



THE CITY OF SAN DIEGO



CITY OF SAN DIEGO POTABLE REUSE PLANNING

AMY DORMAN
SENIOR ENGINEER

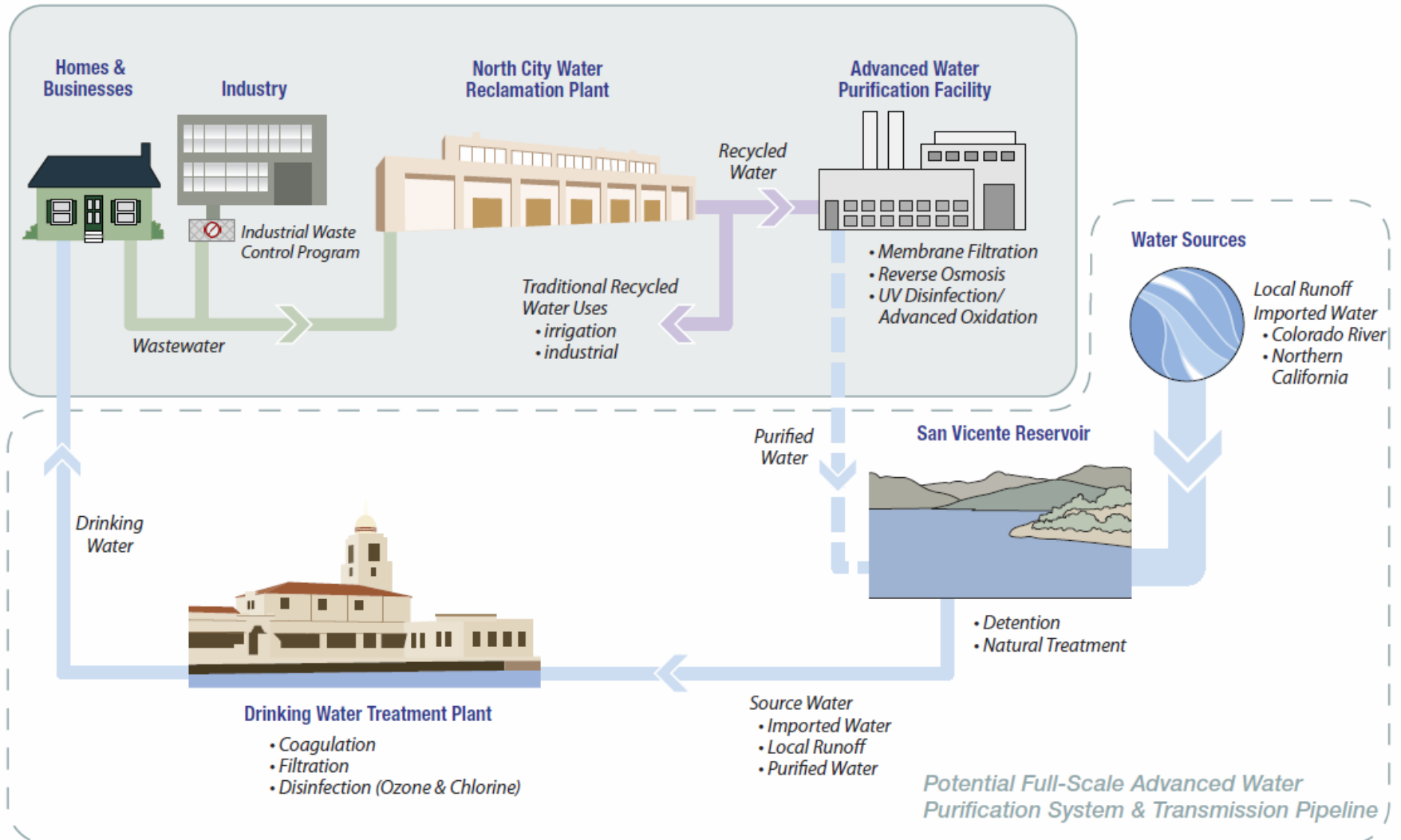
JANUARY 22, 2014

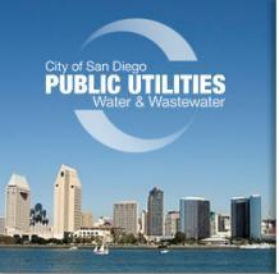


City of San Diego's Water Purification Demonstration Project

Purification Process

Demonstration-Scale Project



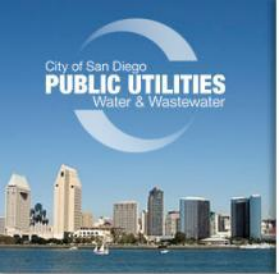


WATER PURIFICATION DEMONSTRATION PROJECT

COMPONENTS

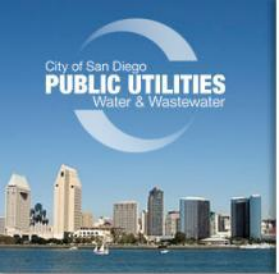
- Advanced Water Purification (AWP) Facility
- Independent Advisory Panel (IAP)
- San Vicente Reservoir Study
- Regulatory requirements
- Energy and cost analysis
- Education and outreach program





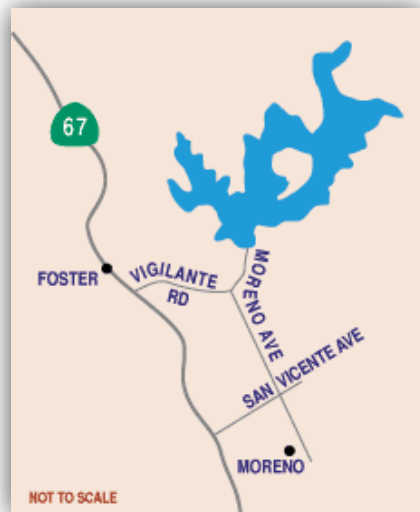
TREATMENT TESTING RESULTS

- Testing period August 1, 2011 to July 31, 2012
- Measured for 342 constituents and parameters in recycled water, purified water, and imported water
- Conducted 9,000 individual water quality laboratory tests
- Implemented continuous and daily monitoring before and after each treatment step to verify integrity of each treatment process



SAN VICENTE RESERVOIR STUDY RESULTS

- Reservoir provides an environmental barrier that satisfies anticipated regulatory requirements
- Purified water will be diluted at least 200:1 under all anticipated reservoir operations
- Water quality in San Vicente will not be affected by adding purified water



REGULATORS

- California Department of Public Health (CDPH) concept approval letter 9/7/2012

“Based on CDPH’s review of the City’s ... submittal ... CDPH approves the San Vicente Reservoir Augmentation Concept.”

