211] https://www.ocwd.com/learning-center/ocean-desalination/project-cost-term-sheet-agreement/

service area described below, including the area near the project's proposed location in Huntington Beach, as well as for comparison. Staff used census tracts in the selected geographies and analyzed communities that were identified as low-income communities (either through the low-income definition from AB 1550[212] or at two times the federal poverty level [213]), communities with a large number of people of color, [214] and disadvantaged community classifications as defined by California Environmental Protection Agency.[215]

In addition to gathering and evaluating quantitative information from online sources, staff conducted outreach to interested parties. Staff posted an FAQ in Spanish and English on its website and shared it on its EJ email listserv, inviting interested stakeholders to engage. Staff also contacted community members who had spoken about EJ concerns at other meetings and reached out to local EJ groups. Staff also visited the site of the proposed project to meet with stakeholders to better understand the perspective of those who may be affected by the project as ratepayers, the lived experiences of nearby resident groups, and to ground truth quantitative information. Staff met with individuals from local and statewide EJ groups, tribal members, social justice representatives, representatives from civil rights groups, and residents from various communities in the Orange County water district service area. Because COVID-19 restrictions made many in-person meetings challenging, staff conducted most outreach by email, phone, and video conference.

Most communities in Orange County use a combination of several water sources, including wells in local aquifers, recycled water, and imported water. OCWD manages the Orange County Groundwater Basin and provides water either fully or partially to more than 21 cities and more than 2.5 million people.[216] While it remains unclear whether OCWD would purchase the water, this new source of water could be delivered to their ratepayers throughout northern Orange County. The demographic and socioeconomic indicators within the OCWD distribution area indicate a high percentage of communities of concern in the following cities: Garden Grove, Stanton, Westminster, Orange, Villa Park, Tustin, Buena Park, La Palma, Placentia, Yorba Linda, Cypress, Los

[212] AB 1550 identifies "Low-income communities" as census tracts with median household incomes at or below 80 percent of the statewide median income or with median household incomes at or below the threshold designated as low-income by HCD's State Income Limits adopted pursuant to Section 50093 of the Health and Safety Code. This provides a more reliable measure of low-income communities due to higher costs and wages in California than the Federal Poverty Level.

[213] A threshold of twice the federal poverty level was used in this analysis because California's cost of living is higher than many other parts of the country.

[214] "Individuals of color" or "people of color" was calculated through selection of all individuals that self-identified as non-White, or Hispanic/Latino in American Community Survey 5-Year Estimates (2015-2019) pulled from CalEnviroScreen 4.0.

[215] Disadvantaged communities are defined as the top 25% scoring areas from CalEnviroScreen along with other areas with high amounts of pollution and low populations pursuant to SB 535.

[216] How water works in OC | OCWD. < www.ocwd.com/learning-center/how-water-works-in-oc/ >

Alamitos, Seal Beach, Huntington Beach, Irvine, Newport Beach, Fountain Valley, Costa Mesa, Santa Ana, Anaheim, and Fullerton as shown in Table N-1. The communities of concern and low-income ratepayers within these cities would be impacted by the proposed project if OCWD enters into a formal water purchase agreement with Poseidon Water.

Table N-1. Communities of Concern in Relevant Geographies			
	Orange County	OCWD	Huntington Beach
Total Population	3,932,826	3,132,063	279,164
% AB 1550 Low Income	51%	59%	32%
% 2x Federal Poverty Level	27%	29%	20%
% Individuals of Color	62%	67%	44%

Source: CalEnviroScreen 4.0, American Community Survey 5-Year Data (2015-2019)

While only 29 percent of households in OCWD's service territory live two times below the federal poverty line, out of approximately three million people, more than half earn less than $85,000. This is considered low-income for the average household of three in Orange County, as defined by AB 1550. OCWD's service area contains a majority of individuals of color and more than two-thirds of its ratepayers are non-white. Additionally, there are a number of census tracts that fall within the SB 535 Disadvantaged Communities definition, as shown on figure 1 below, where communities have both high levels of pollution and environmental hazard exposures and sensitive population characteristics.

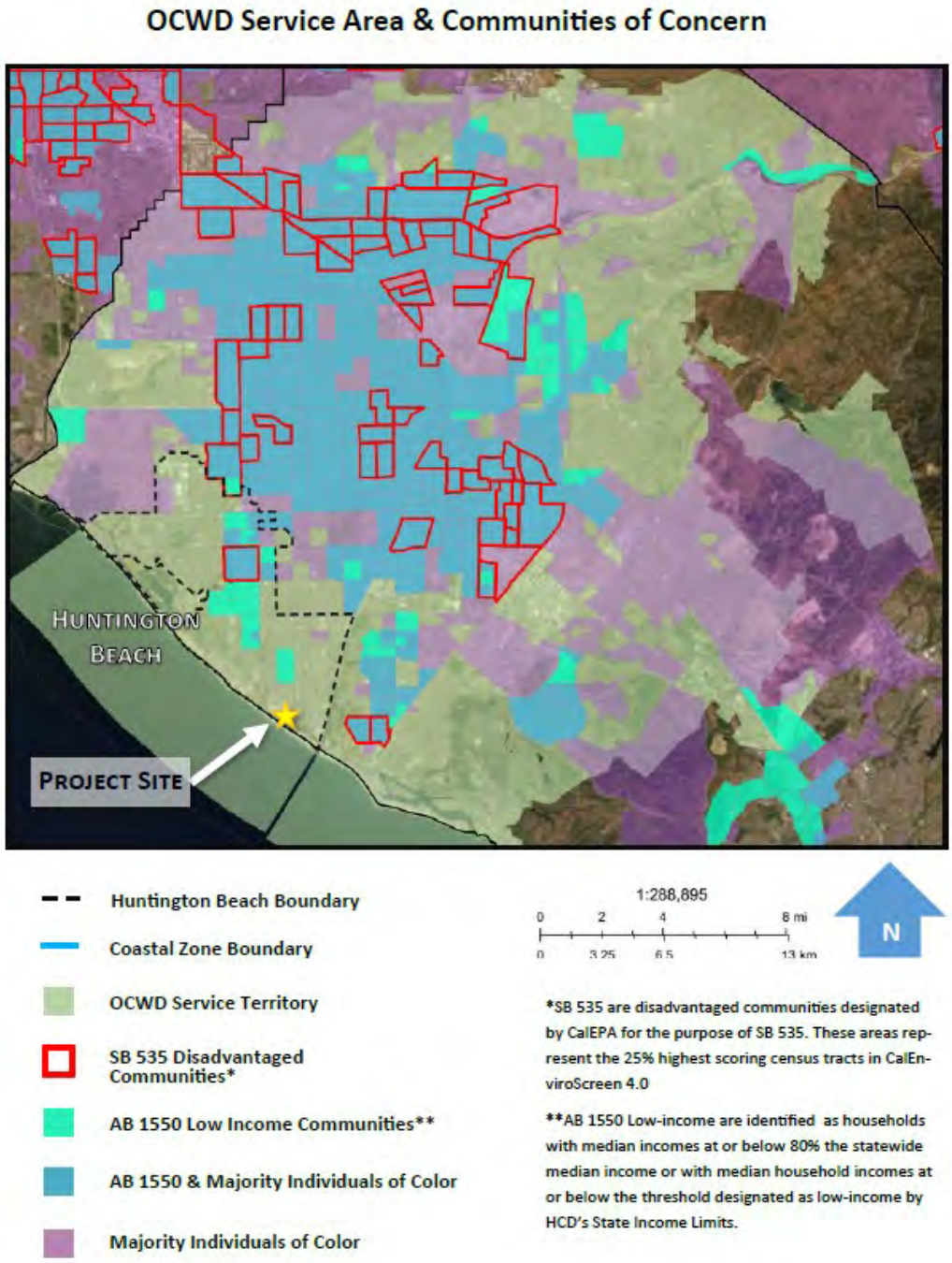

Figure 1. OCWD Service Area & Communities of Concern

The proposed project location is in an area with a concentration of industrial development and a history of contamination problems. Although the area is bordered on one side by the beach and wetlands, it is also the home of the Orange County Wastewater Treatment Plant, and a cluster of heavy industry that includes two natural gas power plants within Poseidon's project location, the former ASCON Superfund site that is still being remediated, and the Magnolia Tank Farm. Nearby residents and EJ

