

**Meeting Agenda**

Carlsbad Desalination Project – NPDES Permit Development Update

**Date and Time**

Thursday, December 15, 2016  
9:00am-12:00pm

**Location**

California Regional Water Quality Control Board, San Diego Region  
Third Floor Library  
2375 Northside Drive, Suite 100  
San Diego, CA 92108

**Teleconference**

Phone number: 916-255-4044  
Access code is not needed

**Webex Link:**

[https://join.me/PW\\_CB\\_Office](https://join.me/PW_CB_Office)

**Meeting participants**

Entity	Staff
Poseidon, LLC	Peter MacLaggan Josie McKinley Craig Johns Kelly Huffman Michael Welch Tim Hogan Michelle Powelson
San Diego County Water Authority	Robert Yamada Toby Roy Jeremy Crutchfield
San Diego Water Board	David Barker Catherine Hagan Brandi Outwin-Beals Ben Neill Dan Connally (USEPA contractor, by phone)
State Water Board	Phil Wyels (by phone) Marleigh Wood (by phone) Claire Waggoner (by phone) Kim Tenggardjaja (by phone) Renan Jauregui (by phone) Daniel Ellis (by phone)

1. Introductions
2. Intake and Fish Return
  - a. Velocities – Intake
  - b. Location – Intake
  - c. Antidegradation Analysis – Fish Return
3. Mitigation
  - a. Method for Determining Diffuser-related Mitigation
  - b. Area within the BMZ
  - c. Mitigation Ratio
  - d. Deferred Mitigation
4. Zone of Initial Dilution
5. Schedule Update
  - a. Deliverables from Poseidon
  - b. Permit Development
6. Additional Discussion

CARLSBAD DESALINATION PROJECT  
PERMIT RENEWAL MEETING  
DECEMBER 15, 2016

# Discussion Topics

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1. Intake and Fish Return
2. Mitigation
  - a. Mitigation Ratio
  - b. Deferred Mitigation and Security
  - c. Method for Determining Diffuser Mitigation
  - d. Area within the BMZ
3. Zone of Initial Dilution

