



Environmental  
Research and  
Consulting

February 5, 2019

Scott Maloni  
Poseidon Water  
5780 Fleet Street, Suite 140  
Carlsbad, CA 92008

Re: [Appendix BBBBB-3: Technical Memorandum: Linear Diffuser Design Modification for the Proposed Huntington Beach Desalination Plant](#)

Dear Scott,

I am pleased to submit this memorandum (memo) which clarifies the realignment of the 14-port linear diffuser for the proposed Huntington Beach Desalination Plant, which was described in the November 27, 2018 Dudek report entitled "*Huntington Beach Desalination Plant Response to Request for Information Regarding Environmental Analysis of the 2018 Diffuser Modifications*" (Appendix BBBBB-2). This memo was prepared to respond directly to the Santa Ana Regional Water Quality Board staffs' request for this information during the January 31, 2018 call with Poseidon and in the Regional Board staff's February 4, 2019 letter.

I look forward to receiving your feedback on this memo. Please feel free to call with any questions or comments.

Sincerely,

A handwritten signature in blue ink that reads "Timothy W. Hogan". The signature is written in a cursive style with a prominent initial 'T'.

Timothy W. Hogan  
TWB Environmental Research and Consulting, Inc.

# Linear Diffuser Realignment Description

At the request of the Santa Ana Regional Water Quality Control Board staff, Poseidon developed a linear diffuser design for the proposed Huntington Beach Desalination Plant (HBDP) based on the method described by Dr. Phil Roberts (2018a, b).

The initial 14-port linear diffuser design (Figure 1) was submitted on August 3, 2018 as part of Appendix BBBBB in a report prepared by Alden Research Laboratory (Alden 2018). Appendix BBBBB also included an environmental analysis report from Dudek (Dudek 2018a) which evaluated the initial 14-port linear diffuser design.

The CA State Lands Commission (SLC) staff issued a letter dated September 25, 2018, requesting clarification whether the footprint of the revised linear diffuser was inside the authorized lease area. Based on the Lease Amendment No. PRC 1980.1 accompanying exhibits A and B (See 2010 SLC Lease - Regional Board Application Appendix I), the revised linear diffuser's footprint appeared to be within the authorized lease area; however, it was not possible to indisputably document without an extensive surveying effort. Therefore, in response, Poseidon modified the alignment of the 14-port linear diffuser (relative to the existing intake tower) that lies within the authorized lease area (Figure 2). The modified linear diffuser alignment and a revised environmental analysis from Dudek (Dudek 2018b) were submitted as Appendix BBBBB-2 on November 27, 2018.

The only modification to the linear diffuser was in its alignment relative to the existing discharge tower to which it will be connected. Rather than utilizing a single continuous header for all 14 ports, the diffuser was split into two 7-port header sections with one section placed on either side (shoreward and seaward) of the existing discharge tower.

Table 1 provides a comparison of the design details for each 14-port linear diffuser alignment. The overall length of the diffuser and the length of the riprap associated with it have increased slightly; however, the total seabed area effected has not since the elbow needed to connect to the existing discharge tower is no longer included (see Figure 1 and Figure 2). Therefore, relative to the FSEIR, there are no additional benthic impacts associated with the modified alignment of the 14-port linear diffuser. Similarly, as reported in Appendix NNNNN, the brine mixing zone (BMZ) area is 1.09 acres. This compares favorably to the previous BMZ area of 0.64 acres. In addition, the size of the realigned diffuser's BMZ is consistent with the operational impacts evaluated in the FSEIR and still remains well within the OPA's 100-meter (328 foot) boundary. Therefore, operation of the realigned linear diffuser would not create a new significant impact to marine biology and would not cause a



substantially more severe impact to marine biological resources than that of the Lease Modification Project analyzed in the 2017 FSEIR.

The initial and modified 14-port linear diffuser alignments are depicted in Figure 1 and Figure 2, respectively.

Per the Regional Board staff’s February 4, 2019 letter requesting additional clarification, an updated shearing analysis using the Roberts (2018a, b) methodology is unnecessary. The realignment of the diffuser with the discharge tower does not affect the number, diameter or angle of the diffuser ports or the volume and velocity of the discharged water. Consequently, the previously submitted shearing analysis is unchanged.

Furthermore, the analysis of the brine mixing zone reflecting the realigned brine diffuser was submitted on January 18, 2019 in Appendix NNNNN.

## Conclusion

The initial 14-port linear diffuser for the HBDP was realigned based on a preliminary engineering-level design. The diffuser was realigned with the existing discharge tower, but no changes were made to the diffuser’s functional design (e.g., number of ports, port angle, port diameter, discharge velocity). This memo documents the realignment and is consistent with the description previously presented in Appendix BBBB-2. The modified alignment of the 14-port diffuser continues to represent a diffuser design for the HBDP based on the method described by Dr. Phil Roberts (2018a, b).

