

# Carlsbad Desalination Plant

## A Texas Size Opportunity

Mark Lambert, CEO IDE Americas

Texas Desalination Association, 2015



# IDE Technologies



Delivering Excellence  
50  
YEARS  
Through Partnership

**Industrial Water  
Treatment**

**Seawater  
Desalination**

**Wastewater Reuse**



# Successful Global Leadership



**3M** m<sup>3</sup>/day of high quality water

# Leadership in Seawater Desalination



## **Sorek, Israel**

The largest SWRO plant worldwide: 624,000 m<sup>3</sup>/day – BOT



## **Tianjin, China**

The largest desalination plant in China: 200,000 m<sup>3</sup>/day – EPC



## **Reliance, India**

The largest desalination plants in India: 400,000 m<sup>3</sup>/day – EPC



## **Carlsbad, USA**

The largest desalination plant in the western hemisphere:  
204,000 m<sup>3</sup>/day – EPS + O&M (In commissioning)

# Culture of Continual Innovation

Proven innovations:

- Pressure Center Design
  - Boron Removal System
  - Chemical-Free Desalination
  - Direct Osmotic Cleaning (DOC)
  - 16" Membranes in a Vertical Array
- 
- Increased efficiency and reliability
  - Reduced CAPEX and OPEX costs
  - Lowest specific energy consumption





# Carlsbad, California, USA

An award-winning, milestone plant for the desalination industry



## Overview

- › **Capacity:** 54 MGD (204,412 m<sup>3</sup>/day)
- › **Technology:** SWRO
- › **Project Type:** EPS and O&M – 30 years
- › **Footprint:** 6 acres (24,000 m<sup>2</sup>)
- › **Off-Taker:** San Diego County Water Authority (SDCWA)
- › **Commission Date:** October 2015 (in commissioning)