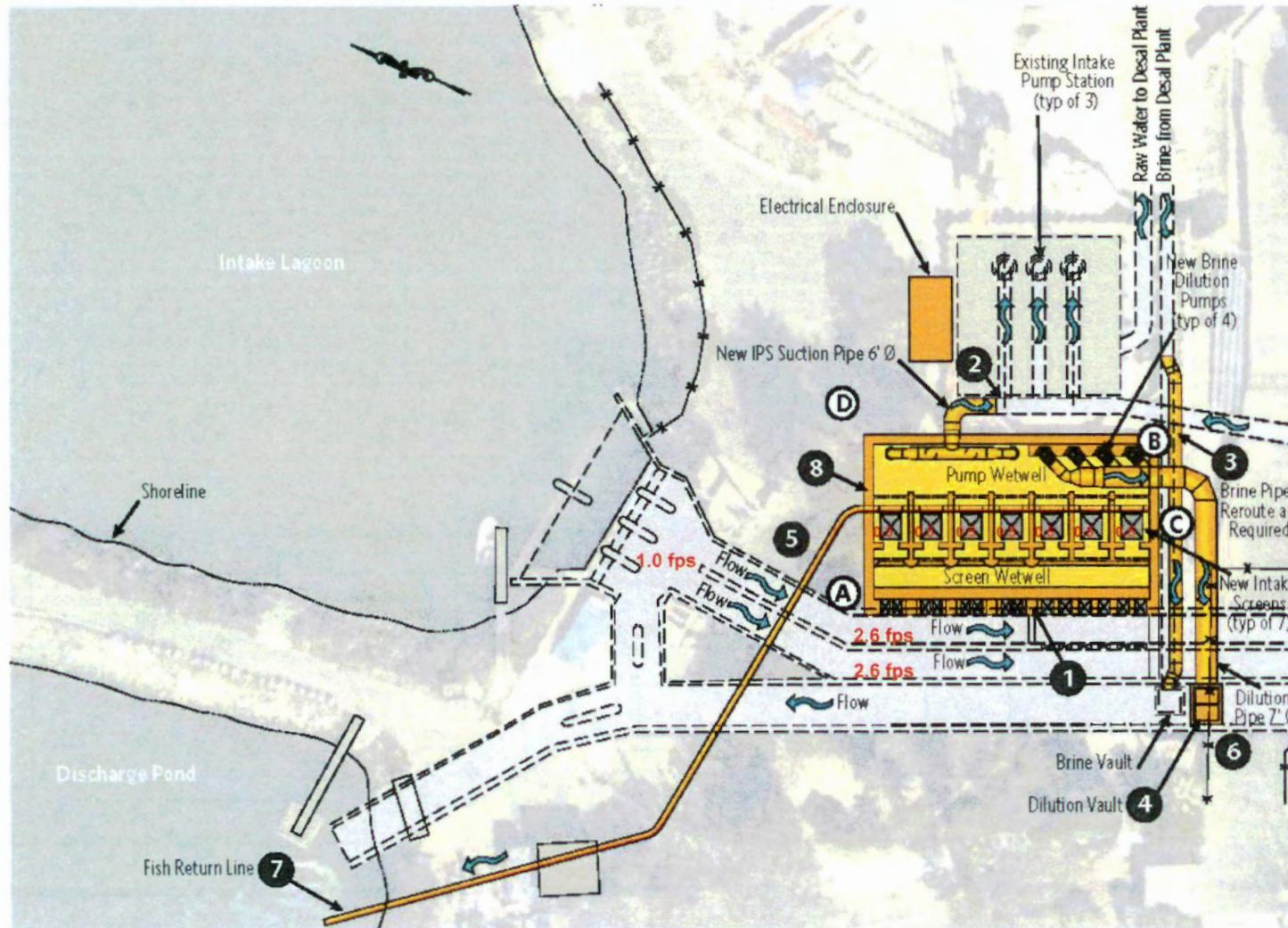
# INTAKE AND FISH RETURN

# Intake and Fish Return Discussion Topics

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1. Comparison of Traveling Screen Alternatives
2. Ocean Plan Velocity Requirements
3. Through-Screen Velocity Standard
4. Feasibility Assessment of Traveling Screen Alternatives

