Water Reliability for Tucson's Future

Water **Supply** | Water **Quality** | Water **Customers** | Operations **& Systems** | Water Conservation **& Efficiency**

Water Resources Research Center

March 9, 2015

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Water Reliability means Tucson Water's customers can count on…

- ***Long-term planning and appropriate infrastructure and program investment***
- ***Maximizing the use of <u>all</u> renewable water resources***
- ***Clear and timely communication about our water and how to use and re-use it efficiently***

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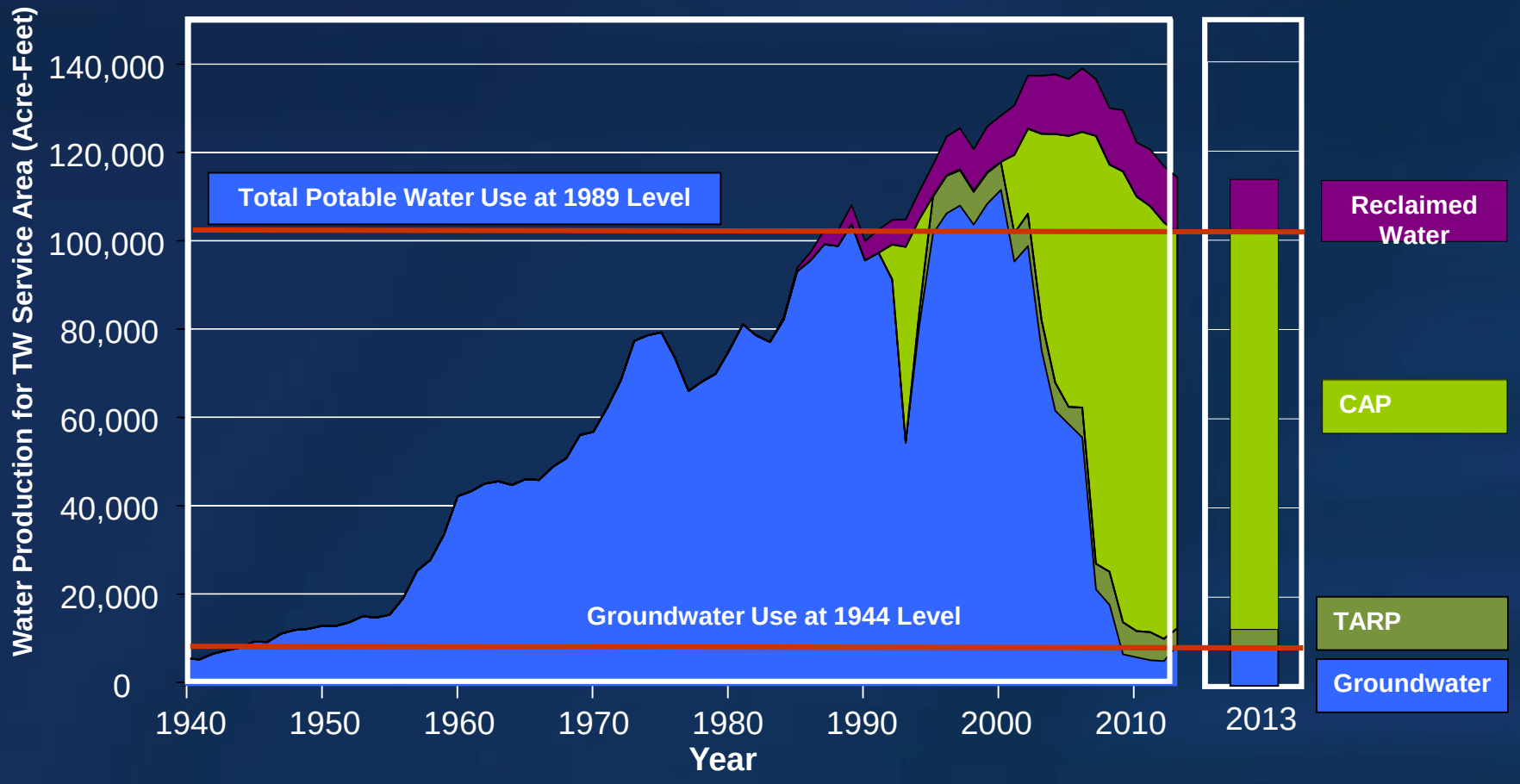
Transition to Renewable Supplies