# Carlsbad Desalination Project Accolades

**Largest U.S. Project Financing  
Deal of 2012**

**Bloomberg**



**North American Infrastructure  
Deal of the Year 2012**

**North American  
Water Deal of the Year 2012**

**Project Finance**

**Global  
Water Intelligence**

**Global Desalination  
Deal of the Year 2012**



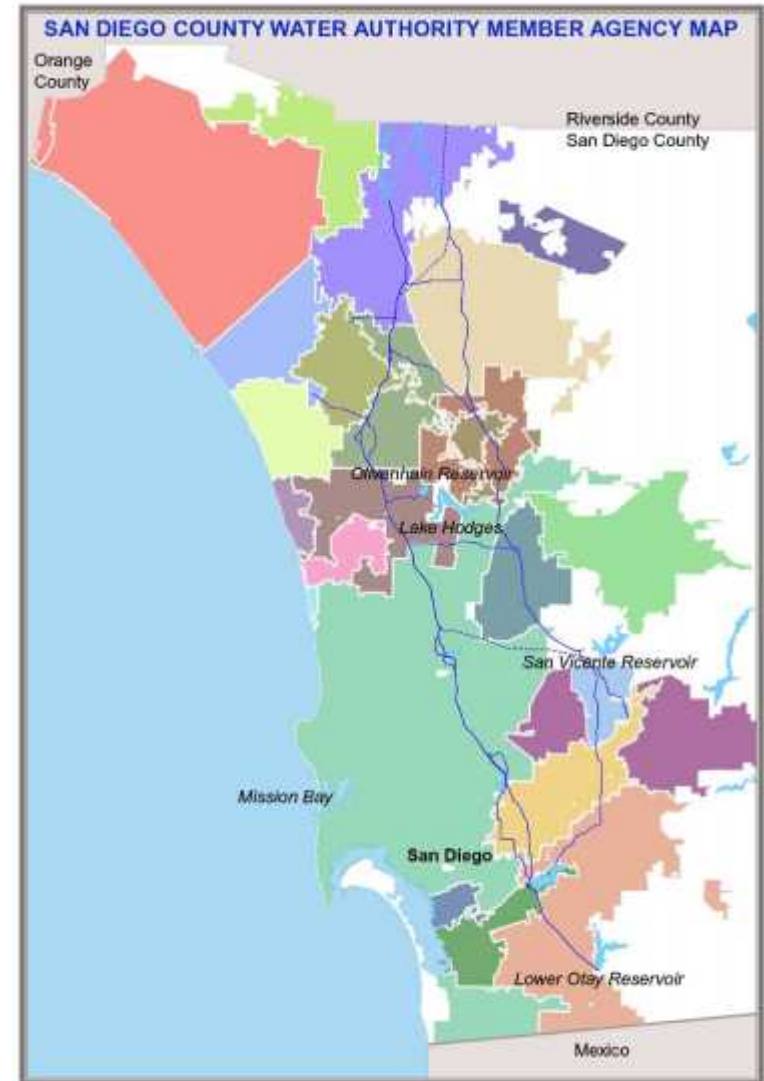
# San Diego County Water Authority

Wholesale water agency created by State Legislature in 1944

- ▶ 24 member agencies
- ▶ 36-member board of directors
- ▶ Serves 3.2 million people and region's \$218 billion economy

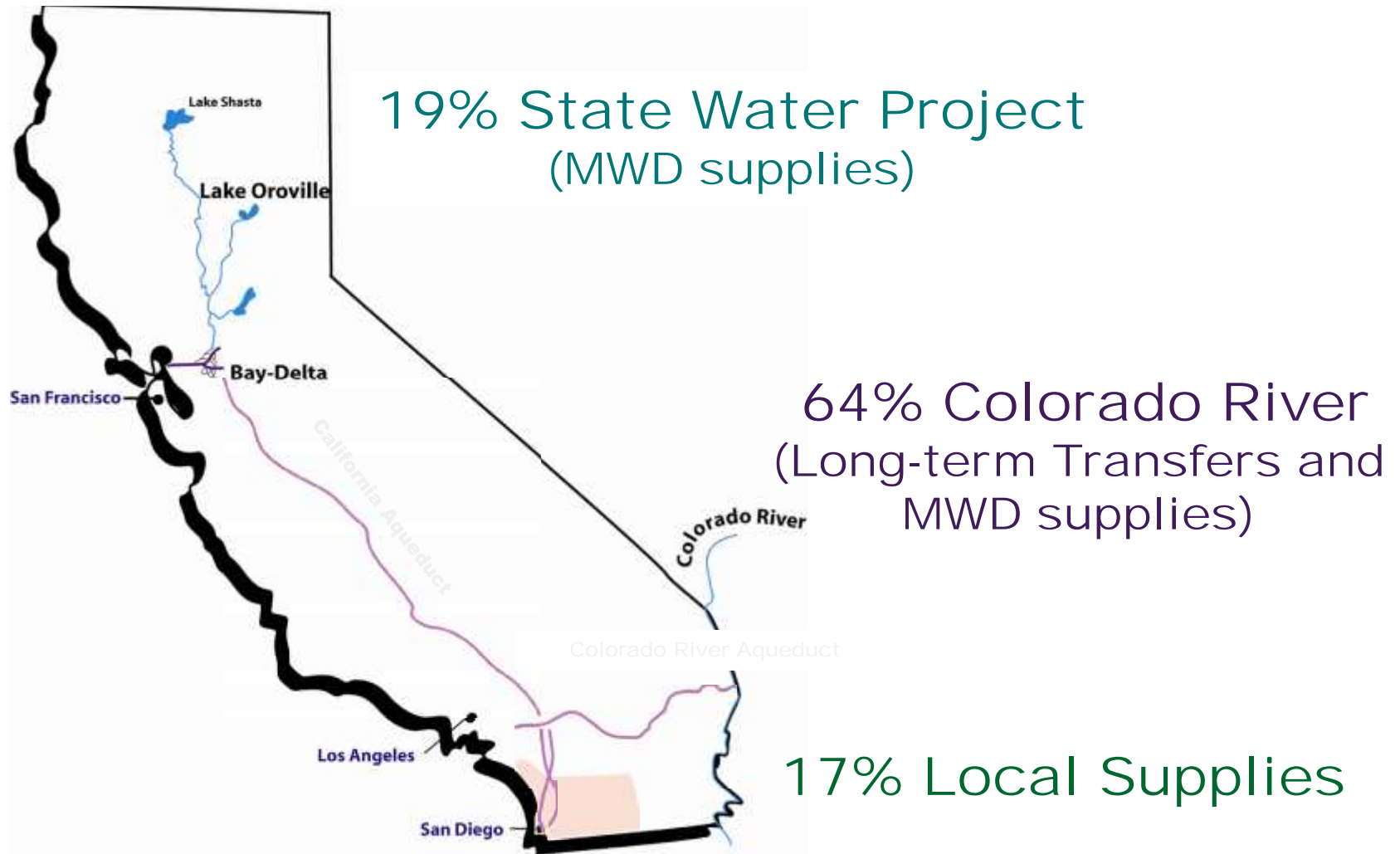
Imports 80%-90% of water used in San Diego County