stakeholders refer to this industrial area as the “toxic triangle,” noting that the site is a brownfield and that much of the soil is likely toxic. Until recently, the Tank Farm included above ground oil storage tanks, but the tanks have recently been demolished and the site is now proposed for medium-density housing. Northeast of the site is a former dump that has since been turned into a park, soccer fields, skate park, tennis courts and other amenities that serve a nearby local high school, elementary school, and community, as shown in figure 2. Nearby residents have raised concerns about adding more industrial development to an area already dealing with these existing harms, citing a disproportionate impact. The ASCON site is in the process of being remediated, but that process was slowed in 2019 amid complaints of respiratory health issues from nearby residents.[217] There are now some air monitoring trucks and signs posted around the fenced-off site asking residents to call the South Coast Air Quality Management District if there are dust issues and warning that the soil contains arsenic, chromium, copper, lead, mercury, nickel, benzo(a)pyrene and dibenz(a,h)anthracene. Residents are wary of part of Poseidon’s proposed project, which would involve trenching a water delivery pipeline route along Hamilton Avenue, thereby disturbing the soil adjacent to the landfill cleanup site and possibly mobilizing contaminants in the soil and groundwater. They also note that the demolition and construction would require hauling toxic soil off-site to a landfill likely located near EJ communities or remediated on site.

[217] See, for example, “Huntington Beach landfill outrage spurs school officials to address health concerns,” in the Orange County Register (ocregister.com)

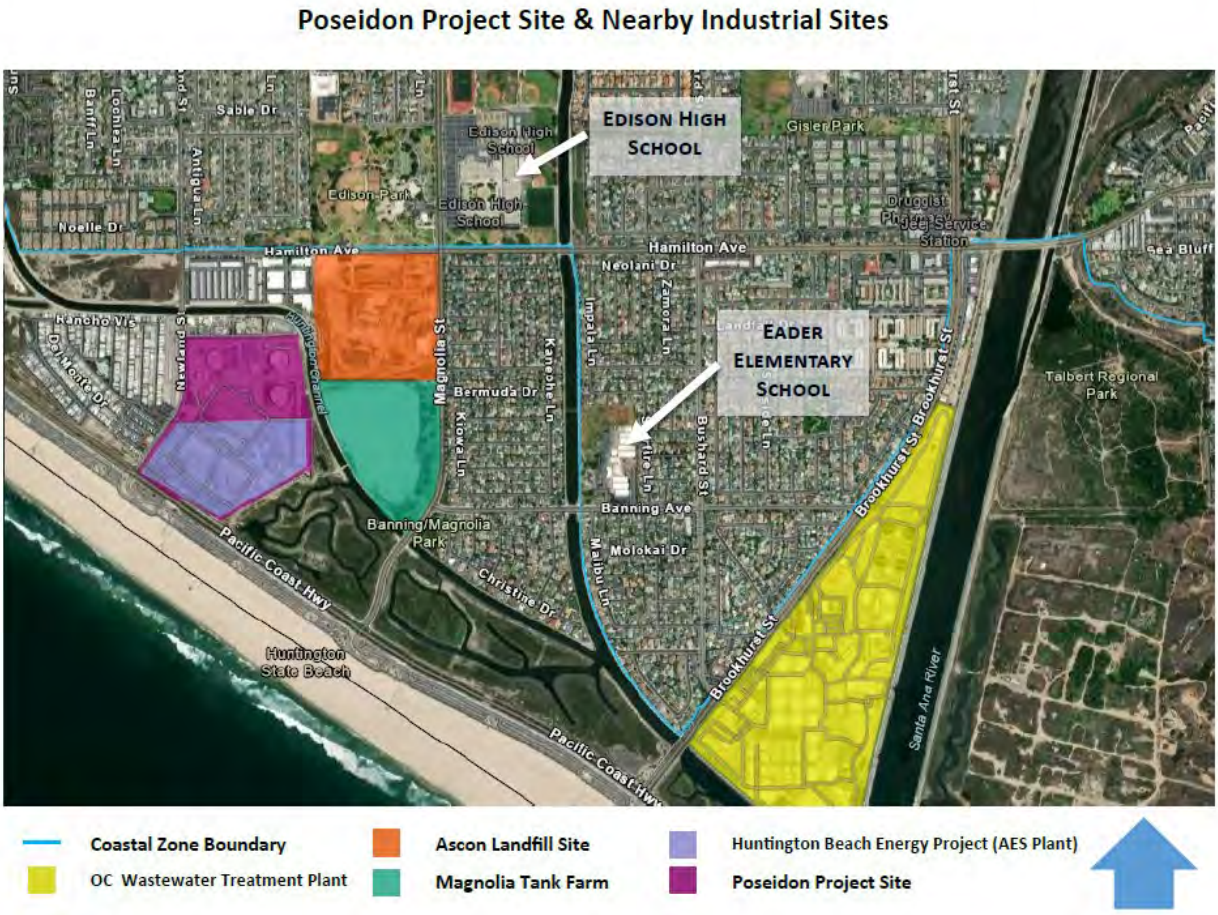

Figure 2. Poseidon Project Site & Nearby Industrial Sites

The community surrounding the project site has a disproportionate number of industrial impacts due to the polluting infrastructure when compared to the rest of California.[218] Much of the housing surrounding the proposed project site consists of large two-story homes, and surrounding census tracts show a predominantly white population with a low overall composite CalEnviroScreen score and is not a low-income community, as defined by AB 1550 or twice the federal poverty level, with the exception of one census tract less than a mile north. However, nearly two miles east, across the Santa Ana River, there are several communities of concern in Westside Costa Mesa, as shown in figure 3, with a predominantly Latino population. Farther out, with the assistance of local EJ stakeholders, staff identified several low-income communities near the proposed project, including a community nicknamed Oakview, which is a largely Latino working-class population who work in gardening, cleaning, and the hotel industry.

[218] Although the overall "Pollution Burden" score in CalEnviroScreen 4.0 for the community immediately adjacent to the project site scored a low percentile, individual pollution indicators such as Toxic Releases and Solid Waste for the site qualify in the top 15th percentile for California.