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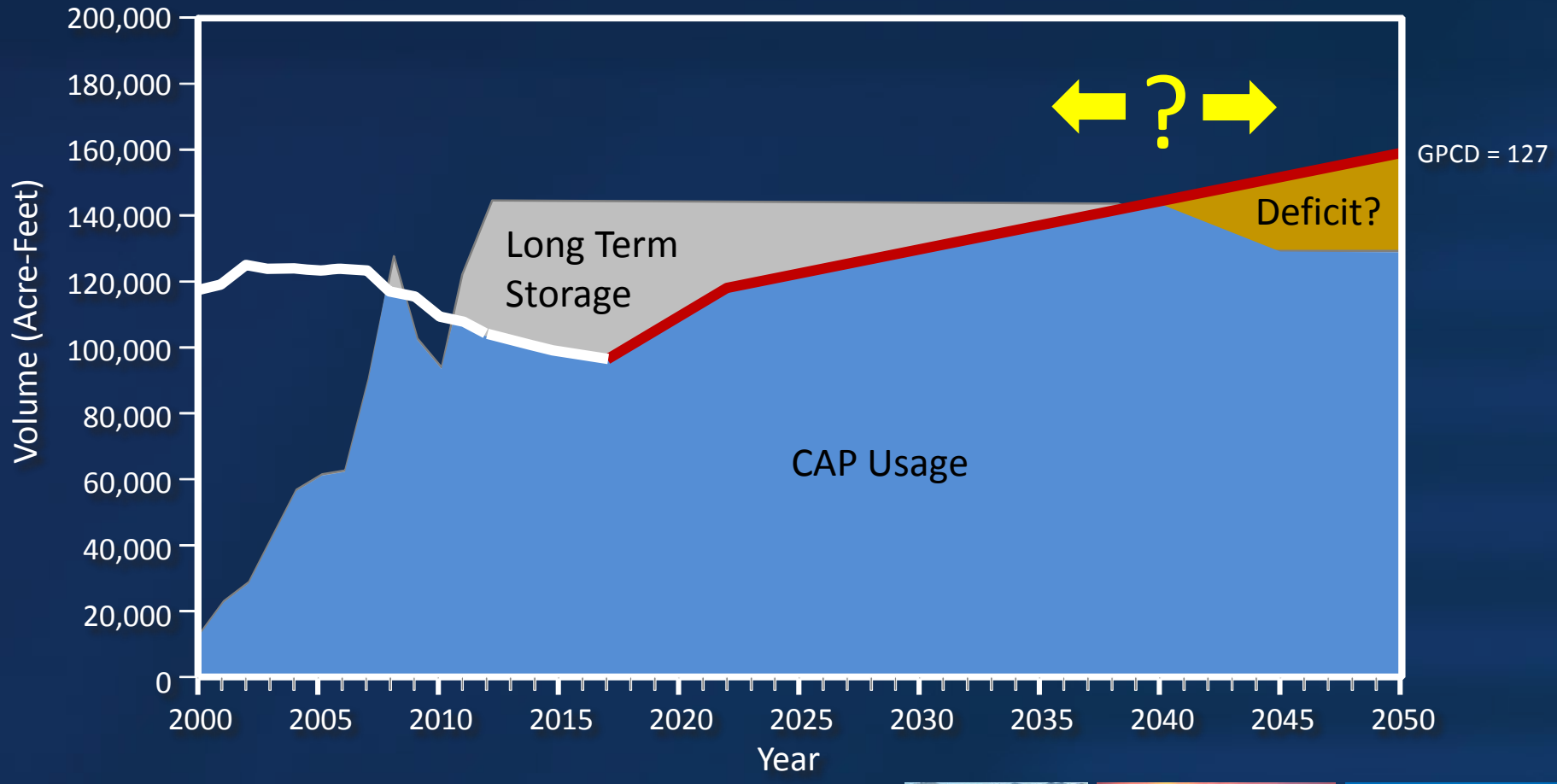
Potable Water Use - Projection to 2050 with Shortage



