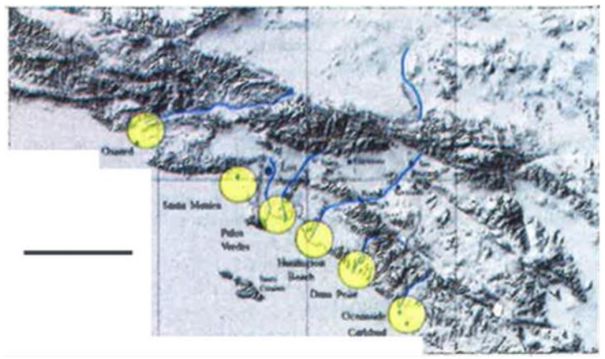
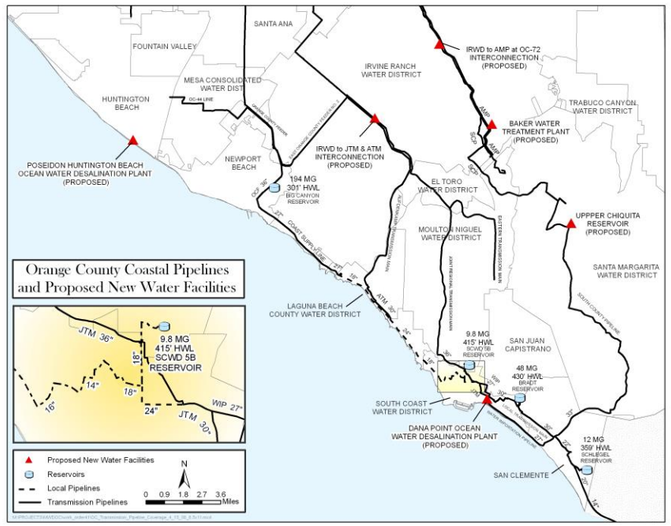
Information Requests Related to Analysis of Alternative Sites
-Intake, Discharge and Other Considerations
Huntington Beach Desalination Project (HBDP) Part 2

SITE	INTAKE	DISCHARGE	OTHER CONSIDERATIONS
Property 1A: Existing Land Use: (44.98 Acres) Rockwell Facility Heliport, Boeing Seal Beach, Aramark Corp. Seal Beach GP Designation: Industrial - light	**Is it technically possible to install subsurface intake wells that can withdraw 106 MGD of feed water? If so, how many wells would be needed?** **Not Possible.** Per the *Huntington Beach Desalination Plant Alternative Sites Analysis (Alternative Site Analysis) prepared by Dudek on June 11, 2015* in support of the CDP application, shallow supply wells for the HBDP drilled in Segment 1 have the potential to affect production from and the water quality in adjacent coastal aquifers, including the Sunset Gap coastal aquifer nearest to Property 1A. This aquifer in addition to the Alamitos, Bolsa Gap, and Talbert Gap aquifers are currently used to supply approximately 250 MGD to the member agencies of the Orange County Water District (OCWD) and are subject to seawater intrusion. The sediments of the coastal aquifers are the best targets for subsurface collector systems that require high well yields. The Talbert aquifer has a range of transmissivity of between 17,500 and 23,400 square feet per day and storativity of 4.6×10^{-4} under confined conditions (see *Feasibility Assessment of Shoreline Subsurface Collectors, Huntington Beach Seawater Desalination Project* prepared by *Geosyntec in September 2013*). The transmissitvity of the aquifer is considered to be moderate and would therefore limit well yields. Under unconfined conditions along the shore the Talbert Aquifer, storativity is estimated at 0.01–0. 05.. In order to provide 50 MGD of product water it is anticipated that HBDP will require 127 MGD of feed-water from the wells. At the anticipated production capacity and including an estimated run-time of 75%, between 32 and 73 wells would be required to meet the demand of 127 MGD. The Independent Scientific Technical Advisory Panel (ISTAP) estimated that 212 vertical wells would be required for subsurface technologies using the unconfined, shallow aquifer, given an estimated yield of 0.72 MGD per well. For vertical wells drilled into the confined, deep aquifer, the ISTAP estimated that 70 individual wells would be required After examining a variety of technologies that would extract water from the Talbert aquifer, the *ISTAP Final Phase 1 Report* concluded that vertical well intake options would be technically infeasible due to sweater intrusion complications and groundwater usage from the unconfined shallow aquifers, the confined deeper parts of the aquifer, and a combination of both shallow and deep sources. The OCWD stated in a public meeting that proposed pumping of 127 MGD would equate to 45% of the quantity of water that is pumped from the Orange County Groundwater Basin. As such, it was determined that any subsurface intake technology extracting groundwater from the Orange County Groundwater Basin would adversely affect the water budget of this basin. While the capacity of the Orange County Groundwater Basin was identified as the key infeasible aspect, fluid mixing was also identified as a technical barrier to the use of certain subsurface well designs, including slant wells and vertical wells with any portion completed below the confining unit. Furthermore, the subsurface wells analyzed in the	**Is it possible to commingle all of the discharge with OCSD's ocean outfall?** **Not Possible.** The wastewater treatment plants near Segment 1 is the Orange County Sanitation District (OCSD) Treatment Plant #2. As discussed in Poseidon Water's *Proposed Huntington Beach Seawater Desalination Project Brine Discharge Compliance with State Water Board Desalination Amendment Memorandum (Brine Discharge Memorandum)* in support of the CDP application, in a May 27, 2016 letter from OCSD to Poseidon Resources (Channelside) LP (Poseidon) regarding the potential for commingling the Huntington Beach Desalination Plant's (HBDP's) brine discharge with the existing wastewater effluent OCSD stated that it would not be feasible to commingle part or all of the HBDPs brine discharge due to conflicts with OCSD's Wastewater Ordinance, goals for future wastewater recycling, and lack of available wastewater to sufficiently dilute the HBDP's brine discharge. This *Brine Discharge Memorandum* also demonstrated that SOCWA's Coastal Treatment Plant and JB Lanthem Treatment Plant do not have sufficient wastewater flows or capacity to dilute the HBDP's brine discharge sufficiently and that the discharge areas for these outfalls contain sensitive marine biological resources that could be affected from increased salinity in their discharge. **Is it possible to commingle part of the discharge with OCSD's ocean outfall?** **Not Possible** As discussed in *Brine Discharge Memorandum* in a May 27, 2016 letter from OCSD to Poseidon Resources (Channelside) LP (Poseidon) regarding the potential for commingling the Huntington Beach Desalination Plant's (HBDP's) brine discharge with the existing wastewater effluent OCSD stated that it would not be feasible to commingle part or all of the HBDPs brine discharge due to conflicts with OCSD's Wastewater Ordinance, goals for future wastewater recycling, and lack of available wastewater to sufficiently dilute the HBDP's brine discharge. This *Brine Discharge Memorandum* also demonstrated that SOCWA's Coastal Treatment Plant and JB Lanthem Treatment Plant do not have sufficient wastewater flows or capacity to dilute the HBDP's brine discharge sufficiently and that the discharge areas for these outfalls contain sensitive marine biological resources that could be affected from increased salinity in their discharge. **Diffuser** **Possible** Construction of the associated discharge pipeline will have significant and severe construction-related benthic, traffic, site access, noise and visual impacts and the diffuser will have construction related benthic impacts. As discussed in the *Alternative Sites Analysis,* prepared by Dudek on June 11, 2015 in support of the Coastal Development Permit (CDP) application, it was determined that no Areas of Special Biological Significance (ASBSs), kelp beds, surfgrass beds, or eelgrass beds were present within Segment 1,	"Geologic and hydrogeologic conditions readily dictate whether a submerged intake is at all feasible. If the coastal deposits consist of low permeability silts and clays, or low permeability consolidated (rock) formations, it may be difficult or impossible to construct a submerged intake or infiltration gallery. *(Assessing Seawater Intake Systems for Desalination Plants, Water Research Foundation, 2011).* According to Dennis Williams in *Chapter 13, Slant Well Intake Systems: Design and Construction,* in *Intakes and Outfalls for Seawater Reverse-Osmosis Desalination Facilities,2015, "*The most favorable conditions for a subsurface feed water supply are those where permeable alluvial deposits extend offshore (typically near the mouth of streams and rivers). …Where these deposits exist below the ocean floor and have sufficient thickness and permeability, reliable subsurface feed water supplies can be developed by slant wells." (Page 279)  Fig. 13.4 Rivers discharging to the Pacific Ocean off the Coast of California are favorable geohydrologic conditions for slant well feed water supply wells (Page 280) According to the California's *Groundwater Bulletin 118,* there are three groundwater basins on the Orange County coast: (1) The Coastal Plain of Orange County Groundwater Basin which underlies a coastal alluvial plain in the northwestern portion of Orange County. This is the basin that underlies the lower Santa Ana River watershed. The surface area of this basin is 350 square miles. The California Department of Water Resources has determined that the total capacity of this basin is 38 million AF. Orange County Water District manages this groundwater basin. (2) The San Juan Valley Groundwater Basin which underlies the San Juan Valley and several tributary valleys in southern Orange County. The surface area of this basin is 26 square miles and the total storage has been estimated to be 90,000 AF. (3) The San Mateo Valley Groundwater Basin which underlies San Mateo Valley and Christianitos Canyon in northwest San Diego and southeastern Orange County. The surface area of this basin is 4.7 miles and the total storage for this basin is 14,000 AF. From a Site Factor perspective, a seafloor infiltration gallery for Segment 1 was deemed feasible because an area with a stable seafloor is present offshore of Huntington Beach that has relatively low environmental sensitivity. Since the offshore areas of Segment 1 have