**Table 1. Comparison of initial and modified 14-port linear diffuser alignments.**

Design Component	Initial Alignment	Modified Alignment
Number of ports	14	14
Port diameter (effective opening)	1.28 ft	1.28 ft
Port spacing	20.4 ft between ports on same side of header; 10.4 ft between ports on opposite sides of header	20.4 ft between ports on same side of header; 10.4 ft between ports on opposite sides of header
Port angle of inclination	60°	60°
Port discharge elevation	-17.8 ft	-17.8 ft
Port discharge velocity	5.3 ft/sec at flow of 62.5 MGD	5.3 ft/sec at flow of 62.5 MGD



Header diameter	4 ft	4 ft
Number of headers	1	2
Overall length of diffuser	194 ft - single section	208 ft - two sections of equal length
Overall length with rip rap	212 ft	228 ft
Rip rap area	6,400 sq ft	6,375 sq ft
BMZ area	0.64 acres	1.09 acres

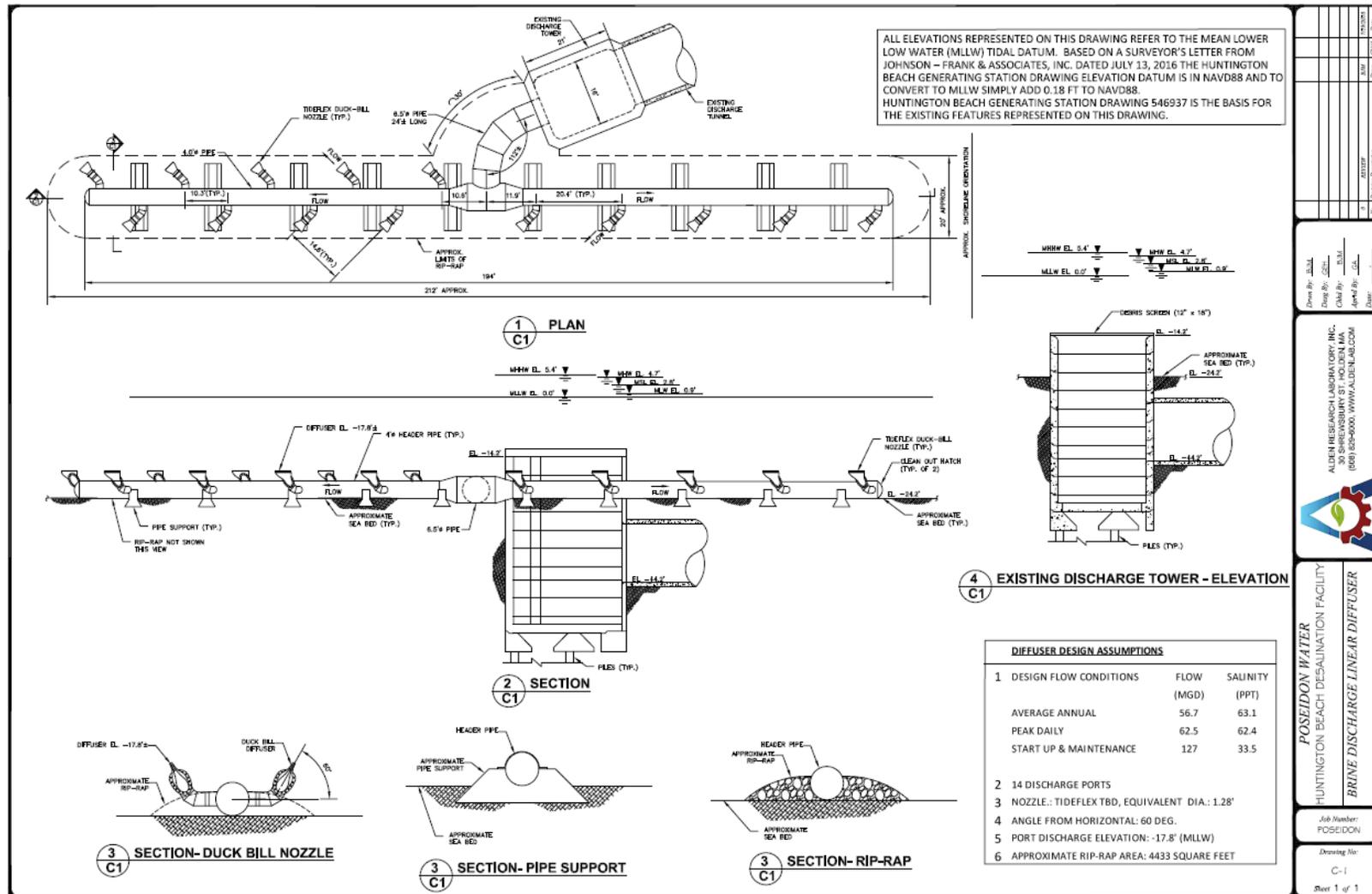


Figure 1. Initial 14-port linear diffuser design. Design is documented in Appendix BBBB (August 3, 2018).