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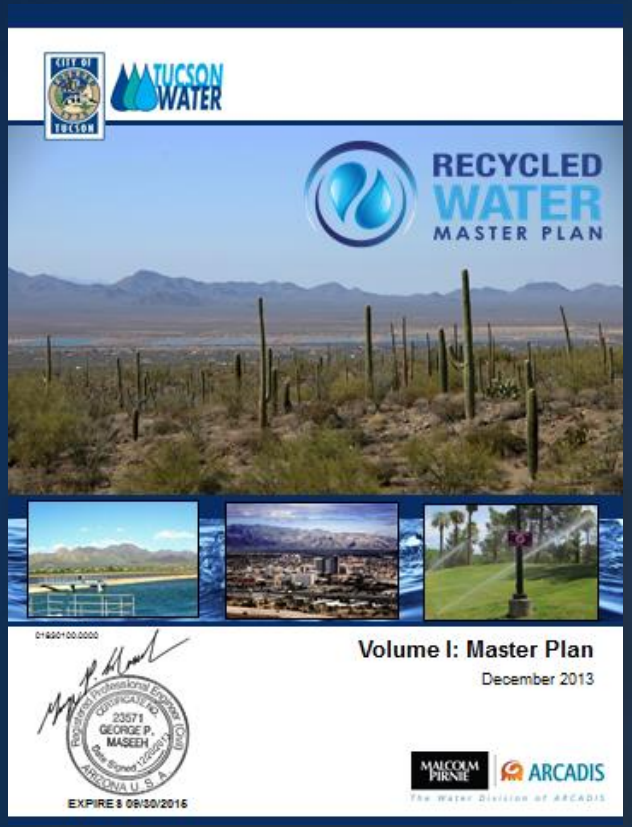
Recycled Water Program
Focus

- Continue to invest in the Reclaimed Water System to maintain efficient service to existing and potential future customers
- Pursue full utilization of the City's recycled water entitlement through indirect potable reuse (IPR) to diversify renewable supplies





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Recycled Water Makes Sense

- Long Term Planning: Development of water supplies for the future
- Drought: Cutbacks in deliveries of CAP Water
- Community Investments:
  - $250 Million – Storage and Recovery of CAP Water
  - $600 Million – Wastewater Improvements
  - $25 Million – Purchase of CAP Allocation (FY15)
- Supports Economic Development

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What Exactly Is Recycled Water?

- Reusing treated wastewater for beneficial purposes such as irrigation, industrial processing, replenishing groundwater basins, and purifying it for drinking water

- Tucson Water has been delivering recycled water, known as reclaimed water, for 30 years



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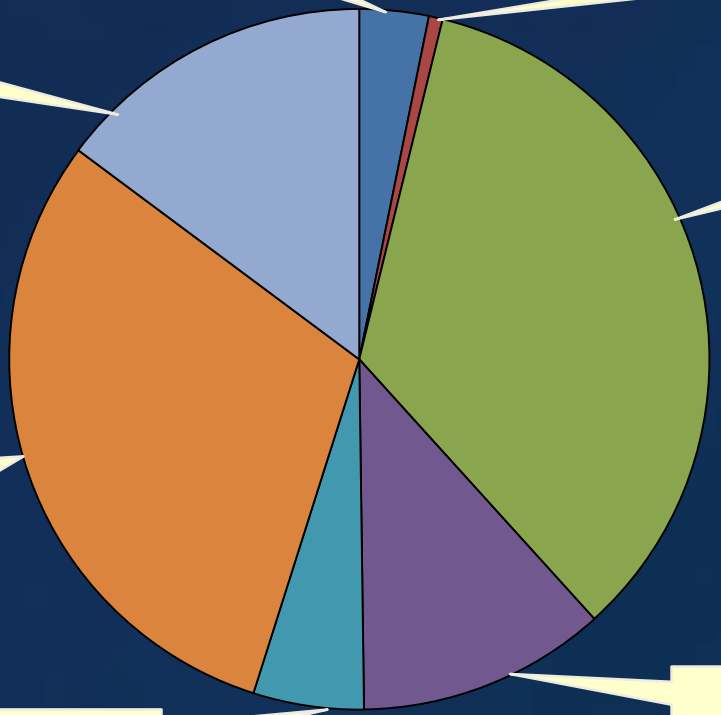
Current Reclaimed Water Customer Base (percent of use by volume)



