

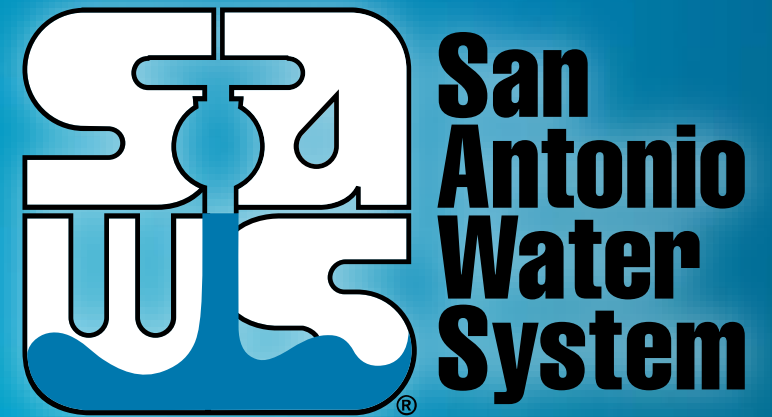
Water Reuse

Robert R. Puente

President/Chief Executive Officer

National Association of Regulatory Utility Commissioners

November 18, 2019



MAKING SAN ANTONIO
WATERFUL





Nation's Longest History of Reuse

1718:

Acequia system reused
wastewaters



1894:

First collection system to
sewage farm



1901:

