December 6, 2018

Scott Maloni, Vice President
Poseidon Water
5780 Fleet Street, Suite 140
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smaloni@poseidonwater.com

REQUEST FOR INFORMATION: SEAFLOOR SEDIMENT CHARACTERISITICS AND LITHOLOGICAL DATA IN AREA OFFSHORE OF THE PROPOSED HUNTINGTON BEACH SEAWATER DESALINATION FACILITY

Dear Mr. Maloni:

As you are aware, on June 21 and July 9, 2018, Coastkeeper Alliance submitted analyses of the feasibility of subsurface intakes for the proposed Poseidon Water Huntington Beach Desalination Project (Project) to the Santa Ana Regional Water Quality Control Board (Regional Board). Staff from the Regional Board and the State Water Resources Control Board (State Water Board) (collectively, Water Boards) reviewed these submittals and the documents previously submitted by Poseidon Water (Poseidon) to support the infeasibility of subsurface intakes. Water Boards' staff, Poseidon, and Poseidon's hydrogeological consultant, Geosyntec, met on October 8, 2018 to discuss Water Boards staff's evaluation of the submittals. This letter summarizes and clarifies what the Water Boards conveyed to you in that meeting, and requests additional information concerning the feasibility of subsurface intakes.

Review of Documents

Prior to our meeting, staff reviewed the HydroFocus report and Poseidon's response to that report (Appendix CCCCC). As part of this review: staff reassessed the documents and appendixes containing hydrogeological and geophysical data that Poseidon previously submitted in support of the proposed site for the Project; the hydrogeological model that your technical team relied upon in concluding that slant wells would not be suitable for intake of seawater at the proposed site; and the May 18, 2018 letter from Roy Herndon of the Orange County Water District, discussing the slant well intake option (Attachment 1).

In his letter, Mr. Herndon expressed general agreement with Geosyntec's conclusion that slant wells would not be feasible for seawater intake. Notably, however, Mr. Herndon stated:

> "We appreciate the Regional Board's need to investigate the feasibility of subsurface seawater intakes as a potential source of water for the proposed Poseidon seawater desalination facility in Huntington Beach. **The challenge is that this concept entails pumping large quantities of shallow groundwater for the first time in areas where the hydrogeological conditions have not been substantially characterized, including the fundamental question of how hydraulically connected the subsurface intakes would be to the ocean vs. inland aquifers**." (Emphasis added.)

Previous Request for Information

This is not the Water Boards' first request for information concerning subsurface intakes. On October 31, 2016, the Regional Board asked Poseidon to provide additional information to address this matter. Poseidon's submission was not adequate, and we provided Poseidon with technical comments on the submission and again requested additional information in a letter dated May 23, 2017 (Attachment 2). Specifically, we asked Poseidon to provide an estimate of the maximum production volume that could be extracted by slant wells offshore of the Talbert, Bolsa and Sunset gaps without negatively impacting seawater intrusion barriers and coastal wetlands (i.e., the "safe yield"). We also asked for a sensitivity analysis of the hydrogeologic model, utilizing a range of representative hydraulic conductivity input values for the offshore sediments and the wetland areas. Since then, we also discussed the hydrogeological model with your technical team during several meetings and in multiple email correspondence. Poseidon has not provided the requested information in full and has not performed the requested sensitivity analysis.

Coastkeeper's submittals pertain to the issue of the feasibility of subsurface intakes and require staff to reevaluate the issue. The information in the model analysis performed by HydroFocus (September 2016) is consistent with the Water Boards staff's previous comments and the observations presented below.

Discussion

Chapter III.M.2.d.(1)(a) of the California Ocean Plan provides that the "regional water board in consultation with State Water Board staff shall require subsurface intakes unless it determines that subsurface intakes are not feasible." Based on the information provided by Poseidon and Coastkeeper's submission, the Water Boards' staff do not have sufficient information to make a recommendation as to whether subsurface intakes are feasible.

In consideration of all currently available geological, geophysical and hydrogeological reports pertaining to the proposed facility, as well as the historical data and reports cited, we offer the following observations:

1. Poseidon/Geosyntec have ruled out the use of slant wells for offshore subsurface intake of sea water based largely on results of screening-level groundwater flow modelling of subsurface extraction that predicts interference with the Orange County Water District's Talbert Gap and Alamitos Gap sea water intrusion

barriers, negative impacts to the coastal wetlands ecosystem, mobilization of contaminated groundwater in the Sunset Beach area, and potential subsidence resulting from simulated drawdown of the water table.

2. There is limited information regarding the hydraulic and lithological characteristics of the sediments below the seabed in the area offshore of the proposed Huntington Beach project site, and the other potential subsurface intake sites. Poseidon's vibracore borings extended to a maximum of only 20 feet below the seabed; yet your technical team believes that the limited data from those shallow borings, combined with an extrapolation of geophysical data and inland lithological data, are sufficient to support the conclusion that the underlying lithologies "include numerous layers of fine-grained, low permeability sediments that collectively limit the hydraulic connections between the upper aquifer and the ocean." Because of sensitive habitat, Poseidon has not been asked to collect samples in any wetland areas; however, information on the soil types and characteristics in typical wetlands environments can be obtained from scientific literature.