Total Reuse in 2013
24,426AF

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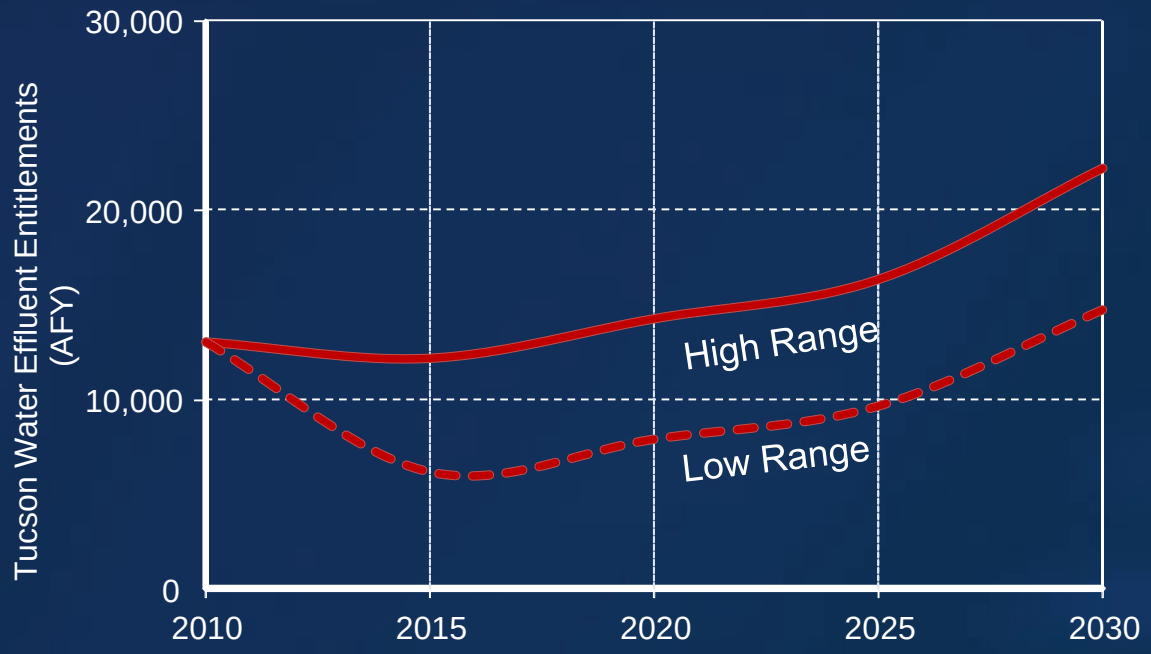
Projections of Unutilized Recycled Water Resources



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Recycled Water: A New Vocabulary

- Recycling water for 30 Years as “Reclaimed Water”
  - Reclaimed Water- Treated wastewater with additional filtration. Not suitable for drinking
  - Potable reuse: Purification of treated wastewater for drinking water
    - Direct Potable Reuse (DPR): Purified water goes directly into drinking water system
    - Indirect Potable Reuse (IPR): Purified water goes through environmental buffer before introduction to drinking water system.

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Is Recycled Water Safe to Drink?

Yes! Multiple barriers, or stages of treatment, would ensure that purified recycled water is safe for our customers.

- Conventional Wastewater Treatment – removes solid matters and other impurities.
- Soil Aquifer Treatment – a process where water is treated as it moves through the soil. A natural filtering and treatment process that removes pathogens, organic carbon, nutrients, and additional emerging contaminants.

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Is Recycled Water Safe to Drink?

- Reverse Osmosis and Nanofiltration - mineral content is reduced and emerging contaminants are removed.