- City received a letter of concurrence from the Regional Water Board on 2/12/2013

“The . . . Water Board, with concurrence from USEPA, strongly supports the efforts of the City to develop the San Vicente Reservoir Augmentation Project...”



ENERGY & COST ANALYSIS

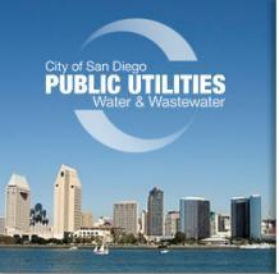
Energy:

- Energy consumption and greenhouse gas emissions of purified water delivered to San Vicente comparable to that of imported water

Cost:

- \$2,000 per acre-foot to produce and convey 15 mgd of purified water to San Vicente Reservoir



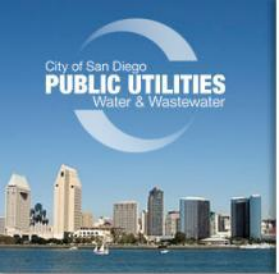


PUBLIC OUTREACH & EDUCATION PROGRAM

Program Statistics as of Dec. 31, 2013:

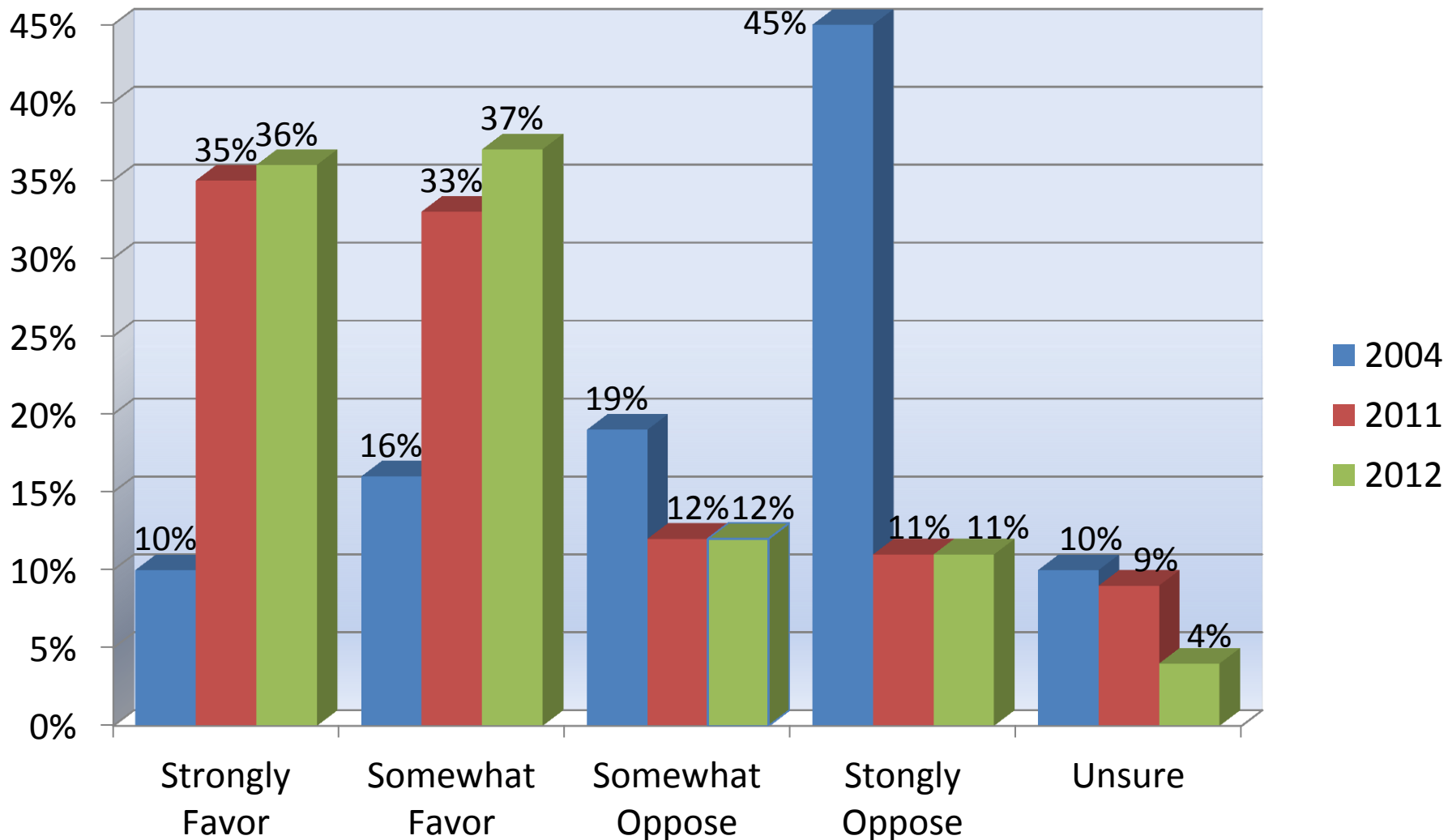
- Speakers Bureau presentations/attendees 198/4,100+
- Community events/attendees 60/7,500
- Facility tour attendees 4,294

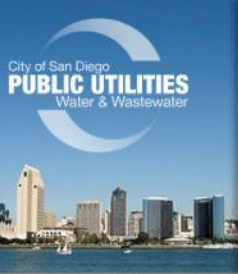




PUBLIC OUTREACH & EDUCATION PROGRAM RESEARCH RESULTS

USE ADVANCED TREATED RECYCLED WATER AS AN ADDITION TO DRINKING WATER SUPPLY





SUMMARY

ADVANCED WATER PURIFICATION FACILITY

Operated 12 months; produced water that met all state and federal standards

SAN VICENTE RESERVOIR STUDY

Satisfied all anticipated regulatory requirements

REGULATORY FRAMEWORK

Received conceptual approval for a full-scale project from CDPH & Regional Water Board