Mitchell Lake part of large
irrigation system

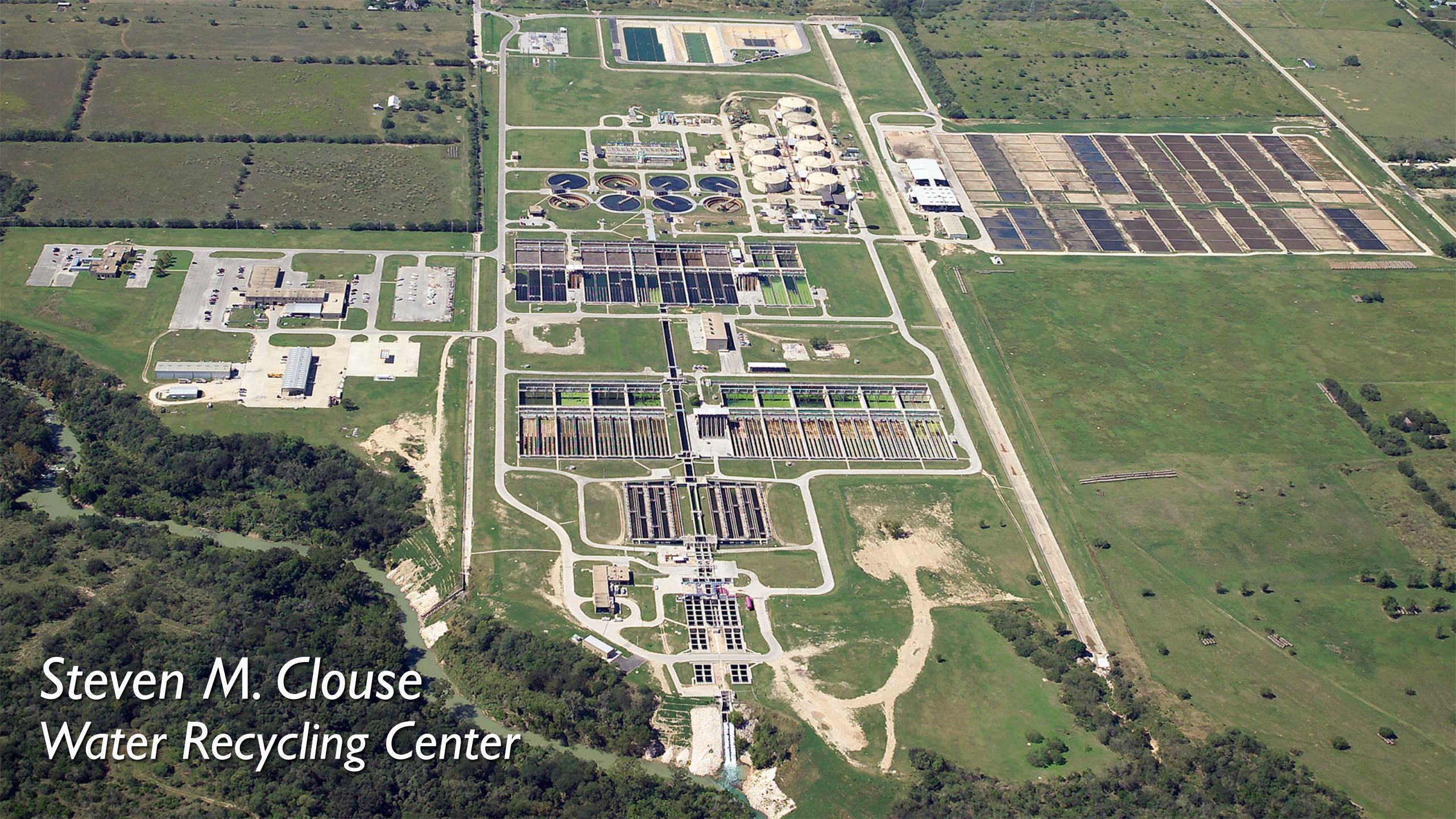


Mitchell Lake



Water Reuse

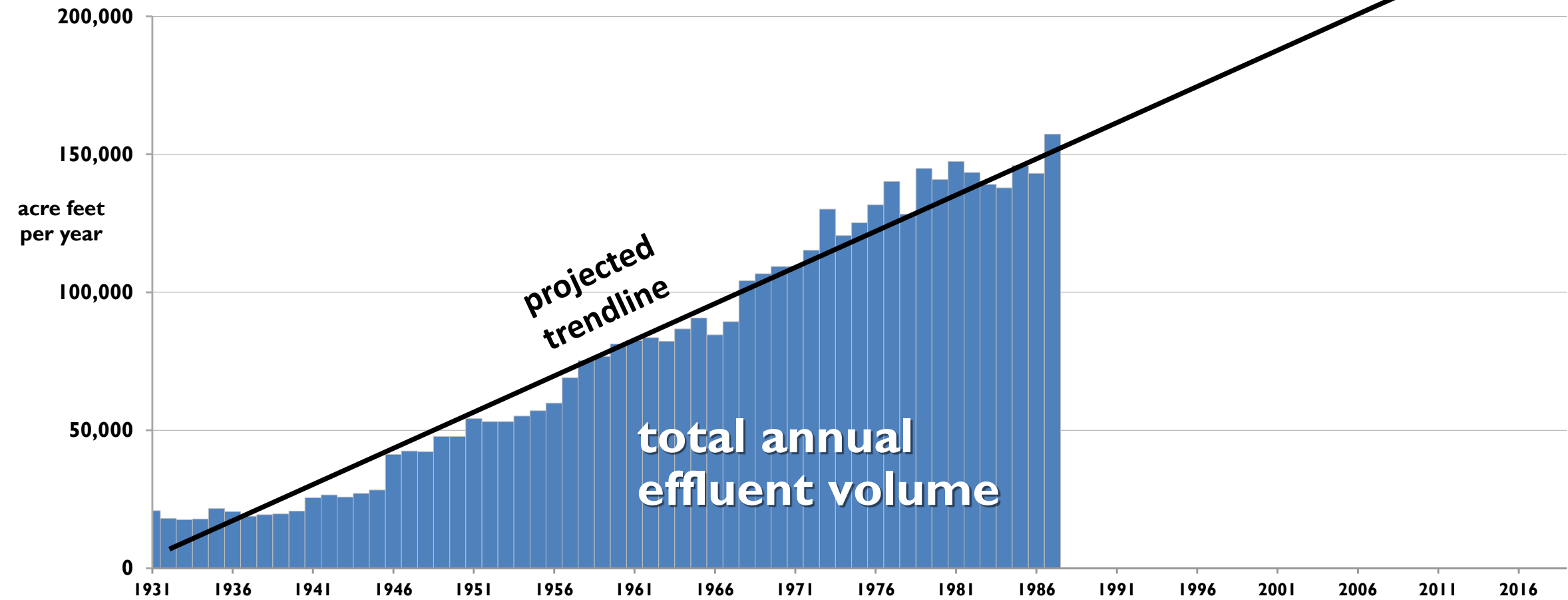




Steven M. Clouse
Water Recycling Center

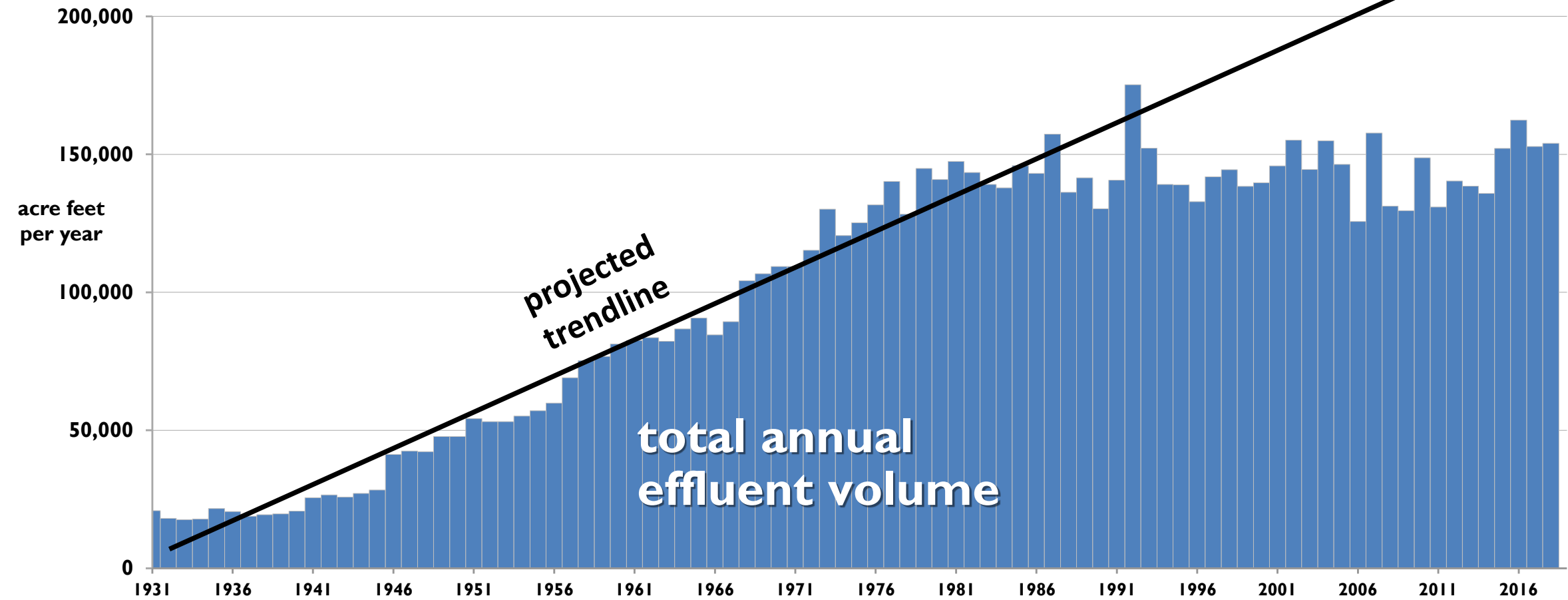
Growth Projections

All projections in 1970s and 80s were for large increases in effluent flow



Growth Projections

Growth did not occur because of aggressive conservation



Water Reuse



Recycled Water Program

Water for
CPS Energy

Water for
Reuse System

Water for
Instream Benefit



Water Reuse

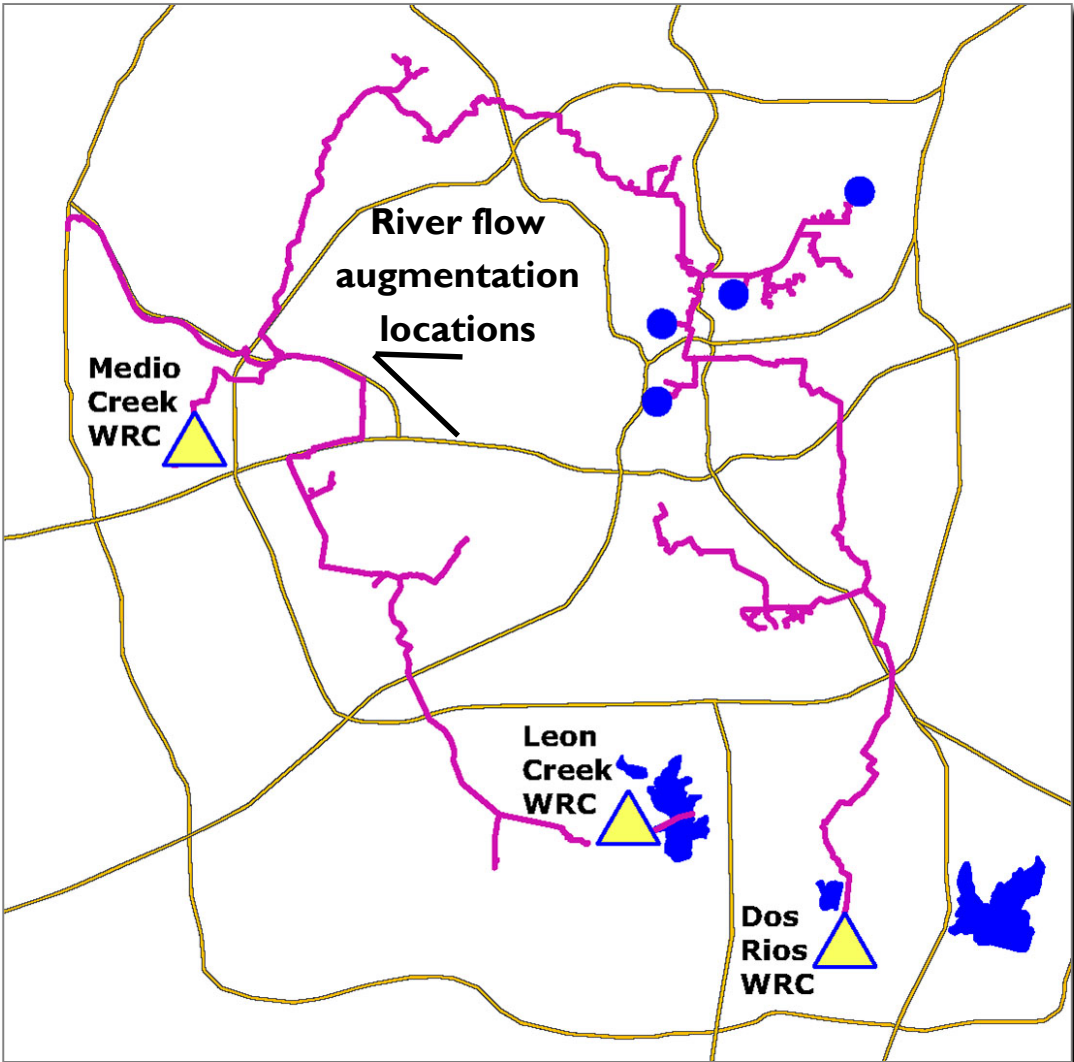
Water for CPS Energy



Water Reuse

Water for Reuse System

Recycled Water System



Consumptive Uses of Recycled Water