During our October 8 meeting, staff explained to your technical team that additional offshore borings could be advanced to collect deeper sediment samples and measure hydraulic conductivity. We also informed your team that they should utilize scientific literature to obtain accurate values of the vertical permeability of sediments beneath the wetlands to allow for more reliable prediction of potential leakage from those wetlands in response to pumping. Further, we informed your team that with additional offshore and wetlands sediment data, safe yield estimate, and the appropriate sensitivity analysis, there may be sufficient information for staff to make a recommendation on the feasibility of subsurface intakes.

Conclusion

In the absence of the information previously requested and described above, and based on the existing data, we conclude that Poseidon has not demonstrated that the use of an array of slant wells for sea water intake, most notably in a combined intake scenario, would be infeasible.

Our conclusion is justified as follows:

- Based on the current understanding of hydrogeologic conditions as presented by Poseidon, slant wells could possibly be operated at an extraction rate that would be protective of both the inland aquifers and the wetlands ecosystem.
- Subsurface intake would reduce the volume of sea water drawn in through an offshore intake pipe, thus minimizing the entrainment of sea life.

By December 31, 2018, please submit the following:

1. An estimate of the maximum production volume that could be extracted by slant wells offshore of the Talbert, Bolsa and Sunset gaps without negatively impacting inland aquifers and coastal wetlands (i.e., the "safe yield"); and

2. A sensitivity analysis of the hydrogeologic model, utilizing a range of representative hydraulic conductivity input values for the offshore sediments and the wetland areas.

If you wish to discuss this matter further, please contact me at (951) 782-4493, or you may send email to hope.smythe@waterboards.ca.gov. You may also contact Ann Sturdivant, Chief of our Groundwater and Regulatory Division, at (951) 782-4904, or by email to ann.sturdivant@waterboards.ca.gov.

Sincerely,

Hope Smythe

Hope A. Smythe
Executive Officer

Attachment 1 – Letter from Roy Herndon to RWQCB dated May 18, 2018
Attachment 2 – Letter from RWQCB to Scott Maloni dated May 23, 2017

cc: Kimberly Tenggardjaja, SWRCB (kimberly.tenggardjaja@Waterboards.ca.gov)
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ORANGE COUNTY WATER DISTRICT

ORANGE COUNTY'S GROUNDWATER AUTHORITY

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May 18, 2018

Ms. Jayne Joy
Assistant Executive Officer
Santa Ana Regional Water Quality Control Board
3737 Main Street, Suite 500
Riverside, CA 92501

Subject: Review of Geosyntec Report prepared for Poseidon to Evaluate the Feasibility of Subsurface Seawater Intakes in Bolsa, Sunset, and Alamitos Gaps for the Proposed Huntington Beach Desalination Plant dated July 25, 2017

Dear Ms. Joy,

Per your letter dated April 23, 2018, Orange County Water District (OCWD) staff has performed an initial review of the subject report by Geosyntec and provides comments below as they relate to the question of the maximum yield of potential slant wells at the Talbert, Bolsa, Sunset, and Alamitos Gaps without negatively impacting the seawater intrusion barriers or groundwater resources of the Orange County Groundwater Basin.

1. It was not explicitly stated in the Geosyntec report, but OCWD staff interpreted the Alternative Sites 1D, 1E, 1G, and 1H as alternative locations for storage, blending, and/or treatment facilities, but <u>not</u> as locations for subsurface extraction wells. Therefore, our review comments are limited to Geosyntec's modeling evaluation of the effects of slant wells along the beaches at the four gaps, as depicted in the report figures.

2. The four coastal models developed by Geosyntec utilize information from previous OCWD models which generally end at the coastline; however, Geosyntec's models extend off shore beyond the boundaries of OCWD's models, as this was necessary for the slant well evaluation. OCWD staff did not independently verify the input parameters or output of Geosyntec's models, as this would require a substantial hydrogeologic and modeling exercise that exceeds current OCWD staff resources. We did, however, review Geosyntec's summary-level descriptions of their modeling assumptions, sensitivity analyses, and results. Based on our review, we did not identify assumptions or descriptions that run counter to our conceptual understanding of the on-shore hydrogeology. Our knowledge of off-shore hydrogeologic conditions, particularly for the Bolsa, Sunset, and Alamitos Gaps, is limited. What has been well documented is that the hydrogeologic conditions of the coastal gaps are highly complex, each gap having distinct characteristics.

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3. Under the modeling scenarios described by Geosyntec, slant wells near the beach at the four gaps would extract groundwater from aquifer zones as shallow as approximately 30 feet below ground surface (bgs) and as deep as 200 feet bgs, depending on location. As extraction occurs, a groundwater level depression forms which will draw water that originates from a combination of the ocean, inland groundwater, and wetlands surface water and near-surface groundwater. The relative proportions of those sources at each gap will depend on the lateral and vertical permeabilities of the aquifer zone and overlying aquitard, and the degree of on-shore and off-shore faulting. Acknowledging their inherent uncertainty, Geosyntec considered these factors and performed sensitivity analyses in their model scenarios.