ENERGY & COST ANALYSIS

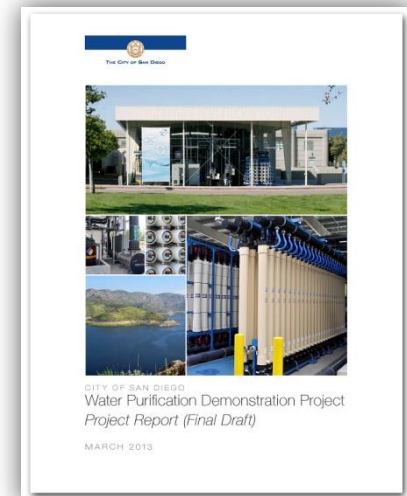
Determined energy use is comparable to imported water and costs \$2,000 per AF

EDUCATION & OUTREACH

Increased understanding and approval of water purification

PROJECT REPORT

Adopted by City Council in April 2013

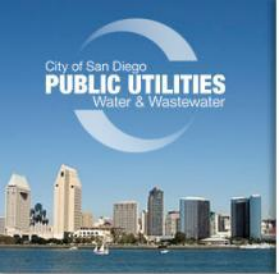




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RECYCLED WATER STUDY



BACKGROUND AND OBJECTIVES

- Driver: Point Loma Wastewater Treatment Plant's 2010 Permit Renewal
- Objective: Identify opportunities to increase recycling of wastewater for Indirect Potable Reuse (IPR) and Non-Potable Reuse (NPR) for a 2035 planning horizon
- Determine the extent recycling can reduce wastewater flows to the Point Loma Wastewater Treatment Plant
- Determine implementation costs

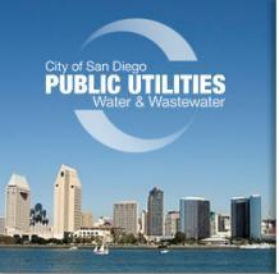
REUSE OPPORTUNITIES

- Non Potable Reuse (NPR)
 - Demand from potential customers is minimal compared to Point Loma flows; limited offload opportunity
 - Serving new customers requires significant amount of new infrastructure
- Indirect potable reuse (IPR)
 - Presents largest opportunity to offload Point Loma
 - Higher level of treatment relieves restriction on use
 - No need for separate delivery system



POTABLE REUSE FACILITY ALTERNATIVES

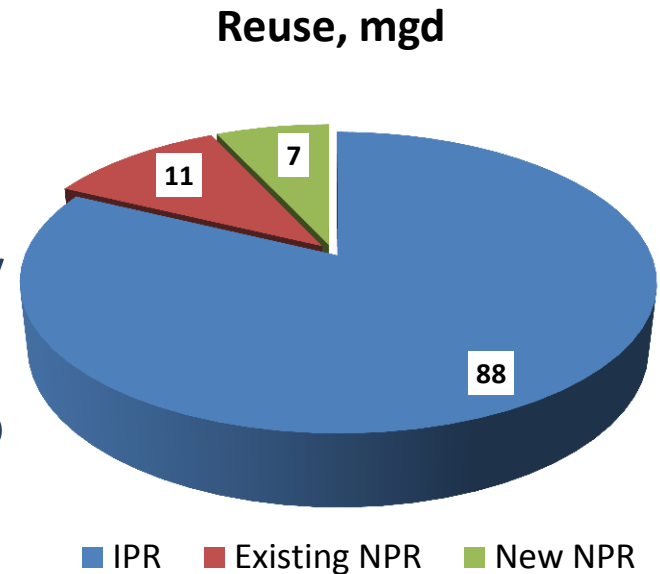




REUSE ALTERNATIVES

(2035 PLANNING HORIZON)

- Divert 135 mgd away from Point Loma to new and existing reuse facilities
- Resultant average daily Point Loma flow of 143 mgd
 - Reduces cost of upgrades by 40%
- All alternatives would lead to 101 mgd of reuse
 - 18 mgd non-potable
 - 83 mgd indirect potable
- Cost¹: \$1700 - \$1900/acre-foot



¹2011 \$



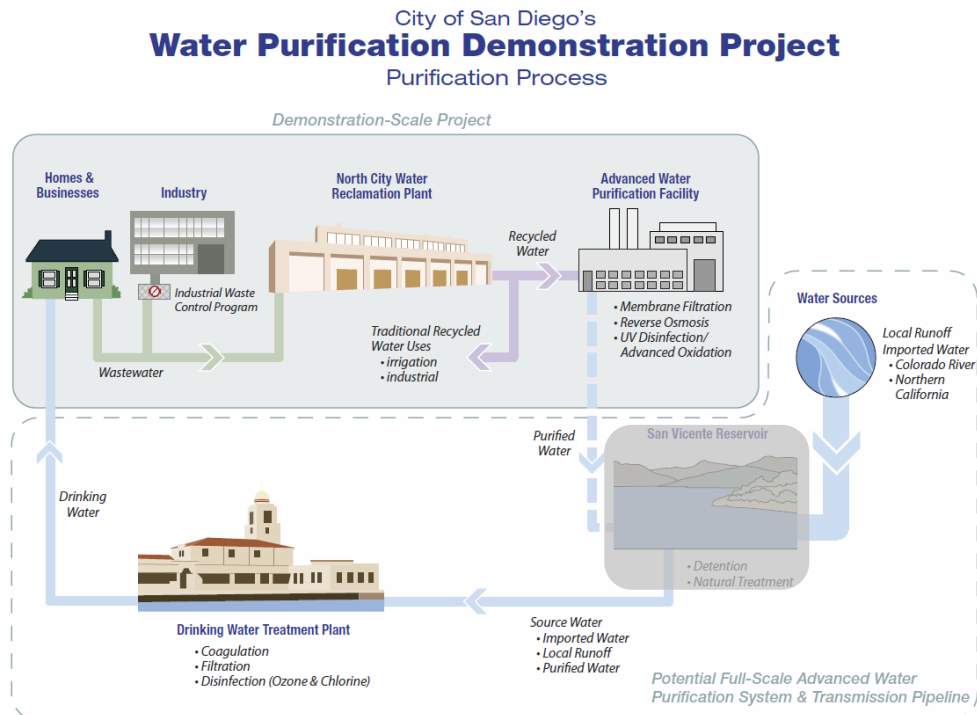
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NEXT STEPS

