Supporting Document 4

Proposed Backup Site – Poseidon Resources Wetland Mitigation

California Coastal Commission (CCC) staff has requested that Poseidon Resources (Poseidon) present a recommendation for a primary and secondary or back-up site for their mitigation requirements as specified in the Marine Life Mitigation Plan (MLMP) approved August 2008. Previously, Poseidon recommended the Otay River Floodplain Subarea of the South San Diego Bay Unit of the San Diego Bay National Wildlife Refuge as the primary choice for conducting the required mitigation. Poseidon proposes that Tijuana Estuary be considered as the secondary or back-up site for mitigation.

Project Location. Tijuana Estuary is located in the southwestern corner of the U.S. in San Diego County (see Figure 2-1).

Rationale for Selection as Back-up Site. Tijuana Estuary may serve as Poseidon's back-up site in the event that restoration of the Otay River Floodplain is determined to be infeasible. Tijuana Estuary was ranked second highest, after the Otay River Floodplain site, in terms of mitigation potential in a comparison of seven north San Diego County sites, Tijuana Estuary and the Otay River Floodplain (Nordby Biological Consulting (January 2011); Dr. Michael Josselyn (January 17, 2011).

This analysis was conducted for Poseidon to respond to the CCC staff's request to assess potential mitigation sites (Nordby Biological Consulting January 2011 Exhibit A). This analysis compared the ability of each wetland site to meet the minimum standards and objectives for mitigation developed by CCC staff. All north San Diego County sites failed to meet the minimum standards and objectives. Tijuana Estuary met all of the minimum standards and all but two of the objectives. Key standards and objectives that served to differentiate Tijuana Estuary from north San Diego County sites included:

- Potential for restoration as tidal wetland, with extensive intertidal and subtidal areas;
- Potential to provide for substantial fish benefits;
- Creates or substantially restores a minimum of 37 acres and up to at least 66 acres of habitat similar to the affected habitats in Agua Hedionda Lagoon, excluding buffer zone and upland transition area;
- Provides a buffer zone of a size adequate to ensure protection of wetland values, and at least 100 feet wide, as measured from the upland edge of the transition area.

Existing Restoration Plan for Back-up Site. In 2004, the California State Coastal Conservancy funded a study of large-scale restoration of Tijuana Estuary. Completed in 2007, the Tijuana Estuary – Friendship Marsh Restoration Feasibility and Design Study (Feasibility and Design Study; Tierra Environmental Services 2007) identified seven site-specific restoration goals including:

- Increase tidal prism;

- Restore areas of former salt marsh, tidal channel and mudflat affected by sedimentation to the maximum extent possible;
- Restore barrier beach and dunes;
- Increase habitat for endangered species;
- Increase area of undisturbed transition zone;
- Incorporate a berm to prevent sudden loss of restored habitat from flood event; and,
- Incorporate research and adaptive management.

Several of these site-specific goals are relevant to CCC standards and objectives, including:

- Restore areas of former salt marsh, tidal channel and mudflat,
- Increase habitat for endangered species;
- Increase area of undisturbed transition zone;

The Feasibility and Design Study identified a preferred restoration alternative comprised of approximately 250 acres located in the south arm of the estuary (see Figure 4-2 of the Feasibility and Design Study). The 250-acre preferred alternative is located on lands owned by California State Parks (CSP) and the U.S. Fish and Wildlife Service (USFWS). The southern arm of the estuary has been impacted by sedimentation from Mexico over the last several decades resulting in loss and degradation of once functional tidal wetlands. Poseidon has initiated informal discussions with CSP and the USFWS regarding their mitigation policies or use of their lands for Poseidon's mitigation needs. Both agencies have agreed informally to consider use of the southern arm of the estuary as a potential mitigation site for Poseidon.

The Feasibility and Design Study identified five phases for implementing the 250-acre restoration. The five phases and the distribution of habitats within each phase are presented below.

Tijuana Estuary Restoration Project - Proposed Phasing and Habitat Distribution, March 2007.

Phase	**Habitat (acres)**					
	Open Water	**Mudflat**	**Low Salt Marsh**	**Mid-High Salt Marsh**	**Transition**	**Total**
1	22.9	6.1	4.1	3.1	2.5	38.7
2	7.7	6.1	10.8	12.7	0	37.3
3	**13.0**	**18.3**	**23.7**	**19.9**	**0**	**74.9**
4	5.5	11.5	5.5	9.2	0	31.7
5	12.0	18.5	15.9	16.3	4.6	67.3
total	61.1	60.5	60.0	61.2	7.1	250

Proposed Potential Back-up Site. Based on the total acreage of each phase and potential impacts to existing degraded wetland habitats, Phase 3 totaling approximately 75 acres was selected as a potential back-up for Poseidon's mitigation requirements (see Figure 12-11 of the Feasibility and Design Study). It should be noted that each restoration phase can be constructed in any order and that Phase 3 is not dependent upon prior construction of phases 1 and 2. Some modification of Phase 3 would be necessary in order to fully meet Poseidon's mitigation needs; however, it represents a reasonable surrogate.