- ▶ Builds, owns, operates and maintains regional water infrastructure
- ▶ Largest member agency of Metropolitan Water District of Southern California





# Sources of San Diego County's Water Supply (2010-2014 five-year average)



# Total Project Costs

## Total Capital Cost

Total desalination plant	\$537 million
Total conveyance pipeline	\$159 million
Financing costs	\$227 million
Water Authority improvements and oversight	\$80 million
<b>Total Capital Costs</b>	<b>\$1.003 billion</b>

## 2016 water purchase price\* (includes pipeline)

\*Current estimate based on highest electricity rate applicable

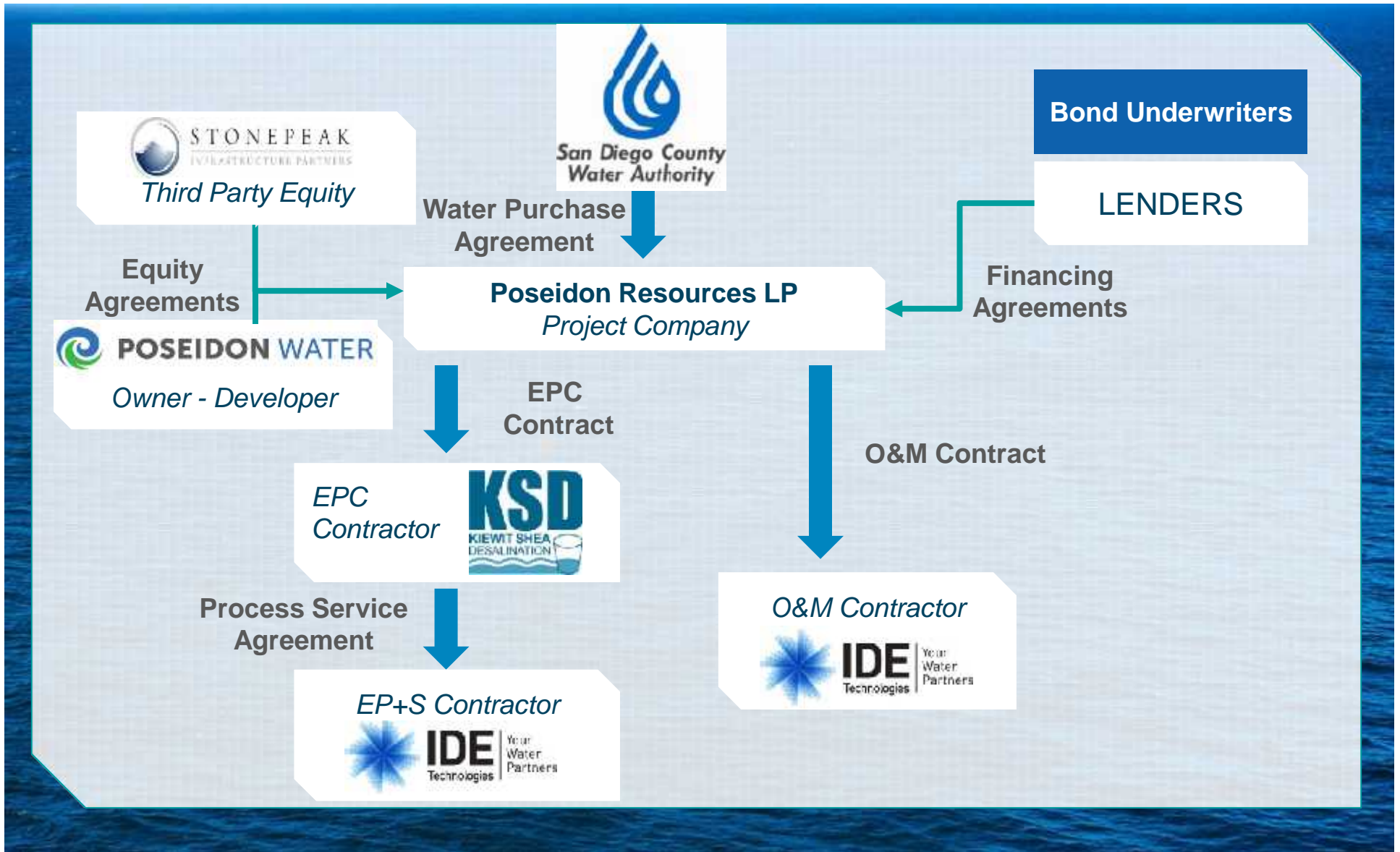
<b>56,000 acre feet per year</b>	<b>48,000 acre feet per year</b>
<b>\$2,131/AF (\$5.80/kgal )</b>	<b>\$2,367/AF (\$6.45/kgal )</b>