- Advanced Treatment – Ultraviolet/Hydrogen Peroxide Advanced Oxidation Process is used to disinfect and destroy remaining emerging contaminants and pathogens, leaving purified water.

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Advanced Water Treatment Considerations

- Multiple barriers
- Pre-recharge and post-recovery treatment
- Soil aquifer treatment
- MF/UF, RO/NF
- GAC, UV-AOP
- Brine management
- National Water Research Institute oversight

Alternative	Advanced Water Treatment		
	Pre-Recharge	Natural Treatment & Storage	Post-Recovery
1	MF + NF + UV-AOP	Recharge	Disinfection
2	-	Recharge/SAT	SAT + NF + Disinfection
3	-	Recharge/SAT	SAT + NF + UV-AOP + Disinfection



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Recommended Advanced Water Treatment Concepts

Denitrified Reclaimed Water from Pima County

Soil-Aquifer Treatment
- *Pathogens*
- *Organic Carbon*
- *Nutrients*
- *Emerging Contaminants*

Nano Filtration
- *Mineral content*
- *Emerging Contaminants*

Blending / Distribution

Clearwell Res.

UV-Advanced Oxidation
- *Emerging Contaminants*
- *Pathogens*

HU WTP



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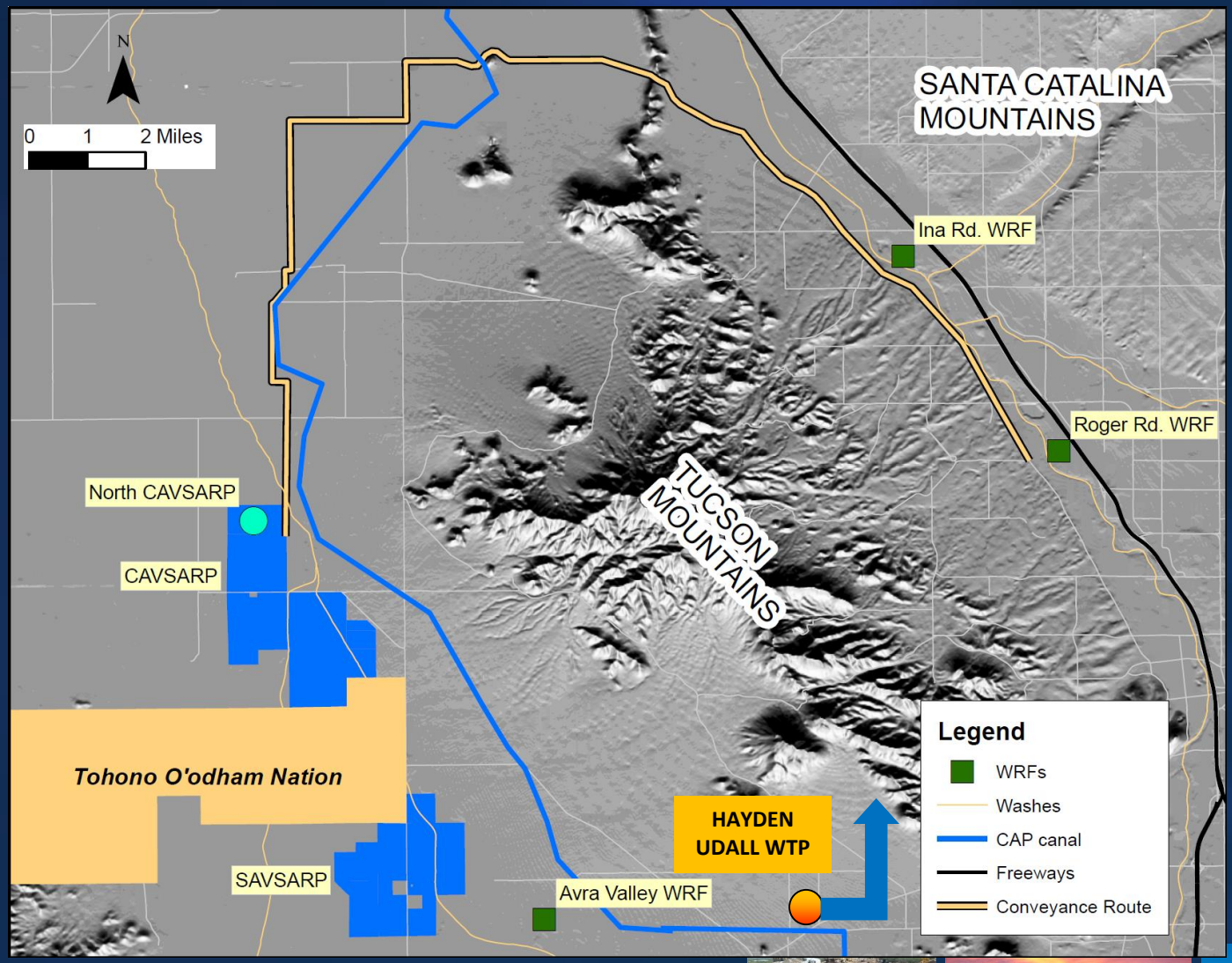
Recommended Recycled Water Program Concepts