Site Constraints. While the Feasibility and Design Study identified potential opportunities for restoration and mitigation, there are constraints associated with the plan that could affect the CCC's approval of this site as an alternative to the Otay River Floodplain site. These include:

- Construction of the protective berm;
- Potential impacts to existing degraded wetlands;
- Sediment within the project footprint; and
- Inlet stability.

Berm and Weir. As part of the Feasibility and Design Study, Dr. Howard Chang conducted an analysis of the flood hydrology of the Tijuana River and associated erosion and sedimentation as these factors could affect the long-term integrity of the restored area. He concluded that an earthen berm and weir would be required to protect the restored area from deposition and scour in manner similar to the restoration design for San Dieguito Lagoon currently being constructed by Southern California Edison. This berm would be approximately 7,000 feet long and connect to exiting levees within the river valley. The berm would be approximately 10 feet high. A 700-foot-long armored weir would be built into the berm at an elevation of approximately 7.5 feet. This weir would allow floods higher than the 10-year event to enter the restored marsh. Water entering the marsh would have an average flow velocity of less than three feet per second, and thus would not result in scour of the restored marsh. Only suspended sediment load would be transported into the restored marsh which would result in minimal sedimentation. The proposed berm would impact approximately 3,500 linear feet of existing disturbed and undisturbed coastal salt marsh. As the restoration proposed in the Feasibility and Design Study has not been elevated to a final design study, no action has been requested of the resource agencies with jurisdiction over these habitats. Thus, the status of this project feature is uncertain.

Impacts to Degraded and Undisturbed Wetlands. The Feasibility and Design Study developed a restoration plan that was considered to be "self-mitigating" in that impacts to existing wetlands associated with each phase were offset by wetland restoration in non-wetland habitats at a ratio greater than 1:1. Impacts associated with Phase 3 include 0.56 acre of undisturbed salt marsh and 16.8 acres of degraded salt marsh as well other wetland and non-wetland habitats (see Table 12-27 from the Feasibility and Design Study). The CCC would need to review the proposed plan and determine that Poseidon would receive credit for restoring these degraded habitats to more functional habitats in order to comply with the MLMP's objective that the site result in an increase in the aggregate acreage of wetland in the Southern California Bight. As degraded wetland habitats occur throughout the southern arm of the estuary, design of a restoration project that does not impact these habitats could be difficult.

Sediment within the Project Footprint. The primary source of sedimentation in the south arm of Tijuana Estuary has been Goat Canyon Creek. Goat Canyon Creek has a transborder watershed, 90% of which is located in Mexico. The Goat Canyon Enhancement Project, constructed in 2005, is a series of sedimentation basins designed to capture sediment before it enters the estuary. While this has alleviated the source of the sedimentation, substantial amounts of sediment exist within the project footprint from sedimentation events that occurred prior to construction of the sedimentation basins. It is estimated that this sediment will remain mobile for many years. The Feasibility and Design Study accommodated this sediment by over-

excavating subtidal habitat in the vicinity of Goat Canyon. However, with specific habitat requirements contained in its permit, this approach may not be available to Poseidon. Thus sediment within the system poses a risk to successful mitigation.

Inlet Stability. The inlet to Tijuana Estuary has closed only once in recent history, in 1984. However, the inlet is bifurcated into south and north tidal channels carrying tidal water to the northern and southern arms of the estuary. The southern channel is more susceptible to closure due to the reduced tidal prism in this part of the estuary – a direct result of decades of sediment deposition. The southern channel closes more frequently, most recently in January 2010. Although the channel was reopened by mechanical means from the beach with little or no impacts to wetlands, the stability of the tidal inlet remains a risk to restoration. Closure at a more sensitive location could impact sensitive wetland resources and affect restoration success, as defined by the CCC.

Water Quality. The Tijuana River and Tijuana Estuary have been subjected to renegade wastewater flows from the City of Tijuana, Mexico, for over 70 years with an estimated average of 10-12 million gallons per day in the late 1980s (Nordby, C.S. and J.B. Zedler 1991. Responses of Fish and Macrobenthic Assemblages to Hydrologic Disturbances in Tijuana Estuary and Los Peñasquitos Lagoon, California. *Estuaries* 14 No 1). While infrastructure improvements in both the U.S. and Mexico since that time have improved conditions, wastewater from Tijuana still impacts the system, especially during the rainy season when Tijuana's sewerage system is overwhelmed. Although these renegade flows include pathogens that have been shown to pose human health risks, no direct link to the health of the wetlands of Tijuana Estuary has been demonstrated.