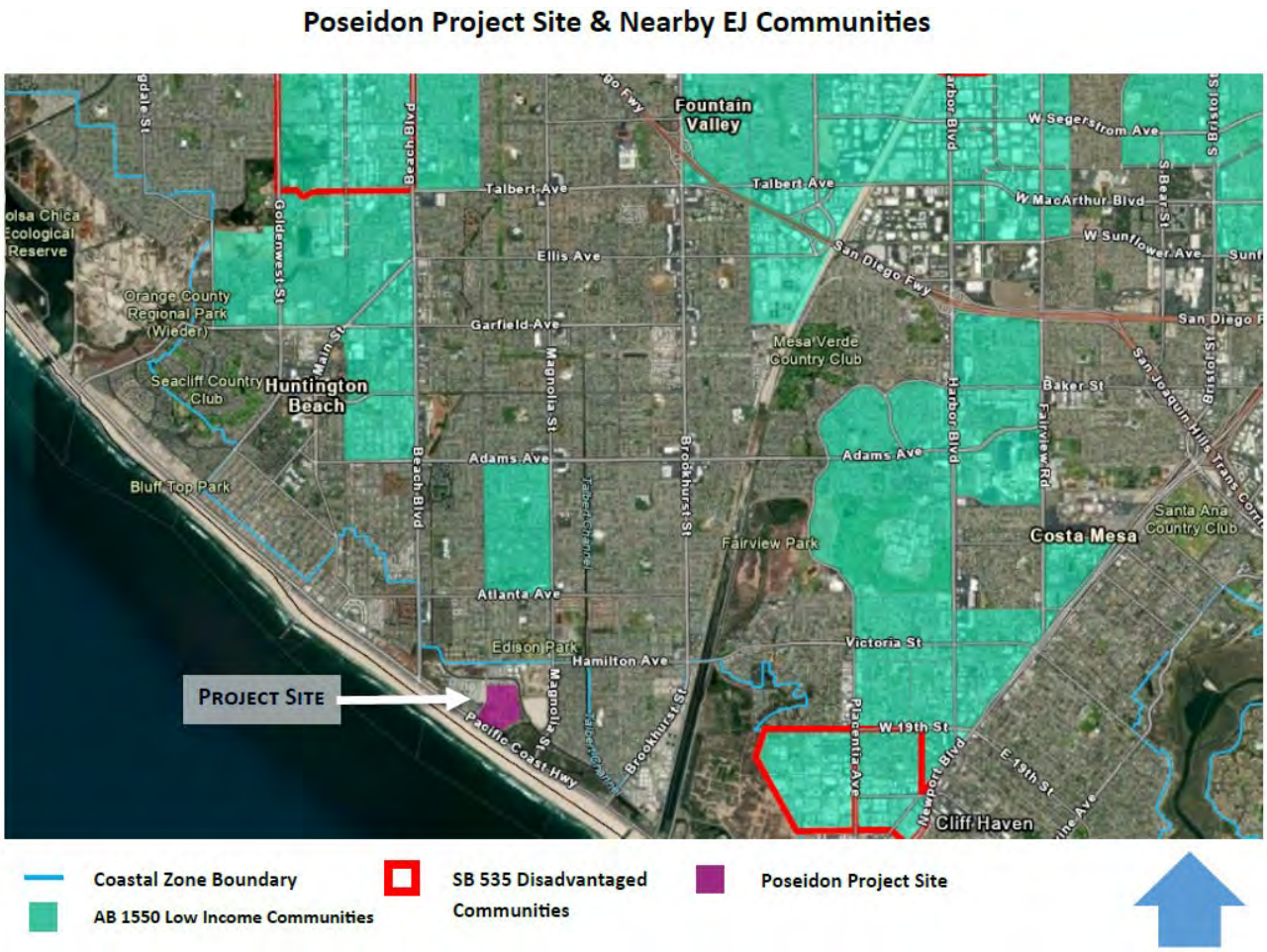

Figure 3. Poseidon Project Site & Nearby EJ Communities

Based on qualitative and quantitative information, staff concludes that there are several communities of concern within the identified geographies of potential impact that may be affected by project impacts who may experience disproportionate burdens, particularly low-income ratepayers throughout the OCWD water district. Potential impacts to those communities and the Commission's ability to mitigate those impacts warrant additional consideration pursuant to Section 30604(h) of the Coastal Act.

Environmental Justice Coastal Act Analysis

Procedural Concerns: Due to the lack of a final water purchase agreement from a water supplier and uncertainty about where the water might be needed or used, it is unclear which ratepayers would be affected by the proposed project. This made it challenging for Commission staff to conduct meaningful engagement with all communities of concern who may be disproportionately burdened by the project impacts. Even so, environmental justice stakeholders raised several procedural concerns. For example, some expressed frustration at some previous regulatory meetings with other agencies where they felt unwelcome, the scope of their comments was limited, and because supporters of the project were in at least one case allowed to comment first, causing many EJ stakeholders to leave after hours of waiting.

Several community representatives also told Commission staff they felt they were at a disadvantage engaging in the process because many materials were not initially translated into commonly spoken languages among communities of concern in Orange County, including Spanish, Vietnamese, or Korean. Additionally, many community members could not take a day off work to attend the meetings and do not have the resources to hire attorneys or lobbyists, such as those employed by the applicant. In a letter to staff, EJ representatives also noted that the applicant has "never engaged any EJ community or sensitive population in meaningful public participation." The Santa Ana Regional Water Quality Control Board (SARWQCB), which reviewed the project but does not consider water rates, stated in its Order[219] that its public process provided opportunities for stakeholders, including disadvantaged communities, to provide meaningful input and that they would have additional opportunities to weigh in at rate increase hearings with their appropriate water supply agency.

Stakeholders also expressed concerns about the lack of engagement with future low-income rate payers who may be disproportionately burdened by the project. Orange County ratepayers who spoke with staff said they felt they were in the dark about fundamental project details and raised concerns that neither Poseidon nor OCWD had proactively engaged with them regarding expected costs associated with Poseidon's project and who might bear these costs. Ratepayers told staff they learned of the project through social media, friends and EJ groups. It appears that OCWD has not alerted ratepayers within its service area as to possible rate increases or other potential effects of purchasing and assimilating Poseidon's water into its system.

In response to these concerns, Commission staff agreed to several additional approaches to encourage the widest possible involvements from stakeholders and underserved members of the public. This included creating a project webpage for all documents, an FAQ handout in Spanish and English explaining the project in accessible terms for groups to distribute, translating the executive summary into Spanish, creating a Spanish language page with all translated materials and other helpful information such as how to sign up to speak, how to log into the hearing in one place and how to use Google Translate on the Commission's website. EJ groups also requested that the Commission have Poseidon translate their application and the staff report into Spanish and provide simultaneous translation at the hearings, so Spanish-speaking stakeholders can follow the proceedings and provide public commentary. Commission staff has asked Poseidon if it would help with these requests, though this had not been determined at the time the staff report was published.

Substantive Concerns: Along with the quantitative data collected, qualitative information and the lived experience of the community members is key to understanding existing environmental justice burdens on a community and the potential for new

[219] California Regional Water Quality Control Board Santa Ana Region Order R8-2021-0011 NPDES No. CA8000403 Waste Discharge Requirements for Poseidon Resources (Surfside) L.L.C Huntington Beach Desalination Facility Orange County

development to inadvertently exacerbate those impacts. Staff toured the project area and spoke with stakeholders and EJ groups as part of the Commission's ongoing commitment to foster meaningful involvement consistent with 30107.3(a) and increase outreach consistent with its Environmental Justice Policy. Representatives shared information to consider regarding project burdens and benefits for communities of concern. This includes: 1) burdens associated with increased costs for water; 2) concerns about beach access; and 3) benefits from increased jobs and a more secure water source. Staff evaluate and address these concerns below. While residents near the project site and EJ groups shared concerns regarding increased environmental burdens that would contribute to cumulative impacts they already experience, these potential impacts do not appear to disproportionately burden communities of concern nearby. There is insufficient information regarding construction impacts on nearby EJ communities such as Oak View in North Huntington Beach and West Costa Mesa, though some of those construction activities are described in other sections of these Findings.

Water costs: One of the primary concerns residents and stakeholders expressed is the disproportionate burden that potential low-income ratepayers could experience as a result of increasing water rates due to the construction and operation of the proposed Project. Notably, the LCP also calls for providing cost-effective water services. Objective C 9.1 states: "Provide and maintain water, sewer and drainage systems that adequately serve planned land uses at a maximized cost efficiency." Opponents also raised concerns about a private for-profit company having control over a public resource such as water. They said that renters in multifamily units pay for their water through their rent, and landlords could raise their rents if rates increase, potentially pushing them of their neighborhoods. Affordable water is critical for people on limited incomes and a critical component in the State's Human Right to Water Policy, that identifies every human being has a right to safe, clean, affordable, and accessible drinking water as a public health imperative.[220]

There is general agreement that the project would result in increased water costs, but there is a wide range of estimates for how much additional cost would be borne by ratepayers. Reasons for this uncertainty include the lack of a committed buyer, uncertainty as to where the water would be distributed and used, and unknown additional costs associated with infrastructure to provide the eventual distribution and treatment,[221] associated with the need to address the project's significant impacts to marine life, water quality, and wetlands by providing adequate mitigation, and those associated with constructing the facility to meet more stringent building standards applicable to a critical infrastructure facility. This uncertainty is underscored by statements in the current term sheet that the cost of service would be negotiated in the

[220] Assembly Bill 685 added Section 106.3 to the Water Code which declares it is the established policy of the state that every human being has the right to safe, clean, affordable, and accessible water.