landscaping



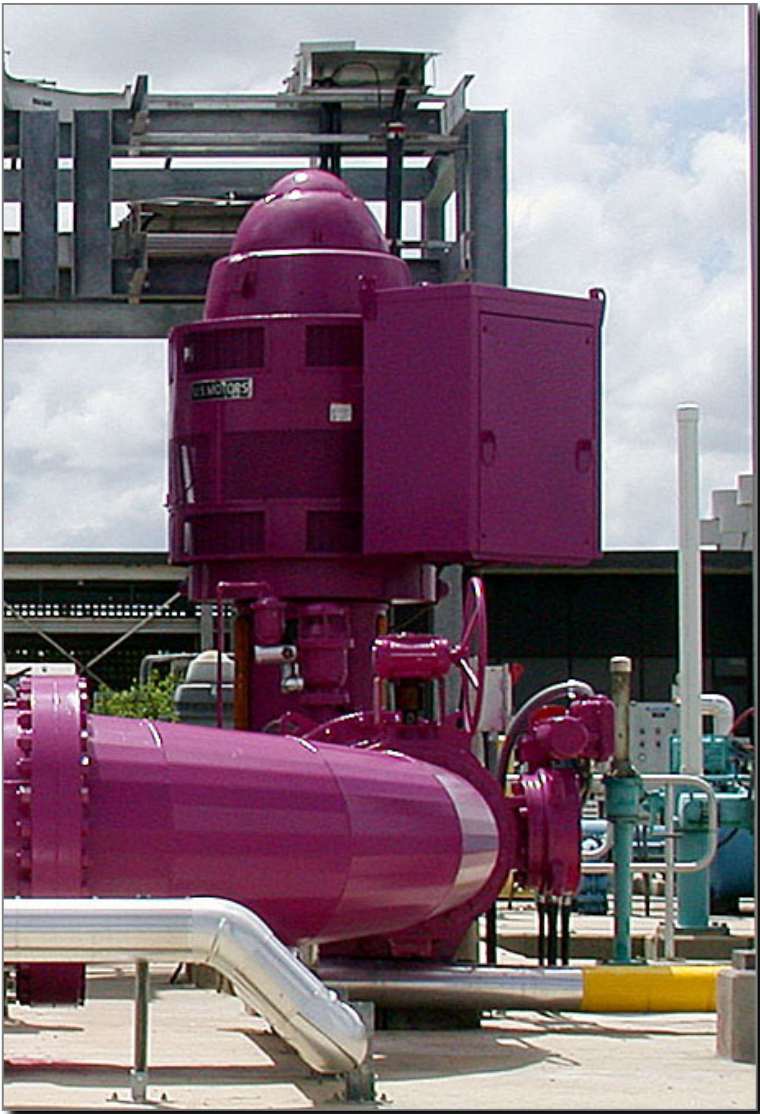
golf courses



cooling towers



industrial processes



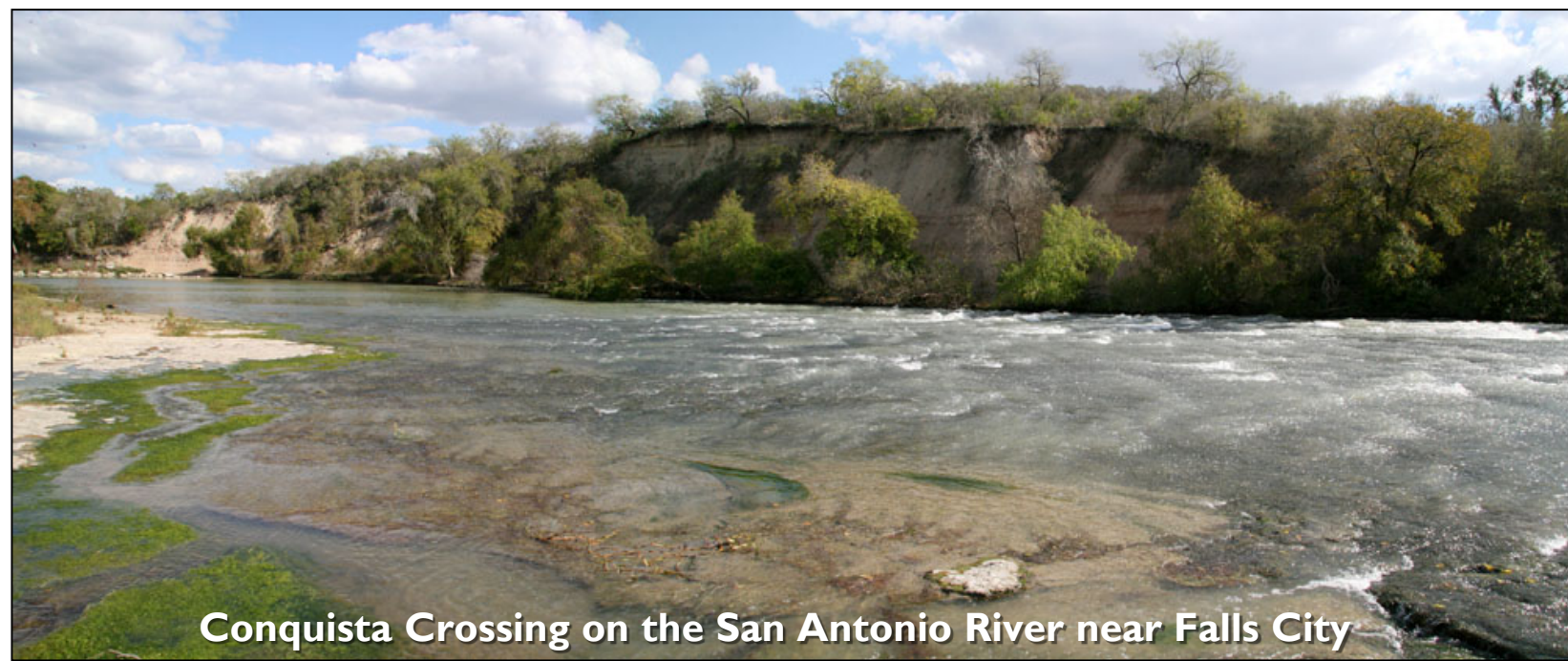
Non-Consumptive Uses



Water Reuse

Water for Instream Benefit

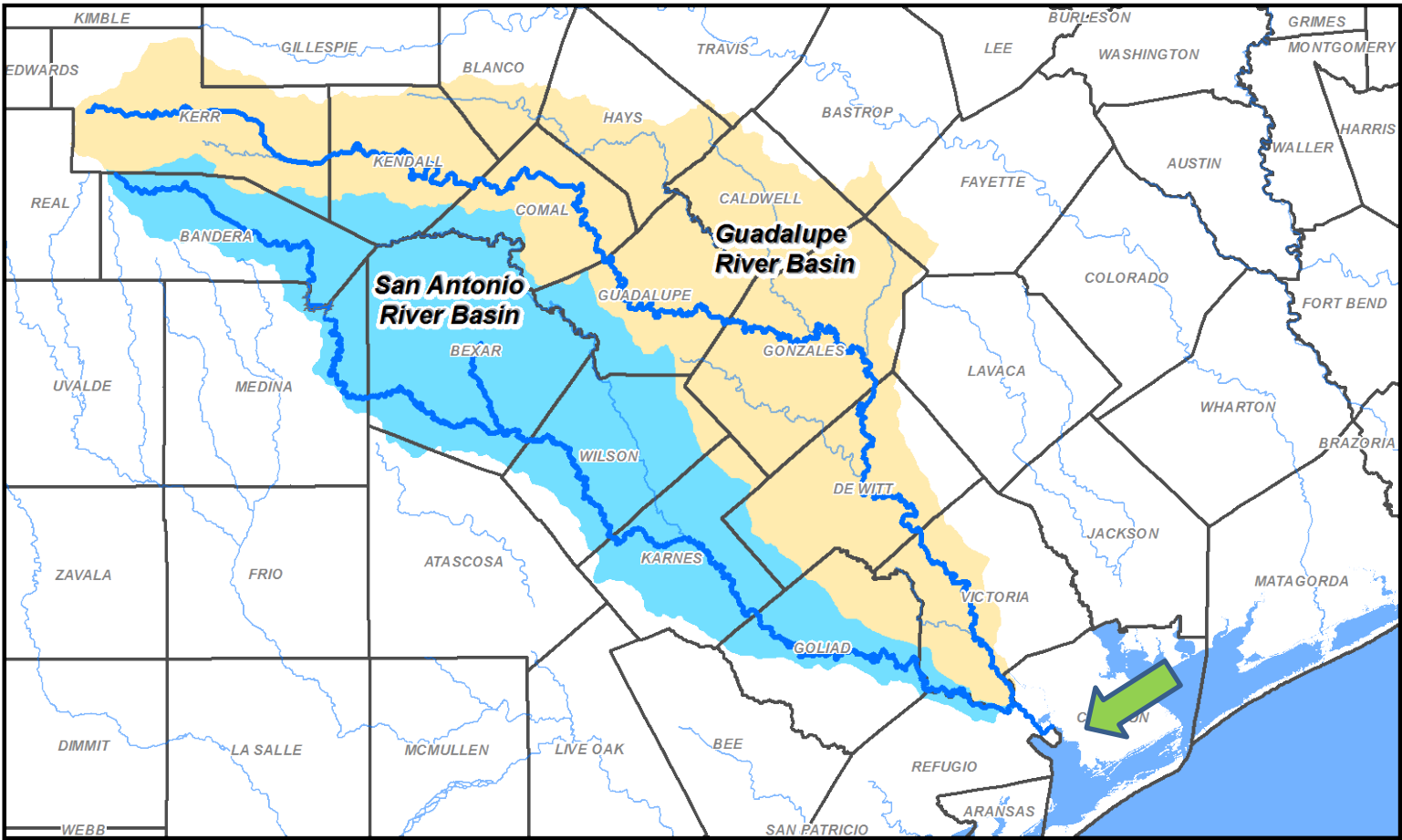
SAWS recycled water effluents are a critical contribution to the San Antonio River during drought periods



Water Reuse

Water for Instream Benefit

San Antonio/Guadalupe basin



Water Reuse



Environmental, Tourism & Economic Benefits



Water Reuse

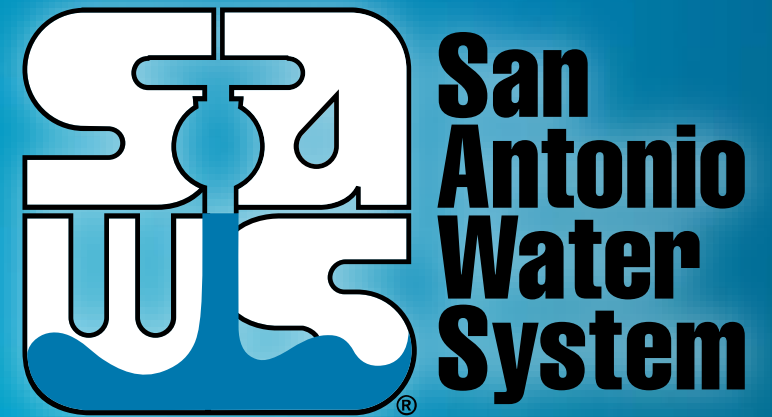
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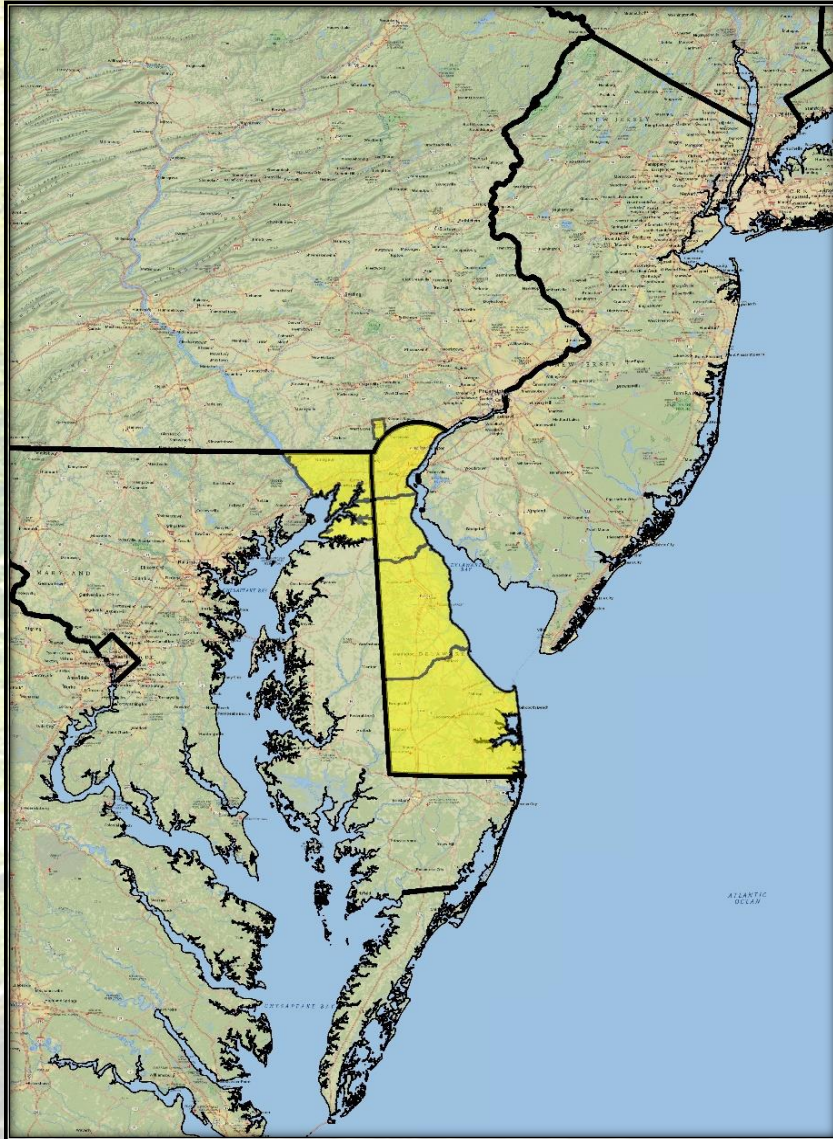
NARUC Annual Meeting and Education Conference