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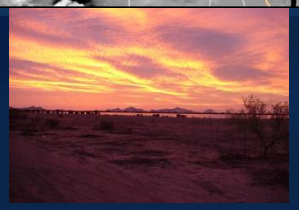

Implementation Timeline

Program Timeline

FY 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021 | 20XX

Master Plan Complete

Demonstration Facility Operating

Recycled Water Deliveries to Clearwater Blend

Public Outreach

Continuous Outreach

- Obtain City Manager's Office, Mayor, & Council support
- Conduct surveys & focus groups, and monitor trending of support
- Involve Independent Advisory Panel (NWRI) throughout implementation
- Establish economic development /sustainability communications
- Continue *Water Reliability* communications
- Achieve key stakeholder and broader community support

Technical Investigations

Technical Investigations

- Conveyance Route Studies
  - *Tres Rios WRF to Avra Valley*
  - *East side of Tucson Mountains to 96"*
  - *Distribution system hydraulics*
- Hydrogeologic Feasibility Study for IPR
- Full-scale Facility Concepts (IPR / DPR)
- Advanced Treatment Research
- Energy efficiency; alternative energy sources

Pilot Testing & Demonstration

Process Selection / Piloting

- Piloting plan (refine concepts & cost opinions)
- Agua Nuevo WRF-area pilot (TW property)
- Shorter-term / IPR and DPR piloting
- Smaller scale / multiple treatment trains
- Full urban water cycle outreach opportunity
- Interactive displays/tours; coord. w/ Wetlands

Public Demonstration Project

- Permitting, design, construction and O&M//monitoring
- SHARP IPR demonstration opportunity
- Larger scale / selected treatment train
- Potential 1st phase of full-scale IPR
- Ongoing public outreach and tours.
- Opportunity for public to taste water

Financial Planning

Alt. Funding Sources

- WateReuse Foundation Tailored Collaboration (TC)
- U.S. Bureau of Reclamation Title XVI
- Regional collaboration potential

Financial Plan

- CIP development / coordination
- Alternate rate/fee structures
- Alternate financing approaches
- Regional collaboration potential

Permitting

Permitting *(2-3 years lead time)*

- Conveyance Rights-of-Way/Easements
- Aquifer Protection Permit (APP)
- Underground Storage Facility Permit
- Recovery Permit

Design & Construction

Design & Construction *(6-10 years lead time)*

- Conveyance Infrastructure
- Recharge and Recovery Facilities
- Advanced Water Treatment Facility
- Concentrate Management/Recovery

Malcolm Pirnie | ARCADIS

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Summary

- Long-term Planning with Sound Infrastructure Investment is Key to Tucson's Water Future
- CAP M&I allocation unlikely to be shorted in the near-term
- The Long-Range Plan accounts for uncertainty regarding M&I shortage probability
- Recycled Water Program is integral to Tucson Water's continuous planning for resource reliability

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Water reuse is happening worldwide.