[221] As noted above, the most recent estimates show that these additional costs could range from about $200 million to $350 million.

future. This raises concerns, given that over half of all individuals in OCWD's service area can be considered "low-income communities" as shown on table 1. Stakeholders and tribal members also raised concerns about allowing a public resource such as water to be controlled by a for-profit company that is not subject to the same transparency requirements and expectations as a public agency.

According to Poseidon, the expected additional cost for the desalinated water per household is $5 to $7 a month. However, this estimate does not include potential additional costs for the items described above (i.e., infrastructure, mitigation, and construction to meet more stringent building standards). Recent estimates for the additional infrastructure costs alone range from about $200 to $350 million in 2017 dollars, depending on the distribution option used, which could increase the cost per acre-foot by an additional $200-300 dollars, which would represent an approximately 10% increase over currently estimated costs.[222] Additionally, all of the distribution options OCWD is currently considering would reduce the amount of lower-cost water it currently purchases through the Metropolitan Water District and substitute all or some of that supply with higher-cost Poseidon water. With critical components of the project still to be determined, it is uncertain how these costs would translate into increased costs for ratepayers because it impossible to discern all project costs, how these additional costs would be distributed or how many people would be expected to pay them.

A 2017 study by the South Coast Water District ("SCWD") provides some additional insight into expected costs and projected differences among various projects.[223] The study compared the expected water costs if SCWD was to construct its own smaller desalination facility and the expected costs if SCWD were to purchase water from Poseidon. It projected that costs (in 2021 dollars) for SCWD water would be $1540 per acre-foot and Poseidon water would be $2100 per acre-foot. This several hundred-dollar difference per acre-foot also applied when SCWD compared the cost of financing and building its own facility versus having a private entity like Poseidon finance and build the same facility.

The Regional Water Board acknowledges in its analysis of consistency of the project with its Human Right to Water Policy that the projected rate increases for residential water bills could affect the affordability of water for customers and encourages the OCWD to specifically consider the impacts on disadvantaged communities in its service area when considering a water purchase agreement. Although water rates would likely increase for all ratepayers in the service area, higher rates resulting from the proposed desalination facility would disproportionately impact low-income ratepayers in Orange County. Additionally, staff noted a very limited number of low-income water rate assistance programs offered by retail water agencies and city water departments in OCWD's service area. Several service providers do not offer any assistance, and among those that do, only two service providers provide any sort of assistance for low-

[222] See CDM Smith, 2018 Orange County Water Reliability Study, prepared for MWDOC, February 2019.

[223] See, for example, CDM Smith, Water Reliability Study – Technical Memorandum Report, prepared for South Coast Water District, December 2017

income households, as defined by extremely low incomes, while the remainder only offer assistance to low-income individuals above the age of 65, which does not account for the full range of low-income households that may be affected by the project.

Moreover, a 2019 UCLA study titled “Analyzing Southern California Supply Investments from a Human Right to Water Perspective” examined how a proposed agreement between Poseidon and OCWD for 30 years would affect the county’s disadvantaged households. The report found no significant benefits for disadvantaged communities from the proposed project and concluded through a range of calculations and evidence of climbing water rates from Poseidon’s Carlsbad plant that “the agreement will likely make drinking water for disadvantaged households in Orange County moderately to severely less affordable.” It also found that:

> All available reputable sources—including Orange County Water District (OCWD), Municipal Water District of Orange County (MWDOC) and Irvine Ranch Water District (IRWD)—show the upfront unit cost of water from the agreement to be substantially more expensive than the unit cost of all other local supply options. Our own analysis also yielded no evidence to reasonably project that Agreement Water will be cost competitive with any incremental supply investments for the next several decades.

The report acknowledged that many southern California water districts are seeking to “enhance their own water security by increasing their reliance on local or regional water resources and reducing their exposure to imported water,” and noted that imported water has become more expensive and harder to obtain for a variety of reasons. It also describes how desalinated ocean water can provide benefits in terms of reliability in areas with scarce supplies and in terms of quality and affordability in areas where other water sources are of poor quality or where water has to be trucked in. However, the report questioned the need for this project because the county’s population is almost entirely served by community water systems that do not face the types of severe water supply reliability and quality concerns or risks that a new source of desalinated water might help to improve. The report concluded:

> While potential positive HRW [human right to water] benefits from desalinated ocean water can occur in certain contexts, we find that no such benefits can be plausibly realized by the Poseidon agreement in Orange County. Nearly all of the county’s households are connected to community water systems which already provide high-quality, reliable water service and thus would not see supply improvement from ocean desalination. Those served by the county’s small underperforming systems, whose lower-quality water might be improved through new desalinated supply, will not be served by the proposed agreement to purchase desalinated water. The only plausible impact of Agreement Water on disadvantaged households in the county will be a decrease in affordability due to higher system rates.

The study determined that a more effective approach would be to pursue conservation and alternative local water supplies, particularly given that Orange County is home to one of the nation's largest water recycling facilities. These findings are also supported by a 2018 MWDOC study that found Poseidon's project would provide lower reliability at higher costs than about 6 other local or regional potential water supply projects.[224]

Although there is not enough information to provide definitive water costs or rate increases for this facility, the costs of water at Poseidon's Carlsbad facility are instructive. During the Commission proceedings related to Poseidon's CDP for that facility in 2008, Poseidon estimated that the price for its product water would be approximately $950 per acre foot.[225] The Commission found that this price did not account for anticipated increases in electricity costs, the costs of additional mitigation, and some other factors, and it estimated that actual costs would be approximately $1400 per acre foot. However, recent reports from the San Diego County Water Authority showed that actual costs of Poseidon's water in 2018/19 were $2,685 per acre foot and estimated that year 2019/2020 costs would be $2,817 per acre foot.[226] Although inflation and other factors have caused costs of water generally, and many other products, to increase over the past 14 years as well, this near-tripling of costs as compared with what Poseidon expected is significant, and the cost of desalinated water is significantly more than obtaining water savings through conservation or additional water through other sources. (See, e.g., MWDOC 2018 study, 2019 UCLA study.) This history also demonstrates that the costs of desalinated water have not decreased, as some desalination proponents claimed would occur, as the technology improves and the industry matures.

Beach access and subsistence fishing: EJ groups raised concerns about the seawater in front of the proposed desalination plant becoming polluted with brine discharge and creating a dead zone. They worry this would potentially impact underserved communities accessing the coast and subsistence fishermen. Community members also raised concerns for vulnerable populations such as children and youth who train to become junior lifeguards in station in close proximity to the project site. Staff explored these concerns further, and as described in Section II.M – Public Access and Recreation, concluded that the project's effects would be relatively minor or could be address through Special Conditions, if the project overall was consistent with the Coastal Act and LCP.

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[224] See https://www.xx.com/wp-content/uploads/2019/02/2018-FINAL-OC-Study-Report_Final-Report_02-01-2019-with-appendices.pdf. The study shows that the presence of Poseidon's 50 mgd water supply in the Orange County water system could result in even greater costs to local ratepayers during declared regional water shortages by MWD, as MWD would disproportionally reduce its lower cost supplies to Orange County during any supply cutbacks, making the area even more reliant on the more expensive Poseidon water.