	ISTAP Final Phase 1 Report would have a relatively high sensitivity to complications from sea level rise. Due to the variety of issues described above, the ISTAP determined that subsurface wells relying on the water in the Orange County Groundwater Basin would be technically infeasible. Taken together, the episodic flooding events and the lack of transport offshore suggest that the silts and clays deposited by the San Gabriel and Santa Ana Rivers have the potential to adversely affect the infiltration capacity of the engineered substrate required for a SIG in Segment 1. However, the ISTAP concluded in the *Final Phase 1 Report* that a SIG would be feasible from a technical standpoint at the HBDP location. The SIG could be located in either the surf zone or past the surf zone. A SIG was deemed technically feasible because an area with a stable seafloor is present offshore of Huntington Beach that has relatively low environmental sensitivity. Since the offshore areas of Segment 1 have similar bathymetry, geology, and biological conditions, it can be assumed that a stable seafloor conducive to a SIG is present throughout many areas of Segment 1. **Combined intake system – what is maximum amount of feed water that can be withdrawn through a subsurface intake?** **None** Subsurface intake technologies, other than a Subsurface Infiltration Gallery (SIG) are not technically feasible. In addition, the ISTAP findings included a discussion of downward scalability of the technologies investigated. However, all options with the exception of the SIG were deemed technically infeasible for reasons other than production capacity. At the conclusion of the ISTAP Phase 1 evaluation, Poseidon and the Coastal Commission convened a Wells Investigation Team (WIT) to develop additional information about the potential effects of using wells to provide source water for the Project. (Scott McCreary, CONCUR, Inc., *Summary of the California Coastal Commission-Poseidon Well Investigation Team Process* at 1 (Jan. 13, 2016) As part of this investigation, Geosyntec conducted site-specific hydraulic modeling, which shows that the amount of groundwater flowing from inland to a subsurface intake could account for 22 to 36 percent of the total subsurface intake extraction. (Gordon Thrupp, Geosyntec Consultants, Inc., *Revision and Sensitivity Analyses of Slant Well SSI Model Feasibility Assessment of Shoreline Subsurface Collectors, Huntington Beach Seawater Desalination Project (June 3, 2015).* In response to this information, OCWD informed the Coastal Commission: "Based on the modeling parameters used and the overall hydrogeologic setting of the Talbert Gap that OCWD staff has studied for decades, these results appear reasonable and could, in fact, still underestimate the proportion of inland groundwater extracted by a SSI. Geosyntec also found that lowering the total SSI extraction rate	where Property 1A is located per data from the California Department of Fish and Wildlife (CDFW) Marine Region GIS Unit data from 2014 (available at http://www.dfg.ca.gov/marine/gis/downloads.asp).	similar bathymetry, geology, and biological conditions, it can be assumed that a stable seafloor conducive to a SIG is present throughout many areas of Segment 1. Per the *Alternative Sites Analysis*, construction of a desalination plant sited adjacent to the Bolsa Chica Ecological Reserve, the Seal Beach National Wildlife Refuge, or the wetlands located near the northern and southern boundaries of Segment 1 would have the potential to cause short-term, construction-related impacts to biological resources. Short-term, construction-related impacts could include the following: noise from construction equipment could adversely affect wildlife and important wildlife activities such as bird breeding; contaminated stormwater runoff from construction sites could impact the water quality of a nearby wetlands or streams; fugitive dust from construction could cause wetland degradation; vegetation removal that may be required to clear the site or a staging area could affect the viability of plant communities, thereby decreasing available habitat; and increased human activity in the area could lead to trampling of vegetation or disruption of wildlife. Per the *Alternative Sites Analysis*, Property 1A is also governed by the Boeing Integrated Defense Systems Specific Plan. This Specific Plan provides for development of a business park, combined with hotel and light commercial uses and would be incompatible with the development of a desalination plant (*City of Seal Beach General Plan Land Use Element and Open Space Element, 2003* & *City of Seal Beach Zoning Map*, prepared June 2010). The *Phase 1 ISTAP Report* recommended that of the various intake options evaluated during the Phase I study that only seabed infiltration galleries (SIGs) and beach infiltration galleries (BIGs) be investigated in the ISTAP Phase 2 assessment. The *Phase 2 ISTAP Report* found that the SIG subsurface intakes recommended for further study by the *Phase I ISTAP Report* were not economically viable for implementation at the project site, and that the Beach Infiltration Gallery was not technically feasible as well. Distance from OCWD distribution system: 11.5 miles. "There are no regional connections of significant size in that area." Email from Howard Johnson, Executive Vice President, Richard Brady & Associates, Inc., dated September 1, 2016, www.richardbrady.com. See *Orange County Coastal Pipelines and Proposed New Water Facilities map* below.

	produced a slight increase in the proportion of inland groundwater being extracted by the SSI. Based on the results presented by Geosyntec, it is OCWD staff's position that a SSI constructed within the Talbert aquifer near the coast would produce an unacceptable amount of inland groundwater that would reduce the yield of the groundwater basin and, likewise, would effectively reduce the net yield of "new" water produced by an ocean desalination project. Not only would such a reduction in net yield of an ocean desalination project undermine its objective of increasing water reliability, but it would cause the project to be economically infeasible. For these reasons, OCWD staff would not be in favor of continued consideration of a SSI option for the Huntington Beach Seawater Desalination Project." (Letter from Roy Herndon, Chief Hydrogeologist, OCWD, to Scott McCreary, Principal, CONCUR, Inc., dated Sept. 28, 2015.		
Property 1B Property 1B is approximately 13.78 acres of contiguous property located adjacent to and southwest of Property 1A. This property is designated as industrial according to the SCAG land use mapping. The existing land uses on the property consist of the Seal Beach Helistop B80 and Carlen Enterprises. The property is fully developed with the majority of the land cover occupied by buildings and parking lots with a small portion of the site being covered with ornamental landscaping.	**Is it technically possible to install subsurface intake wells that can withdraw 106 MGD of feed water? If so, how many wells would be needed?** **Not Possible.** (See answer to Property 1A) **Combined intake system – what is maximum amount of feed water that can be withdrawn through a subsurface intake?** **None** (See answer to Property 1A)	**Is it possible to commingle all of the discharge with OCSD's ocean outfall?** **Not Possible** (See answer to Property 1A) **Is it possible to commingle part of the discharge with OCSD's ocean outfall?** **Not Possible** (See answer to Property 1A) **Diffuser** **Possible** (See answer to Property 1A)	Construction related environmental impacts to adjacent wetland and riparian habitat is possible. The site is governed by an existing Specific Plan and is highly developed, limiting available space for a desalination plant. Coastal access and views could be impeded depending on subsurface intake technology used in this area. Per the *Alternative Sites Analysis*, the approximately 13.78-acre size of Property 1B and the surrounding land uses may be compatible with the use of the site for a desalination plant. However, Property 1B is developed with existing buildings and parking lots that would I not accommodate the required amount of available area for a 25 to 50 MGD desalination plant and as pointed out above the Specific Plan does not contemplate a desalination plant in this area. Distance from OCWD distribution system: 11.5 miles. "There are no regional connections of significant size in that area." Email from Howard Johnson, Executive Vice President, Richard Brady & Associates, Inc., dated September 1, 2016, www.richardbrady.com. See Orange County Coastal Pipelines map in Property 1A.