**“Leading the Way
Exploring Opportunities”**



November 17 - 20, 2019

Artesian's Service Area



Water Service

Wastewater Service

Service Line Protection

Contract Operations

Our Business Today



Where we started



Back to the Source



Reusing/Recharging Wastewater in Delaware



Artesian Wastewater Management

\$26.8 Million CapEx
Last five years



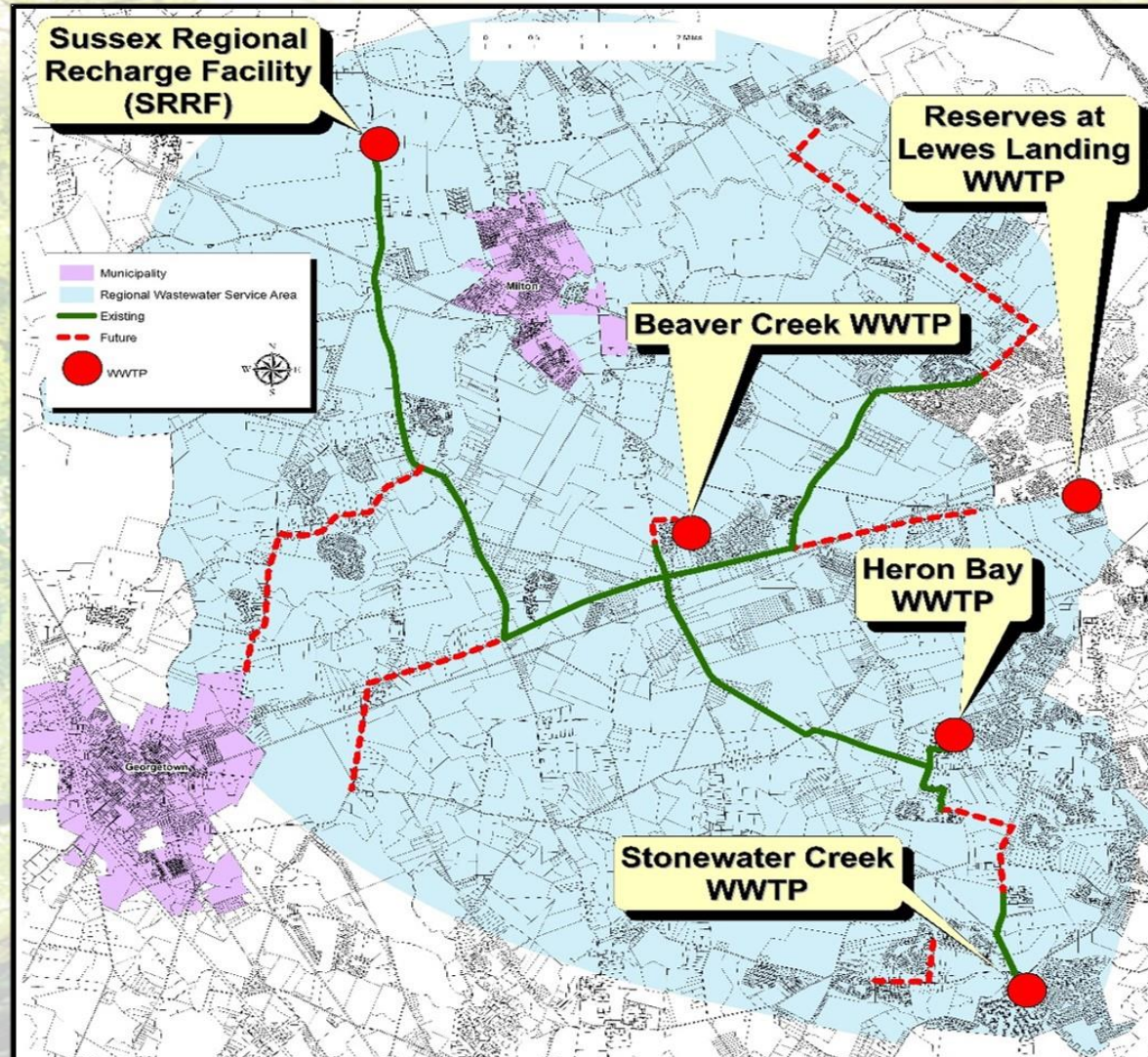
650 Million
Gallons recycled annually

5
Wastewater facilities

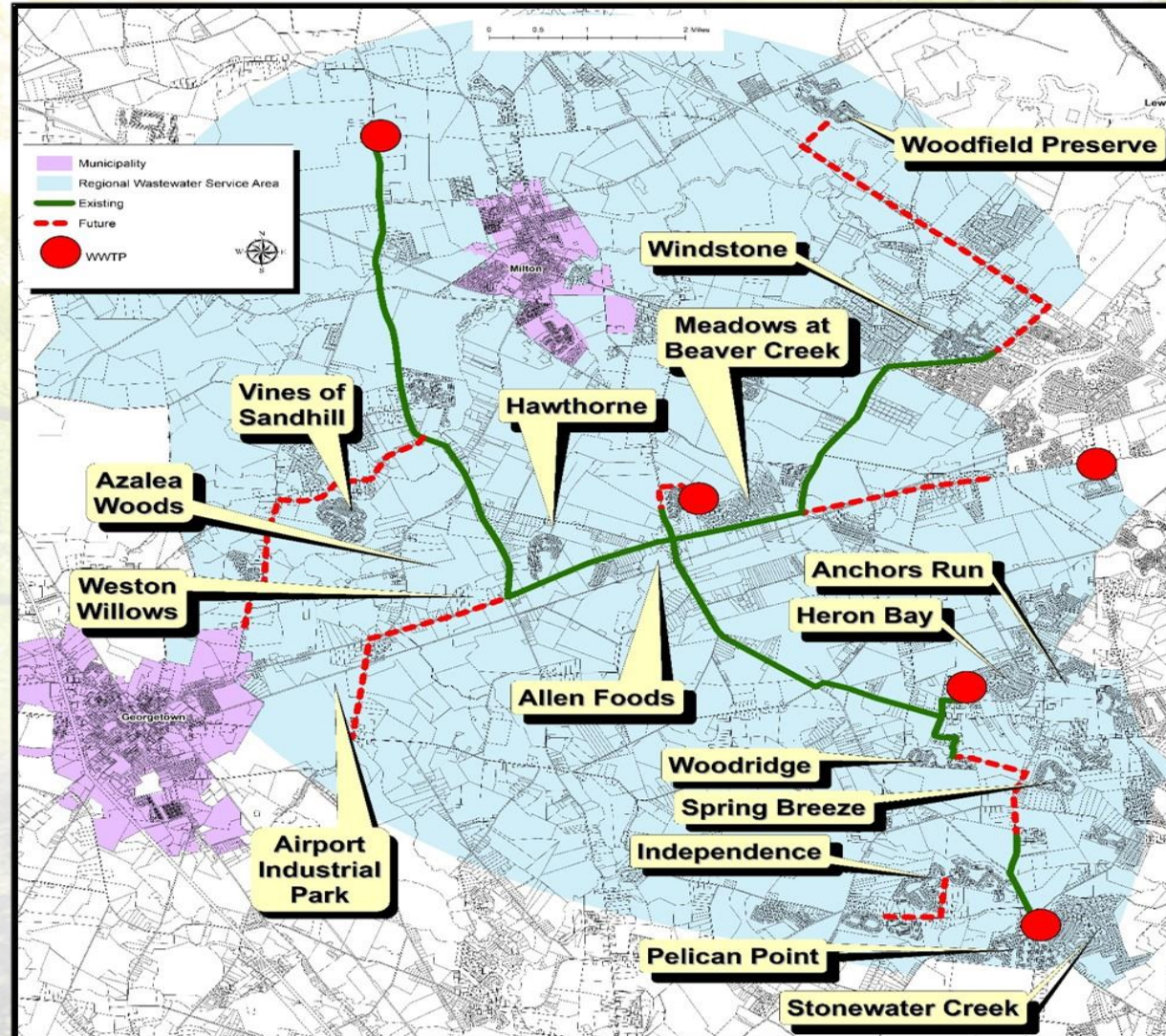


23 Square Miles
Service area

Regulated Wastewater Service Area



Wastewater Service Growth



Rapid Infiltration Basins (“RIBS”) Using “Recycling to” “Reuse”