[225] https://www.waterboards.ca.gov/sandiego/press_room/announcements/carlsbad_desalination/updates_4_30_09/tab%205.pdf

[226] https://www.sdcwa.org/sites/default/files/2016-12/Board/2019_Agendas/2019_09_26FormalBoardPacketSEC_0.pdf#page=41.

Jobs and secure water source: Staff also met with proponents that identified several project benefits, including additional jobs and a reliable, drought resilient supply of water. They believe the initial costs to ratepayers would be outweighed by these benefits. However, just as there is a lack of information about the identity of affected ratepayers because there is no water purchase agreement identifying who would get the water provided by the proposed project, there is no guarantee EJ communities would experience these benefits. EJ groups also point to a 2013 study by the Pacific Institute, arguing that that more permanent jobs would be created through local water conservation and recycling initiatives.[227] Furthermore, there is no guarantee that jobs would go to their community members or that water supply would be reliable. Factors such as sea level rise and seismic risk pose a threat to the long-term functionality of this facility and may also affect reliability of water produced compared to other alternatives. For example, the 2018 MWDOC study referenced above ranked Poseidon last in terms of system and supply reliability when compared with a variety of other, potential local water supply projects. As figure 1 showed, the location of Poseidon's plant is also in an area of relative wealth compared to inland areas of OCWD's service territory. Local benefits proposed by Poseidon may not be felt in areas that may be disproportionately impacted through potential water rate hikes.

Conclusion

The Coastal Commission's EJ Policy was created to introduce a greater level of fairness to a government process that has historically excluded underserved communities of color and low-income communities from participating in land use decisions that may cause disproportionate impacts to their households. The Policy also provides a framework for the Commission to evaluate and address the equitable distribution of project benefits and burdens. In this case, however, the lack of information limits the Commission's ability to fully consider all environmental justice impacts and engage all underserved communities that may be affected by the project. Although the Commission was unable to provide the kind of in-depth analysis it has provided with other projects, it is clear that a significant number of communities of concern could be impacted by the proposed project through potential water rate hikes. The extent of these impacts is unknown, but available evidence demonstrates that the proposed project would likely be significantly more expensive and less reliable than a variety of other potential water supply projects for the area. For these and other reasons outlined above, the Commission finds that the proposed project is not guaranteed to benefit environmental justice communities affected by the project, and if OCWD purchases the water, the project has the potential to disproportionately burden a greater number of low-income residential ratepayers in Orange County.

[227] Sustainable Water Jobs. 2013. Pacific Institute.

O. COASTAL-DEPENDENT INDUSTRIAL FACILITY OVERRIDE

Section 30260 of the Coastal Act states:

> Coastal-dependent industrial facilities shall be encouraged to locate or expand within existing sites and shall be permitted reasonable long-term growth where consistent with this division. However, where new or expanded coastal dependent industrial facilities cannot feasibly be accommodated consistent with other policies of this division, they may nonetheless be permitted in accordance with this section and Sections 30261 and 30262 if (1) alternative locations are infeasible or more environmentally damaging; (2) to do otherwise would adversely affect the public welfare; and (3) adverse environmental effects are mitigated to the maximum extent feasible.

Section 30101 of the Coastal Act and Section 216.04 of the City's Coastal Zoning Ordinance state:

> Coastal-dependent development or use" means any development or use which requires a site on, or adjacent to, the sea to be able to function at all.

Section 30101.3 of the Coastal Act states:

> Coastal-related development" means any use that is dependent on a coastal dependent development or use.

Section 30255 of the Coastal Act states:

> Coastal-dependent developments shall have priority over other developments on or near the shoreline. Except as provided elsewhere in this division, coastal-dependent developments shall not be sited in a wetland. When appropriate, coastal-related developments should be accommodated within reasonable proximity to the coastal-dependent uses they support.

The City of Huntington Beach LCP includes the following provisions:

LCP Policy C8.2.4 states:

> Accommodate coastal dependent energy facilities within the Coastal Zone consistent with Sections 30260 through 30264 of the Coastal Act.

LCP Policy C1.1.2 states:

> Coastal dependent developments shall have priority over other developments on or near the shoreline. Coastal-related developments should be accommodated within reasonable proximity of the coastal-dependent uses they support.

LCP Policy C7.2.6 states:

> Prohibit fill in any wetland areas for the purpose of road construction, except for roads allowed pursuant to Section 30233 of the Coast Act or when required to serve uses allowed in wetlands pursuant to and consistent with Sections 30260-30264 of the Coastal Act for coastal dependent and energy uses. Any roads governed by this policy shall be limited to necessary access roads appurtenant to the facility, and shall be permitted only where there is no feasible, less environmentally damaging alternative and where feasibility mitigation measures have been provided.

Coastal Zoning Ordinance Section 216.08 states, in relevant part:

> C. The following uses and structures may be permitted in the CC [Coastal Conservation] District subject to Planning Commission approval of a conditional use permit where there is no feasible, less environmentally damaging alternative and where feasible mitigation measures have been provided.
>
> . . .
>
> 10. In addition to the above uses, coastal dependent industrial facilities shall also be allowed even where inconsistent with other provisions of the certified Local Coastal Program if:
>
> a. To locate elsewhere is infeasible or causes greater environmental damage, and
>
> b. To do otherwise would adversely affect the public welfare, and
>
> c. Adverse environmental effects are mitigated to the maximum extent feasible, and
>
> d. Where findings consistent with Section 216.20 can be made.

Coastal Zoning Ordinance Section 216.20 states, in relevant part:

> B. Prior to coastal dependent industrial facilities being approved, the approving authority shall make the following findings with statement of facts:
>
> 1. Alternative locations are infeasible or more environmentally damaging.
>
> 2. To locate the construction or expansion elsewhere would adversely affect the public welfare.
>
> 3. Adverse environmental effects are mitigated to the maximum extent feasible consistent with Section 216.18.
>
> 4. Siting is consistent with the study titled Designation of Coastal Zone Areas Where Construction of an Electric Power Plant Would Prevent Achievement of the Objectives of the California Coastal Act of 1976 (readopted by the California Coastal Commission December 1985).

Analysis
As evaluated above, the Commission finds that the proposed project is fundamentally inconsistent with Coastal Act and/or LCP policies regarding marine life, geologic and coastal hazards, wetlands, and others. Nonetheless, Coastal Act Section 30260 allows the Commission to consider approval of a coastal-dependent industrial facility that is inconsistent with one or more Chapter 3 policies of the Coastal Act. This allows the Commission to consider overriding the policy inconsistencies related to the portion of the project in the Commission's original jurisdiction because—as explained below—that portion of the project is a coastal dependent industrial development.

The City of Huntington Beach's LCP also has some similar override policies based on Section 30260; however, they are different in a couple of relevant ways. LUP Policy C8.2.4 permits the approval of coastal dependent energy facilities using the Section 30260 override process, but it does not state that other types of coastal dependent industrial facilities may use that override. LUP Policy C7.2.6 permits the filling of wetlands for the construction of roads that are appurtenant to coastal dependent industrial or energy facilities, pursuant to Section 30260. Further, Coastal Zoning Ordinance Section 216.08, which governs development in the Coastal Conservation District zone, permits new or expanded energy and coastal dependent industrial facilities to be approved if the three tests of Section 30260 are met and, additionally, the site is consistent with the Commission's designation of certain areas as being inappropriate for power plant construction pursuant to Section 30413(b) of the Coastal Act.

