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Scott Maloni
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5780 Fleet Street, Suite 140
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Via email: smaloni@poseidon1.com and swilliams@poseidonwater.com

RE: Coastal Commission Staff Comments on Poseidon's January 2017 draft *Sea Level Rise Hazard Assessment*

Dear Mr. Maloni and Mr. Williams:

Thank you for the opportunity to review and discuss with you Poseidon's January 2017 draft *Sea Level Rise Hazard Analysis* report. We are providing the following comments and recommendations below for you to consider incorporating into a revised report:

1. The draft report states that its analyses are meant to determine the proposed project's conformity to Coastal Act Section 30253 and the Coastal Commission's August 2015 *Sea Level Rise Policy Guidance*. Because the Commission will also be reviewing the project under appeal for conformity to the City of Huntington Beach Local Coastal Program ("LCP"), please revise the report to additionally describe the proposed project's conformity to relevant LCP provisions that address hazards (see Attachment 1 – Primary City of Huntington Beach LCP Policies relevant to Poseidon's Draft Hazards Assessment Report).
2. We also recommend that the report be revised to incorporate more recent findings related to projected sea level rise, including the National Oceanic and Atmospheric Administration's January 2017 *Global and Regional Sea Level Rise Scenarios for the United States*, which describes plausible sea level rise scenarios that are significantly higher than those currently referenced in Poseidon's report. Additionally, and as we discussed, we recommend a revised report incorporate relevant provisions of the updated guidance we expect soon from the California Ocean Protection Council.
3. The report states that the project as currently proposed may be subject to several potential design or layout modifications, including some unspecified "additional structural design measures." For example, it states that the finished grade of project components are likely to range from 10 to 14 feet above mean sea level but that exact elevations will be determined during final design. Because those final elevations will affect the project's hazards assessments and possibly other aspects of the project's LCP conformity, please

consider those elevations in a revised sea level rise assessment report. Further, any potential changes to the project's water treatment components, changes in chemical storage and use, and any other anticipated project design changes should be incorporated and considered in a revised sea level rise hazard assessment.

4. The report does not appear to comprehensively evaluate various hazards associated with sea level rise, such as increased storm wave heights, increased storm energy, etc. For example, while the report cites preliminary CoSMos 3.0 results, it does not include or evaluate the full range of the CoSMos 3.0 findings, such as increased wave uprush heights resulting from stronger coastal storms, changes in shoreline infrastructure (such as beach nourishment practices) that would change the expected hazards to shoreline development, etc. Please fully incorporate the final CoSMos 3.0 examination of scenarios when they are available later in 2017.

Additionally, the report is largely focused on separately evaluating individual hazards – e.g., assessing the project's exposure to fluvial flooding, then assessing the project's exposure to "King Tides," etc. We recommend that these analyses be integrated where possible, at least for those hazards when during the project's expected operating life it will most likely be exposed concurrently to more than one hazard – e.g., "King Tides" and coastal storms occurring simultaneously. With regard to the "King Tides" scenario, the tides that are mentioned in the draft report are the 1-year return period tides. There is no formal recognition of King Tides or how King Tides relate to the Highest Observed Water Level. Nevertheless, the tidal conditions that have been given the name "King Tides" exceed the 6.8 NAVD elevation developed from the 1-year return period tides. If the water levels used in the King Tide Flood Hazard Maps are actually the 1-year return period tides, the report is under-estimating the risk from current and future King Tides.

5. We concur with the report basing its sea level rise scenarios on a range of expected elevation increases than tying those expected increases to particular future dates – e.g., instead of specifying an increase expected by a certain date, the report acknowledges the project site could experience a range of increased elevations at times during its proposed operating life. We recommend the revised report follow this scenario-based approach. We also recommend that the revised report remove references to 2070 or 2100 water levels and instead discuss hazards in terms of the modeled water levels or use the modeled water levels with the possible year of exceedance included with the sea level rise amount. In addition to the report's recognition that there could be future flooding of the site under certain sea level rise conditions, we recommend the revised report better characterize those exceedance conditions. For example, at present, the report notes that they will be infrequent or of short duration – does this mean site flooding of a few inches of water for 2 or 3 hours once a year, or flooding of a foot or more of water during winter high tides over a 3-month period? Some general ranges will help put these short duration events into perspective.