Delivering Cost-Effective Solutions

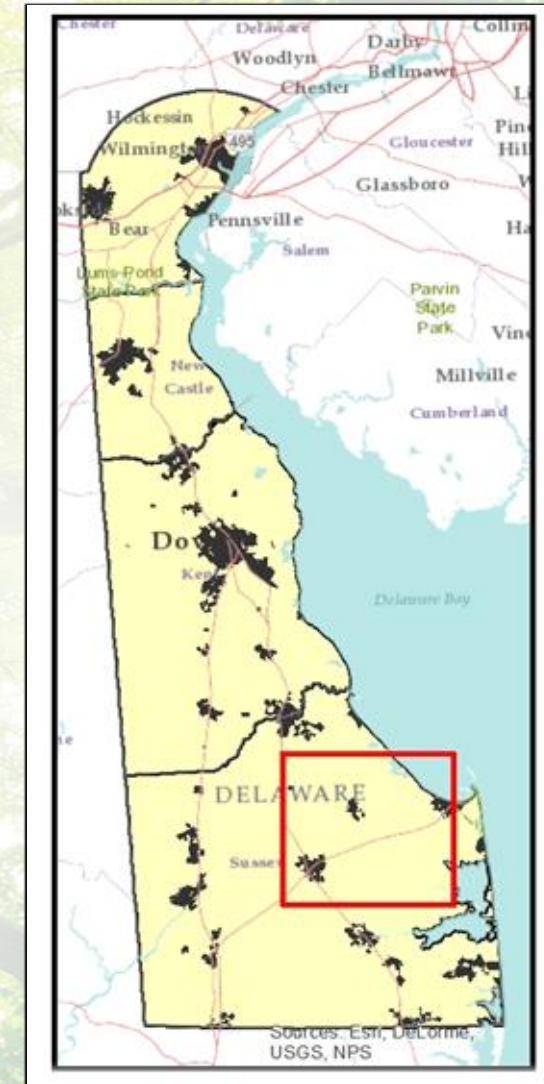
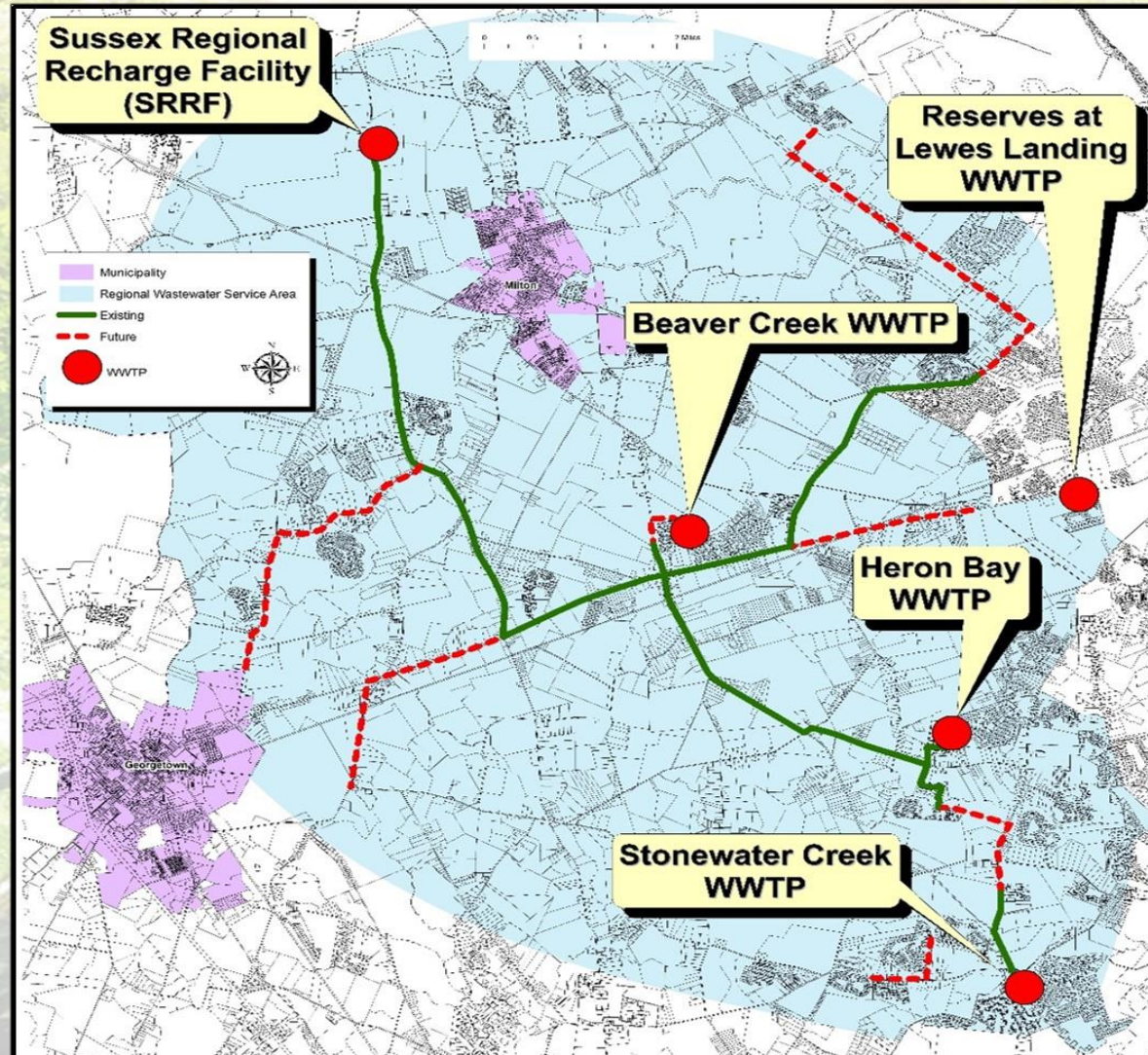