Property 1C Property 1C is situated adjacent and to the south of Property 1A and covers approximately 5.5 Acres. This property is designated as an Industrial land use by the SCAG land use data. The site is currently used by Accurate Storage RV and Boat Stop as part of the Pacific Gateway Business Center. The property is almost fully developed with one primary building, paved parking lots, and smaller areas of grass landscaping along the perimeter.	**Is it technically possible to install subsurface intake wells that can withdraw 106 MGD of feed water? If so, how many wells would be needed?** **Not Possible.** (See answer to Property 1A) **Combined intake system – what is maximum amount of feed water that can be withdrawn through a subsurface intake?** **None** (See answer to Property 1A)	**Is it possible to commingle all of the discharge with OCSD's ocean outfall?** **Not Possible** (See answer to Property 1A) **Is it possible to commingle part of the discharge with OCSD's ocean outfall?** **Not Possible** (See answer to Property 1A) **Diffuser** **Possible** (See answer to Property 1A)	From a Site Factor perspective, a seafloor infiltration gallery for Segment 1 was deemed feasible because an area with a stable seafloor is present offshore of Huntington Beach that has relatively low environmental sensitivity. Since the offshore areas of Segment 1 have similar bathymetry, geology, and biological conditions, it can be assumed that a stable seafloor conducive to a SIG is present throughout many areas of Segment 1. Construction related environmental impacts to adjacent wetland and riparian habitat are possible. The site is highly developed, with no likely available space for a desalination plant. Coastal access and views could be impeded depending on subsurface intake technology used in this area. Per the *Alternative Sites Analysis*, Property 1C, the Seal Beach General Plan designated this property as Industrial – Light. However, the property is zoned for Residential High Density, despite having an existing land use that is not consistent with this zoning. The properties surrounding Property 1C primarily contain commercial and industrial land uses, including Property 1A, Property 1B, the City of Seal Beach Police Department, and the Naval Weapons Station. Property 1C is only approximately 5.5 acres in size and is currently occupied by existing structures and parking lots. As such, this property would require further investigation and coordination with the existing uses on the property to have sufficient space for development of a 25 to 50 MGD desalination plant. Distance from OCWD distribution system: 12 miles. "There are no regional connections of significant size in that area." Email from Howard Johnson, Executive Vice President, Richard Brady & Associates, Inc., dated September 1, 2016, www.richardbrady.com. See Orange County Coastal Pipelines map in Property 1A.
Property 1D Property 1D is situated generally west of properties 1A, 1B, and 1C and is separated from Property 1B by a small strip of vacant land. The property encompasses approximately 94.76 acres of land with the northern part of the site designated as Transportation, Communications, and Utilities by the SCAG land use information and as Industrial on the southern portion of the site. The existing use on the property is comprised of the Rockwell Seal Beach Heliport and other industrial facilities that are sparsely located in the southern part of the property. Property 1D is largely undeveloped by above ground	**Is it technically possible to install subsurface intake wells that can withdraw 106 MGD of feed water? If so, how many wells would be needed?** **Not Possible.** (See answer to Property 1A) **Combined intake system – what is maximum amount of feed water that can be withdrawn through a subsurface intake?** **None** (See answer to Property 1A)	**Is it possible to commingle all of the discharge with OCSD's ocean outfall?** **Not Possible** (See answer to Property 1A) **Is it possible to commingle part of the discharge with OCSD's ocean outfall?** **Not Possible** (See answer to Property 1A) **Diffuser** **Possible** (See answer to Property 1A)	From a Site Factor perspective, a seafloor infiltration gallery for Segment 1 was deemed feasible because an area with a stable seafloor is present offshore of Huntington Beach that has relatively low environmental sensitivity. Since the offshore areas of Segment 1 have similar bathymetry, geology, and biological conditions, it can be assumed that a stable seafloor conducive to a SIG is present throughout many areas of Segment 1. Construction related environmental impacts to adjacent wetland and riparian habitat are possible. The site is highly developed, with no available space for a desalination plant of any material scale Coastal access and views could be impeded depending on subsurface intake technology used in this area. Per the *Alternative Sites Analysis*, Property 1D is zoned by the City of Seal Beach as Open-Space Natural Specific Plan Regulation and Oil Extraction Specific Plan Regulation for Hellman Ranch. At buildout this specific plan would include residential, mineral operation areas, and public land uses. The Hellman Ranch Specific Plan also states that all oil production land use designated parcels are deed restricted by the Coastal Commission permit conditions and will be re-designated for the restoration of wetlands upon the closeout of oil and mineral related operations. Although there is sufficient undeveloped land on Property 1D to allow for development of a desalination plant, this use is not compatible with Coastal Commission permit conditions and planned land uses for the site. Therefore,

structures; however, it has been graded in large portions and includes unpaved roadways that traverse the site.			development of a 25 to 50 MGD desalination plant is not consistent with the plans and policies that are in place for Property 1D. Distance from OCWD distribution system: 12 miles. "There are no regional connections of significant size in that area." Email from Howard Johnson, Executive Vice President, Richard Brady & Associates, Inc., dated September 1, 2016, www.richardbrady.com. . See Orange County Coastal Pipelines map in Property 1A.
Naval Weapons Station	**Is it technically possible to install subsurface intake wells that can withdraw 106 MGD of feed water? If so, how many wells would be needed?** **Not Possible.** (See answer to Property 1A) **Combined intake system – what is maximum amount of feed water that can be withdrawn through a subsurface intake?** **None** (See answer to Property 1A)	**Is it possible to commingle all of the discharge with OCSD's ocean outfall?** **Not Possible** (See answer to Property 1A) **Is it possible to commingle part of the discharge with OCSD's ocean outfall?** **Not Possible** (See answer to Property 1A) **Diffuser** **Possible** (See answer to Property 1A)	From a Site Factor perspective, a seafloor infiltration gallery for Segment 1 was deemed feasible because an area with a stable seafloor is present offshore of Huntington Beach that has relatively low environmental sensitivity. Since the offshore areas of Segment 1 have similar bathymetry, geology, and biological conditions, it can be assumed that a stable seafloor conducive to a SIG is present throughout many areas of Segment 1. Similar to the surrounding properties in this area, the Naval Weapons Station could result in construction related environmental impacts to adjacent wetland and riparian habitat. The site is part of an active Naval Weapons Station and is likely not able to be used for non-military uses. Coastal access and views could be impeded depending on subsurface intake technology used in this area. Coastal access and views could be impeded depending on subsurface intake technology used in this area. Distance from OCWD distribution system: 12 miles "There are no regional connections of significant size in that area." Email from Howard Johnson, Executive Vice President, Richard Brady & Associates, Inc., dated September 1, 2016, www.richardbrady.com. . See Orange County Coastal Pipelines map in Property 1A.
1G The property is the site of the proposed Huntington Beach Desalination Plant and is currently occupied by the Huntington Beach Generating Station for energy production by AES Energy.	**Proposed surface water intake** The proposed intake will make use of the existing HBGS intake location. The intake will be modified to retrofit cylindrical wedgewire screens with 1-mm slots. The through slot velocity is designed to be 0.5 ft/sec or less. **Combined intake system – what is maximum amount of feed water that can be withdrawn through a subsurface intake?** **None** The Coastal Commission's Independent Scientific & Technical Advisory Panel ("ISTAP") demonstrated the infeasibility of subsurface intakes. The *ISTAP Final Phase 1 Report* found that "The shallow vertical wells would create unacceptable water level drawdowns landward of the shoreline and could impact wetlands and cause movement of potential contaminants seaward. The deep vertical wells would have a significant impact on the Talbert aquifer that would interfere with the management of the salinity barrier and the management of the interior freshwater basin. The combined shallow and deep-water wells would adversely impact both the shallow aquifer and Talbert aquifer, and in addition,	**Is it possible to commingle all of the discharge with OCSD's ocean outfall?** **Not Possible** The wastewater treatment plants near Segment 1 is the Orange County Sanitation District (OCSD) Treatment Plant #2. As discussed in Poseidon Water's *Brine Discharge Memorandum,* in a May 27, 2016 letter from OCSD to Poseidon Resources (Channelside) LP (Poseidon) regarding the potential for commingling the Huntington Beach Desalination Plant's (HBDP's) brine discharge with the existing wastewater effluent OCSD stated that it would not be feasible to commingle part or all of the HBDPs brine discharge due to conflicts with OCSD's Wastewater Ordinance, goals for future wastewater recycling, and lack of available wastewater to sufficiently dilute the HBDP's brine discharge. This *Brine Discharge Memorandum* also demonstrated that SOCWA's Coastal Treatment Plant and JB Lanthem Treatment Plant do not have sufficient wastewater flows or capacity to dilute the HBDP's brine discharge sufficiently and that the discharge areas for these outfalls contain sensitive marine biological resources that could be affected from increased salinity in their discharge.	The *Alternative Sites Analysis* found that portions of Segment 1 (the area north of the Santa Ana River) and Segment 7 (Dana Point) had the highest suitability for well intakes due to the presence of alluvial deposits and potentially higher aquifer yields than in other study area segments. There have been thorough hydrological investigations in both segments. In Segment 1, for the Huntington Beach Desal Project including the ISTAP and WIT Investigation studies. In Segment 7, the Municipal Water District of Orange County found in 2013, after five years and $6.2 million of investigation on the use of a slant well intake for the Doheny Desalination Project, that a project was feasible and could produce up to 15 MGD (16,800 AFY) of new potable water supplies. The first phase is being pursued at 4,000 to 5,000 AF/year by South Coast Water District as a demonstration project, although the CEQA work is just getting started. From a Site Factor perspective, a seafloor infiltration gallery for Segment 1 was deemed feasible because an area with a stable seafloor is present offshore of Huntington Beach that has relatively low environmental sensitivity. Construction related environmental impacts to adjacent wetland and riparian habitat are possible. The site is highly developed, limiting available space for a desalination plant.