# Landmark Water Purchase Agreement between the Water Authority and Poseidon

- Water Authority Board approved WPA on Nov 29, 2012
- Outlines commercial and financial terms for production and delivery of water from the Carlsbad Desalination Project
- Transfers risk to private developer
  - Permitting
  - Design liability
  - Cost overruns
  - Operations
  - Must meet water quality requirements



# Shareholders and Contractual Structure

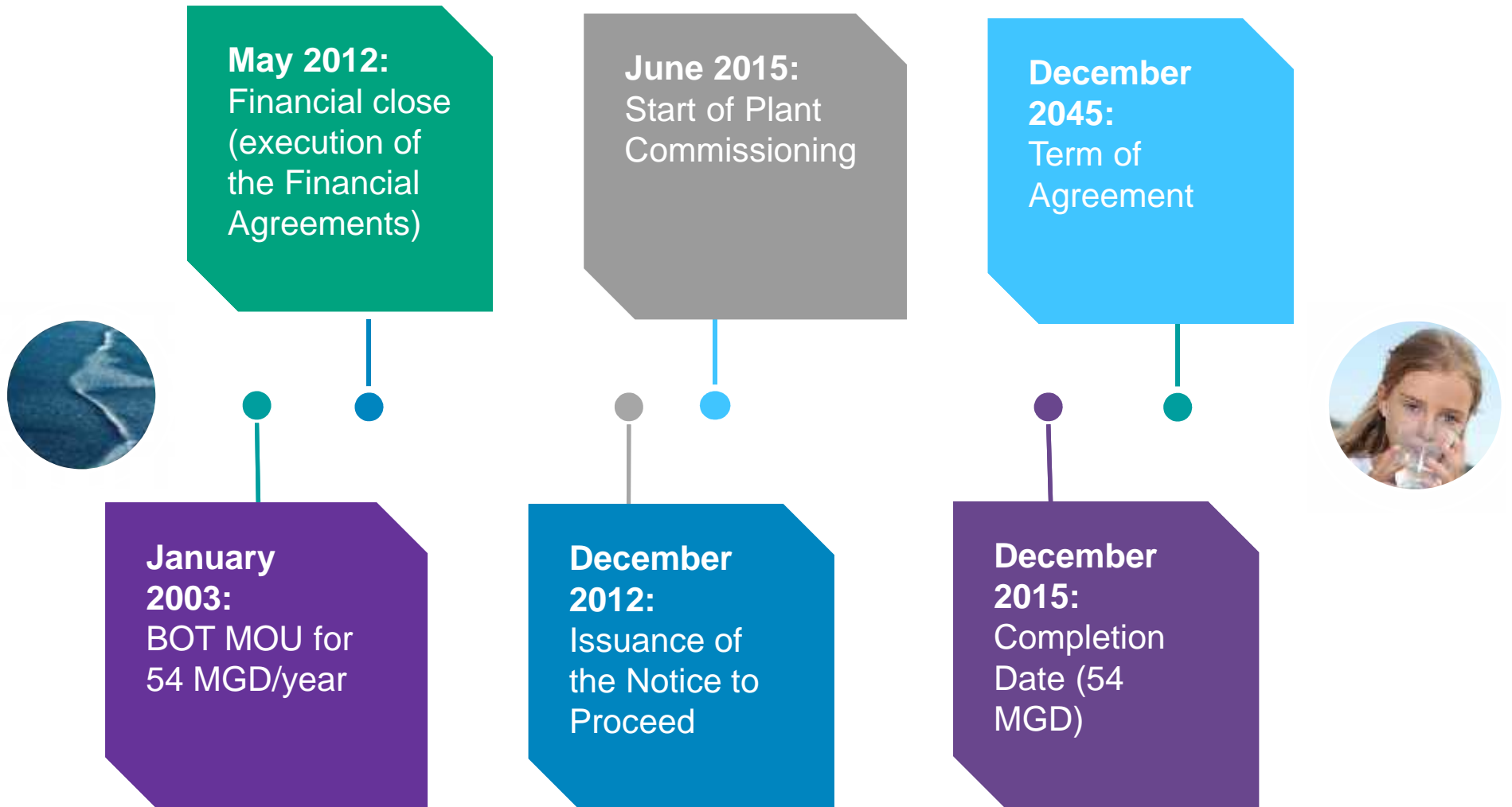


# Key Project Milestones: Don't try this alone!

- › **1998** – Poseidon initiated discussions with City of Carlsbad
- › 2000 – Poseidon project development team begins planning and technical studies
- › 2001 – Poseidon submits project feasibility study submitted to City of Carlsbad
- › 2003 – Poseidon submits key development applications to City of Carlsbad
- › 2003 – Initiates CEQA review and local entitlement process
- › 2006 – City of Carlsbad certifies EIR and approves project development plan and local permits and entitlements, Regional Board approval of NPDES permit
- › 2007 – Coastal Commission (CC) project approval, State Lands Approval and amendment of NRG intake/discharge lease to accommodate desal flows
- › 2008 – CC approval of wetlands restoration project and greenhouse gas reduction plan
- › 2006 - 2009 – eight local water district's entered into contracts to buy full output
- › 2010 – SDCWA expresses interest in buying the full output of the plant; Poseidon and local agencies cancel water purchase agreements
- › 2011-12 SDCWA/Poseidon Negotiate WPA
- › 2011 – Poseidon enters into equity agreement with Stonepeak
- › November 29, **2012** – SDCWA Board approves WPA
- › November 30, District Court of Appeal dismisses last (14<sup>th</sup>) remaining legal challenge
- › December 24 – Project construction bonds sold
- › **December 26 – EPC contractor given NTP**
- › December 28 - EPC contractor mobilizes