These LUP policies permit an override only for coastal dependent energy facilities or for roads appurtenant to coastal dependent energy or industrial uses. Poseidon's project is not an energy facility, so Policy C8.2.4 does not apply. Policy C7.2.6 only permits the override to be used for roads appurtenant to coastal dependent industrial development, so would not permit the override to be used for the whole of the land-based portion of Poseidon's project. Last, the project site is not zoned for Coastal Conservation, so Coastal Zoning Ordinance Section 216.08 does not apply. Accordingly, the Commission may not use the 30260-type process to override the LCP inconsistencies and approve the portion of the project that is on appeal. Nevertheless, even if the LCP could be read to fully incorporate the Section 30260 process, the process still would not apply to the land-based portion of Poseidon's project because that aspect of the project is not coastal dependent. Further, even if it could be considered coastal dependent, the three tests of Section 30260 cannot be met. These issues are described below.

Coastal-Dependent Industrial Facility: The proposed project is considered an industrial facility for the purposes of the override provision. The Regional Board determined that the proposed project involved industrial processing subject to relevant sections of the state's Water Code and Ocean Plan and that it was also subject to U.S. EPA provisions relevant to industrial facilities.[228] Some of the Project components would be built within currently active industrial sites and would use similar equipment

[228] See the Regional Board's Order R8-2021-0011.

and methods as the other uses on those sites. The proposed project would be implemented by Poseidon, an entity that is considered part of the water industry. A court of appeal has also previously upheld the Commission's determination that an intake system—in that case a slant well—for a different desalination project was a coastal dependent industrial facility. Marina Coast Water Dist. v. California Coastal Comm'n (2016) 2016 WL 6267909, at *13. In addition, the Commission has previously found that an outfall pipeline that discharged saline brine from water treatment operations was a coastal-dependent industrial facility,[229] and in 2010 when it took the appeal of this project, it found that these intake and outfall pipes were coastal dependent industrial development. For these reasons, all of Poseidon's proposed project is considered an industrial facility for purposes of consideration of the override provisions.

The question of whether Poseidon's project is coastal dependent is less straightforward. The staff report for the Commission hearing on Poseidon's project in 2013 did not analyze whether the project was coastal dependent because the recommended findings stated that the project, with proposed mitigation, was fully consistent with the Coastal Act and LCP. Thus, it did not analyze the Section 30260 override issue or the subsidiary question of whether the project was coastal dependent. However, in its 2010 decision to accept the appeal of the City's CDP approval, the Commission found that the City's determination that the project was coastal dependent raised a substantial issue. The findings stated:

> "While the current proposed project would rely in part on existing coastal-dependent infrastructure – i.e., the intake and discharge of the power plant – the desalination facility itself would be located about a quarter-mile from the ocean, not "on or adjacent" to the ocean. Further, as evidenced by many desalination facilities that are similarly set back from the shoreline and by many inland desalters that draw brackish water from inland aquifers, desalination facilities do not necessarily require a location "on or adjacent" to the ocean. The City's findings do not make it clear that this particular project is coastal dependent. Therefore, based on the record provided by the City, the information provided by the appellants, and for the reasons cited above, the Commission finds that a substantial issue exists with respect to the project's consistency with the City's certified LCP."

The Coastal Act and LCP define the term "coastal-dependent" as "any development or use which requires a site on, or adjacent to, the sea to be able to function at all." The portion of Poseidon's project relating to the ocean intake and outfall are coastal dependent because they require a site on and adjacent to the sea in order to be able to pull in ocean water for the desalination plant and to send processed brine back to the sea, where it is diffused and mixed back into the ocean water. As described above, the Commission has previously found that these particular intake and outfall lines are coastal dependent and has also found that other brine discharge pipes are coastal dependent because ocean water is required for the dilution of salts being discharged from the pipe. Some commenters have questioned whether any part of the facility is

[229] See https://documents.coastal.ca.gov/reports/2008/11/Th21d-11-2008.pdf.

coastal dependent, arguing that there are project alternatives such as water conservation or a different water project that could adequately provide any needed potable water. However, these alternatives arguments do not go to the question of whether this type of facility is coastal dependent; rather they are only relevant to the analysis under Section 30260 of whether there are alternatives to the project and whether denial of the project would not harm the public welfare because alternative water sources are available.

Unlike the intake and outfall pipelines, the land-based desalination facility itself does not require a site on or adjacent to the ocean to function at all. In fact, the proposed facility site is not located on the open coast; rather, it is set back at least 1500 feet from it. Although it is located adjacent to a floodplain and tidally influenced wetlands, which are considered "coastal waters" under the LCP, it does not depend on or use those wetland areas at all. Many desalination facilities are located, or have been proposed, at inland locations where the source water is brackish water, groundwater, reclaimed water, or similar sources other than seawater. Even for facilities using seawater or brackish groundwater underlying the sea, the actual processing of that water does not depend on being adjacent to the ocean. In its review of potential alternatives for the Poseidon project, the Regional Board considered several sites that were not on or adjacent to the sea. Although it found the sites infeasible for other reasons, its analysis implicitly recognized that the proposed facility could be located some distance inland. As another example, the Cal-Am facility proposed in the City of Marina would have slant wells under the beach and ocean to pull in seawater and saline groundwater. The Commission previously found that one such well, which Cal-Am drilled as a test, was coastal dependent. However, the site of Cal-Am's proposed desalination facility itself is a significant distance inland and would be outside of the coastal zone, demonstrating that processing facilities do not need to be located on or adjacent to the sea to function. Similarly, many wastewater treatment plants rely on having an ocean outfall, which can be considered coastal-dependent, but the facilities themselves can be located some distance inland from the shoreline.[230]

Rather than being coastal-dependent, Poseidon's desalination facility would be considered "coastal-related," which Coastal Act Section 30101.3 defines as "any use that is dependent on a coastal dependent development or use." Pursuant to LCP Policy C1.1.2, "Coastal dependent developments shall have priority over other developments on or near the shoreline. Coastal-related developments should be accommodated within reasonable proximity of the coastal-dependent uses they support." This provision mirrors the Coastal Act's acknowledgment in Section 30255 that certain types of development may have components that are coastal dependent but related components that are not. In such cases, the coastal-related portion of the development should be accommodated within a reasonable distance of the coastal-dependent development, where feasible, but cannot take advantage of the Section 30260 override.

[230] See, for example, the Commission's approval of CDP 3-19-0463 to locate the City of Morro Bay's water reclamation and wastewater treatment facility about a mile inland from the shoreline.

Coastal Act Section 30001.2 supports this distinction as well. That provision describes why it is sometimes necessary to locate coastal dependent development along the coast, despite the fact that it may have significant adverse effects on coastal resources, and it lists examples of coastal dependent development, such as ports and commercial fishing facilities and offshore petroleum and gas development. However, the Commission has interpreted this provision and its reference to offshore oil and gas development as meaning that associated onshore oil and gas processing facilities are not coastal dependent because they do not require a site on or adjacent to the sea. In its decision on the Las Flores Canyon oil and gas processing facility in Santa Barbara County, the Commission found that the pipelines providing oil and gas from offshore platforms were coastal dependent but that the facility used to process the oil and gas was coastal related, rather than coastal dependent. This resulted in allowing coastal dependent pipelines to traverse the coastal zone but siting the onshore processing facility inland of the coastal zone. See CD 64-87 & E-88-1.

Carefully distinguishing between coastal dependent and coastal related development carries out the Coastal Act and LCP policies that acknowledge the need for coastal related development but do not give it as high of a priority as coastal dependent development. Unlike some coastal-dependent developments, which may be approved despite Coastal Act or LCP inconsistencies pursuant to Section 30260, coastal-related development must be fully consistent with relevant Coastal Act and LCP policies. The fact that the land-based portions of Poseidon's desalination facility are not coastal dependent does not mean that they could never be permitted on the proposed site. Rather, it simply means that they would need to be fully consistent with all LCP policies in order to be approved. Because Poseidon's onshore facility does not need a site on or adjacent to the ocean to function, the Commission could not use the LCP's override section to approve it even if the override section was written or interpreted differently to permit an override for coastal dependent industrial uses.