# Proposed Intake Configuration



## LEGEND

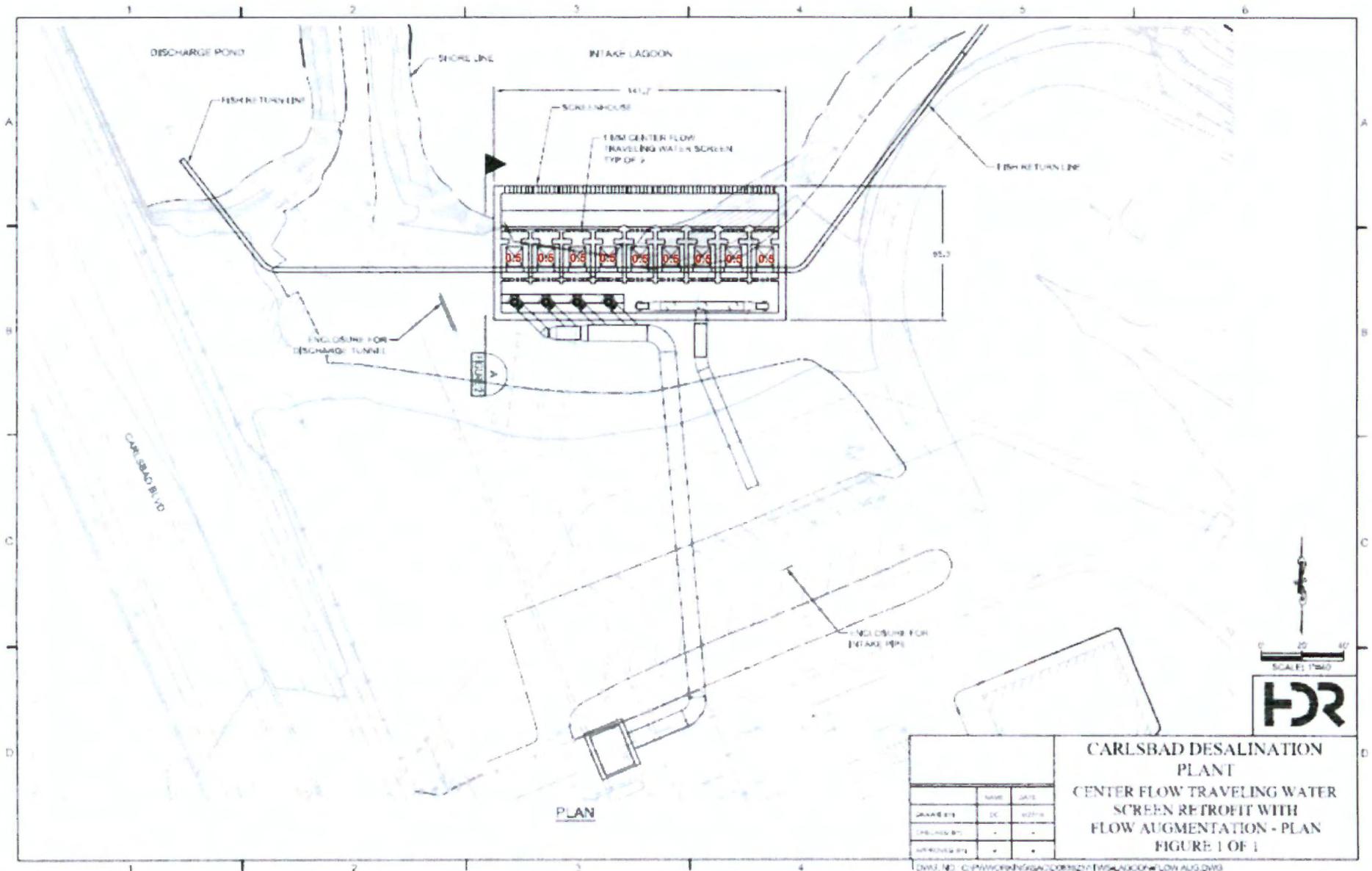
### Footprint Restrictions

- (A)** Inflow Tunnel
- (B)** IPS Suction Pipe
- (C)** Brine Discharge
- (D)** High Groundwater Table

### Construction Sequence Factors

- (1)** Screen Structure Connection to Inflow Tunnels
- (2)** Connection to IPS Suction
- (3)** Brine Discharge Pipe Relocation
- (4)** Dilution Vault
- (5)** Existing Utility Relocations
- (6)** Guard Shack and Driveway Entrance Encroachment
- (7)** Fish Return Pipe
- (8)** Screen Structure Construction

# Lagoon Intake Alternative



# Ocean Plan Velocity Requirements

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- The OPA and Staff Report/Substitute Environmental Documentation (Staff Report/SED) provide that the minimum velocity requirement must be met as the seawater is passing through the intake screen:
  - OPA §M2d(1)(c)(iv):

*In order to minimize impingement, through-screen velocity at the surface water intake shall not exceed [0.5 feet] per second. (emphasis added)*
  - Staff Report/SED §8.3.4:

*To address entrainment reduction for a surface water intake, the through-screen velocity should not exceed 0.5 ft/sec as it have [sic] been demonstrated to protect most small fish and is an appropriate value to preclude most impingement of adult fish. (emphasis added)*
  - Response to Comment 13.91:

*Comment: To accurately and completely inform the Board and the public, the phrase 'allows for no impingement' should be replaced with 'requires an intake velocity of 0.5 feet per second or less' ..."*

*Staff Response: "The swim speed studies conducted by U.S. EPA are used in several federal regulations, including the U.S. EPA 316(b) rule making as the basis for determining that a 0.5 fps through-screen velocity will reduce impingement. The through-screen velocity standard of 0.5 fps is also used in the OTC Policy." (emphasis added)*