	would produce waters with differing inorganic chemistry, which would adversely affect SWRO plant operation. Radial collector wells constructed into the shallow aquifer would have to be located very close to the surf zone which would make them susceptible to damage during storms and would be impacted by the projected sea level rise. Slant wells tapping the Talbert aquifer would interfere with the management of the salinity barrier and the management of the freshwater basin, and further, would likely have geochemical issues with the water produced from the aquifer (e.g., oxidation states of mixing waters). The recently-collected offshore hydraulic conductively data shows that the use of HDD wells is technically questionable and the largest capacity system in Spain is currently not operating at its original design capacity. The water tunnel constructed in the unlithified sediment at Huntington Beach would have overwhelming constructability issues." (*ISTAP Report* at 64) ISTAP evaluated nine different subsurface intake technologies. These subsurface intake options included technologies utilized for fresh, brackish and salt water extraction including (1) vertical wells completed in the shallow aquifer above the Talbert aquifer, (2) vertical deep wells completed within the Talbert aquifer, (3) vertical wells open to both the shallow and Talbert aquifers, (4) radial collector wells tapping the shallow aquifer, (5) slant wells tapping the Talbert aquifer, (6) seabed infiltration gallery, (7) beach gallery (surf zone infiltration gallery), (8) horizontal directional drilled wells, and (9) a water tunnel. (*ISTAP Report* at 17–18.) ISTAP also analyzed different project scales (i.e., product water production capacities) ranging from a plant capable of producing 12.5 mgd to 100 mgd of drinking water. Based on the application of the Coastal Desalination Amendment's definition of feasibility, ISTAP concluded that subsurface intakes would not be feasible at the proposed site. ISTAP issued two reports providing detailed evidence in supports of its conclusion that eight of the nine subsurface intakes were technologically infeasible and that while there was a suitable site for a subsurface infiltration gallery, this ninth technology was economically infeasible (*ISTAP Phase 1 Report* at 17-18; *ISTAP, Phase 2 Report: Feasibility of Subsurface Intake Designs for the Proposed Poseidon Water Desalination Facility at Huntington Beach, Calif.* at 15 (Nov. 2015) ("*ISTAP Phase 2 Report)* Namely, the *ISTAP Phase 1 Report* found the eight options technologically infeasible due to: (a) local hydrologic conditions that would result in adverse impacts to the environment, such as moving contaminants seaward and damaging local wetlands; (b) performance risks; (c) decimating critical freshwater aquifers; (d) sensitivity to sea level rise; (d) poor geochemistry; and (e) constructability issues. (Id. at 17–18.)	**Is it possible to commingle part of the discharge with OCSD's ocean outfall?** **Not Possible** The wastewater treatment plants near Segment 1 is the Orange County Sanitation District (OCSD) Treatment Plant #2. As discussed in the *Brine Discharge Memorandum*, in a May 27, 2016 letter from OCSD to Poseidon Resources (Channelside) LP (Poseidon) regarding the potential for commingling the Huntington Beach Desalination Plant's (HBDP's) brine discharge with the existing wastewater effluent OCSD stated that it would not be feasible to commingle part or all of the HBDPs brine discharge due to conflicts with OCSD's Wastewater Ordinance, goals for future wastewater recycling, and lack of available wastewater to sufficiently dilute the HBDP's brine discharge. This white paper also demonstrated that SOCWA's Coastal Treatment Plant and JB Lanthem Treatment Plant do not have sufficient wastewater flows or capacity to dilute the HBDP's brine discharge sufficiently and that the discharge areas for these outfalls contain sensitive marine biological resources that could be affected from increased salinity in their discharge. **Diffuser** **Yes** A diffuser is already proposed for the HBDP.	Coastal access and views could be impeded depending on subsurface intake technology used in this area. Per the *Alternative Sites Analysis*, under the current license (00-AFC-13C) the Huntington Beach Generating Station Units 3 and 4 are authorized for demolition. Additionally, the Huntington Beach Energy Project is currently proposed on the site, which would demolish the existing Huntington Beach Energy Generation Station Unites 1, 2, and 5 and replace them with a natural-gas-fired electrical generating facility (AES 2012). These changes to Property 1G would provide sufficient undeveloped space for a 50 MGD desalination plant. Additionally, the seawater intake and discharge structures associated with the once-through-cooling system of the Huntington Beach Generating Station would provide existing infrastructure that could be used by a desalination facility for intake and/or discharge, potentially resulting in a reduction of both onshore and offshore construction impacts. Distance from OCWD distribution system: 5 miles **3. Distribution System.** The potable water generated by the Project's RO process would be delivered under all operating scenarios described below to a distribution system that would provide an alternative source of potable water to replace a portion of Orange County's imported water supplies. Distribution system pipeline route and facilities are described in the Final Subsequent Environmental Impact Report (State Clearinghouse No. 200151092) the City certified on September 7, 2010 ("FSEIR"). Pursuant to the Water Reliability Agreement Term Sheet (the "Term Sheet") between Poseidon Resources (Surfside) LLC and the Orange County Water District ("OCWD"), OCWD would finance, own, operate and construct the Project's product water distribution system within and outside of the Coastal Zone. If OCWD does build the Project's product water distribution system, per the California Code of Regulations (14 CCR Section 13170) and Coastal Development Permit Standard Conditions, Poseidon plans to convey through assignment to OCWD the necessary permits to construct the portions of the distribution system within the Coastal Zone and within the City of Huntington Beach's Local Coastal Program jurisdiction. (See *Project Description - Huntington Beach Desalination Project,* September 1, 2015)