6. We understand that the majority of the water Poseidon expects to produce is likely to be purchased by the Orange County Water District ("OCWD") for injection into the groundwater basin beneath Huntington Beach and that Poseidon will likely need to modify its treatment processes to improve its product water quality to a level that will not result in degradation of basin water quality. A revised report should describe what modifications Poseidon will include in its proposed project to provide the additional treatment needed to ensure Poseidon's water does not degrade water quality in the basin. For example, if Poseidon needs to reduce the Total Dissolved Solids ("TDS") or boron concentrations in its product water, the report should describe what treatment methods Poseidon would use – e.g., "second pass" reverse osmosis, ion exchange, additional pH adjustment, etc. – and what project modifications would be needed – e.g., additional structures on site, larger reverse osmosis facility, additional chemical storage and use, etc. Please also clarify whether the proposed injection of Poseidon's water into the groundwater basin would modify other project components. Additionally, prior distribution proposals involved direct use by nearby water districts and relied in part on a proposed storage tank/reservoir at the northwest corner of the project site. Please identify whether this tank/reservoir will be downsized, relocated, or otherwise modified as part of the current distribution proposal, and modify the revised report's coastal hazards analyses accordingly.

7. The report acknowledges that the proposed project would be within an area designated by the City as susceptible to tsunamis and flooding. The LCP's Coastal Element Hazards Section C 10.1.19 requires that development in a tsunami-susceptible area be sites and designed to minimize the hazard and be prohibited from using shoreline protective devices. Section C 10.1.14 requires that development proposed in flood-prone areas avoid the use of protective devices, avoid encroachment into the floodplain, and remove encroachments into the floodplain to the extent feasible. The City's Zoning Code for Coastal Development Permits, at Title 24, Section 245.08(C), describes "shoreline protective devices" as including sea wall revetments, bluff retaining walls, breakwaters, groins, culverts, outfalls, similar shoreline work that involves pilings and other surface and subsurface structures, rip-rap, artificial berms of sand, or any other form of solid material, on a beach or in coastal waters, streams, wetlands, estuaries, or on shoreline protective works. 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."

As currently sited and designed, the proposed project would be located above and adjacent to "coastal waters" as defined by the LCP, as it would border the adjoining Magnolia and Upper Magnolia Marsh, which are wetlands subject to tidal action, and would be located above the site's underlying tidally-influenced groundwater. The project site is currently surrounded by an exterior berm that Poseidon plans to rely on to provide structural support for the facility and for the fill to be placed below the facility. This berm was built in the 1950s to contain spills from the now-retired fuel oil storage tanks that Poseidon plans to remove to allow facility construction. The exterior base of the berm is about five to six feet above mean sea level and extends into the adjacent tidal wetlands as well as the surrounding floodplain. The report states (at Section 1.3, page 4)

that Poseidon may remove some interior and exterior berms from the project site, though it does not specify what changes would be made to the berms or to the site grading. We recommend the revised report include a detailed description of these proposed modifications.

It is also not clear that the existing exterior berm is structurally competent to support the proposed fill and facility, as it consists of earthen fill with a concrete "skin" and was constructed to contain spills, not to provide structural support. The revised report should identify how Poseidon proposes to modify the berm to provide the necessary level of support and how those proposed modifications will not result in a shoreline protective device, pursuant to LCP requirements. Similarly, the report should identify how Poseidon can remove encroachments into the floodplain to the extent feasible, as required by the LCP. These same recommendations apply to other components of Poseidon's current proposal, including the proposed construction of subsurface pilings, stone columns, and unspecified "additional structural design measures." For each of these, the revised report should identify how they will be designed and sited so as not to serve as shoreline protective devices, both currently and during the project's expected operating life, and how they would allow for removal of existing encroachments into the floodplain.