# Through-Screen Velocity Standard

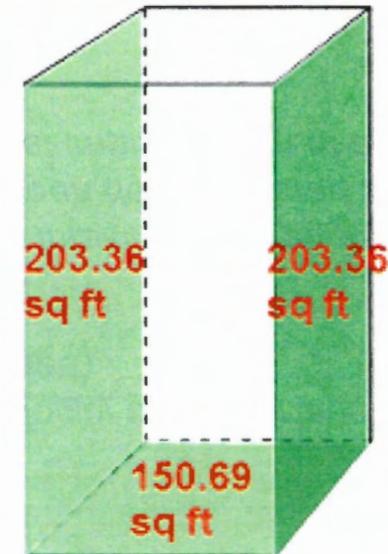
Through-screen velocity can only be measured at one location:

*“Through-screen velocity is the velocity that is measured through the screen face ...”*

## Calculation of Through-Screen Velocity

Through-screen velocity = (intake flow) / (screen open area)

Description	Value	Unit
Total Flow Rate	299	MGD
Total Flow Rate	463	CFS
HWL	3.04	ft
LWL (MLWL)	-2.29	ft
Finished Floor	-20	ft
Depth HWL	23.04	ft
Depth LWL	17.71	ft
Channel Width	4.00	m
Channel Width	13.12	ft
Length	3.50	m
Length	11.48	ft
Surface Area Each Side Screen (Single Plane) HWL	264.57	ft <sup>2</sup>
Surface Area Each Side Screen (Single Plane) LWL	203.36	ft <sup>2</sup>
Surface Area Bottom Screen (Single Plane)	150.69	ft <sup>2</sup>
Total Screen Surface Area (Single Plane) HWL	679.83	ft <sup>2</sup>
Total Screen Surface Area (Single Plane) LWL	557.42	ft <sup>2</sup>
No. of Screens	6	-
Effective Open Area	0.37	-
Open Area Each Screen HWL	253.80	ft <sup>2</sup>
Open Area Each Screen LWL	208.10	ft <sup>2</sup>
Clean Velocity LWL	0.37	ft/s
15% Fouling Velocity LWL	0.44	ft/s



Total Surface Area per Screen =  
557.42 sq ft

Total Open Area per Screen = 557.42  
sq ft x 0.37 = 208.10 sq ft

Total Open Area per 6 Screens =  
208.10 x 6 = 1248.6 sq ft

# Feasibility Assessment – Traveling Screen Location

Alternative	Project Capable of Being Accomplished in a Reasonable Period of Time?			Is Project Economically Feasible?		Marine Life Mortality Ranking	Socially Feasible?		Technically Feasible?
	Completion Time (Years)	Delay Cost	Yes/No	Capital Cost	Yes/No	Impacted Area (Acres)	Water Supply Impact	Yes/No	Yes/No
Poseidon Proposed Screen Location	2.5	\$0	Yes	\$49,061,041*	Yes	Under Review	Minimal Interruption to CDP Operation	Yes	Yes
Lagoon Traveling Screen with Flow Augmentation	6	\$199,925,313*	No	\$80,783,075*	No	Under Review	Significant Interruption to CDP Operation; Critical Regional Water Supply Curtailed for up to 3.5 Years	No	Yes

\* See ROWD Appendix OO for detailed cost estimate.

MITIGATION

# Mitigation Discussion Topics

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1. Method for Determining Diffuser Mitigation
2. Area within the BMZ
3. Mitigation Ratio
4. Deferred Mitigation