TECHNICAL STUDIES

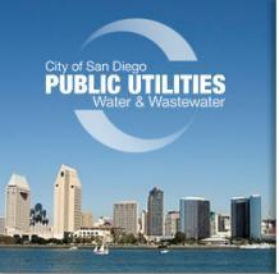
- Detailed siting studies
- Reservoir studies
- Direct Potable Reuse



NON-TECHNICAL CONSIDERATIONS

- Continue Outreach Efforts
- Determine water-wastewater funding allocation
- Develop Financing Plan





IMPLEMENTATION STRATEGY

- Integrate indirect and direct potable reuse (IPR/DPR) options
- Emphasize flexibility and adaptability
- Identify IPR-DPR decision points
- Balance schedule and costs
- Sustain current momentum



THE CITY OF SAN DIEGO

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Water Purification Demonstration Project



@PureWaterSD



purewatersd



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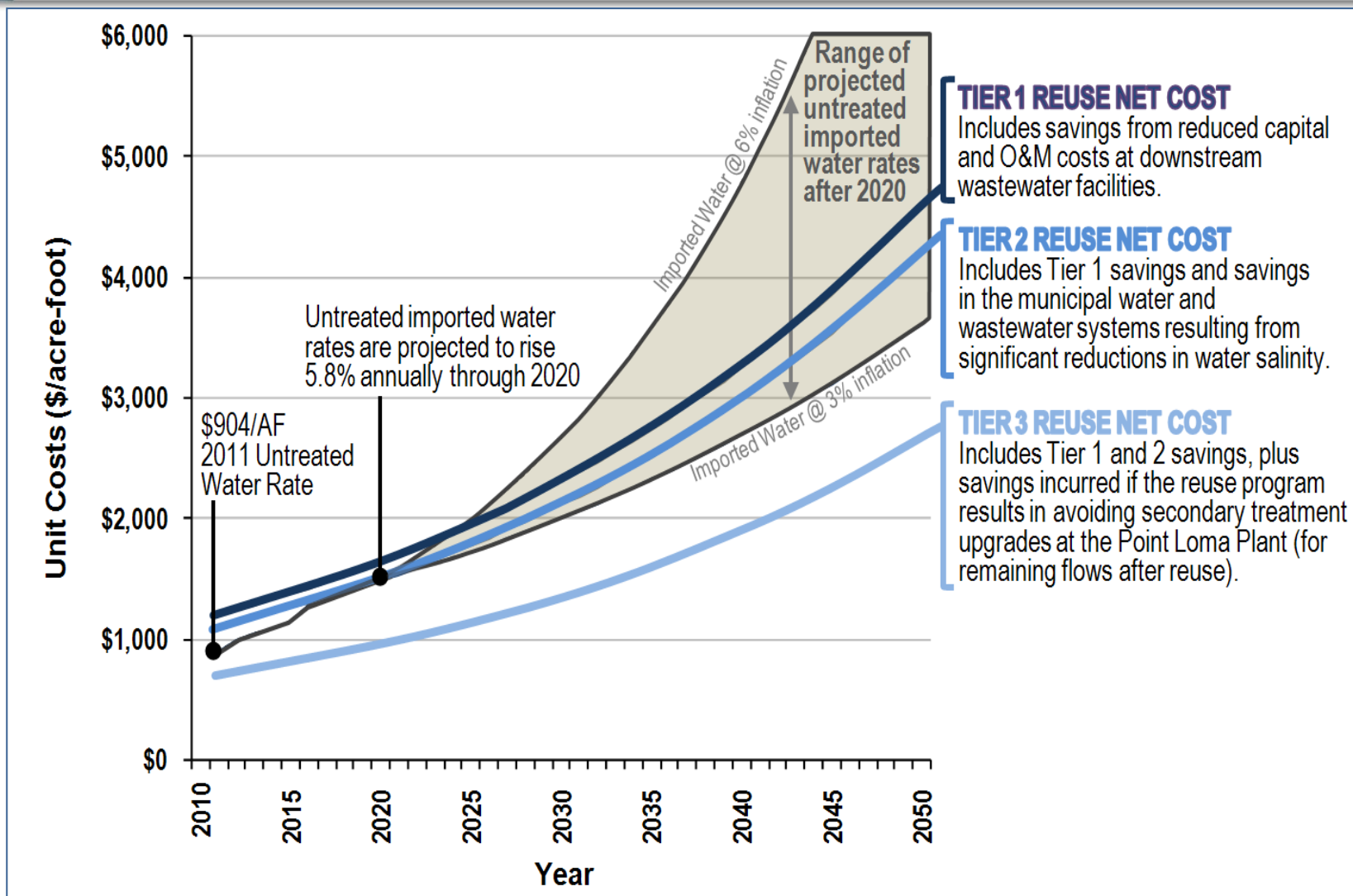


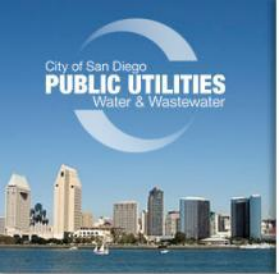
BACK-UP SLIDES

Factoring in the Savings

	\$ per ac-ft
Range of Alternative Costs	\$1700 - \$1900
<i>Tier 1 Savings due to reduced wastewater CIP and O&M costs</i>	<i>(\$600)</i>
<i>Tier 2 Savings due to reduced salinity</i>	<i>(\$100)</i>
<i>Tier 3 Savings due to avoiding Secondary upgrade at PLWTP and Maintaining it as Chemically Enhanced Primary Treatment Plant</i>	<i>(\$400)</i>
<i>Total potential savings</i>	<i>(\$1100)</i>
Net cost after all savings	<u>\$600-\$800</u>