TUCSON WATER

GWRS
GROUNDWATER REPLENISHMENT SYSTEM

ORANGE COUNTY WATER DISTRICT
SINCE 1933

WATEREUSE ASSOCIATION
Sustainable Solutions for a Thirsty Planet

CRMWD
Colorado River Municipal Water District

newWater

VENTURA WATER

Santa Clara Valley Water District

EL PASO WATER UTILITIES
PUBLIC SERVICE BOARD

CITY OF SCOTTSDALE

WEST BASIN MUNICIPAL WATER DISTRICT
City of San Diego
PUBLIC UTILITIES
Water & Wastewater

ESCONDIDO
City of Choice

LA DWP
Los Angeles Department of Water & Power

Questions?

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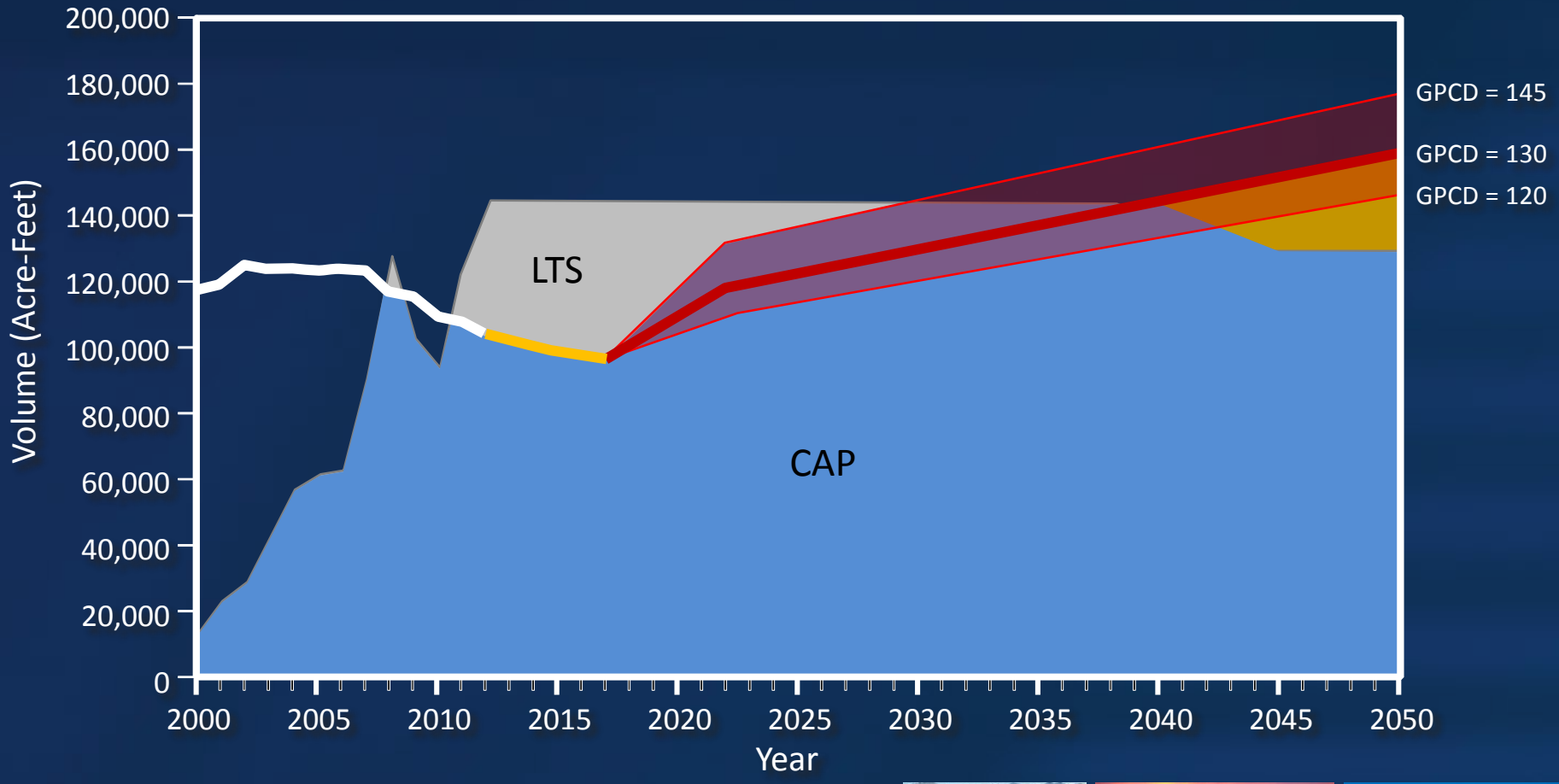