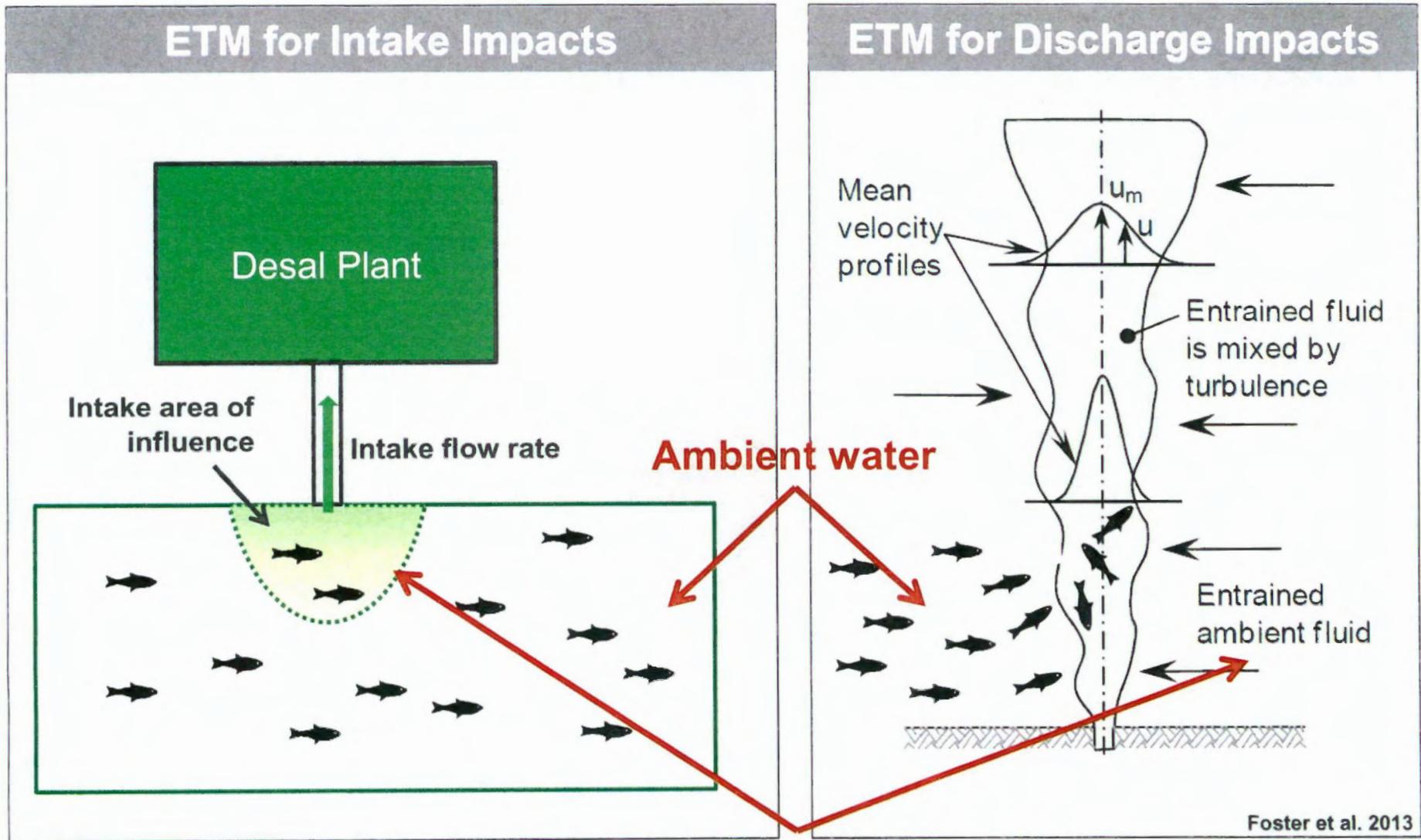
# Method for Determining Diffuser Mitigation