Comparing the Cost of Water





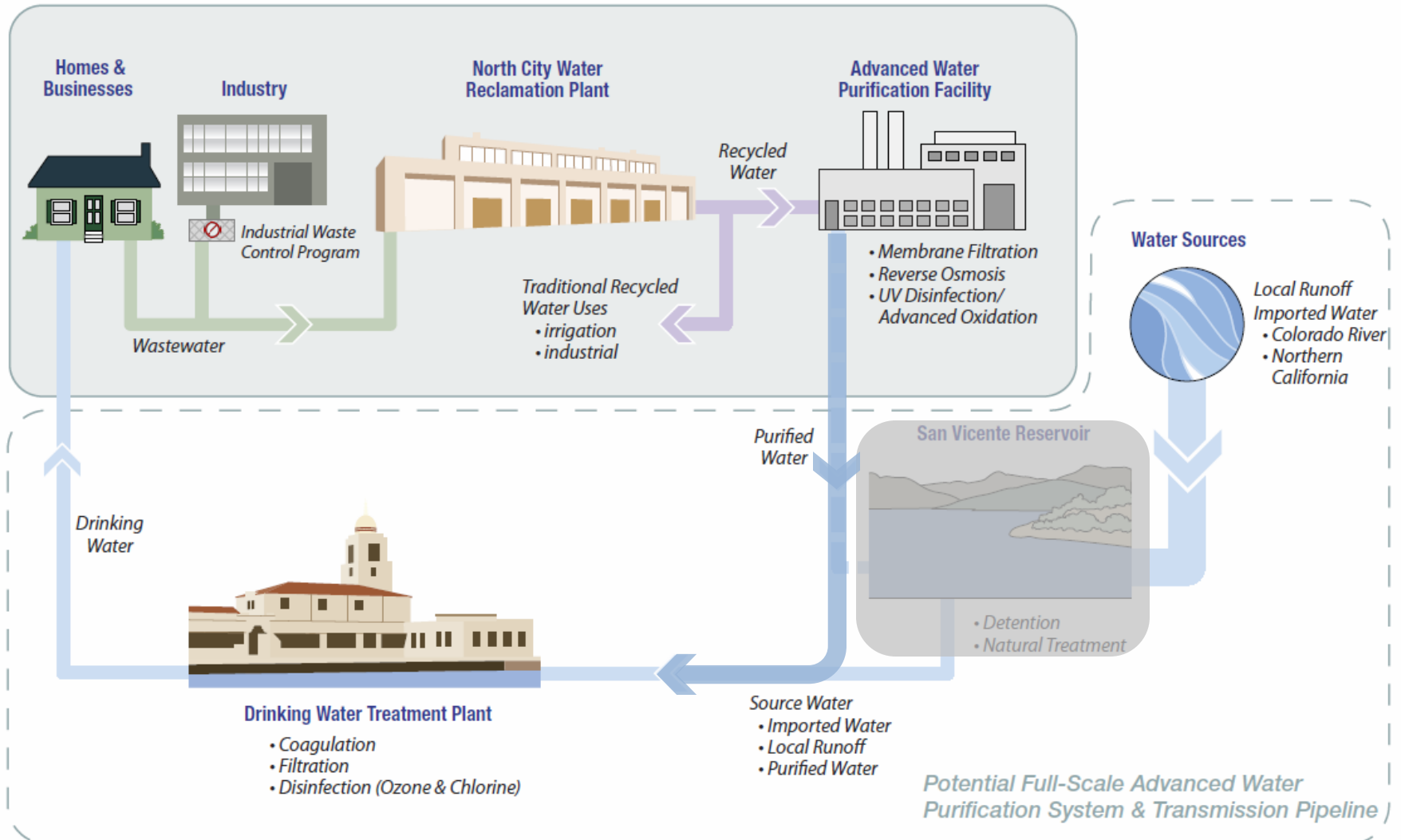
ROAD MAP TO IMPLEMENTATION

1. Determine a preferred implementation plan and schedule that considers potable reuse options for maximizing local water supply and reducing flows to the Point Loma Wastewater Treatment Plant.
2. Continue outreach efforts
3. Develop a strategy for allocating potable reuse costs among local water and wastewater funding sources
4. Develop a financing plan
5. Monitor the development of direct potable reuse regulations
6. Join the Direct Potable Reuse Initiative led by the WaterReuse Research Foundation
7. Coordinate potable reuse implementation strategy with Point Loma 2015 Permit Renewal Application
8. Continue AWPf operations