	The proposed Project site overlies the western portion of the Talbert aquifer, which is a "significant groundwater source for Orange County's Water needs." The Talbert aquifer has a reversed seaward gradient that causes seawater intrusion and threatens inland portion of the aquifer system. (*ISTAP Phase 1 Report* at 14.) In fact, in 2014, Orange County was injecting 30 mgd of treated wastewater into the aquifer system to replenish the basin and control seawater. (Id.) Any increased intrusion of seawater into the Talbert Aquifer would cause severe harm to Orange County's freshwater supply, and would be irreconcilable with the purpose of this Project—namely, to provide fresh water to Orange County. At the conclusion of the ISTAP Phase 1 evaluation, Poseidon and the Coastal Commission convened a Wells Investigation Team (WIT) to develop additional information about the potential effects of using wells to provide source water for the Project. (Scott McCreary, CONCUR, Inc., *Summary of the California Coastal Commission-Poseidon Well Investigation Team Process* at 1 (Jan. 13, 2016) As part of this investigation, Geosyntec conducted site-specific hydraulic modeling, which shows that the amount of groundwater flowing from inland to a subsurface intake could account for 22 to 36 percent of the total subsurface intake extraction. (Gordon Thrupp, Geosyntec Consultants, Inc., *Revision and Sensitivity Analyses of Slant Well SSI Model Feasibility Assessment of Shoreline Subsurface Collectors, Huntington Beach Seawater Desalination Project* (June 3, 2015). In response to this information, OCWD informed the Coastal Commission: "Based on the modeling parameters used and the overall hydrogeologic setting of the Talbert Gap that OCWD staff has studied for decades, these results appear reasonable and could, in fact, still underestimate the proportion of inland groundwater extracted by a SSI. Geosyntec also found that lowering the total SSI extraction rate produced a slight increase in the proportion of inland groundwater being extracted by the SSI. Based on the results presented by Geosyntec, it is OCWD staff's position that a SSI constructed within the Talbert aquifer near the coast would produce an unacceptable amount of inland groundwater that would reduce the yield of the groundwater basin and, likewise, would effectively reduce the net yield of "new" water produced by an ocean desalination project. Not only would such a reduction in net yield of an ocean desalination project undermine its objective of increasing water reliability, but it would cause the project to be economically infeasible. For these reasons, OCWD staff would not be in favor of continued consideration of a SSI option for the Huntington Beach Seawater Desalination Project. (Letter from Roy Herndon, Chief Hydrogeologist, OCWD, to Scott McCreary, Principal, CONCUR, Inc., dated Sept. 28, 2015. Further, the Santa Ana Regional Board considered the option of beach wells in 2012. Like ISTAP, the Regional Board concluded that beach wells would be infeasible due to their likelihood of interfering with the		

	Talbert Barrier. (2012 Order at F-27.) The Regional Board found that intercepting injection water from the Talbert Barrier could impair the function of the barrier to protect against seawater intrusion to the groundwater basin and may direct reclaimed water into the intake. (Id.) Further, intake wells could drain the existing nearby coastal wetlands, including the Talbert Marsh, Brookhurst Marsh, and the Magnolia Marsh, and could cause land subsidence in the vicinity of the site, which would damage key traffic arteries, such as Pacific Coast Highway. (Id. at F-28.) In addition, the source water collected from the coastal aquifer in the vicinity of the Project using wells would have very poor water quality in terms of high pathogen and ammonia content, and low concentrations of dissolved oxygen. (Id.) For all of these reasons, the Regional Board determined that beach wells were not feasible taking into account economic, environmental, and technological factors. Even if Poseidon diminished the size of the size of the seafloor infiltration gallery the cost per unit would increase so dramatically that the entire Project would become economically infeasible. (*ISTAP Phase 2 Report* at 15.) Unfortunately, the construction costs of subsurface technologies do not decrease in a linear fashion when the size of the facility is reduced. (Id.) This lack of proportionality is due to the high mobilization costs of subsurface technologies, regardless of scale. (Id.) Reducing the scale of the plant would not suddenly render subsurface intake feasible, but would hinder local water agencies' efforts to obtain a reliable local source of water. . **Would extending the intake pipe further offshore result in fewer impacts to marine life?** **No,** According to MBC Applied Environmental Sciences and Tenera Environmental, Inc. 2005. *AES Huntington Beach L.L.C. Generating Station Entrainment and Impingement Study Final Report.* Prepared for AES Huntington Beach, LLC, the mean density of Ichthyoplankton 1.2 miles offshore is not different than the density at the existing HBGS intake location. Therefore, the operational impacts (i.e., entrainment) will not be less than the current HBGS intake location. In addition, the construction of a pipeline extension will impact benthic habitat and organisms. Sampling conducted by CalCOFI also indicates that Ichthyoplankton densities generally increase with distance from shore and depth. (Watson, W., S.M. Manion, and R.L. Charter. 2007. *Ichthyoplankton and Station Data for Oblique (Bongo Net) Plankton Tows Taken During a Survey of Shallow Coastal Waters of the Southern California Bight in 2004 and 2005*. NOAA-TM-NFMS-SWFSC-410). Lastly, moving the intake point farther offshore decreases access to the wave-induced sweeping currents that are needed for keeping the screens clean and to aid in hydrodynamic exclusion of organisms. Reduction of ambient currents negatively impacts screen performance.		

Segment 6 Segment 6 extends south from Aliso Creek and terminates just north of the Dana Point Headlands. This segment is located within the Aliso-San Onofre watershed, which drains approximately 498 square miles of land (NRCS 2013). Surface water bodies within Segment 6 generally, consist of small drainages that flow down from the surrounding hills.	**Is it technically possible to use subsurface intakes to withdraw 106 MGD of feed water?** **No** **The** nearshore sediments deposited by the watersheds in Segment 6 would likely not result in a hydraulic conductivity as high as those near the HBDP site and therefore similar conclusions that subsurface intakes (except for a SIG) would be infeasible in this area would apply. Water supply wells drilled on the coast in Segment 6 are likely to encounter thin sediment cover, and low permeability sediments and basement rocks. Because the permeability of the sediment and underlying rock in this area is less than that in Segment 1, it is anticipated that well yields would be low and a high number of wells would be required to meet project demands. Construction of a SIG within Segment 6 is limited by the constraints of thin sediment cover, mass wasting of the shoreline cliffs, and the high wave energy environment in this segment are not ideal for siting and construction of a SIG. Furthermore, the presence of kelp beds in this area indicates a rocky seafloor bottom. In the ISTAP technical feasibility analysis, a rocky bottom was considered an unsuitable condition for a SIG (ISTAP 2014). **Please provide hydrogeological data to support conclusions.** Geologic maps for this area all show no alluvium or alluvial deposits which would be necessary for wells. Kennedy, M.P., and Tan, S.S., 2007, *Geologic map of the Oceanside 30' by 60' quadrangle, California: A digital database, Orange County* http://conservation.ca.gov/cgs/rghm/rgm/Pages/preliminary_geologic_maps.aspx: California *Geological Survey, Regional Geologic Map No. 2, scale 1: 100,000.* *Geologic Map of the Dana Point 7.5' Quadrangle Orange County, California: A Digital Database* ftp://ftp.consrv.ca.gov/pub/dmg/rgmp/Prelim_geo_pdf/dana_point.pdf Morton D.M., and Miller, F.K., 2006, *Geologic map of the San Bernardino and Santa Ana 30' x 60' quadrangles, California,* http://ngmdb.usgs.gov/Prodesc/proddesc_78686.htm: U.S. *Geological Survey, Open-File Report 2006-1217, scale 1: 100,000.* Saucedo, G.J., Greene, H.G., Kennedy, M.P., and Bezore, S.P., 2009 (in progress*), Geologic map of the Long Beach 30' by 60' quadrangle, California: A digital database,* http://conservation.ca.gov/cgs/rghm/rgm/Pages/preliminary_geologic_maps.aspx: California *Geological Survey, Preliminary Geologic Map, scale 1: 100,000*	**Is it possible to commingle part of the discharge with SOCWA's Aliso Creek Ocean Outfall?** **Not Possible** The two wastewater treatment plants near the south Orange County coastline are South Orange County Wastewater Authority's (SOCWA's) Coastal Treatment Plant (via the Aliso Creek Outfall), and SOCWA's JB Lanthem Treatment Plant (via the San Juan Creek Ocean Outfall). As discussed in the *Brine Discharge Memorandum*, SOCWA's Coastal Treatment Plant and JB Lanthem Treatment Plant do not have sufficient wastewater flows or capacity to dilute the HBDP's brine discharge sufficiently and that the discharge areas for these outfalls contain sensitive marine biological resources that could be affected from increased salinity in their discharge. **Is it possible to commingle part of the discharge with SOCWA's San Juan Creek Ocean Outfall?** **Not Possible** The two wastewater treatment plants near the south Orange County coastline are South Orange County Wastewater Authority's (SOCWA's) Coastal Treatment Plant (via the Aliso Creek Outfall), and SOCWA's JB Lanthem Treatment Plant (via the San Juan Creek Ocean Outfall). As discussed in the *Brine Discharge Memorandum*, SOCWA's Coastal Treatment Plant and JB Lanthem Treatment Plant do not have sufficient wastewater flows or capacity to dilute the HBDP's brine discharge sufficiently and that the discharge areas for these outfalls contain sensitive marine biological resources that could be affected from increased salinity in their discharge. **Diffuser** **Not Possible,** Segment 6 has no ASBSs but does contain approximately 2,603 acres of MPAs and 179 acres of kelp beds. Therefore, siting a desalination plant with a brine discharge, including a multi-port diffuser, in Segment 6 could result in marine life mortality and habitat degradation from increased salinity levels and entrainment due to shear forces produced by a multi-port diffuser as well as significant construction related impacts in building the necessary pipeline.	Water supply in this segment is supplied by the South Coast Water District which during normal hydrological years, is 80 percent dependent on imported water, and the remaining 20 percent of its demand comes from its one million gallons per day (MGD) Groundwater Recovery Facility (GRF) and recycled water. In 2008, the District incorporated local groundwater into its water resource portfolio with the construction of its GRF, which extracts and treats brackish groundwater from the Basin. The District's past groundwater production has averaged roughly 850 AFY, or about 12 percent of the District's total water supply. With the addition of the District's second GRF well (located in the City of Dana Point's Creekside Park), the District will be able to extract its full permitted amount of extract 1,300 AFY from the Basin, which will net approximately 1,040 AFY of treated groundwater production. The Creekside well is expected to be operational by 2017. Construction-related environmental impacts to Aliso Creek and Salt Creek are possible. There are no identifiable industrial locations near the coast in the area of any scale that could support a desalination project. Construction of pipelines extending from the collection wells to the desalination facility would require excavation beneath the transportation corridor that extends along the entire Segment. This could involve interruptions in rail and highway traffic and could increase the hazards involved with construction. Distance from OCWD distribution system: 26 miles. "None of the existing pipelines are of sufficient size to accommodate the flow of the plant back to OCWD. Also, the pump station(s) required to reverse flow and make grade would be cost prohibitive." Email from Howard Johnson, Executive Vice President, Richard Brady & Associates, Inc., dated September 1, 2016, www.richardbrady.com. . See Orange County Coastal Pipelines map in Property 1A.