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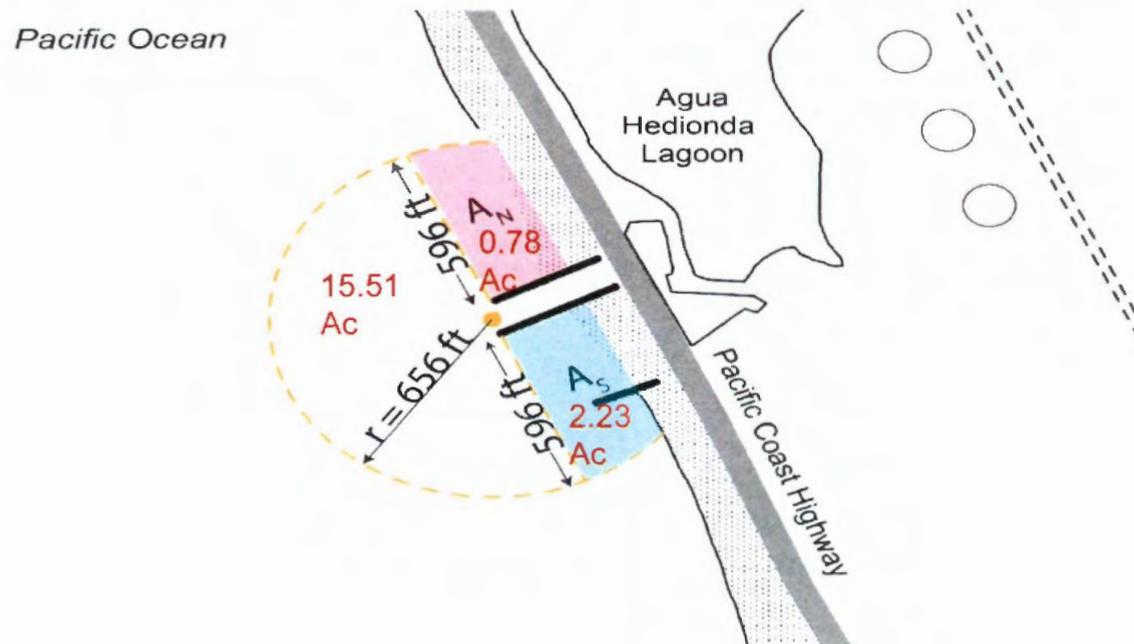
- ETM/APF is appropriate model for assessing mortality of organisms in entrained ambient flow
- ETM estimates proportional loss via intake withdrawal
- Functionally, diffuser jet operates similar to an intake since it is entraining flow
- Page 84 of SED states:

*....until additional data is available we assume that larvae in 23 percent of the total entrained volume of diffuser dilution water are killed by exposure to lethal turbulence. The actual percentage of killed organisms will likely change as more desalination facilities are built and more studies emerge.*

# Method for Determining Diffuser Mitigation



# Area Within the Brine Mixing Zone



Not to scale

The total area within the brine mixing zone:  $15.51 + 0.78 + 2.23 = 18.52$  acres

# Mitigation Ratio

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Per the OPA, the Regional Water Board may permit out-of-kind mitigation for open water or soft-bottom habitat. Included below are the findings from the evaluation of the biological productivity of the impacted soft-bottom habitat in the BMZ and the proposed mitigation habitat.

1. The bottom habitat underlying the BMZ is sand with relatively low diversity and abundance and does not support any submerged aquatic vegetation.
2. Fish productivity in coastal lagoons and estuaries similar to the proposed CDP mitigation are up to 12 times as productive as soft-bottom habitat, and the total fish density is greater than 600 times higher in the estuarine habitat than in the shallow soft-bottom habitat.
3. The most demonstrable difference between the impacted habitat in the BMZ and approved mitigation is the vegetation planting included in the mitigation plan. With no aquatic vegetation present in the BMZ, a true ratio cannot be calculated. A conservative assumption is >10:1, estuarine habitat:BMZ.
4. The proposed mitigation site is home to several protected species such as the federally endangered light-footed Ridgeway's rail (*Rallus obsoletus levipes*), California least tern (*Sternula antillarum browni*), and the federally threatened green sea turtle (*Chelonia mydas*), among several others. All of these listed species will be unaffected by the BMZ, but will greatly benefit from the mitigation project through the increased productivity at the mitigation site caused by the restored vegetation and its cascading ecological improvements that support higher trophic level organisms.

# Mitigation Ratio

The comparison of habitat productivity assessment in ROWD Appendix UU and summarized below supports the 2008 decision by the Coastal Commission that a 10:1 mitigation ratio for open ocean species is appropriate, if not conservative. Ten acres of impacted soft-bottom habitat would be fully mitigated by the restoration of one acre of wetland/estuarine habitat.