City of San Diego's Water Purification Demonstration Project

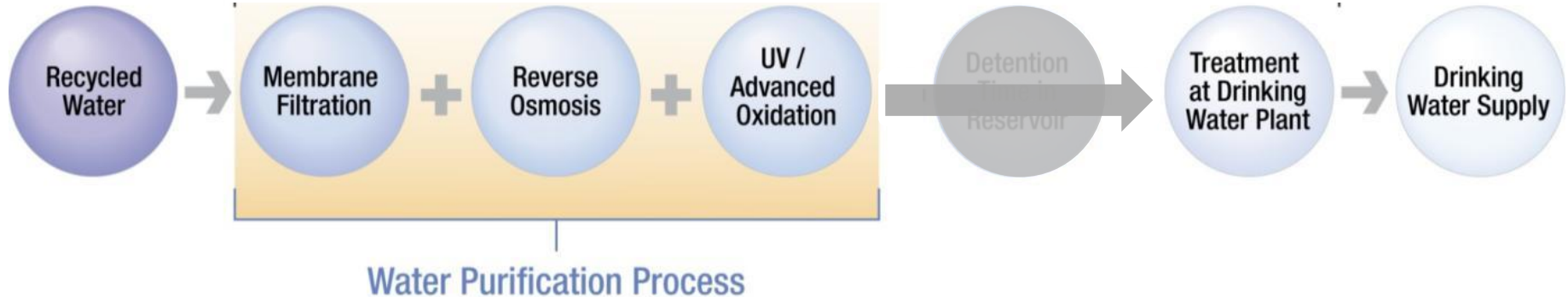
Purification Process

Demonstration-Scale Project



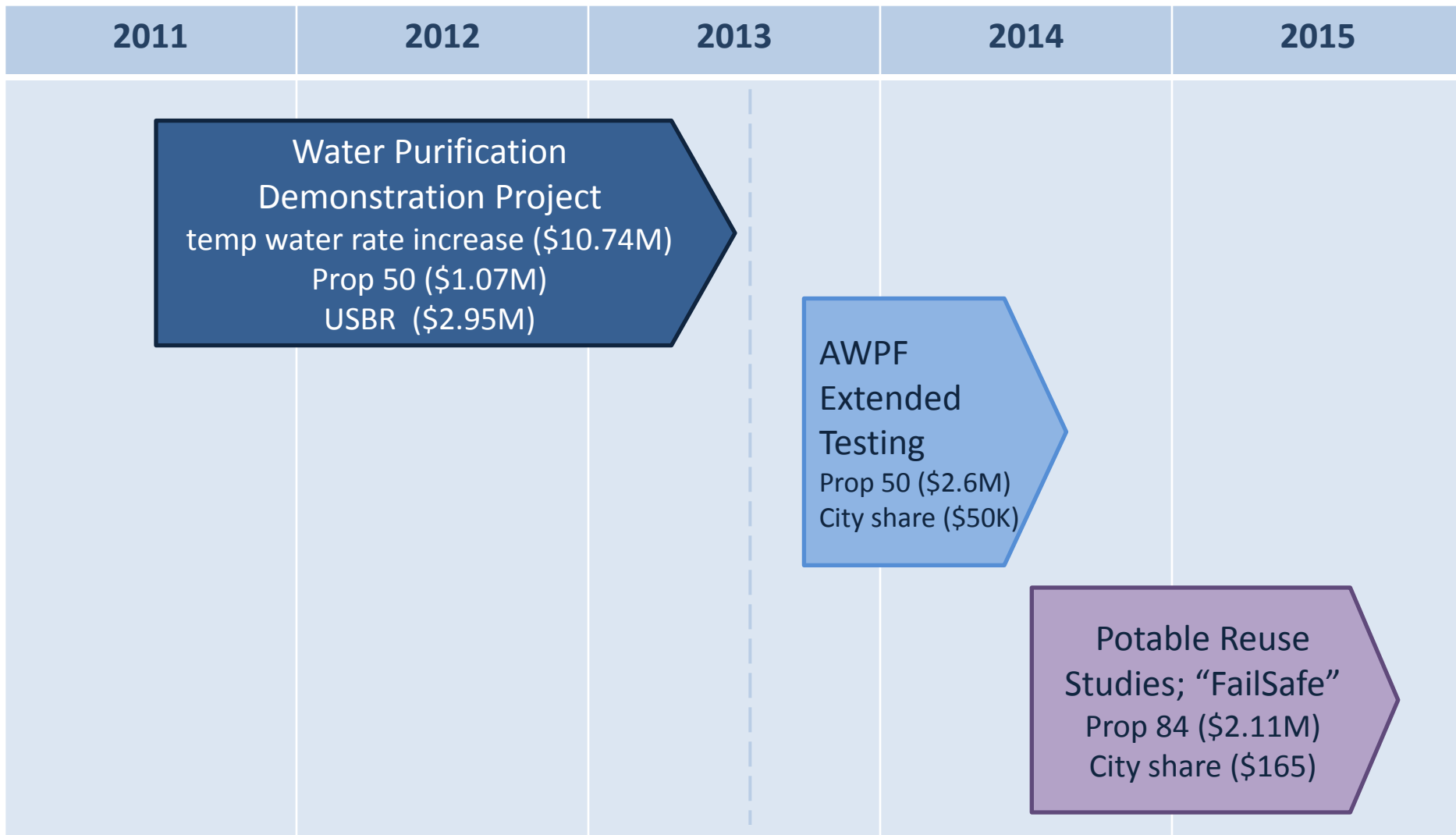
DIRECT POTABLE REUSE CONCEPT

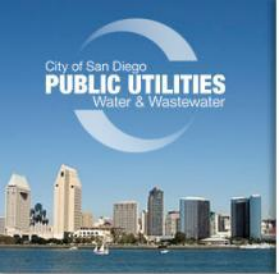
Without the reservoir, additional barriers (treatment or monitoring) will be required to achieve the same level of public health protection. What are those additional barriers?



multiple treatment barriers are the key to protecting public health

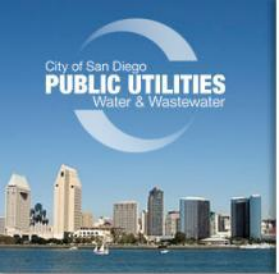
CONTINUED STUDIES AT THE DEMONSTRATION AWP FACILITY





WATER REUSE TIMELINE

- 1993 City & County Water Authority propose Water Repurification Project
- 1994-1998 Planning, regulatory reviews & conditional approval, preliminary design on project
- Fall 1998 Water Repurification Project becomes an issue in several closely contested political campaigns
- Spring 1999 Project cancelled by City Council
- 2002-2004 City enters into a settlement agreement with environmental groups committing to:
 - Evaluate improved ocean monitoring
 - Pilot test biological aerated filters
 - Study on increased water reuse



WATER REUSE TIMELINE

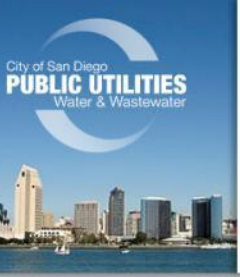
- 2004-2005 City undertakes Water Reuse Study
- October 2007 City Council votes to proceed with the Demonstration Project

Water Purification Demonstration Project

- November 2008 City Council approves temporary water rate increase (3.08%) to fund \$11.8 million Demonstration Project
- January 2009 - August 2010

Temporary water rates in effect





SAN VICENTE RESERVOIR STUDY

RESERVOIR ENLARGEMENT

- San Vicente Dam and Reservoir constructed in 1944
- Reservoir enlarged from 90,000 acre feet to 247,000 acre feet
- Water Authority is constructing facilities
- City will operate reservoir, dam, and outlet works
- Refilling will take three to five years