4. Geosyntec presented the results of model-simulated slant well extraction at each of the four gaps. The effects of extraction were presented as groundwater drawdown contour maps and groundwater head equipotential contour and flow path maps for select model layers. The model-estimated proportions of sources for the extracted groundwater were also presented.

   Of the four gaps, the Talbert Gap contains the most transmissive shallow aquifer (Talbert Aquifer), which is well-connected hydraulically to inland aquifers on the north and to the ocean on the south. The Talbert Aquifer is overlain by approximately 50 feet of low-permeability clays and silts that extend miles inland and a significant distance off shore based on sea-floor geotechnical data. These hydrogeologic conditions were accounted for in Geosyntec's Talbert Gap model, which estimated a maximum achievable slant well extraction rate of 70 mgd. Of that amount, the model estimated approximately 15 mgd would come from inland groundwater. 15 mgd of flow equates to a withdrawal of 16,800 acre-feet per year (AFY) from the groundwater basin and would be subject to payment of OCWD's replenishment assessment, currently $445 per AF. Not only would this interfere with the operation and benefits of OCWD's Talbert Seawater Barrier, the volume of extracted groundwater would need to be accounted for in OCWD's annual water budget, meaning it would need to be balanced by some combination of increased replenishment water or reduced pumping – which would be a substantial financial impact to OCWD and its ratepayers.

5. Based on previous investigations that have indicated that Talbert Aquifer permeabilities decrease off shore (relative to inland), OCWD staff believes that the estimated 15 mgd derived from inland aquifers may be higher under actual operations. Geosyntec also indicated that model scenarios using lower slant well extraction rates produced a *higher* proportion of water from inland aquifers, so the consideration of reducing subsurface extraction rates appears to be at odds with the fundamental project objective of developing a new water supply from seawater.

6. Modeling results for the Bolsa Gap indicate a maximum sustainable pumping rate of 15 mgd from slant wells along the shoreline, of which an estimated 18% (approximately 2.7 mgd or 3,000 AFY) would come from inland aquifers. Modeling results for the Sunset Gap indicate a maximum sustainable pumping rate of 9 mgd from slant wells along the shoreline, of which an estimated 13% (approximately 1.2 mgd or 1,300 AFY) would come from inland aquifers. The cumulative estimated inland aquifer flow of 4,300 AFY from slant well extractions at the Bolsa and Sunset Gaps would be subject to payment of the OCWD replenishment assessment and would need to be accounted for in the groundwater basin's annual water budget through a combination of increased replenishment water or reduced groundwater production – which would be an impact to OCWD and its ratepayers.

7. In consideration of a potentially manageable volume of extraction, OCWD staff believes if a subsurface intake project were to be developed along the coastline in the Talbert, Bolsa, or Sunset Gaps, and it had a cumulative maximum draw from inland aquifers of 1,000 AFY, then this amount of withdrawal could be accommodated within the basin's water budget and groundwater management programs, although it would still be subject to payment of the OCWD replenishment assessment.

8. Modeling results for the Alamitos Gap indicate a maximum sustainable pumping rate of 10 mgd from slant wells along the shoreline, of which an estimated 9% (approximately 0.9 mgd or 1,000 AFY) would come from inland aquifers. The estimated 1,000 AFY derived from inland aquifers is equivalent to about 17% of the annual injection of the Alamitos Seawater Barrier and, as such, would detract from the replenishment benefits of that facility to the Orange County Groundwater Basin and Central Basin in Los Angeles County. The potential slant wells are located outside OCWD's boundary in Los Angeles County, so OCWD's replenishment assessment would not apply; however, other institutional issues may apply regarding pumping rights and replenishment assessments within the adjudicated Central Basin.

9. Addressing the question of potential subsurface intake effects on existing groundwater contaminant plumes requires knowledge of the extent of the contaminant plumes as well as the local stratigraphy and degree of hydraulic connection (or separation) between the plumes and capture zones of the subsurface intakes. OCWD staff is aware of contaminant plumes in the Sunset Gap approximately two miles from the coast. Based on the drawdown contours shown on Figure 12, we do not see that there would be a significant effect on the groundwater flow direction that far inland. However, Geosyntec indicates that there are a number of other environmental sites closer to the coast based on a Geotracker search, and these sites may be within the influence of the subsurface intakes. As OCWD staff is not familiar with the hydrogeologic conditions and extent of contamination at those sites, we are not able to comment on the potential influence of the subsurface intake on those sites.

We appreciate the Regional Board's need to investigate the feasibility of subsurface seawater intakes as a potential source of water for the proposed Poseidon seawater desalination facility in Huntington Beach. The challenge is that this concept entails pumping large quantities of shallow groundwater for the first time in areas where the hydrogeologic conditions have not been substantially characterized, including the fundamental question of how hydraulically connected the subsurface intakes would be to the ocean vs. inland aquifers. Despite this uncertainty, Geosyntec developed screening-level models based on available data and previous work by OCWD and others to estimate proportionate flows from different sources. We are comfortable with the general setup of the models and believe the results provide a reasonable basis to conclude that the subsurface seawater intakes, as described, would cause unacceptable impacts to the Orange County Groundwater Basin water supply and seawater barriers.