RATIO OF PRODUCTIVITY OF ESTUARINE HABITAT TO BMZ	
Natural Resource	Mitigation Ratio
Threatened and Endangered Species	>10:1 <sup>a</sup>
Vegetation (Net prod. g C/m <sup>2</sup> /y)	>10:1 <sup>a</sup>
Fish (count/m <sup>2</sup> )	650:1 to 9,750:1
Fish Productivity (g/m <sup>2</sup> /d)	6:1 to 12:1

a. Since there is no threatened and endangered (T&E) species and no aquatic vegetation present in the BMZ, a true ratio cannot be calculated. However, given that the proposed mitigation site is home to a number of T&E species that will benefit from the mitigation project, and the high productivity of the estuarine habitat compared to no aquatic vegetation in the BMZ, a ratio of 10:1 is extremely conservative. This approach of converting offshore entrainment impacts to areas of wetland mitigation has been used to help determine mitigation in several California power plant siting cases including, Huntington Beach (00-AFC-13), Morro Bay (00-AFC-12), and others.

# Deferred Mitigation Under Co-located Operation

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1. Deferred mitigation is mitigation to be provided at a future date for impacts that occur prior to restoration project completion.
2. No mitigation is deferred when CDP is operating in conjunction with power plant:

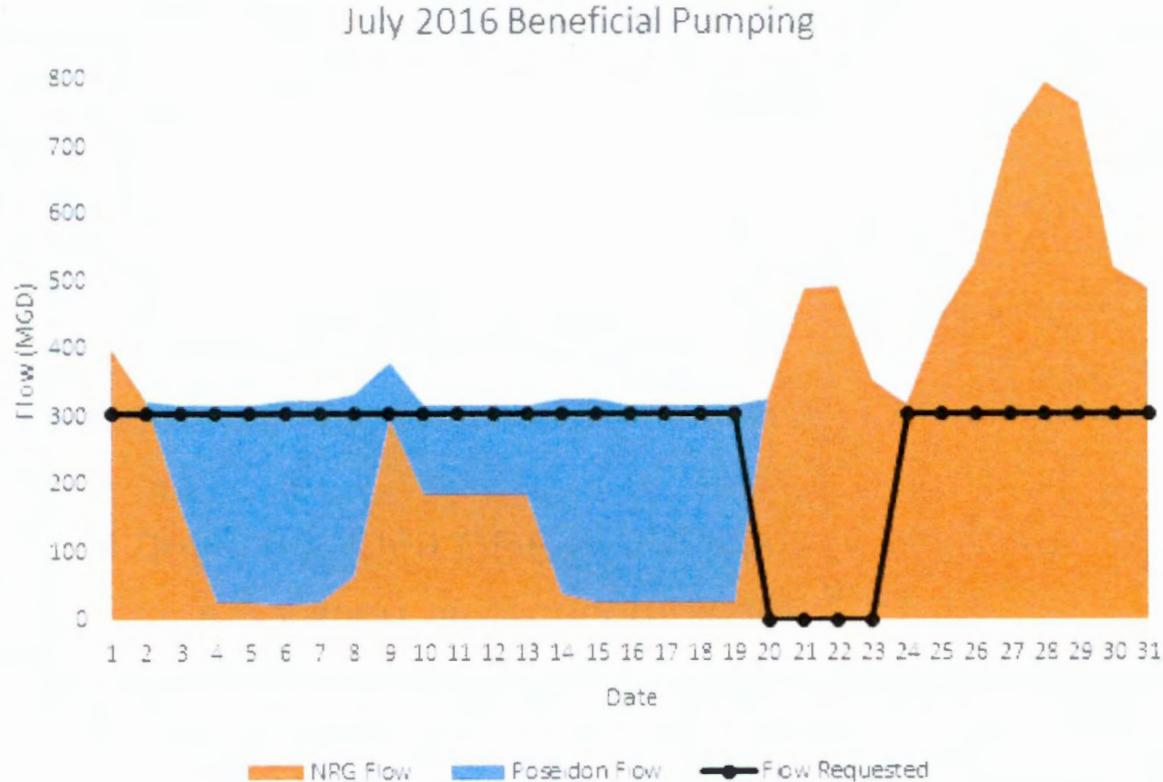
*Order R9-2006-0065 §VII.B.4.(b): When operation in conjunction with the power plant, the desalination plant feedwater intake would not increase the number of organisms impinged or entrained by the EPS cooling water intake structure... In instances when CDP intake requirements exceed the volume of water being discharged by the EPS, the CDP will implement the approved Flow, Entrainment, and Impingement Minimization Plan to comply with the requirements of Water Code section 13142.5(b) to use the best available site, design, technology, and mitigation feasible to minimize the intake and mortality of marine life.*