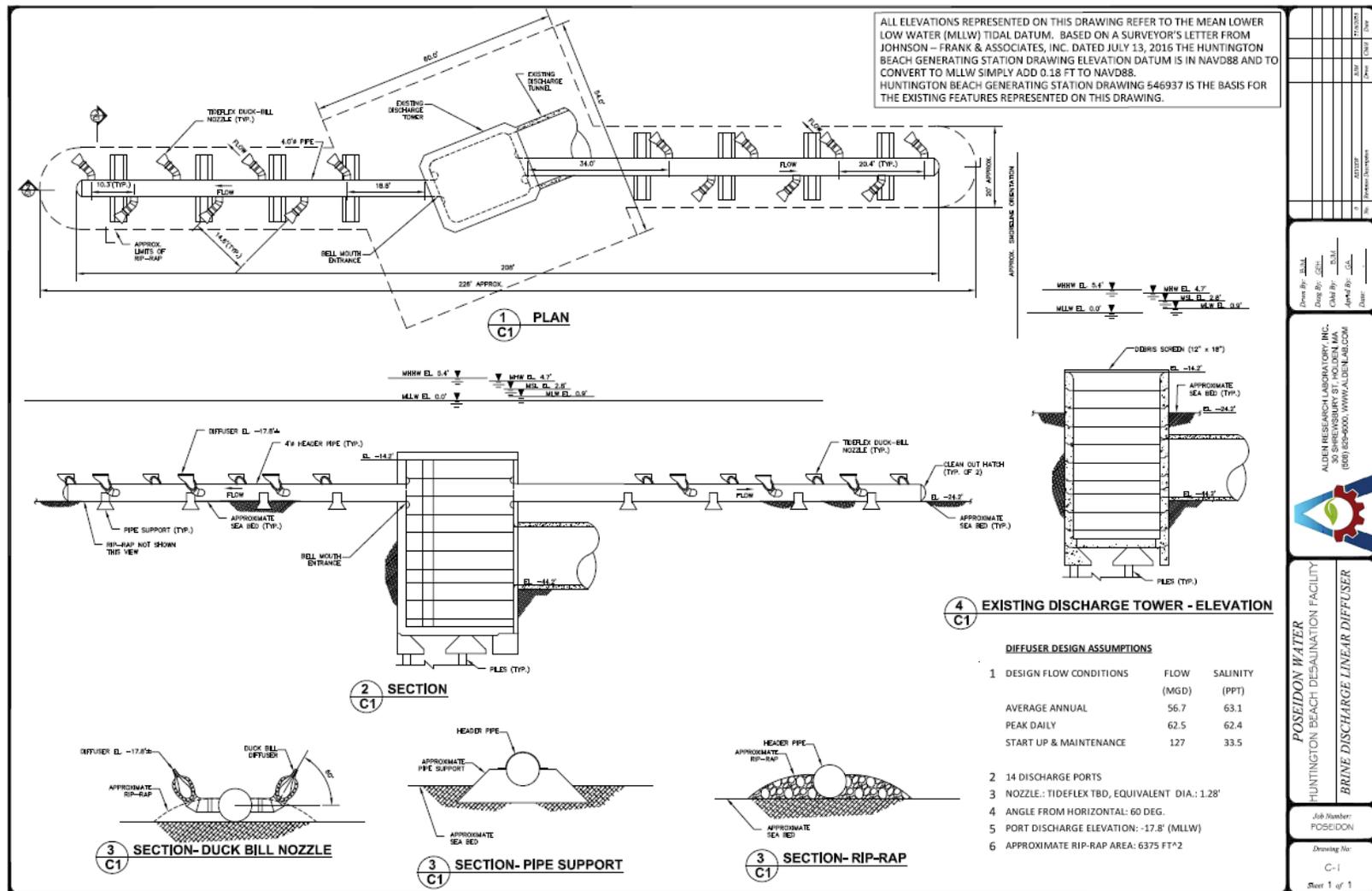


Figure 2. Modified 14-port linear diffuser design. Design is documented in Appendix BBBB-2 (November 27, 2018).



# References

Alden Research Laboratory (Alden). 2018. Linear Diffuser Optimization and Design for Poseidon's Huntington Beach Desalination Plant. July 31, 2018.

Dudek. 2018a. Huntington Beach Desalination Plant 2018 Diffuser Modifications Environmental Analysis. August 3, 2018.

Dudek. 2018b. Huntington Beach Desalination Plant Response to Request for Information Regarding Environmental Analysis of the 2018 Diffuser Modifications. November 27, 2018.

Roberts, P. 2018a. Brine Diffusers and Shear Mortality, Atlanta, GA: prepared for Eastern Research Group.

Roberts, P. 2018b. Brine Diffusers and Shear Mortality: Application to Huntington Beach, Final Report, Atlanta, GA: prepared for Eastern Research Group.