	Geology and Engineering Aspects of the Laguna Beach Quadrangle, Orange County, CA" (CA Div. of Mines and Geology, Special Report 127, 1976) - https://archive.org/details/geologyengineeri127tans *Geologic Map of California, Santa Ana Sheet*, Compiled by D. M. Morton, Version 2 prepared by Kelly R. Bovard and Rachel M. Alvarea, 2004 http://pubs.usgs.gov/of/1999/of99-172/sanana2.pdf In the *Subsurface Intake Analysis for the Huntington Beach Desalination Plant Memorandum* (*Subsurface Intake Memorandum*) dated November 11, 2013 from Dudek to Poseidon, it was determined that the hydrological and geological characteristics of the Talbert Gap area could be used to generalize those characteristics of other areas in the Orange County coastline for the purposes of estimating potential subsurface intake yields. This *Subsurface Intake Memorandum* evaluated subsurface intakes in various areas along the Orange County coastline as a supplement to the potential yield in the Talbert Gap area and concluded that "It is unlikely that sufficient yield could be produced from the remaining areas of coastline within the study area, even if numerous additional wells could support the additional 40 MGD of feedwater. In addition, establishing intake locations in geographically dispersed locations would require either pumping of feedwater over large distances to a centralized desalination plant, or establishment of numerous smaller plants, which would substantially increase both energy use and costs as compared to the proposed HBDP. Therefore, the use of subsurface intakes at multiple sites would not only be infeasible from a technical and environmental perspective, but would be impractical, and would place an unnecessary burden on ratepayers." See *ISTAP Phase 1 and Phase 2 Reports, the Huntington Beach Desalination Plant Alternative Sites Analysis* conducted by Dudek dated June 11, 2015, and the Dudek memo titled *Subsurface Intake Analysis for the Huntington Beach Desalination Plant* dated November 11, 2013. 6, 7, 12 **Combined intake system – what is maximum amount of feed water that can be withdrawn through a subsurface intake?** **None** Due to the hydraulic conductivity of the near shore sediments in this area it would be infeasible to use a subsurface collector to produce even 40 MGD from the entire central and southern portions of the Orange County coast. Segment 6 contains approximately 2,603 acres of MPAs and 179 acres of kelp beds. As such, these sensitive marine habitats and the organisms within them would be negatively affected as a result of siting a surface intake within Segment 6.		

Segment 7 Segment 7 extends south from the Dana Point Headlands and terminates just south of San Juan Creek. This segment is located within the Aliso-San Onofre watershed, which drains approximately 498 square miles of land (NRCS 2013). San Juan Creek and Dana Point Harbor are the main surface water bodies within Segment 7. San Juan Creek originates in the Sana Ana Mountains to the north and drains both open space and urbanized areas.	**Is it technically possible to use subsurface intakes to withdraw 106 MGD of feed water?** **No** The nearshore sediments deposited by the watersheds in Segment 7 would likely not result in a hydraulic conductivity as high as those near the HBDP site and therefore similar conclusions that subsurface intakes (except for a SIG) would be infeasible in this area would apply. The San Juan Valley Groundwater Basin is related to Segment 7. The San Juan Valley Groundwater Basin underlies the San Juan Valley and several tributary valleys in southern Orange County. The surface area of this basin is 26 square miles and the total storage has been estimated to be 90,000 AF. The Dana Point Ocean Desalination Project, now the Doheny Desal Project, has been developed after considerable analysis and testing and the South Coast Water District is pursuing a 4 to 15 MGD desal project to tap in to this coastal aquifer. The San Juan Valley Groundwater Basin is approximately 26 square miles (DWR Bulletin 118). Quaternary alluvium is the primary water bearing unit of this groundwater basin. The average onshore thickness of the alluvium is approximately 65 feet and well yields in the aquifer range from 1.4 to 0.7 MGD (*DWR Bulletin 118*). This basin is currently under study for a slant well extraction of seawater to support a proposed 15 MGD desalination plant. **Please provide hydrogeological data to support conclusions.** Geologic maps for this area all show a limited amount of alluvium or alluvial deposits which would be necessary for wells. Kennedy, M.P., and Tan, S.S., 2007, *Geologic map of the Oceanside 30' by 60' quadrangle, California: A digital database, Orange County* http://conservation.ca.gov/cgs/rghm/rgm/Pages/preliminary_geologic_maps.aspx: California *Geological Survey, Regional Geologic Map No. 2, scale 1: 100,000.* *Geologic Map of the Dana Point 7.5' Quadrangle Orange County, California: A Digital Database* ftp://ftp.consrv.ca.gov/pub/dmg/rgmp/Prelim_geo_pdf/dana_point.pdf Morton D.M., and Miller, F.K., 2006, *Geologic map of the San Bernardino and Santa Ana 30' x 60' quadrangles, California*, http://ngmdb.usgs.gov/Prodesc/proddesc_78686.htm: U.S. *Geological Survey, Open-File Report 2006-1217, scale 1: 100,000*. Saucedo, G.J., Greene, H.G., Kennedy, M.P., and Bezore, S.P., 2009 (in progress*), Geologic map of the Long Beach 30' by 60' quadrangle, California: A digital database,*	**Is it possible to commingle part of the discharge with SOCWA's Aliso Creek Ocean Outfall?** **Not Possible** The existing San Juan Creek Ocean Outfall associated with the SOCWA JB Lanthem Treatment Plant in the central portion of Segment 7. The San Juan Creek Ocean Outfall is approximately 2.2 miles long has a capacity of approximately 36.8 MGD and an average annual discharge of approximately 17.3 MGD (SOCWA 2014b). As such, a desalination plant location in Segment 7 may be within an adequate distance to consider co-location of brine discharge with the Aliso Creek Ocean Outfall, but the South Coast Water District's proposed desalination project's waste brine concentrate from the Reverse Osmosis unit process will be co-disposed with treated municipal wastewater in the adjacent San Juan Creek Ocean Outfall. **Is it possible to commingle part of the discharge with SOCWA's San Juan Creek Ocean Outfall?** **Not Possible** As discussed in the *Brine Discharge Memorandum*, SOCWA's Coastal Treatment Plant and JB Lanthem Treatment Plant do not have sufficient wastewater flows or capacity to dilute the HBDP's brine discharge sufficiently and that the discharge areas for these outfalls contain sensitive marine biological resources that could be affected from increased salinity in their discharge **Diffuser** **Not Possible** Segment 7 contains approximately 96 acres of MPAs in the northern portion of the segment, which are identified in the Final OPA for avoidance by desalination plant brine discharges. Additionally, the segment contains approximately 34 acres of kelp beds that provide habitat for various marine organisms. Therefore, locating a desalination plant with a brine discharge, including a multi-port diffuser, in Segment 7 could negatively affected these sensitive areas and marine habitats depending on the specific siting, design, and technology of brine discharge used.	The *Alternative Sites Analysis* found that parts Segment 1 (the area north of the Santa Ana River) and Segment 7 (Dana Point) had the highest suitability for well intakes due to the presence of alluvial deposits and potentially higher aquifer yields than in other study area segments. There have been thorough hydrological investigations in both segments. In Segment 1, for the Huntington Beach Desal Project including the ISTAP and WIT Investigation studies. This finding is consistent with the *2003 MWDOC Ocean Desalination Plant Feasibility Study*. After assessing the almost 40 miles of coastal shoreline, preliminary studies for a potential ocean desalination plant focused on three sites: Huntington Beach, San Juan Creek, and San Onofre. The more specific locations are as follows: Huntington Beach -at the AES power plant site; San Juan Creek near the mouth of San Juan Creek in Dana Point; and San Onofre at the San Onofre Nuclear Generating Station (SONGS). San Onofre is further ruled out as Edison has a multi-decade nuclear plant decommissioning effort underway and has indicated that it does not want a desalination facility on or near the site as it undertakes the decommissioning Construction related environmental impacts to adjacent wetland and riparian habitat is possible. The site is highly developed, limiting available space for a desalination plant. Coastal access and views could be impeded depending on subsurface intake technology used in this area. Construction of pipelines extending from the collection wells to the desalination facility would require excavation beneath the transportation corridor that extends along the entire Segment. This could involve interruptions in rail and highway traffic and could increase the hazards involved with construction. While not yet analyzed by CEQA, the project location for the Doheny Project is likely the only location in this segment possibly suitable for desalination facility (albeit for a much smaller scale than the Huntington Beach project). The area is heavily residential or has parks and beaches. There are no known zoned industrial sites in the area. Distance from OCWD distribution system: 27 miles. "None of the existing pipelines are of sufficient size to accommodate the flow of the plant back to OCWD. Also, the pump station(s) required to reverse flow and make grade would be cost prohibitive." Email from Howard Johnson, Executive Vice President, Richard Brady & Associates, Inc., dated September 1, 2016, www.richardbrady.com. . See Orange County Coastal Pipelines map in Property 1A.

