CALIFORNIA
Water Boards

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ENVIRONMENTAL PROTECTION

Santa Ana Regional Water Quality Control Board

May 23, 2017

Scott Maloni, Vice President
Poseidon Water
5780 Fleet Street, Suite 140
Carlsbad, CA 92008
smaloni@poseidonwater.com

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,

Hope A Smythe

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:
Stan Williams, Poseidon Water
Swilliams@poseidonwater.com
Jonathan Bishop, State Water Resources Control Board
Jonathan.Bishop@waterboards.ca.gov
Karen Larsen, State Water Resources Control Board
Karen.Larsen@waterboards.ca.gov
Philip Wyels, State Water Resources Control Board
Philip.Wyels@waterboards.ca.gov

Marleigh Wood, State Water Resources Control Board
Marleigh.Wood@waterboards.ca.gov
David Rice, State Water Resources Control Board
David.Rice@waterboards.ca.gov
Hope Smythe, Santa Ana Regional Water Quality Control Board
Hope.Smythe@waterboards.ca.gov
Milasol Gaslan, Santa Ana Regional Water Quality Control Board
Milasol.Gaslan@waterboards.ca.gov
Kathleen Fong, Santa Ana Regional Water Quality Control Board
Kathleen.Fong@waterboards.ca.gov
Julio Lara, Santa Ana Regional Water Quality Control Board
Julio.Lara@waterboards.ca.gov
Claire Waggoner, State Water Resources Control Board
Claire.Waggoner@waterboards.ca.gov
Kimberly Tenggardjaja, State Water Resources Control Board
Kimberly.Tenggardjaja@waterboards.ca.gov
Daniel Ellis, State Water Resources Control Board
Daniel.Ellis@waterboards.ca.gov
Tom Luster, California Coastal Commission
Tom.Luster@coastal.ca.gov
Cy Oggins, State Lands Commission
Cy.Oggins@slc.ca.gov
Alexandra Borack, State Lands Commission
Alexandra.Borack@slc.ca.gov
Sean Bothwell, California Coastkeeper Alliance
sbothwell@cacoastkeeper.org
Joe Geever, Residents for Responsible Desalination
geeverjoe@gmail.com
Colin Kelly, Orange County Coastkeeper
Colin@coastkeeper.org

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

May 23, 2017

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.

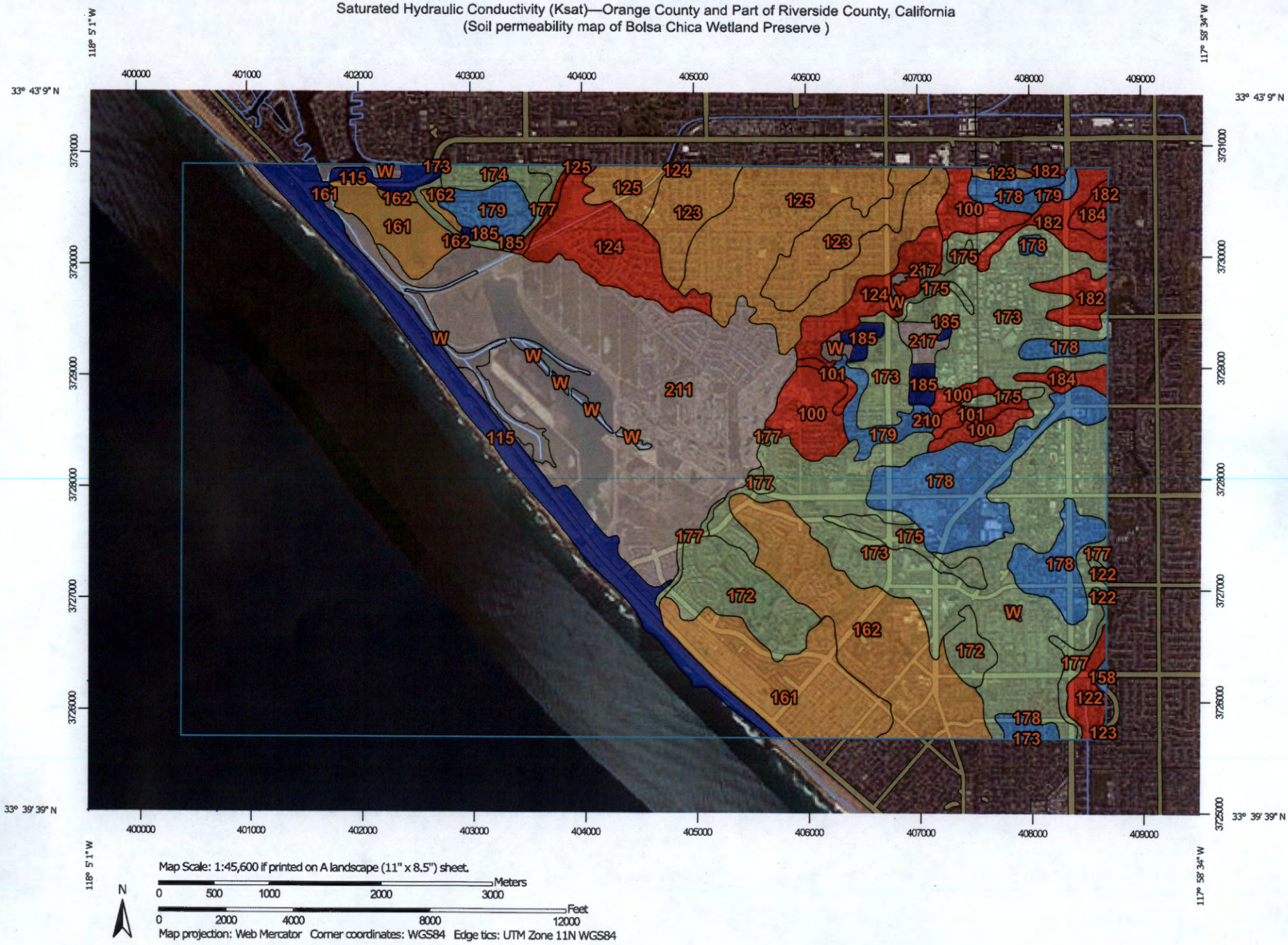
For Sunset and Bolsa Gaps, please overlay expected zone of pumping influence with existing plume maps showing distribution of contaminated groundwater. For Bolsa Gap, the model should simulate the discontinuous nature of the Bolsa Aquifer associated with the Newport/Inglewood fault zone, using model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