**New Cooperative
Agreements with
Sussex County**

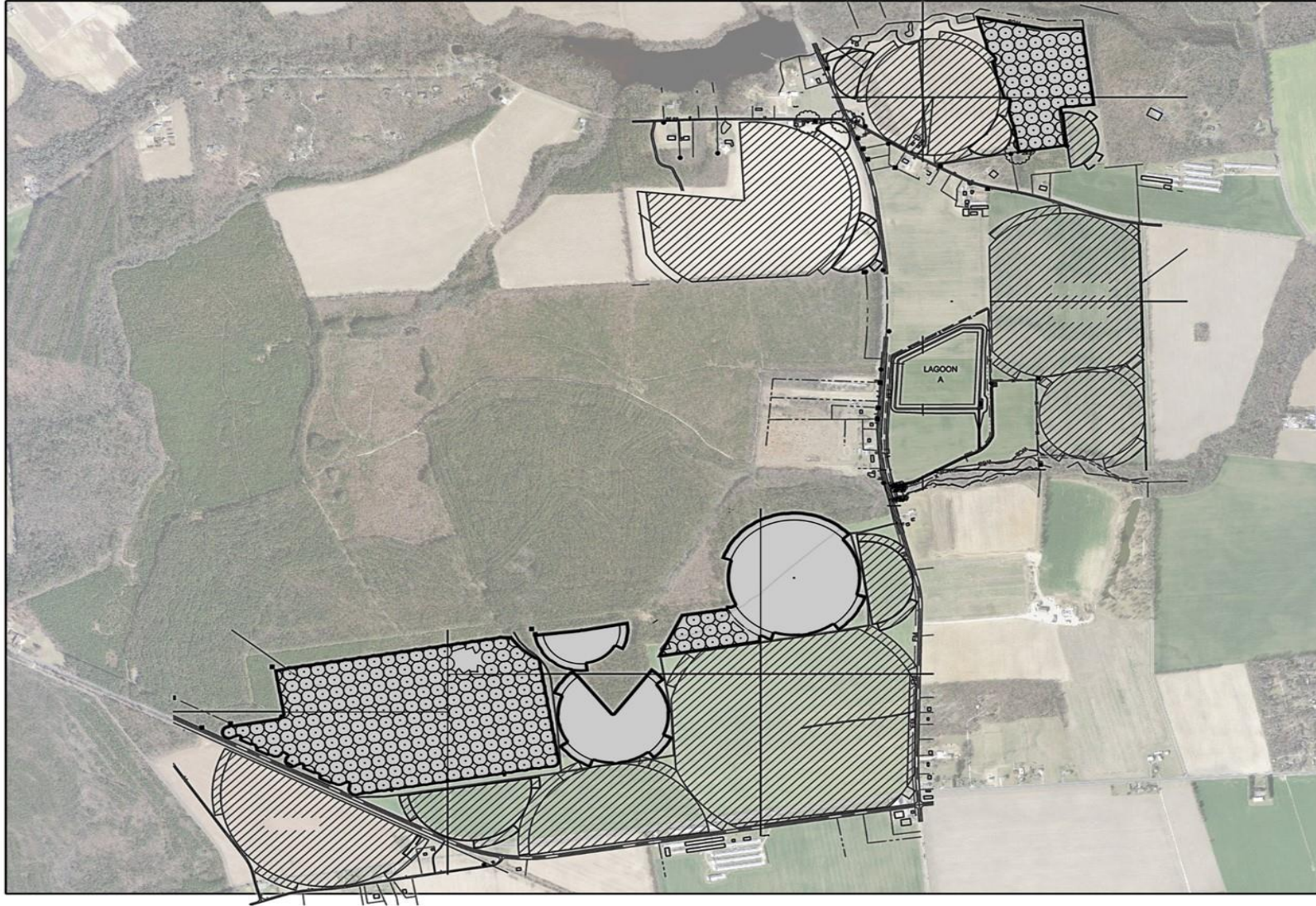


**Combined millions in
cost savings for
Artesian and Sussex
County**

Sussex Regional Recharge Facility “SRRF”



SRRF



SRRF LAGOON

90 MILLION GALLONS



FARMING/UTILITY SERVICE

A PARTNERSHIP



FARMING/UTILITY SERVICE

A PARTNERSHIP



Preserving Farms, Forests and Open Space



NARUC Annual Meeting and Education Conference

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November 17 - 20, 2019

A smiling woman with long brown hair, wearing a red jacket, holds a clear plastic water bottle with a blue cap and handle. The bottle is partially filled with water and has a reflection of the surrounding landscape on its surface. The background is a blurred outdoor scene with trees and a bright sky.

Yes, *I can* drink It?

Presentation to NARUC Water Committee

By Richard C. Svindland, P.E.

President, California American Water

Nov. 18, 2019



CALIFORNIA
AMERICAN WATER

Presentation Topics

- Water Sources
- Types of Recycled Water
- DPR & IDPR
- Examples of DPR & IDPR & Costs
- Items for Consideration

Sources



Surface Water

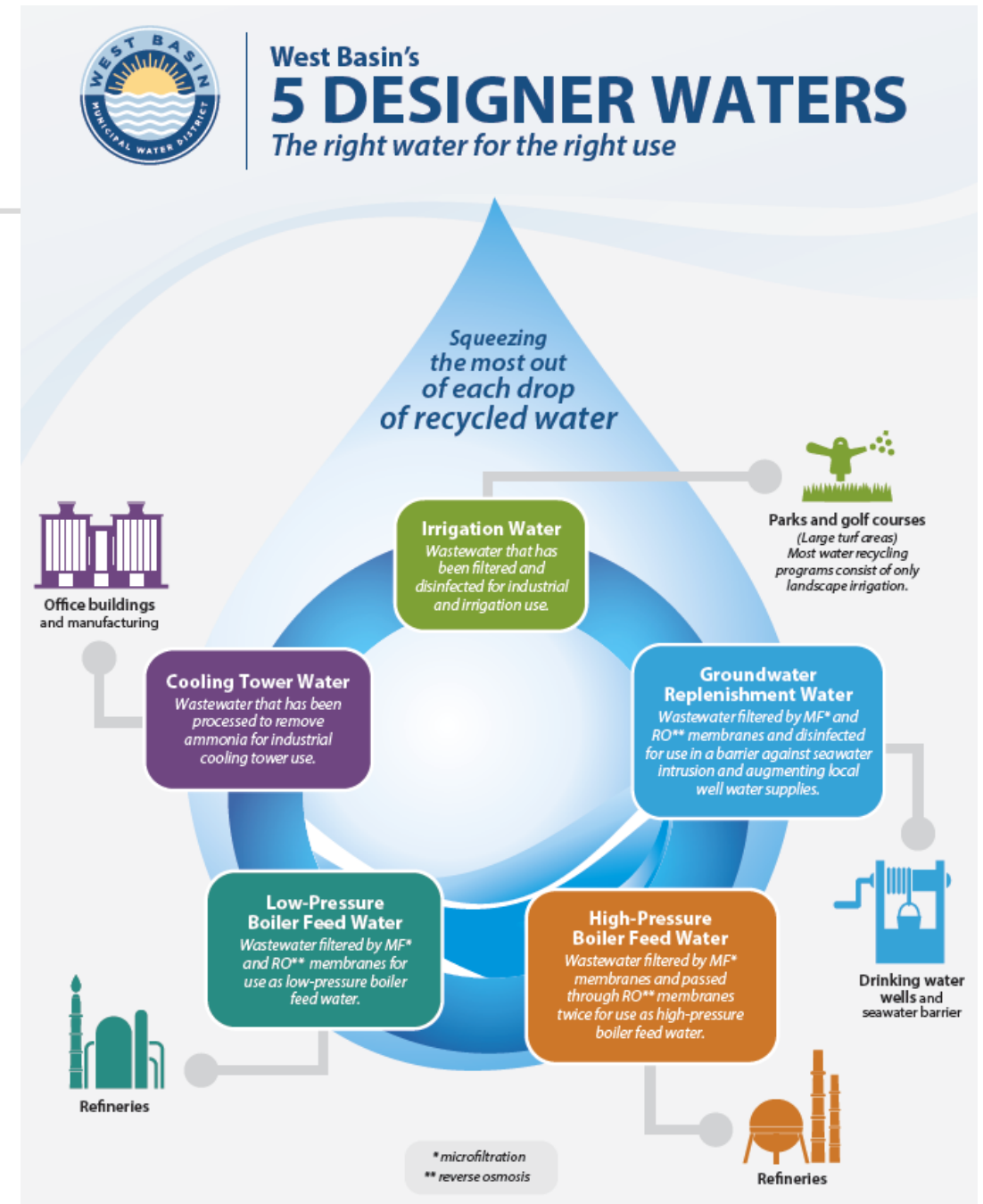


Groundwater

Sources, cont'd

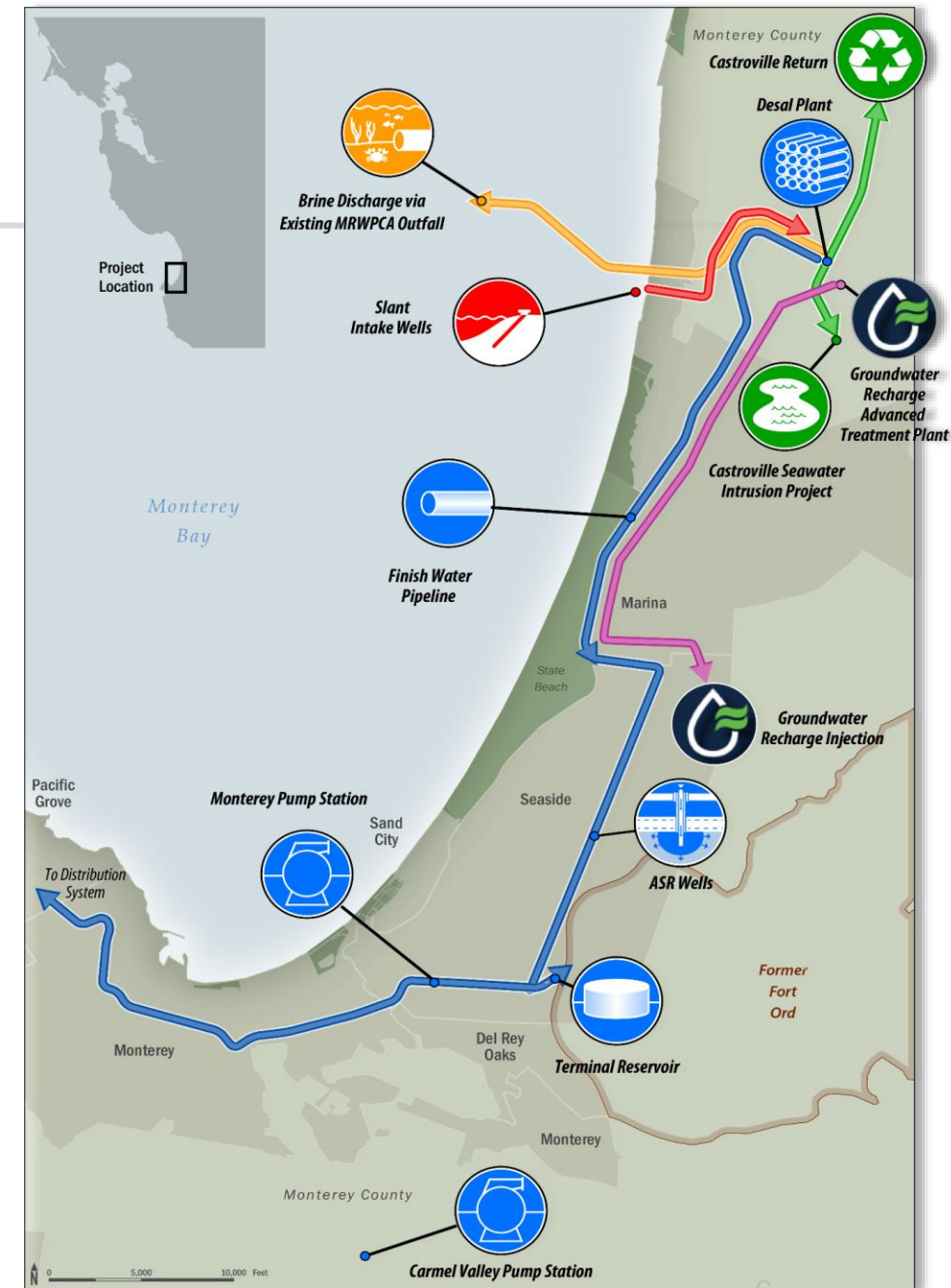


Types of Recycled Water



DPR & IDPR

- DPR = Direct Potable Reuse
- IDPR = In-Direct Potable Reuse
- AWPf = Advanced Water Purification Facility
- AWWTF = Advanced Wastewater Treatment Facility