8. The proposed 50-60 year project would be subject to a number of hazards related to flooding, tsunami, seismic events, sea level rise, etc. While Poseidon can partially address some of these hazards through onsite project design elements such as grading and structural improvements, the project would also rely heavily on existing public infrastructure for protection from these hazards during the project's proposed operating life. Although the report identifies some of the infrastructure and whether they will need to be modified, we recommend the report be revised to address the following:
 - a) The proposed project would rely on existing roadways and bridges to provide access to the facility; however, even relatively small increases in sea level elevations will result in several of these nearby roads and bridges needing to be elevated or relocated. Please describe what infrastructure changes would be needed to provide ongoing access during the life of the project in the face of expected sea level rise and higher flooding events. For example, please identify the water elevations that would flood existing roads and bridges and identify whether the roads and bridges need to be elevated or relocated in the face of these higher water levels.
 - b) The report states that the adjacent Huntington Beach Flood Control Channel is expected to protect the project site from 100-year floods even with sea level rise of up to about five feet. It appears, though, that the report does not adequately evaluate sea level rise-related risks to the Channel and does not identify infrastructure modifications likely to be needed under even lower sea level rise scenarios. For example, under a number of scenarios expected during the life of the project, the Channel mouth may be blocked or impeded due to sand transport along the beach, higher storm waves, or other phenomena resulting from sea level rise, which would prevent it from adequately conveying flood waters away from the facility site. Similarly, bridges over the Channel, including the two nearby bridges on Newland

and Magnolia Streets used to access the facility, will likely need to be elevated so as not to impede flood conveyance. While the report cites a 2014 assessment as the basis for its conclusion that the Channel will adequately convey a 100-year flood even with five feet of sea level rise, that assessment did not account for the higher flood water elevations that would result from flood waters being obstructed due to low bridge crossing elevations.¹ Importantly, the report does not appear to acknowledge that the Channel may not provide the anticipated level of protection because a section of the Channel's levee close to Poseidon's project site along the Magnolia Marsh was removed several years ago to allow tidal flows into the Marsh. As a result, tidal and flood flows are likely to directly reach the base of the project site's exterior berm. We recommend the revised report more fully describe what modifications will be needed to maintain the protections provided by the flood channel in the face of increasing sea level and its associated higher water and increased storm events.

- c) This area of Huntington Beach relies on an extensive system of stormwater pumps and conveyance structures to reduce the area's frequent flooding. The City's 2014 *Vulnerability Assessment* acknowledges that even a relatively low 1.0-foot increase in sea level could affect performance of this system and that further evaluation is needed to determine what changes are needed for the system to handle sea level rise. We recommend the revised report describe what additional stormwater infrastructure would be needed to allow ongoing access to the project site and to provide adequate protection to the facility under expected flooding and sea level rise scenarios during the life of the project.

9. The LCP's Environmental Hazards Program I-EH-4 states, in relevant part:

*During development review... and/or environmental review, require: ...
g. that proposed projects located in the tsunami hazard areas (Figure EH-9): Are designed to minimize beach/bluff erosion and the need for sand replenishment along city beaches...*

Poseidon's report states that the project would be protected from coastal storms and flooding in part by the existing wide beaches near the project site. It assumes that the existing levels of beach nourishment needed to support those beach widths will continue for the life of the project, and cites the above-referenced 2014 Moffat & Nichol report and the preliminary results of the CoSMos 3.0 modeling work conducted by USGS and others, both of which assume that the existing beach nourishment program will continue to protect the beaches.²

¹ See Moffat & Nichol, *City of Huntington Beach Sea Level Rise Vulnerability Assessment*, December 2014. This report states (at pages 30 and 73, for example) that it did not account for bridge crossings over the flood channel and that its model results may underestimate water surface elevations along the channel.

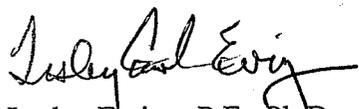
² For example, the Moffat & Nichol report (at page 34) assumes that "the federal beach nourishment project will continue to provide sand to the shoreline and possibly be augmented to meet increased demand."

However, we note that the conclusions Poseidon reaches in this report conflict with those reached in the 2015 report by the Poseidon/Coastal Commission Independent Science and Technical Advisory Panel (“ISTAP”), which found that beach galleries would be infeasible near the project site in part due to the uncertainty about the availability and effectiveness of ongoing beach nourishment. Additionally, and given the expected climate change-related increases in storm and wave energy and the uncertainty of funding for the beach nourishment program, it is not clear whether the existing level of beach nourishment is sufficient to provide continued protection and it is not clear how much additional beach nourishment would be needed or available to provide the greater level of protection likely necessary under future conditions.³ We therefore recommend the revised report either evaluate hazards assuming beach nourishment does not continue, or that it identify how much beach nourishment would be needed to provide adequate protection for Poseidon’s facility from current and future levels of these coastal hazards.