Please contact John Kennedy at (714) 378-3304 or jkennedy@ocwd.com or the undersigned at (714) 378-3260 or rherndon@ocwd.com if we can be of further assistance.

Sincerely,

Roy L. Herndon
Chief Hydrogeologist

CALIFORNIA
Water Boards

EDMUND G. BROWN JR.
GOVERNOR

MATTHEW RODRIQUEZ
SECRETARY FOR
ENVIRONMENTAL PROTECTION

Santa Ana Regional Water Quality Control Board

May 23, 2017

Scott Maloni, Vice President
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PROPOSED POSEIDON WATER HUNTINGTON BEACH DESALINATION PROJECT, APPLICATION FOR CALIFORNIA WATER CODE SECTION 13142.5(b) DETERMINATION AND REPORT OF WASTE DISCHARGE: REMAINING OUTSTANDING INFORMATION REQUESTS AND TOPICS FOR THIRD PARTY REVIEW

Dear Mr. Maloni:

In the letter dated October 31, 2016, the Santa Ana Regional Water Quality Control Board (Santa Ana Water Board) identified the outstanding information necessary for Santa Ana Water Board staff to determine that Poseidon Water's (Poseidon's) application for a Water Code section 13142.5, subdivision (b) (Water Code section 13142.5(b)) determination for the Huntington Beach Desalination Project (Project) is complete. Over the past six months, the Santa Ana Water Board staff, in conjunction with the State Water Resources Control Board (State Water Board) staff, has worked diligently with Poseidon towards the shared goal of a complete project application. Recently, Poseidon has asked for a clear accounting of what information needs are still outstanding so that Santa Ana Water Board staff can determine that both Poseidon's application for the Water Code section 13142.5(b) determination and its Report of Waste Discharge (ROWD) for renewal/reissuance of the National Pollutant Discharge Elimination System (NPDES) Permit for future operation of the Project are complete.

In response to this request, the purpose of this letter is fourfold. First, this letter identifies the reasonable range of alternative sites requiring further analysis (see Attachment A to this letter). Second, it identifies information requests from the October 31, 2016 letter that are still outstanding and must be submitted in order for Santa Ana Water Board staff to determine that Poseidon's application for a Water Code section 13142.5(b) determination is complete. Third, this letter identifies outstanding information that Poseidon must submit in order for Santa Ana Water Board staff to determine that Poseidon's ROWD for the NPDES Permit is complete. Fourth, this letter identifies topics for which Santa Ana Water Board staff will seek third party review of Poseidon's scientific information and analyses.

Outstanding information requests for Water Code section 13142.5(b) determination
Site

- RCF 18: For the remaining alternative sites (Property 1A-1D, 1E-F, and 1H and Segment 2), provide a description of whether sufficient land is available to accommodate the Project.
- RCF 19: Provide a project timeline for construction of subsurface intakes and surface intakes at each of the alternative sites.
- RCF 21: Update *Appendix W: Assessment of entrainment effects due to the proposed HBDP on State Marine Protected Areas* (May 2015) to include operational impacts from surface intakes at each alternative site (i.e., Property 1A-1D, 1G, 1H, Segment 2) to sensitive habitats and Marine Protected Areas. Use methodology that would account for impacts to estuaries, tidal embayments, and the Seal Beach National Wildlife Refuge (e.g., Regional Ocean Modeling System). For each alternative site, include distance from sensitive habitats, including estuaries.
- RCF 22: Using existing data, calculate Area Production Foregone (APF) for each sampling location in the 2005 Huntington Beach Generating Station entrainment report, to assess entrainment impacts from surface intakes at each location. Add a discussion of whether data from these sampling locations may be representative of surface intakes at the remaining alternative sites.
- RCF 23: Conduct additional hydrogeological modeling to:
    - Estimate the maximum yield from slant wells. Conduct hydrogeological modeling to estimate maximum yield of slant wells sited at Talbert, Bolsa, and Sunset Gaps that can be achieved without negatively impacting coastal aquifers and wetlands. Include estimates of percentages of the source water coming from coastal aquifers, wetland areas, and seawater. Also discuss any potential impacts to existing seawater intrusion barriers. Modeling must include a range of expected permeability of sediment underlying coastal wetland areas that is based on the varying depositional environments associated with wetlands versus surrounding environments. Modeling must also include an appropriate range of vertical permeability for sediments overlying the aquifers, which should incorporate permeability data collected from existing offshore vibracore borings that have indicated vertical permeability ranging from 0.1 to 10 ft/day (average of 10 ft/day). For Bolsa Gap, the model should simulate the discontinuous nature of the Bolsa Aquifer associated with the Newport/Inglewood fault zone, using model input parameters from the calibrated Orange County Water District model. Please see Attachment B to this letter for a response from Water Boards hydrogeologists to Geosyntec's 5/5/17 comments on this RCF.
    - Analyze potential intake of contaminated groundwater. If contaminated groundwater is a potential reason that a subsurface intake is not feasible at Sunset Gap, provide a narrative for how the slant wells in the analysis could be sited and designed in a manner to avoid intake of contaminated groundwater to the extent feasible. Overlay expected zone of pumping influence with existing plume maps that show the distribution of contaminated groundwater. Please see Attachment B to this letter for a response from Water Boards hydrogeologists to Geosyntec's 5/5/17 comments on this RCF.
- RCF 27: Perform an updated analysis for *Appendix FFF: Sensitivity of sweeping velocities to ocean water depth for wedgewire intake screens at HBDF* (2/7/17), using