1944 to 2012



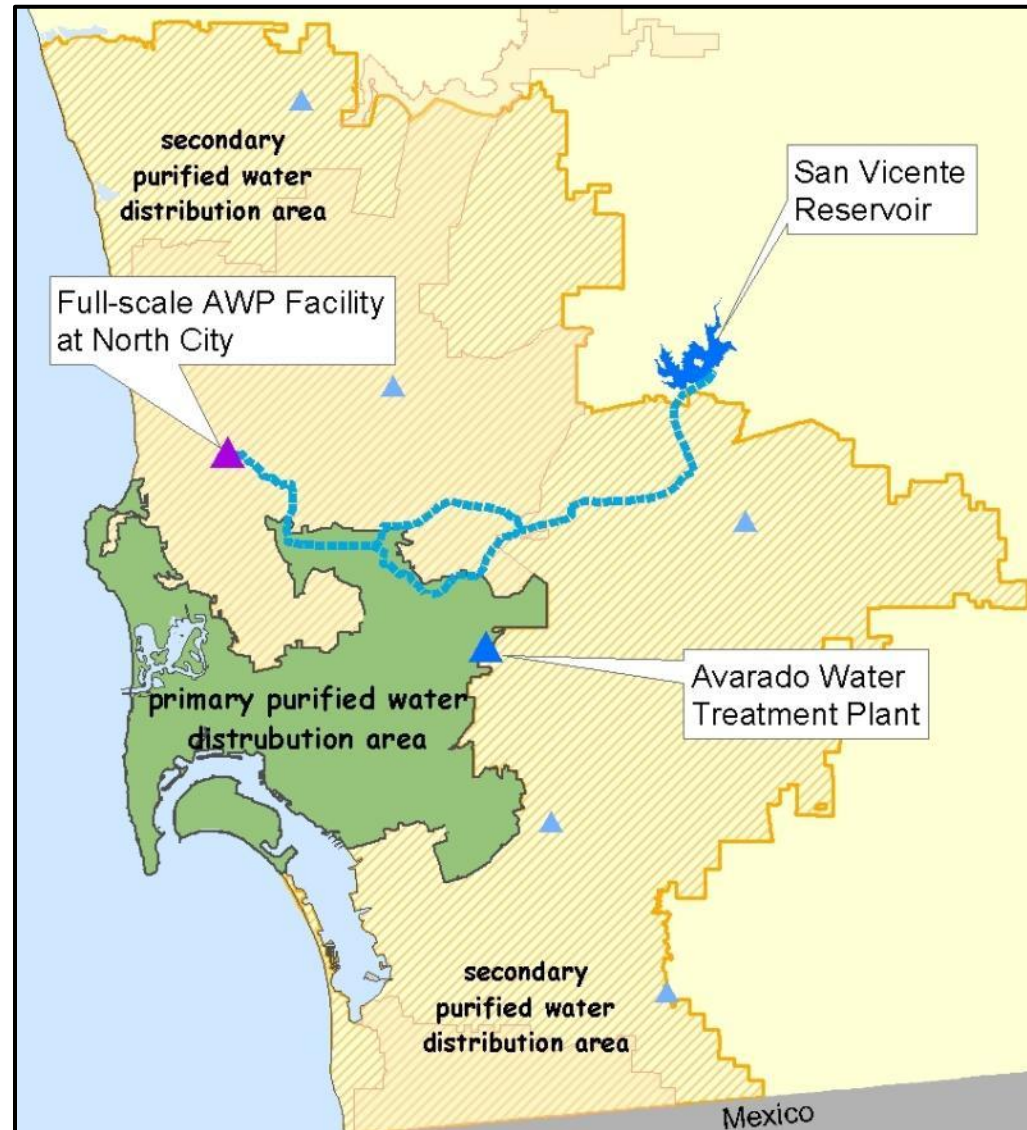
2013



PURIFIED WATER DISTRIBUTION AREAS

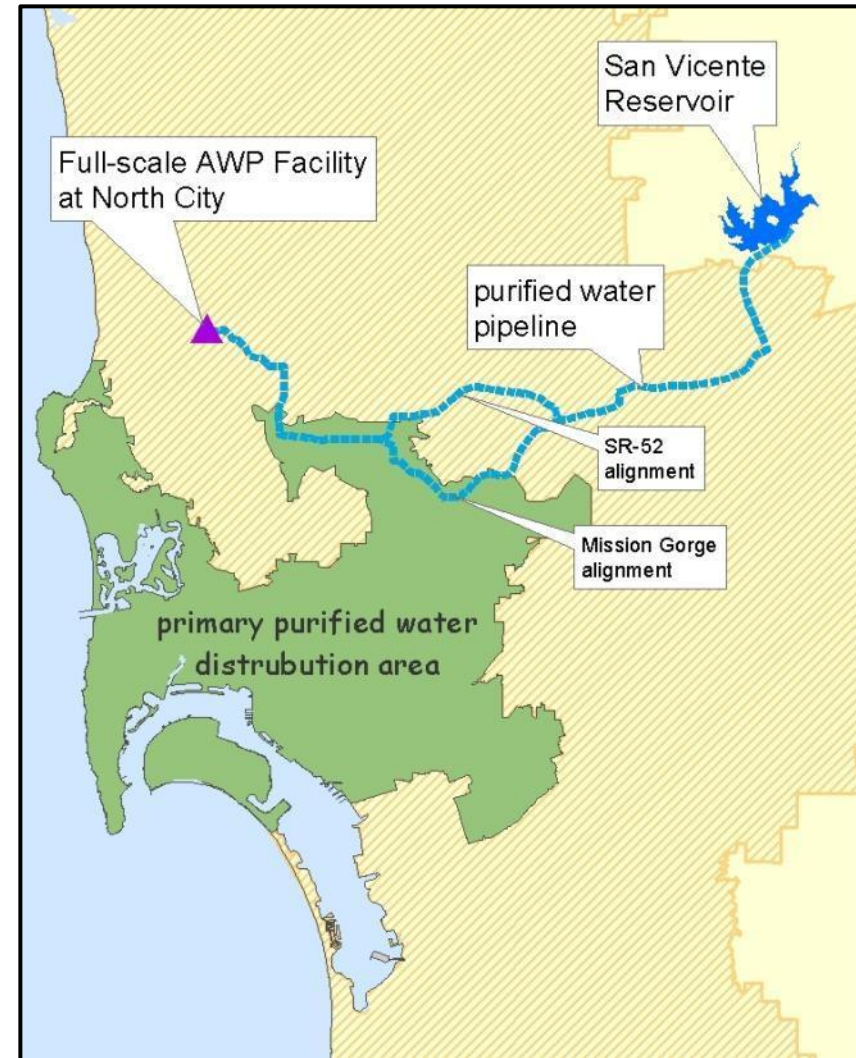
Under normal operations, purified water is delivered to the Alvarado WTP and to the area in green.

In an extraordinary event, such as extended drought, purified water could go to six WTPs and to the crosshatched area.