We also recommend the revised report incorporate the full results of CoSMos 3.0 modeling, which are expected to be published shortly and will identify the expected risks from coastal hazards both with and without the protections provided by ongoing beach nourishment and the presence of existing infrastructure. These full results are likely to provide a better basis to assess the hazards to Poseidon’s facility if beach nourishment does not continue or does not keep up with the increased storm and wave energy expected over the life of the project.

Again, thank you for the opportunity to review this draft report. We are happy to discuss any of these comments further and answer any questions you may have about how best to incorporate our recommendations into the revised report.

Sincerely,


Lesley Ewing, P.E., Ph.D.
Coastal Engineer


Tom Luster
Senior Environmental Scientist

Attachment 1 – Primary City of Huntington Beach LCP Policies relevant to Poseidon’s Draft Hazards Assessment Report

cc: City of Huntington Beach, Planning Department – Ricky Ramos
Santa Ana Regional Water Quality Control Board – Milasol Gaslan
State Lands Commission – Cy Oggins
Coastal Commission – Meg Vaughn

³ See, for example, Barnard et. al, *Extreme oceanographic forcing and coastal response due to the 2015-2016 El Nino*, in Nature Communications, February 2017, which describes recent “extreme” coastal erosion rates and discusses the potential that climate change will further reduce coastal sediment supplies and thereby further increase coastal erosion rates.

ATTACHMENT 1

Primary City of Huntington Beach LCP Policies relevant to Poseidon's Draft Hazards Assessment Report

[Note: these do not include all LCP policies relevant to seismic/geologic hazards]

LCP Policy I-C.20, Environmental Hazards Element, states:

Enforce and implement the policies and programs of the Environmental Hazards Element of the General Plan to the extent that these programs and policies are not inconsistent with the City's Local Coastal Program.

The relevant and applicable policies and programs of the above-cited Environmental Hazards Element are listed below. Figures in parentheses at the end of each Environmental Hazards Policy refer to the Implementation Program applicable to each Policy.

Environmental Hazards Policy 1.1.4 states: *Evaluate the levels of risk based on the nature of the hazards and assess acceptable risk based on the human, property, and social structure damage compared to the cost of corrective measures to mitigate or prevent damage. (I-EH 3 and I-EH 4)*

Environmental Hazards Policy 5.1.1 states: *Identify tsunami and seiche susceptible areas, 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 (see Figure EH-8). (I-EH 1 and I-EH 4)*

Environmental Hazards Program I-EH 4, Development Review or Environmental Review Process, states: *During development review (site plan, tract map, etc.) and/or environmental review, require:*

- a. *building structures proposed in liquefaction, unstable soil/slope conditions, flood prone areas, high water tables, peat or other geologic hazards prone areas to determine potential problems and to require mitigation measures;*
- b. *a potential seismic/geologic damage assessment to be conducted for essential public utilities (gas, water, electricity, communications, sewer) and require that appropriate mitigation measures be incorporated;*
- c. *critical or sensitive facilities and uses to be located in areas where utility services and continuous road access can be maintained in the event of an earthquake;*
- ...
- f. *that proposed critical, essential, and high-occupancy facilities be subject to seismic review, including detailed site investigations for faulting, liquefaction, ground motion characteristics, and slope stability, and application of the most current professional standards for seismic design;*

- g. *that proposed projects located in the tsunami hazard areas (Figure EH-9):*
- *are designed to minimize beach/bluff erosion and the need for sand replenishment along city beaches; and*
 - *consider design options which reduce the potential for damage to private property and threats to public safety, i.e., raised foundations, ground floor parking with upper level uses.*

LCP Policy C1.1 states:

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

LCP Policy C1.1.1 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 Coastal Element Hazards Section 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: (I-C 7, I-C 8)

- 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 Coastal Element Hazards Section C10.1.19 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.