data from Acoustic Doppler Current Profilers at stations O2 and O4 instead of at the proposed site. Additionally, the report claims that a sweeping velocity of 1 ft/sec is required. However, *Appendix VVV: Sweeping Velocity for Wedgewire Screen Cleaning* (4/16/17) indicates that a sweeping velocity equal to the through-screen velocity may be sufficient. Accordingly, revise the analysis in *Appendix FFF* to reflect that a sweeping velocity of 0.5 ft/s will be sufficient. Furthermore, *Appendix FFF* uses only linear wave theory to calculate currents. Update *Appendix FFF* to reflect other physical mechanisms that contribute to current speed, including internal tides, internal waves, wind-driven currents, and tidal effects.

- RCF 33: If subsurface intakes at an alternative site are being ruled out because of cost, provide project life cycle cost as determined by evaluating the total cost of planning, design, land acquisition, construction, operations, maintenance, mitigation, equipment replacement and disposal over the lifetime of the facility (California Ocean Plan III.M.2.d.1.a.i). If subsurface intakes at an alternative site are being ruled out because of energy use, provide a comparison of energy use for surface intakes and subsurface intakes at that particular site.

Design

- RCF 26: Provide a narrative describing, for each alternative site, how the proposed designs of intakes, discharges, and other infrastructure, including the treatment train, are the best available designs feasible to minimize intake and mortality of all forms of marine life, in comparison to alternative designs at that site.

Technology

- RCF 30: Revise *Dilution analysis Alden 3-jet duckbill diffuser retrofit at HBDF* (2/18/17) to include:
  - The cross sectional area of each port in open and closed configurations, as well as a discussion of how this area varies based on discharge rates
  - A discussion of how the discharge velocity of 10ft/s is calculated
  - Model inputs, outputs, boundary conditions, and sufficient detail to replicate the analyses.
  - An explanation for the basis under which the "worst-case #2" operating scenario might occur
  - Validation of the model's results and comparisons with existing experimental or observational data to justify use of the model's results
  - An updated Appendix A, because Appendix A currently appears to be for a 6-port diffuser design
  - An estimate of the Zone of Initial Dilution
- RCF 31: For the proposed site, include an evaluation of the potential resuspension of benthic sediments, and perform modeling to analyze the velocity of the brine plume at the point it interacts with the sea floor.

Mitigation, Monitoring, and Reporting

- RCF 56: Update *Appendix H: HBDP intake/discharge feasibility assessment* (3/14/16) to reflect permanent benthic impacts due to installation of the revised diffuser design (*Dilution analysis Alden 3-jet duckbill diffuser retrofit at HBDF*, 2/18/17).
- RCF 59: Update *Appendix SS: Newland Marsh Marine Life Mitigation Plan (July 2016)* with the following information: site selection, baseline site conditions, maintenance plan, long-term management plan, adaptive management plan, performance standards and

success criteria, and monitoring requirements. The information submitted in response to this RCF may need to be updated when the final impact to marine life is determined.

- RCF 61: For both proposed mitigation projects at Bolsa Chica Ecological Reserve and Newland Marsh, perform modeling to assess how and to what extent the source water body for the proposed surface intake overlaps with the proposed mitigation project's production area. The information submitted in response to this RCF may need to be updated when the final impact to marine life is determined.
- RCF 97: Submit a monitoring and reporting plan consistent with Chapter III.M.4 of the California Ocean Plan. The monitoring and reporting plan shall include a reference site of Poseidon's choosing and an explanation of the site's applicability and appropriateness.

Outstanding information requests for ROWD

- RCF 26: List chemicals or additives to be used throughout the desalination treatment process from the intake to potable water production, to the discharge of the brine. The list should include concentrations of chemicals and constituents, frequencies of use, how and where waste streams will be discharged, and discharge volumes.