3. Order R9-2009-0038, Finding 50: the mitigation provided for in the Minimization Plan is expected to fully offset projected entrainment and impingement losses for up to 304 MGD of source water withdrawn directly from Agua Hedionda Lagoon.

Based on 1 and 2 above, the deferred mitigation (measured in days) during co-located operation is: the total millions of gallons of water withdrawn from Agua Hedionda Lagoon for the benefit of the CDP divided 304 MGD.

# Deferred Mitigation Under Co-located Operation

The EPS maintains an accurate record of the quantity of water withdrawn from Agua Hedionda Lagoon for the benefit of the CDP each month and bills Poseidon for the costs associated with pumping:



# Mitigation Available Under Co-located Operation

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- The mitigation provided in the approved Marine Life Mitigation Plan (MLMP) fully compensates for projected entrainment and impingement losses for up to 304 MGD of source water withdrawn directly from Agua Hedionda Lagoon for an operating period of 30 years is a 55.4 wetlands restoration project that meets or exceeds the biological performance standards set forth in the MLMP and the biological performance standard for impingement set forth in Order R9-2006-0065.
- The Discharger requested the Regional Water Board waive the biological performance standard in exchange for the Discharger providing an additional 11 acres of mitigation for impingement, for a total mitigation area of 66.4 acres.
- The mitigation actually provided in any given year will be determined by the MLMP Science Advisory Panel based on the performance of the wetlands restoration project against the biological performance standards set forth in the MLMP and as determined by the Regional Water Board with respect to the biological performance standard for impingement set forth in Order R9-2006-0065 (if applicable).
- To the extent that any mitigation is provided during co-location operation, and that mitigation is greater than or less than that required, the co-located operation will receive a pro rata mitigation credit in accordance with actual performance of the restoration project.

# Deferred Mitigation Under Stand-Alone Operation

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- The Regional Water Board will establish the mitigation required for stand-alone operations in the revised Order.
- The deferred mitigation (measured in days) during stand-alone operation is: the total millions of gallons of water withdrawn from Agua Hedionda Lagoon prior to the mitigation being available divided 299 MGD.
- The mitigation actually provided in any year will be determined by the Science Advisory Panel based on the performance of the wetlands restoration project against the biological performance standards set forth in the MLMP and as determined by the Regional Water Board under the revised Order.
- To the extent that the mitigation actually provided during stand-alone operation is greater than, or less than that required under the revised Order, the stand-alone operation will be provided pro rata mitigation credit in accordance with actual performance of the restoration project and any deficit will be added to the deferred mitigation account.

# Deferred Mitigation Account and Security

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- Beginning November 7, 2015, and continuing until end of the term of the Water Purchase Agreement (WPA), the CDP will maintain a record of the number deferred mitigation days under co-located and stand-alone operations that have not been offset by available mitigation credit.
- One year prior to the end of the term of the WPA, the Discharger shall submit for review and approval by the Regional Water Board documentation estimating the total number of deferred mitigation days that will be accrued as of the end of the term of the WPA (the “Deferred Mitigation Days”), along with an estimate of the cost of maintaining the wetlands for the projected Deferred Mitigation Days (which is expected to be nominal).
- Prior to the end of the term of the WPA, the Discharger shall provide the Regional Water Board a non-cancelable mitigation security deposit in the amount of the projected cost of maintaining the restoration project for the Projected Mitigation Days.
- The performance deposit may take one of the forms below:
  - Cash;
  - A Non-Cancelable Bond; or
  - Irrevocable letter of credit.

ZONE OF INITIAL DILUTION

# Chronic Toxicity Results from the CDP M-001 Brine Discharge December 2015 through November 2016