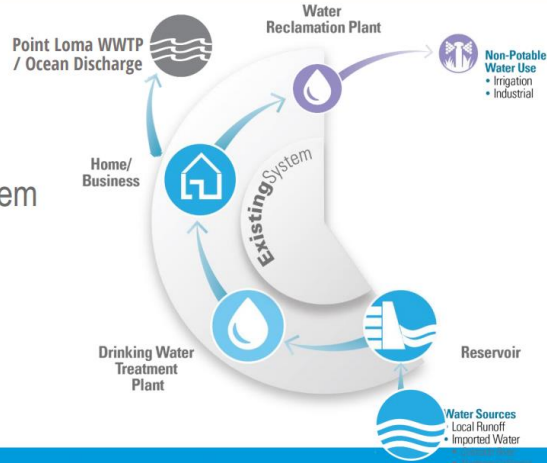


Example of IDPR – City of San Diego

San Diego's Water Supply System

Existing System...

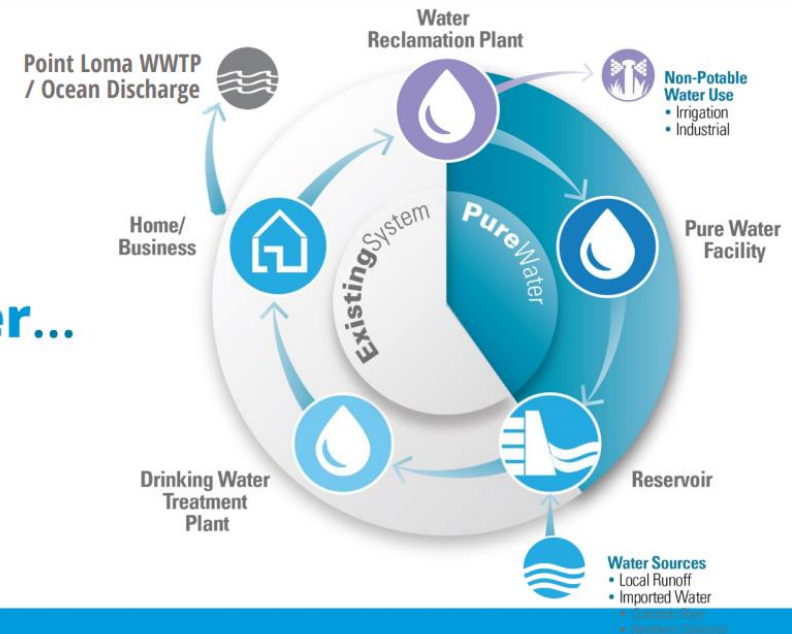
Primarily a Single-Use System



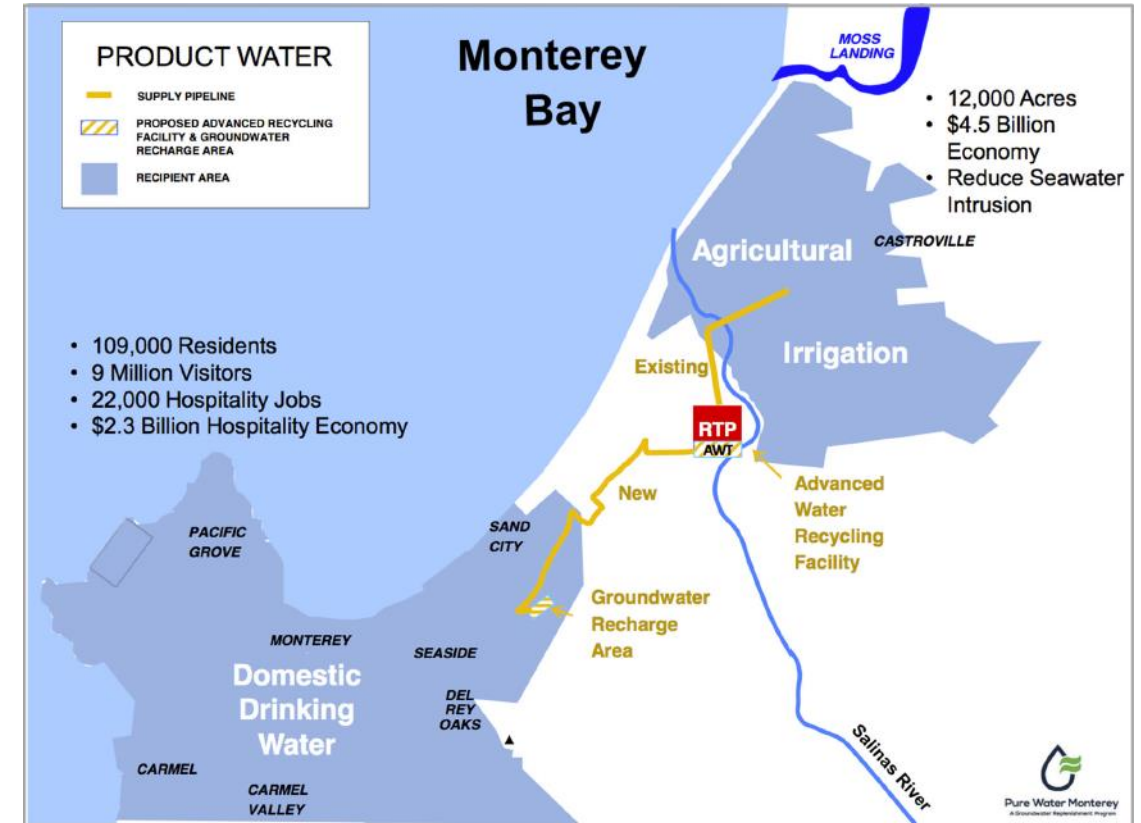
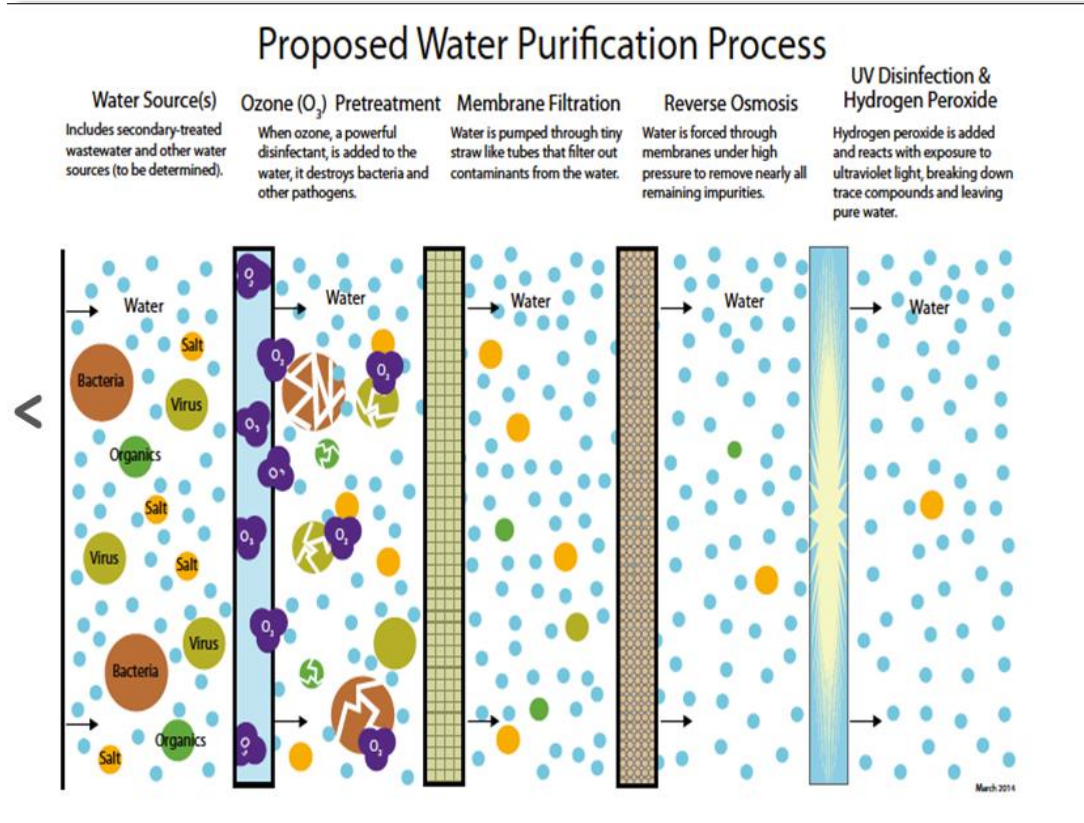
San Diego's Water Supply System

Pure Water...