Third party review of submittals provided by Poseidon

Santa Ana Water Board staff recognizes that Poseidon has provided substantial scientific information and analyses regarding larval abundance and density and compensatory mitigation for the Project. Santa Ana Water Board staff intends to determine if scientific information and analyses provided by Poseidon on these issues are complete. The scientific information and analyses that will be submitted for third party review are contained in the following documents:

- *AES Huntington Beach L.L.C. Generating Station entrainment and impingement study final report (MBC and Tenera, April 2005)*
- *Appendix Q: Comparison of ichthyoplankton data collected at HBGS intake for two 12-month periods: July 2014-June 2015 and September 2004-August 2005 (11/6/15)*
- *Appendix V: Memo on approach for APF calculations at Huntington Beach (7/1/15)*
- *Appendix T: Huntington Beach Desalination Facility diffuser discharge analysis (March 2016)*
- *Appendix BB: Technical memo on evaluation of a long-distance offshore intake for the HBDP (4/29/16)*
- *Appendix PP: Technical memo – comparison of existing offshore ichthyoplankton data for the HBDP (8/8/16)*
- *Appendix SS: Newland Marsh Marine Life Mitigation Plan (July 2016)*
- *Appendix TT: Bolsa Chica Marine Life Mitigation Plan (July 2016)*
- *Appendix KKK: Technical memo: Brine Discharge Mortality Calculations for the Huntington Beach and Carlsbad Desalination Projects (1/30/17)*
- *Appendix QQQ: Intake location entrainment analysis (2/6/17)*
- *Appendix TTT: Utilization of 2003-04 Huntington Beach Generating Station Entrainment Data (4/28/17)*
- *Appendix UUU: Huntington Beach Desalination Plant: Mitigation Habitat Assessment* (4/28/17)

Santa Ana Water Board staff would like independent verification of the information and analyses performed by Poseidon on the following issues:

- Use of 2003-04 Huntington Beach Generating Station entrainment study instead of 2014-15 entrainment study
- Use of larval data to address, in part, the best site for locating a surface intake
- Applicability of larval data to remaining alternative sites for a surface intake
- Data and assumptions underlying calculation of APF estimates
- Application of mitigation ratios
- Adequacy of proposed mitigation projects

Santa Ana Water Board staff intends to seek neutral third party review to confirm the adequacy of the scientific information and analyses to support Poseidon's conclusions. If Poseidon would like to supplement the scientific information and analyses it has already provided, prior to Santa Ana Water Board staff's submittal of the existing scientific information and analyses for third party review, please let staff know as soon as possible.

Santa Ana Water Board staff intends to expedite the third party review to minimize any impact on the timing of the Santa Ana Water Board's decision on the Project and will initiate the third party review process prior to staff's upcoming determination on whether the application is complete. Rather than using the existing Water Board's peer review process, Poseidon has expressed that they would like to pursue a quicker process through a Memorandum of Agreement with the California Marine Sanctuaries Foundation. Santa Ana Water Board staff will share the third party review questions and the results of the review process with Poseidon and other stakeholders. Poseidon will also have the opportunity to supplement its information and analyses after reviewing the results of the third party review process.

If you have any questions or would like to discuss further, please contact me at (951) 782-3286, Kurt.Berchtold@waterboards.ca.gov. You may also contact Milasol Gaslan at (951) 782-4419, Milasol.Gaslan@waterboards.ca.gov.

Sincerely,

for Kurt V. Berchtold
Executive Officer

Enclosures:
Attachment A: Huntington Beach Desalination Project – alternative sites for further analysis
Attachment B: Water Boards hydrogeologists response to Geosyntec comments on RCF 23

cc via email:
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Attachment A:
Huntington Beach Desalination Project – Alternative Sites for Further Analysis

Reasonable range of sites requiring further analysis	Overview of outstanding information requests
Segment 1: Property 1A – D, Sunset Gap • Poseidon selected Property 1D to represent Property 1A – D	• Further analysis of surface intakes and subsurface intakes and the other analyses described in the 5/23/17 letter from Santa Ana Water Board staff are still needed
Segment 1: Property 1E – F, Bolsa Gap • Poseidon selected Property 1E to represent Property 1E – F	• Further analysis of surface intakes at this site is not required due to potential impacts to Bolsa Chica Basin and Bolsa Bay State Marine Conservation Areas • Further analysis of subsurface intakes and the other analyses described in the 5/23/17 letter from Santa Ana Water Board staff are still needed
Segment 1: Property 1H	• Further analysis of surface intakes and subsurface intakes and the other analyses described in the 5/23/17 letter from Santa Ana Water Board staff are still needed
Segment 2 • Poseidon selected Property 2A to represent Segment 2	• Further analysis for subsurface intakes is not required • Further analysis of surface intakes and the other analyses described in the 5/23/17 letter from Santa Ana Water Board staff are still needed

Attachment B: Water Boards hydrogeologists response to Geosyntec comments on RCF 23 (Hydrogeological Modeling)

On May 5, 2017, Gordon Thrupp of Geosyntec provided comments via email on RCF 23 in the May 3, 2017 draft of a letter from the Santa Ana Regional Water Quality Control Board (Santa Ana Water Board) to Poseidon that listed the outstanding information requests for the Huntington Beach Desalination Project (Project). RCF 23 has been updated in the final version of the letter with outstanding information requests for the Project.

RCF 23 request is **bold**, followed by email response from Gordon Thrupp of Geosyntec (sent 5/5/17) in *blue italics*, followed by staff discussion points.