	http://conservation.ca.gov/cgs/rghm/rgm/Pages/preliminary_geologic_maps.aspx: California Geological Survey, Preliminary Geologic Map, scale 1: 100,000 *Geology and Engineering Aspects of the Laguna Beach Quadrangle, Orange County, CA" (CA Div. of Mines and Geology, Special Report 127*, 1976) - https://archive.org/details/geologyengineeri127tans *Geologic Map of California, Santa Ana Sheet, Compiled by D. M. Morton, Version 2* prepared by Kelly R. Bovard and Rachel M. Alvarea, 2004 http://pubs.usgs.gov/of/1999/of99-172/sanana2.pdf **Combined intake system – what is maximum amount of feed water that can be withdrawn through a subsurface intake?** **None** In Segment 7, in 2013, after five years and $6.2 million to investigate use of a slant well intake for the Doheny Ocean Desalination Project, it was concluded the project was feasible and could produce up to 15 MGD (16,800 AFY) of new potable water supplies to five participating agencies. These agencies consisted of: The District, City of San Clemente, City of San Juan Capistrano, Laguna Beach County Water District (LBCWD) and MNWD. The South Coast Water District has taken the lead on the project and has hired a consulting team to proceed with project development for the Doheny Ocean Desalination Project. On March 11, 2016, the District issued a NOP for the project draft EIR. The District is investigating the possibility of constructing a 5 MGD demonstration phase with potential future expansions up to 15 MGD. The EIR will evaluate both the initial 5 MGD demonstration phase as well as up to the 15 MGD ultimate capacity. Both the initial 5 MGD and ultimate 15 MGD capacities would be available for the District and local water agencies to provide a high quality, locally-controlled, drought-proof potable drinking water supply. The desalination facility would also provide emergency back-up water supplies should an earthquake, system shutdown, or other event disrupt the delivery of imported water to the area. (South Coast Water District, *2015 Urban Water Management Plan.* Due to the hydraulic conductivity of the near shore sediments in this area it would be infeasible to use a subsurface collector to produce even 40 MGD from the entire central and southern portions of the Orange County coast. Segment 7 does not contain any existing seawater surface intakes that could be used for co-location. The siting of a desalination plant surface intake in Segment 7 could affect sensitive biological and marine resources present in that segment. There are approximately 96 acres of MPAs, which area areas that the Final OPA specifically identifies to be avoided and for desalination plant intakes to be setback from to the		

	maximum extent feasible. Additionally, Segment 7 contains approximately 34 acres of kelp beds that provide habitat for a variety of marine species that could be negatively affected from the siting of a desalination plant surface intake in this segment.		
Segment 8 Segment 8 begins just south of San Juan Creek and terminates just south of the Segunda Deshecha Canada, a channelized stream that discharges to the Pacific Ocean. This segment is located within the Aliso-San Onofre watershed, which drains approximately 498 square miles of land (NRCS 2013). Prima Deshecha Canada is one of two main streams that flow through Segment 8. Its discharge is located at Poche Beach within the City of San Clemente. The Segunda Deshecha Canada is the second main stream within Segment 8. Its discharge is located at the northern boundary of North Beach within the City of San Clemente, near the southern boundary of Segment 7	**Is it technically possible to use subsurface intakes to withdraw 106 MGD of feed water?** **No** The continental shelf within Segment 8 is wider than that of Segments 4 through 7, extending approximately 3 miles offshore, and is defined by the eastern extent of the Newport-Inglewood fault zone. Sediment cover on the shelf ranges from <5 to 15 feet (Sommerfield et al. 2009). No major creeks drain Segment 8 and there are no defined coast aquifers in this segment. Well yields in Segment 8 are expected to be low (<1 MGD), similar to the anticipated yields in Segments 4 through 6. A prohibitively large number of wells would be required to meet the project demands in this segment. The nearshore sediments deposited by the watersheds in Segment 8 would likely not result in a hydraulic conductivity as high as those near the HBDP site and therefore similar conclusions that subsurface intakes (except for a SIG) would be infeasible in this area would apply. **Please provide hydrogeological data to support conclusions.** Geologic maps for this area all show no alluvium or alluvial deposits which would be necessary for wells. Kennedy, M.P., and Tan, S.S., 2007, *Geologic map of the Oceanside 30' by 60' quadrangle, California: A digital database, Orange County* http://conservation.ca.gov/cgs/rghm/rgm/Pages/preliminary_geologic_maps.aspx: *California Geological Survey, Regional Geologic Map No. 2, scale 1: 100,000.* *Geologic Map of the Dana Point 7.5' Quadrangle Orange County, California: A Digital Database* ftp://ftp.consrv.ca.gov/pub/dmg/rgmp/Prelim_geo_pdf/dana_point.pdf Morton D.M., and Miller, F.K., 2006, *Geologic map of the San Bernardino and Santa Ana 30' x 60' quadrangles, California,* http://ngmdb.usgs.gov/Prodesc/proddesc_78686.htm: U.S. *Geological Survey, Open-File Report 2006-1217, scale 1: 100,000*. Saucedo, G.J., Greene, H.G., Kennedy, M.P., and Bezore, S.P., 2009 (in progress*), Geologic map of the Long Beach 30' by 60' quadrangle, California: A digital database,* http://conservation.ca.gov/cgs/rghm/rgm/Pages/preliminary_geologic_m	**Is it possible to commingle part of the discharge with SOCWA's Aliso Creek Ocean Outfall?** **Not Possible** As discussed in the *Brine Discharge Memorandum*, the NPDES application and as elsewhere previously provided in this table for other locations, SOCWA's Coastal Treatment Plant and JB Lanthem Treatment Plant do not have sufficient wastewater flows or capacity to dilute the HBDP's brine discharge sufficiently and that the discharge areas for these outfalls contain sensitive marine biological resources that could be affected from increased salinity in their discharge. **Is it possible to commingle part of the discharge with SOCWA's San Juan Creek Ocean Outfall?** **Not Possible** As discussed in the *Brine Discharge Memorandum*, the NPDES application and as elsewhere previously provided in this table for other locations, SOCWA's Coastal Treatment Plant and JB Lanthem Treatment Plant do not have sufficient wastewater flows or capacity to dilute the HBDP's brine discharge sufficiently and that the discharge areas for these outfalls contain sensitive marine biological resources that could be affected from increased salinity in their discharge **Diffuser** .**Possible,** though very doubtful as construction of the associated discharge pipeline will have significant and severe construction-related benthic, traffic, site access, noise and visual impacts and the diffuser will have construction related benthic impacts	Construction of a SIG within Segment 8 is limited by the same constraints as in Segments 4 through 6: thin sediment cover, mass wasting of the shoreline, and the high wave energy environment in this segment are not ideal for siting and construction of a SIG. However, the scattered and sparse distribution of kelp beds throughout the offshore areas of Segment 8 indicates the potential for seafloor areas that do not have rocky bottoms. As such, in the absence of the other constraining factors listed above, portions of the seafloor in Segment 8 could be potentially conducive for constructing a SIG. No major creeks drain Segment 8 and there are no defined coast aquifers in this segment. Well yields in Segment 8 are expected to be low (<1 MGD), similar to the anticipated yields in Segments 4 through 6. A prohibitively large number of wells would be required to meet the project demands in this segment. Construction of pipelines extending from the collection wells to the desalination facility would require excavation beneath the transportation corridor that extends along the entire Segment. This could involve interruptions in rail and highway traffic and could increase the hazards involved with construction. Operation of collection wells along Dohney State Beach, Poche Beach, and North Beach would permanently reduce the stock of beach available for recreation and would permanently degrade the coastal viewshed that can be experience from these beaches and the nearby bluff tops. Distance from OCWD distribution system: 30 miles. "None of the existing pipelines are of sufficient size to accommodate the flow of the plant back to OCWD. Also, the pump station(s) required to reverse flow and make grade would be cost prohibitive." Email from Howard Johnson, Executive Vice President, Richard Brady & Associates, Inc., dated September 1, 2016, www.richardbrady.com. . See Orange County Coastal Pipelines map in Property 1A.