PIPELINE ALIGNMENT STUDY

- 22 mile, 36-inch pipeline to convey water from the AWP Facility to San Vicente Reservoir
- Two potential alignments identified:
 - State Route 52 alignment
 - Mission Gorge alignment
- Additional analysis is needed to refine alignment

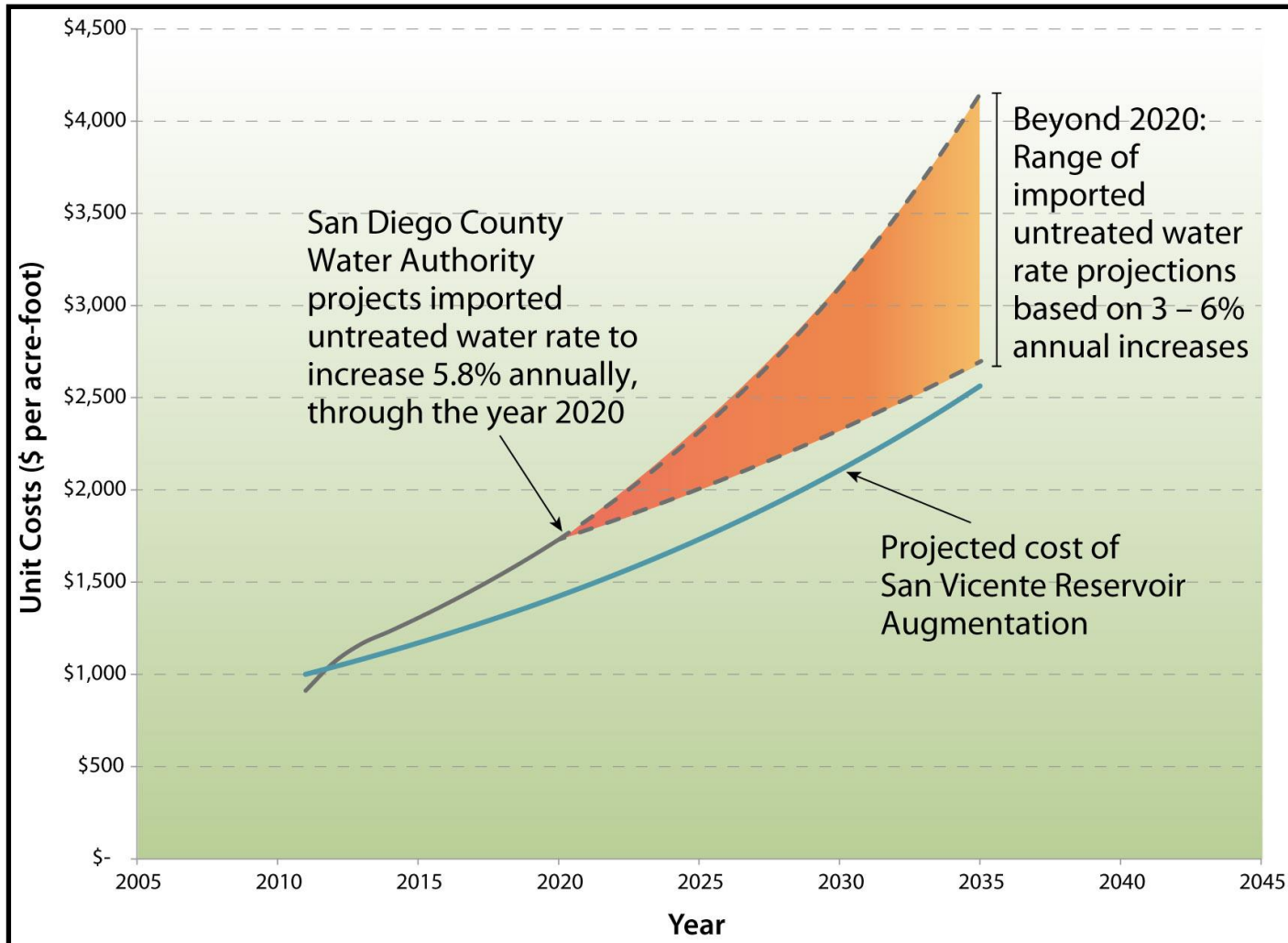




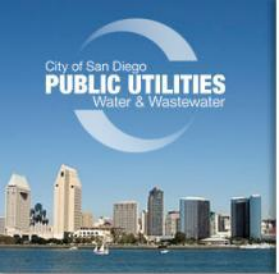
REGULATED CONSTITUENTS

Regulations/Guidelines	Number of Constituents
California Department of Public Health Goals	
Primary Drinking Water Maximum Contaminant Levels (MCLs)	90
Secondary Drinking Water MCLs	18
Microbial	4
Notification Levels	30
Groundwater Replenishment Criteria	142
San Diego Water Board (projected)	
San Vicente Reservoir Limits	143
Total	231

COMPARING THE COST OF THE WATER



Projected cost of purified water (solid line) of a full-scale reservoir augmentation project at San Vicente Reservoir compared to actual and projected costs of untreated imported water (dashed lines).

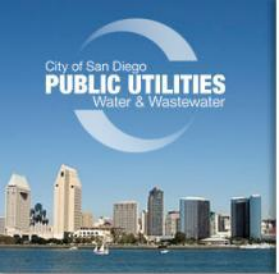


DEMONSTRATION PROJECT

SAN VICENTE IPR/RA COST ESTIMATE

	Capital	Annual Operating and Maintenance
AWP Facility	\$144,700,000	\$8,145,000
Pipeline & Pump station	\$224,500,000	\$3,385,000
Increased North City Tertiary Treatment	\$0	\$3,965,000
Total	\$369,200,000	\$15,495,000

- Result - \$2,000 per acre-foot to produce and convey 15 mgd of purified water to San Vicente Reservoir



DEMONSTRATION PROJECT, SAN VICENTE IPR/RA AVOIDED WASTEWATER COSTS

	Capital	Annual Operating and Maintenance
Point Loma Wet Weather Storage Facility	\$123,000,000	\$6,150,000
Reduced Treatment at Point Loma	\$0	\$2,210,000
Reduced Pumping at Pump Station No. 2	\$0	\$450,000
Total	\$123,000,000	\$8,810,000
Total (per-acre-foot basis)	\$1,000	

- Net cost: \$1,000 per acre-foot to produce and convey 15 mgd of purified water to San Vicente Reservoir