Conduct hydrogeological modeling to estimate maximum yield of slant wells at Talbert, Bolsa, and Sunset Gaps without negatively impacting seawater intrusion barriers and coastal wetlands.

Modeling already conducted shows that any pumping from slant wells along the coast in the Talbert Gap would draw a portion of the intake water from coastal wetlands and from the Talbert Injection, which both counteracts seawater intrusion and replenishes the aquifer system.

Modeling sensitivity analyses (Geosyntec, Nov 2015) at the request of Well Investigation Team (WIT) and Coastal Commission include reduction of the pumping rate by a factor of two and four. The proportion of intake water derived from coastal wetlands remained approximately 2 % of the pumping rate, and the flow from the inland boundary condition (injection barrier) was 10 % (12.7 mgd) for 127 mgd pumping, 12% (~8 mgd) for 63.5 mgd, and 15% (~5 mgd) for 31.75 mgd.

To do the requested analysis, we would need to quantify how much flow or drawdown constitutes negative impact.

1. This analysis does not provide an estimate of what is a safe rate of extraction of brackish/saline groundwater from the Talbert Aquifer, or the other aquifers. (This evaluation implies it is 0.0 gallons per minute).

2. Talbert model cannot be used to draw conclusions regarding the Bolsa Aquifer because the Bolsa Aquifer does not have a hydraulic connection to inland groundwater. (There is no sea water intrusion barrier for the Bolsa Aquifer).

3. Yes, the hydrogeological evaluation does need to include criteria for negative impact (this is typical of any impact analysis). Otherwise we are left with a safe extraction rate of 0.0 gpm, due to the conclusion that "a portion" of water would come from interior or wetlands.

4. Conclusion from the model is based on the assumption that the wetland soils have the same permeability as all of the other soils in the model. This does not consider input from 3rd party review ("it is likely that the sediments in the wetland/marsh differ significantly from the shallow sediments elsewhere in the model domain").

NOTE: Readily available literature indicates that soil in Bolsa Chica Preserve consists "predominantly of discontinuous lenses of fine sands and clays. Intertidal sediments consist of soft organic clays, loose to medium sands and silts, and local peat" (i.e., not similar to surrounding sandy sediments). http://resources.ca.gov/wetlands/geo_info/so_cal/bolsa_chica.html. Also see NRCS map (attached).

Modeling should include an appropriate range of expected permeability of sediment underlying coastal wetland areas. Modeling should include an appropriate range of vertical permeability for sediments overlying the aquifers, which should incorporate permeability data collected from offshore vibracore borings that have indicated vertical permeability in the range of 10 ft/day.

An appropriate range of permeability was used for the sediment underlying the coastal wetlands and sediments between the aquifer and seafloor (Geosyntec, Nov 2015). The mesurements of permeability on vibracore samples provide a localized snapshot of a disturbed sample and may not be representative of permeability on a larger scale. Based on lithology and stratigraphy from the coastal margin borings and geophysical surveys, the average large scale horizontal and vertical hydraulic conductivity of 10 ft/d and 1 ft/d assigned to the model for the shallow sediments is considered optimistically high (WIT, 2015, and Detwiler, 2015).

1. Vibracore borings covered an area approx. 6,000 feet by 3,000 feet (not localized) of sediment (not a "snapshot"), using a method for collection appropriate for that sediment type.

2. The samples of sediment retrieved from the vibracore borings were sufficiently undisturbed for use to calibrate and interpret the geophysical data. What is the rationale for why they are not deemed adequate for permeability estimation?

3. Agree that the higher K values from the vibracore samples may or may not be representative of entire recharge area, hence the need for sensitivity analysis to arrive at an estimated range of potential safe yields in lieu of a pumping test.

4. Initial model estimate of 1 foot per day was not modified after collection of the vibracore data, yet there is little/no information in the record to justify why that data are not considered, even in the context of a sensitivity analysis.