# Project Milestones



# Ground Breaking: May 2013

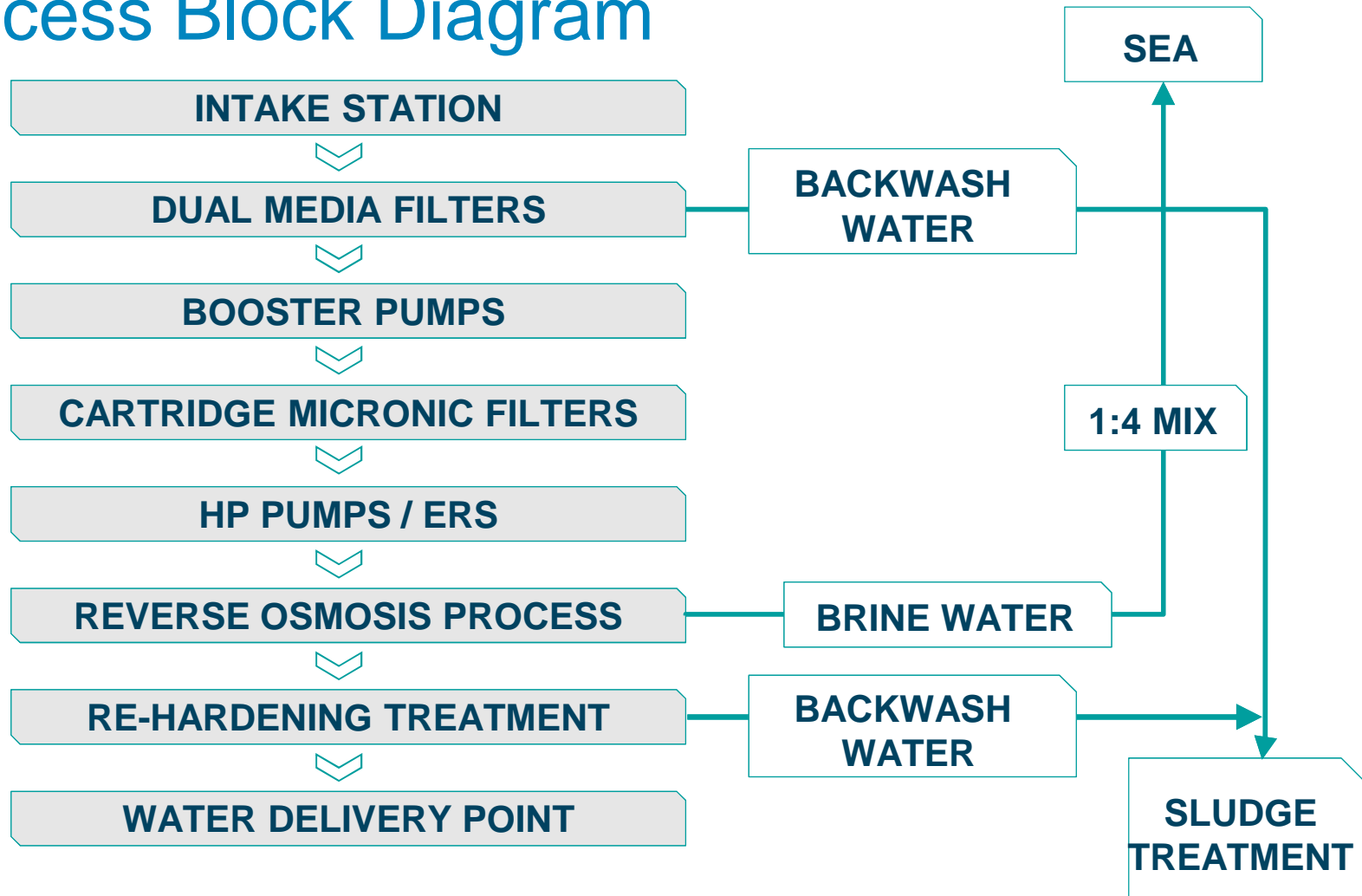


# Agua Hedionda Lagoon Aerial View





# Process Block Diagram



# Plant Aerial View

Intake

Pretreatment

Clear Well

RO 1<sup>st</sup> Pass

RO Cascade

Post-treatment

Product tank

Chemical  
Area





# Key Technical Parameters

- Recovery ratio ~52% - intake capacity 104 MGD
- Plant footprint - 6 acres
- 14,000 RO membranes → 6.2 million ft<sup>2</sup> of membrane area
- 4 high-pressure pumps 970-1060psi → 14.4 kWh per 1000 gallons
- 8 ERI trains – 168 PX300Q in total → 98% efficiency
- DAF-Lamella sludge treatment system → 20% dryness of sludge
- 2.5 million gallon product water tank → 8 – 420psi Product Pumps

# 10 Miles Pipe to Twin Oaks Reservoir



**Delivery System** - Pipeline Construction March 2013 – June 2015



# Startup and Commissioning Timeline

- › IDE O&M Team in Place: **January of 2015** (38 employees)
- › Wet Testing of all Process Equipment;
  - › Intake pump station delivers water to pretreatment: **Feb 2015**
  - › First Water to RO; **July 2015**
  - › All RO Trains Operational : **August 2015**
- › Mechanical Completion Certified: **Done**
- › Occupancy Permit: **September 30<sup>th</sup>**
- › Provisional DDW Permit: **October 1<sup>st</sup>**
- › Acceptance Test: **30 days beginning October 3**
- › Finalize DDW Permit: **November 1st**
- › Begin Water Sale Under WPA: **November 10<sup>th</sup>** (or earlier!)

# Summary of Project Benefits

## › Water Supply Benefits

- › 56,000 acre-feet per year of new water from the Pacific Ocean
- › Locally-controlled, high-quality, drought-proof supply
- › Project will serve 8% of regional demand in 2016
- › Key element of SDCWA water supply diversification strategy

## › Environmental Benefits

- › Restoration and enhancement of marine habitat
- › Net carbon neutral
- › Reduces demand on sensitive water bodies

## › Economic Benefits

- › Private investment in regional infrastructure will support 2,400 skilled jobs during the project construction period
- › An estimated \$560 million in local spending during construction
- › Up to \$5.3 million per year in incremental property and business tax revenues





# Construction: 2014





# Ariel View: September 2014



# 14 RO Trains; 14,000 RO Membrane Modules





# Where the Water Goes!



IDE – Your Water Partners

Thank  
You