Sustainability. Certain aspects of Tijauna Estuary as a back-up site for Poseidon's mitigation needs suggest that restoration there would be less sustainable than restoration at the Otay River Floodplain. Those aspects include sedimentation and inlet stability discussed above, but moreover include the unpredictability of the Tijuana River watershed. The Tijuana River watershed covers approximately 1,731 square miles with nearly 75% occurring in Mexico. Three reservoirs regulate 71% of the total watershed (Chang, H. as cited in Tierra Environmental Services. 2007. Tijuana Estuary – Friendship Marsh Restoration Feasibility and Design Study). Two of these occur in the U.S. – Morena and Barrett reservoirs (combined capacity of 96,000 acre-feet) and one in Mexico - Rodriguez reservoir (capacity 110,000 acre-feet). In the past, Mexico has released water from Rodriquez reservoir when it is at or near capacity. These releases have not been coordinated with water or resource managers in the U.S. Prolonged reservoir draw down has been shown to impact coastal salt marsh vegetation. Prolonged release of water from El Capitan Reservoir in the U.S. in 1980 resulted in a shift of vegetative dominance from Pacific pickleweed (*Sarcocornia pacifica*) to cattail (*Typha domigensis*) in the salt marsh at the mouth of the San Diego River. (Zedler, J.B. 1982. The Ecology of Southern California Coastal Salt Marshes: A Community Profile. U.S. Fish & Wildlife Service FWS/OBS-81/54.) In addition, prolonged freshwater releases have been shown to affect fish and invertebrate populations in southern California lagoons and estuaries. Nordby and Zedler (1991 *Ibid*) concluded that increased freshwater input resulted in reduced species richness and abundance, populations skewed toward young animals, and dominance by species with early reproductive maturity and prolonged spawning periods at Tijuana Estuary and Los Peñasquitos

Lagoon. Inability to control hydrologic events within the greater part of the watershed coupled with a dynamic sediment environment pose uncertainty for a sustainable restoration at Tijuana Estuary.

By contrast, the watershed of the Otay River is approximately 160 square miles all of which occurs within the U.S. Lower Otay Dam and Lake controls approximately 60% of the watershed (100 square miles) such that the watershed below the Lower Otay Dam and the Otay River Mouth consists of approximately 60 square miles. The reservoir capacity is about 50,000 acre-feet. Lower Otay is operated by the City of San Diego as a drinking water reservoir and is the terminus of the 2nd San Diego Aqueduct. Water is released only after very large rain events and is managed to minimize downstream impacts.

Request. As demonstrated in the reports from Nordby Biological Consulting (January 2011) and Dr. Michael Josselyn (January 17, 2011), the Otay River Floodplain site is a superior site for wetland mitigation that best achieves the MLMP's minimum standards and objectives. Both studies also have determined that the Tijuana Estuary site is the next best site to meet the MLMP's minimum standards and objectives. CCC staff and the SAP are requested to review this proposal and concur with Poseidon's proposed primary and secondary sites.

FIGURE 2-1 **Regional Location Map**

FIGURE 4-2 **Alternative B (Preferred) Restoration Plan and Habitat Configurations**

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FIGURE 12-11

Alternative 3A

Table 12-27. Project Impacts by Proposed Phase

	Phase 1 – 39 acres			Phase 2 - 37.3 acres			Phase 3 – 74.9 acres			Phase 4 – 31.7 acres			Phase 5 – 67.3 acres		
	Impact			Impact			Impact			Impact			Impact		
	Pristine	Disturbed	Creation	Pristine	Disturbed	Creation	Pristine	Disturbed	Creation	Pristine	Disturbed	Creation	Pristine	Disturbed	Creation
Tidal Open Water			22.9	0.02		7.7			13			5.5			12
Channel															
Mudflat			6.1			6.1			18.3			11.5			18.5
Low Salt			4.1			10.8			23.7			5.5			15.9
Mid-High Salt			3.1			12.7			19.9			9.2			16.3
High Salt															
Salt Marsh Subtotal	***0.06***	***4.93***	***7.2***	***1.34***	***12.46***	***23.5***	***0.56***	***16.79***	***43.6***		***17.14***	***14.7***		***7.53***	***32.2***
Brackish Marsh							0.01							45.33	
Salt Marsh Fleabane Scrub				0.49			0.07								
Salt Panne		0.36						4.47			13.08			2.48	
Mule-fat Scrub		22.73					1.84	13.97			0.22			8.06	
Southern Willow Scrub								0.89							
Saltbush Scrub								2.72							
Tamarisk Scrub								0.45							
Ruderal		7.67			0.32			8.46						3.66	
Transition			2.5	4.14											4.6
Non-native Grassland				17.49											
Upland		1.99						20.23			0.14				
Developed														0.06	
Disturbed		1.02			1.55			4.55			1.19				
Total	**0.06**	**38.7**	**38.7**	**23.03**	**14.33**	**37.3**	**2.48**	**72.53**	**74.9**		**31.77**	**31.7**		**67.12**	**67.3**
Total Impact	**38.76**			**37.36**			**75.01**			**31.77**			**67.12**		