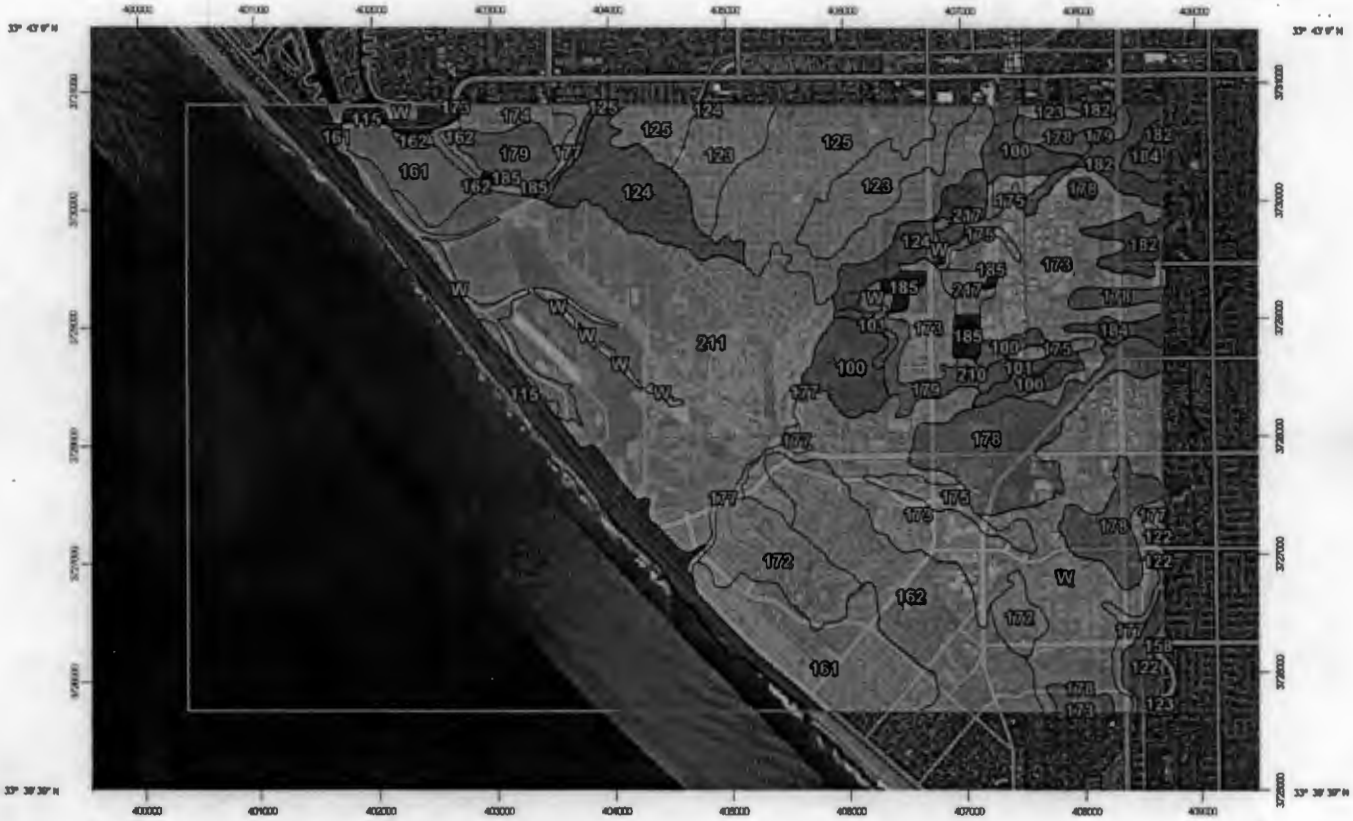
For Sunset and Bolsa Gaps, please overlay expected zone of pumping influence with existing plume maps showing distribution of contaminated groundwater. For Bolsa Gap, the model should simulate the discontinuous nature of the Bolsa Aquifer associated with the Newport/Inglewood fault zone, using model input parameters from the calibrated Orange County Water District model.

As reported for the alternative sites analysis, based on available information on transmissivity and width of the coastal alluvial aquifer in the gaps (including the OCWD model), the estimated production potential of subsurface intakes in the Bolsa and Sunset Gaps is 7 and 6 times lower than the Talbert Gap.

1. This does not respond to the request to demonstrate/justify the conclusion that extraction from slant wells will interfere with existing contaminant plumes.

2. The production estimates do not result in credible estimates of the potential safe yield of the alluvial aquifers. (As stated above, the safe yield of Talbert is effectively "0," so we are left with 7 and 6 times lower than 0, which does not constitute an assessment of potential yield.

Saturated Hydraulic Conductivity (Ksat)—Orange County and Part of Riverside County, California
(Soil permeability map of Bolsa Chica Wetland Preserve)



Map Scale: 1:45,600 if printed on A landscape (11" x 8.5") sheet.

Meters: 0 500 1000 2000 3000

Feet: 0 2000 4000 8000 12000

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 11N WGS84

MAP LEGEND

Area of Interest (AOI)

- Area of Interest (AOI)

Soils

Soil Rating Polygons

- <= 4.9550
- > 4.9550 and <= 9.1700
- > 9.1700 and <= 16.9917
- > 16.9917 and <= 28.0000
- > 28.0000 and <= 92.0000
- Not rated or not available

Soil Rating Lines

- <= 4.9550
- > 4.9550 and <= 9.1700
- > 9.1700 and <= 16.9917
- > 16.9917 and <= 28.0000
- > 28.0000 and <= 92.0000
- Not rated or not available

Soil Rating Points

- <= 4.9550
- > 4.9550 and <= 9.1700
- > 9.1700 and <= 16.9917
- > 16.9917 and <= 28.0000
- > 28.0000 and <= 92.0000
- Not rated or not available

Water Features

- Streams and Canals

Transportation

- Rails
- Interstate Highways
- US Routes
- Major Roads
- Local Roads

Background

- Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:24,000.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL:
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Orange County and Part of Riverside County, California
Survey Area Data: Version 10, Sep 30, 2016

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Jan 1, 1999—Jan 17, 2015

The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.