Application of Section 30260: Coastal Act Section 30260 provides for special consideration of coastal-dependent industrial facilities that would otherwise be unapprovable due to inconsistencies with the Act's Chapter 3 coastal resource protection policies. Section 30260 allows the Commission to approve such projects, notwithstanding the project's inconsistencies with those other policies, if they meet a three-part test: 1) if alternative locations are infeasible or more environmentally damaging; 2) to do otherwise would adversely affect the public welfare; and 3) if adverse effects are mitigated to the maximum extent feasible. Here, Section 30260 applies to the portion of the project in the Commission's original jurisdiction and the inconsistencies of that project component with the Coastal Act (related to marine resources). However, there would be little purpose in considering overriding that policy inconsistency and approving only this portion of the project. Thus, to provide a full analysis of the benefits and drawbacks of the project as a whole, this section assumes that the facts and LCP interpretation are different and that the onshore portions of Poseidon's facility are also subject to a similar 30260-style override.

Application of the Section 30260 override provision is discretionary: it allows the Commission to approve a project that meets the three statutory criteria, but it does not require the Commission to do so. Similarly, the Commission need not find that a coastal-dependent industrial project fails to meet the three criteria in order to deny it, although such findings could support a denial. If, however, the Commission finds that any of the three tests are not met, then it may not approve the Project. The three tests of Section 30260 are applied below.

Test 1 – Alternative Locations are Infeasible or More Environmentally Damaging:

The first test of Section 30260 allows the Commission to approve a project that is otherwise inconsistent with Coastal Act policies if it finds that alternative locations are infeasible or more environmentally damaging. Here, the City of Huntington Beach looked at potential alternative sites in and near the City as part of its 2010 CEQA review. It identified a number of sites of sufficient size in the area, though noted constraints with many of them. In the end, the City dismissed the alternative sites because they would not address the only unavoidable, significant impact that the City had identified for the project, related primarily to short-term air quality impacts from construction. It did not consider alternative sites that would address sea level rise, flooding, or other hazards. For its part, the Regional Board considered a range of nearby sites, including five sites that might allow for subsurface or surface intakes, have different brine disposal options, and address issues related to proximity to biological and marine resources and sensitive species. It concluded that the proposed location is the best feasible site and that the other potential sites would have a range of issues and impacts related to land use designations, sensitive habitat, infeasibility of intake structures, and other constraints that made them less feasible than the proposed site. (See Regional Board Staff Report Attachment G.1—Narrowing of Sites.) It did not consider alternative sites that might support a smaller facility.

Based on the information previously provided through other agencies' review processes, alternative locations for a desalination plant of this size have been found to be infeasible. However, some of this information is more than 10 years old (e.g., the City's 2010 EIR analysis of alternatives), so the analyses of some issues such as land use constraints may be out of date. In addition, those alternatives analyses did not analyze the relative benefits and drawbacks of those sites with regard to environmental issues pertinent to the Coastal Act—such as sea level rise and flooding hazards.

In addition, the Municipal Water District of Orange County ("MWDOC") completed an Orange County Water Reliability Study in 2019 that identified several different types of projects at other locations that, individually or collectively, would provide more water than Poseidon's project and would all provide that water at less cost and with greater reliability.[231] The study also found that the "reliability gap," or the expected shortfall in water supply that might be needed under several future dry-year and drought scenarios was much smaller than the supply that Poseidon would provide. It also noted that integrating Poseidon's supply into the regional water systems would result in greater

[231] See MWDOC, 2018 Orange County Water Reliability Study, published February 2019.

integration costs than the other supplies, and that the main benefits of Poseidon's proposed water production volumes would occur only if climate change was more intense than the most extreme scenario evaluated in the study. As noted above, these more extreme scenarios would also result in even greater hazards to Poseidon's site and surrounding area than described in these Findings. Importantly, these other water supply projects described in the study would have few, if any adverse effects on coastal resources, unlike the significant adverse effects identified above that would result from Poseidon's proposal.

Accordingly, it is not clear whether alternative locations are infeasible or more environmentally damaging within the meaning of Coastal Act Section 30260. Current evidence does not clearly demonstrate that alternative locations are infeasible, and more information would be needed before the Commission could make this finding under Section 30260. However, because the project cannot meet the other two tests of Section 30260, there is no need to further analyze or definitively answer this question.

Test 2 – To not permit the development would adversely affect public welfare: Section 30260's second test provides that coastal-dependent industrial development may be permitted if to do otherwise (i.e., to deny the proposal) would adversely affect the public welfare. The Commission acknowledges the need for the Orange County region to develop additional, reliable water sources to serve its growing population and address possible reductions in imported water over the coming decades. When the project was first proposed nearly 25 years ago, there were also benefits to co-locating a desalination facility with the adjacent power plant. Specifically, the power plants' use of the seawater had already killed the marine life drawn into the intake, so using the same water for desalination would not result in additional marine life mortality. The higher temperature of the power plant discharge would also allow the desalination facility's reverse osmosis membranes to operate more efficiently. Finally, the power plants' use of seawater would provide sufficient water to dilute the desalination plants' high-salinity discharge, thereby reducing effects on the marine environment. However, since the time of Poseidon's original proposal, there have been significant policy changes, including the phasing out of once-through cooling at coastal power plants, which have eliminated most of the above benefits. In addition, there is a greater understanding of the seismic, tsunami, and sea level rise hazards at the proposed project site, which offsets any benefits of co-locating at the power plant site.

Desalination of both brackish waters and seawater will likely have a key role to play in providing a new, drought-proof water supply for the region. However, as described in the Findings on Environmental Justice, all of which are incorporated here by reference, it is not clear that this proposed project would benefit the surrounding populations in terms of providing more reliable or higher quality water. Rather, reports such as the 2019 UCLA study titled "Analyzing Southern California Supply Investments from a Human Right to Water Perspective" found that the project's main effect would be to raise rates for area customers. That report supports the idea that the public welfare would not be harmed by denying this project; rather, it determined that a more effective approach to obtaining needed water would be to pursue conservation and alternative

local water supplies. This conclusion is also supported by the above-referenced 2019 MWDOC study that found Poseidon's project would provide lower reliability at higher costs than about six other local or regional potential water supply projects. More recently, an April 2022 study conducted by the Pacific Institute identifies opportunities for the South Coast hydrologic region (which includes Orange County) to use efficiency, reuse, and conservation measures to reduce water demand by 30 to 48% (which would essentially represent a supply increase).[232] California is also considering updating its goals and incentives to reduce per capita water use, which would free up additional supplies. Any of these options would provide more water to the Orange County service area than Poseidon would supply, and all would be at lower cost than Poseidon. Poseidon and others have argued that the project's water is needed. Although Poseidon does not yet have a confirmed buyer for its proposed water, it does have a non-binding term sheet with OCWD, whose publicly stated interest in this water served as the basis for the Water Board to make its required "need" determination pursuant to the Ocean Plan's Desalination Amendment Section III.M.2b.(2). That provision requires the Board to consider whether the proposed volume of desalinated water to be produced through an open, screened intake, such as Poseidon's, is consistent with an identified need in an applicable water management planning document. A main purpose of the "need" finding is to ensure that a project proponent does not use an inflated demand for water to justify its inability to use subsurface intakes, which can be more expensive but also have far fewer impacts on marine resources.

As described by the Water Board in its findings, its determination that the water was "needed" was not a determination that the water was critical or immediately necessary or that it was the only available new water source. Rather, the Regional Board noted that it was not a water planning agency, and it viewed the concept of need broadly, deferring to various water agencies that see a general need to develop new, local, drought-proof water supplies over the coming years and view this project as one possible way to obtain such water. This is supported by OCWD's stated interest in possibly purchasing Poseidon's water to replace, rather than augment, existing supplies that OCWD currently purchases through MWDOC from the Metropolitan Water District.