Completes Our Water Cycle

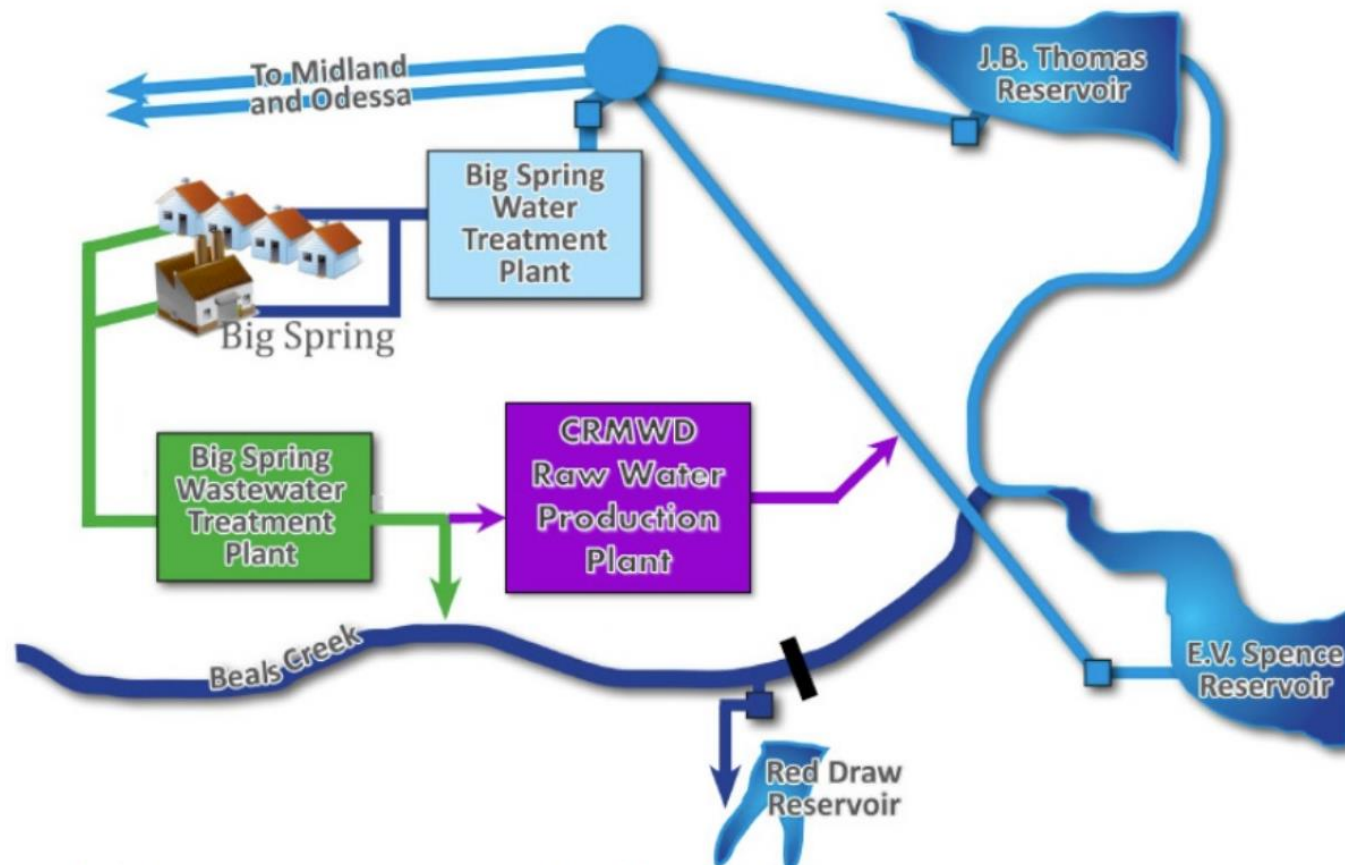


Example of IDPR – Monterey, CA



Example of DPR – Big Spring, Tx

Proposed Big Spring Reclamation Project



11/15/2011

2011 Potable Reuse Conference

Typical Costs – to get to Potable Water

Type (*)	Total Cost (Capex & O&M)	
	(\$/1000 gal)	(\$/AF)
SWRO	\$14.22	\$4632
BWRO	\$8.49	\$2766
AWPF	\$6.06	\$1976
AWPFe	\$6.85	\$2233
SW	\$4.82	\$1569
ASR	\$1.18	\$383
GW	\$1.07	\$348

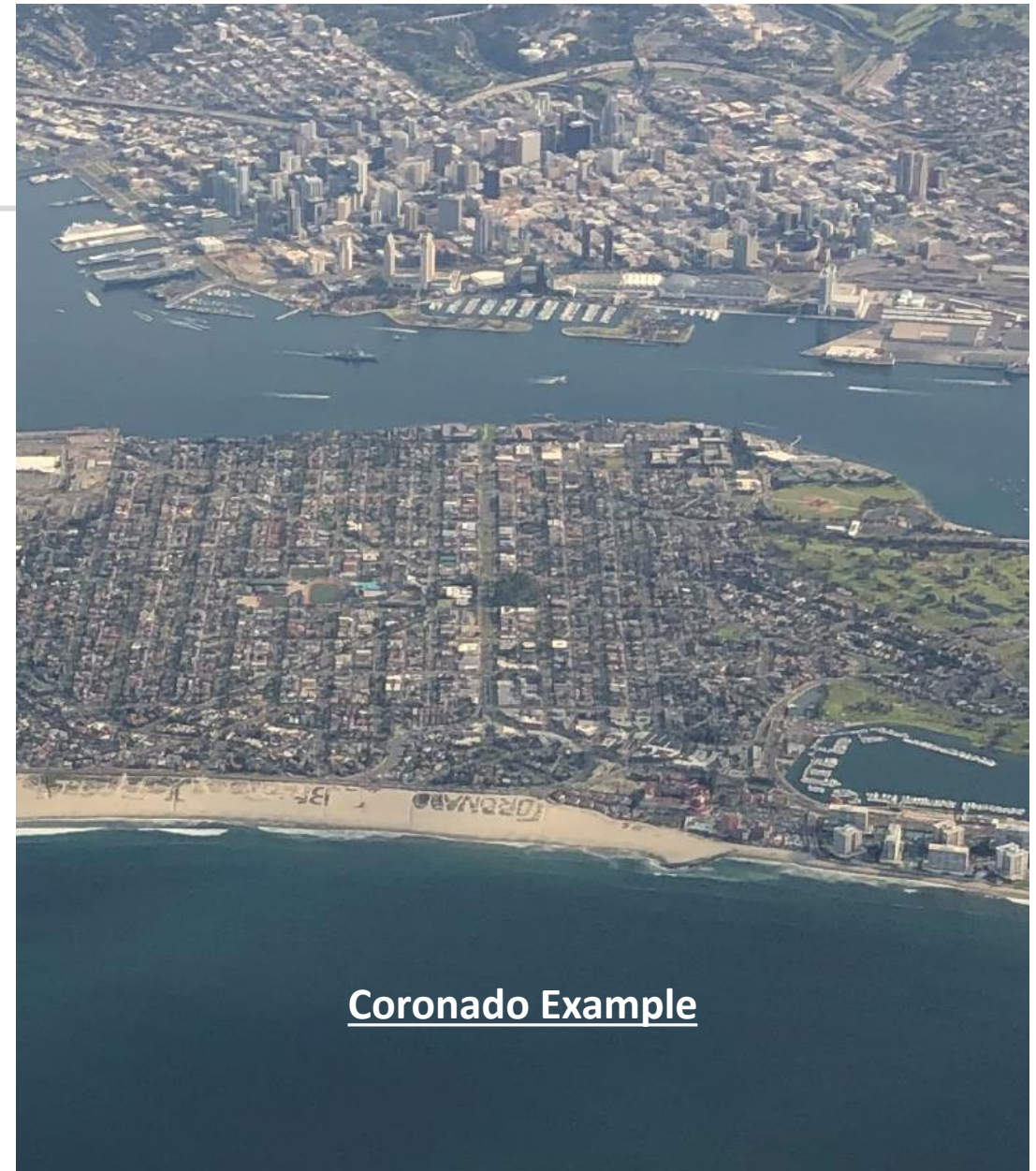
*Based on CAW experience

Type (**)	Total Cost (Capex & O&M)	
	(\$/1000 gal)	(\$/AF)
BWRO	\$1.53	\$500
AWPF	\$4.60	\$1500
SW	\$0.92	\$300
ASR	\$3.07	\$1000
GW	\$0.46	\$150

**Based on EPWater – Civil Engineering, Nov. 2019

Items for Consideration

- Every project is unique with different cost drivers and sensitivities.
- How to address revenue requirement resulting from reduced water sales?
- Are environmental buffers truly needed (IDPR vs DPR)
- If DPR becomes norm, how do we test in real time?
- Is IDPR or DPR really “Drought Proof”?



Coronado Example



THANK YOU