	aps.aspx: California *Geological Survey, Preliminary Geologic Map, scale 1: 100,000* *Geology and Engineering Aspects of the Laguna Beach Quadrangle, Orange County, CA*" (CA Div. of Mines and Geology, Special Report 127, 1976) - https://archive.org/details/geologyengineeri127tans *Geologic Map of California, Santa Ana Sheet*, Compiled by D. M. Morton, Version 2 prepared by Kelly R. Bovard and Rachel M. Alvarea, 2004 http://pubs.usgs.gov/of/1999/of99-172/sanana2.pdf **Combined intake system – what is maximum amount of feed water that can be withdrawn through a subsurface intake?** **None** Segment 8 does not contain any ASBSs or MPAs but does contain approximately 27 acres of kelp beds scattered throughout the segment. If a desalination plant surface intake was sited within Segment 8 it would likely negatively affect some of the sensitive marine organisms within these kelp bed areas, but it would avoid the sensitive areas within the ASBSs and MPAs. Due to the hydraulic conductivity of the near shore sediments in this area it would be infeasible to use a subsurface collector to produce even 40 MGD from the entire central and southern portions of the Orange County coast.		
Segment 9 Segment 9 begins south of the Segunda Deshacha Canada and extends to the southern boundary of Orange County, near San Mateo Point. This segment is within the Aliso-San Onofre watershed, which drains approximately 498 square miles of land (NRCS 2013).	**Is it technically possible to use subsurface intakes to withdraw 106 MGD of feed water?** **No** Well yields in Segment 9 are expected to be low (<1 MGD), Due to the hydraulic conductivity of the near shore sediments in this area it would be infeasible to use a subsurface collector to produce even 40 MGD from the entire central and southern portions of the Orange County coast. **Please provide hydrogeological data to support conclusions**. Geologic maps for this area all show a very limited amount of alluvium or alluvial deposits which would be necessary for wells. The San Mateo Valley Groundwater Basin which underlies San Mateo Valley and Christianitos Canyon in northwest San Diego and southeastern Orange County. The surface area of this basin is 4.7 miles and the total storage for this basin is 14,000 AF, which is just 15% of the storage in the San Juan Valley Ground Water Basin in Segment 7. Kennedy, M.P., and Tan, S.S., 2007, *Geologic map of the Oceanside 30' by 60' quadrangle, California: A digital database, Orange County*	**Is it possible to commingle part of the discharge with SOCWA's Aliso Creek Ocean Outfall?** **Not Possible** Segment 9 does not contain an existing wastewater discharge and is not in proximity to an existing wastewater discharge in any of the adjacent study area segments **Is it possible to commingle part of the discharge with SOCWA's San Juan Creek Ocean Outfall?** **Not Possible** Segment 9 does not contain an existing wastewater discharge and is not in proximity to an existing wastewater discharge in any of the adjacent study area segments **Diffuser** **Possible,** though very doubtful as construction of the associated discharge pipeline will have significant and severe construction-related benthic, traffic, site access, noise and visual impacts and the diffuser will have construction related benthic impacts	Segment 9 has approximately 278 acres of kelp beds and the beach area around San Clemente Pier is identified as a potential grunion spawning location. Construction of pipelines extending from the collection wells to the desalination facility would require excavation beneath the transportation corridor that extends along the entire Segment. This could involve interruptions in rail and highway traffic and could increase the hazards involved with construction. There are no known available industrial sites in this area. The coastal area has either high bluffs or heavy residential use. It is extremely doubtful that a successful zoning change could be made to support a 5-10-acre site to build a desalination project let alone putting in the necessary supporting infrastructure including a major discharge pipe needed for a diffuser Distance from OCWD distribution system: 34 miles. "None of the existing pipelines are of sufficient size to accommodate the flow of the plant back to OCWD. Also, the pump station(s) required to reverse flow and make grade would be cost prohibitive." Email from Howard Johnson, Executive Vice President, Richard Brady & Associates, Inc., dated September 1, 2016, www.richardbrady.com. . See Orange County Coastal Pipelines map in Property 1A.

	http://conservation.ca.gov/cgs/rghm/rgm/Pages/preliminary_geologic_maps.aspx: California Geological Survey, Regional Geologic Map No. 2, scale 1: 100,000. *Geologic Map of the Dana Point 7.5' Quadrangle Orange County, California: A Digital Database* ftp://ftp.consrv.ca.gov/pub/dmg/rgmp/Prelim_geo_pdf/dana_point.pdf Morton D.M., and Miller, F.K., 2006, *Geologic map of the San Bernardino and Santa Ana 30' x 60' quadrangles, California,* http://ngmdb.usgs.gov/Prodesc/proddesc_78686.htm: U.S. Geological Survey, Open-File Report 2006-1217, scale 1: 100,000. Saucedo, G.J., Greene, H.G., Kennedy, M.P., and Bezore, S.P., 2009 (in progress), *Geologic map of the Long Beach 30' by 60' quadrangle, California: A digital database,* http://conservation.ca.gov/cgs/rghm/rgm/Pages/preliminary_geologic_maps.aspx: California *Geological Survey, Preliminary Geologic Map, scale 1: 100,000* *Geology and Engineering Aspects of the Laguna Beach Quadrangle, Orange County, CA" (CA Div. of Mines and Geology, Special Report 127*, 1976) - https://archive.org/details/geologyengineeri127tans *Geologic Map of California, Santa Ana Sheet,* Compiled by D. M. Morton, Version 2 prepared by Kelly R. Bovard and Rachel M. Alvarea, 2004 http://pubs.usgs.gov/of/1999/of99-172/sanana2.pdf **Combined intake system – what is maximum amount of feed water that can be withdrawn through a subsurface intake?** **None** The siting of a desalination plant surface intake in Segment 9 could affect sensitive biological and marine resources present as Segment 9 does contain approximately 278 acres of kelp beds that provide habitat for a variety of marine species that could be negatively affected from the siting of a desalination plant surface intake in this segment. Construction of a SIG within Segment 9 is limited by the same constraints as in Segments 4 through 6: thin sediment cover, mass wasting of the shoreline and the high wave energy environment in this segment are not ideal for siting and construction of a SIG.		