Like the Regional Board, the Commission is not a water planning agency, and it is not the Commission's role to decide how much water the region needs or how it should obtain that water. However, the Commission does have the authority and duty to review proposed water-related development projects for Coastal Act and LCP consistency. In cases like this, it also has the duty to determine whether denial of coastal-dependent water projects that fail to meet coastal protection standards should nevertheless be approved because denying them would harm the public welfare.

Here, denial of Poseidon's project will not adversely affect the public welfare by creating a water shortage or causing public hardship in terms of requiring water cutbacks or creating higher rates. On the contrary, various studies have found that Poseidon's

[232] See Cooley, et. al, The Untapped Potential of California's Urban Water Supply: Water Efficiency, Water Reuse, and Stormwater Capture, Pacific Institute, April 2022.

project would raise water users' rates and that there are a variety of other water projects that could fulfil Orange County's modest growth in water needs in a more cost effective, reliable, and less environmentally damaging manner.[233] Since the late 1990's when Poseidon first proposed this project, Orange County water demand has remained relatively flat and is actually lower today than it was in 1990, despite a significant increase in population.[234] MWDOC projects that water demand will increase by only about 3% (15,000 acre-feet per year) between 2025 and 2045. Although the region may wish or eventually need to reduce its reliance on imported water from the Colorado River and elsewhere, in its 2021 Urban Water Management Plan, MWDOC concluded that the region would reliably meet predicted water demand for the next 25 years, including the extreme planning for five consecutive years of drought, without inclusion of the proposed Poseidon project. While some water agencies have identified potential benefits of the Poseidon project in terms of reducing reliance on imported water and providing a drought-proof water supply, it is clear that denial of the current version of this project will not harm the public welfare by precluding the region from obtaining needed water.

Rather than harming the public welfare, denying Poseidon's project would benefit the public welfare in a number of ways. It would avoid having an expensive public-serving infrastructure project constructed in an area subject to so many coastal hazards, where the project could be damaged or become more expensive or difficult to operate. Without Poseidon's site to protect for the next 60 years, the City would have more options to ensure that the entire region is more resilient to sea level rise and coastal hazards. Denial would allow the existing power plant's open ocean intake to be phased out, rather than allowing it to be used for another 50 or more years, with resultant, continued, significant loss of marine life. This issue is particularly important given that Poseidon has not yet identified feasible mitigation measures that could address those impacts. It would also avoid having utility customers pay for one of the most expensive water supply options and would likely lead to the approval of other, less expensive and less energy-intensive water supply projects. For all of these reasons, the second prong of Section 30260 has not been met.

Test 3 – Adverse environmental effects are mitigated to the maximum extent feasible: This third test of Section 30260 requires that the proposed project's adverse environmental effects be mitigated to the maximum extent feasible. As noted in the Findings above, Poseidon's adverse coastal effects have not been mitigated to the maximum extent feasible, and significantly more mitigation needs to be developed and imposed to address the proposed project's impacts related to marine resources, wetlands/ESHA, and hazards. This prong of Section 30260 has not been met.

[233] As noted previously, MWDOC's 2019 Reliability Study identified six projects that could provide the necessary annual water supply with greater reliability and at less cost than Poseidon's.

[234] See, for example, Table 4-1 at: https://www.mwdoc.com/wp-content/uploads/2021/06/MWDOC-2020-UWMP_2021.06.02.pdf.

Conclusion

The project does not meet the three tests for an override under Section 30260. Denying the project and declining to make the override findings does not mean that Poseidon's project is unapprovable. Rather, it simply means that Poseidon's project would need to fully conform with Coastal Act and LCP policies before it could be approved; for example, by having Poseidon propose adequate marine life mitigation, adequately address impacts to adjacent wetlands/ESHA, and locate the project at a site that is not subject to fewer coastal hazards and where surrounding infrastructure can support it over its lifetime.

P. VIOLATION

Violations of the Coastal Act and/or Huntington Beach LCP exist on the subject property including, but not limited to, unpermitted clearing of vegetation, disking, grading, and draining of surface waters, all resulting in disturbance/destruction of approximately 3.5 acres of wetland habitat. These violations took place between 2009 and 2012 on the out-of-service tank farm portion of the AES Huntington Beach Power Plant, which is the site of the proposed Poseidon Water desalination plant. The presence of wetlands on the site has been determined by the Commission's senior ecologist through site visits, photographic evidence, and forensic examination of Wetland Data Sheets included in the Final SEIR for the site. The Coastal Commission, in its August 2016 report to the CEC pursuant to Coastal Act Section 30413(d), confirmed that there were Commission-jurisdictional wetlands within the proposed project footprint. In 2014, the Commission's enforcement division sent a notice of violation regarding these violations, directing AES to cease any and all unpermitted development on the site, and advising AES and Poseidon that mitigation and/or restoration may be required to resolve the violations.

This pending application does not propose resolution of the violations, or mitigation for wetland loss resulting from the violations; thus, violations remain on the subject property that would not be resolved even if the Commission were to approve the application as it is currently proposed by the applicant. Resolution of the violations will require, among other things, mitigation for interim and any future wetland loss/function and other measures including resolution of liability for penalties.

Although development has taken place prior to submission of this permit application, consideration of this application by the Commission has been based solely upon Chapter 3 policies of the Coastal Act and the City of Huntington Beach LCP. Commission review and action on this permit does not constitute a waiver of any legal action with regard to the alleged violations, nor does it constitute an implied statement of the Commission's position regarding the legality of development, other than the development addressed herein, undertaken on the subject site without a coastal permit. Accordingly, the applicant and/or property owner remains subject to enforcement action just as it was prior to this permit action for unpermitted development that resulted in the disturbance/destruction of wetlands.

III.CALIFORNIA ENVIRONMENTAL QUALITY ACT

Section 13096(a) of the Commission's administrative regulations requires that Commission approval of a Coastal Development Permit application be supported by a finding showing that the application, as conditioned by any conditions of approval, is consistent with any applicable requirements of the California Environmental Quality Act (CEQA). Section 21080.5(d)(2)(A) of CEQA prohibits a proposed development from being approved if there are feasible alternatives or feasible mitigation measures available which would substantially lessen any significant adverse effect that the activity may have on the environment. In addition, CEQA Guidelines Section 15042 states that "[a] Responsible Agency may refuse to approve a project in order to avoid direct or indirect environmental effects of that part of the project which the Responsible Agency would be called on to carry out or approve."

The City of Huntington Beach, as lead agency under the California Environmental Quality Act (CEQA), prepared and certified a Final EIR for the project in 2005 and a Subsequent EIR in 2010. In addition, the California State Lands Commission certified a Supplemental EIR in 2017. The Coastal Commission, acting as a responsible agency pursuant to CEQA, has reviewed and considered the information contained in the Final EIR, Subsequent EIR and Supplemental EIR on the project. The findings in the staff report also address and respond to issues pertaining to significant adverse environmental effects that were raised in public comments received prior to preparation of the staff report.

The Commission incorporates its findings on inconsistency with the Coastal Act and City's certified LCP at this point as if set forth in full. As discussed above, the proposed development is inconsistent with various, applicable policies of the certified LCP and Coastal Act and is denied on that basis. As an additional and independent basis for denial, the Commission denies the proposed project under CEQA in order to avoid the environmental effects that Poseidon's project would have within the coastal zone, including the effects to marine life and environmentally sensitive habitat and the other impacts described in this report.

In addition, Section 21080(b)(5) of CEQA, as implemented by section 15270 of the CEQA Guidelines, provides that CEQA does not apply to projects that a public agency rejects or disapproves. Accordingly, the Commission's denial of this project represents an action to which CEQA, and all requirements contained therein that might otherwise apply to regulatory actions by the Commission, does not apply.