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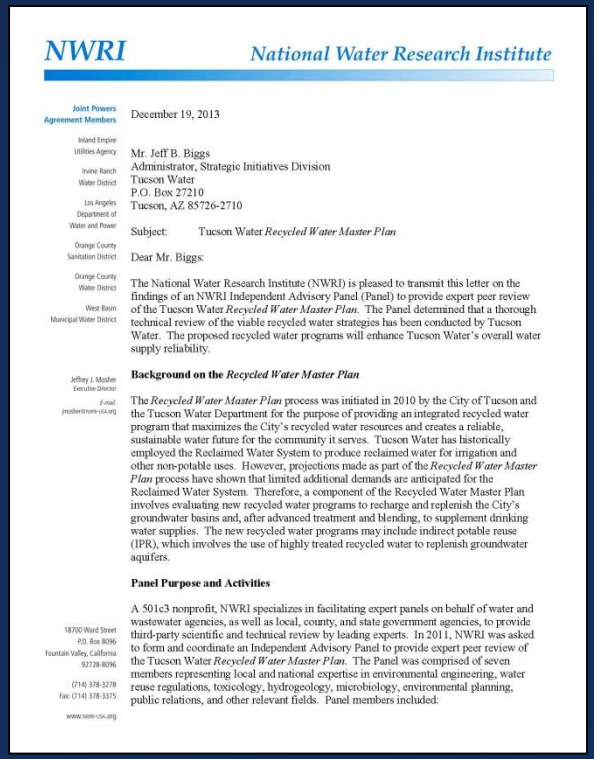
Independent Advisory Panel Letter of Support



NWRI National Water Research Institute

Joint Powers Agreement Members

Inland Empire Utilities Agency
Irvine Ranch Water District
Los Angeles Department of Water and Power
Orange County Sanitation District
Orange County Water District
West Basin Municipal Water District

December 19, 2013

Mr. Jeff B. Biggs
Administrator, Strategic Initiatives Division
Tucson Water
P.O. Box 27210
Tucson, AZ 85726-2710

Subject: Tucson Water *Recycled Water Master Plan*

Dear Mr. Biggs:

The National Water Research Institute (NWRI) is pleased to transmit this letter on the findings of an NWRI Independent Advisory Panel (Panel) to provide expert peer review of the Tucson Water *Recycled Water Master Plan*. The Panel determined that a thorough technical review of the viable recycled water strategies has been conducted by Tucson Water. The proposed recycled water programs will enhance Tucson Water's overall water supply reliability.

Background on the *Recycled Water Master Plan*

The *Recycled Water Master Plan* process was initiated in 2010 by the City of Tucson and the Tucson Water Department for the purpose of providing an integrated recycled water program that maximizes the City's recycled water resources and creates a reliable, sustainable water future for the community it serves. Tucson Water has historically employed the Reclaimed Water System to produce reclaimed water for irrigation and other non-potable uses. However, projections made as part of the *Recycled Water Master Plan* process have shown that limited additional demands are anticipated for the Reclaimed Water System. Therefore, a component of the Recycled Water Master Plan involves evaluating new recycled water programs to recharge and replenish the City's groundwater basins and, after advanced treatment and blending, to supplement drinking water supplies. The new recycled water programs may include indirect potable reuse (IPR), which involves the use of highly treated recycled water to replenish groundwater aquifers.

Panel Purpose and Activities

A 501c3 nonprofit, NWRI specializes in facilitating expert panels on behalf of water and wastewater agencies, as well as local, county, and state government agencies, to provide third-party scientific and technical review by leading experts. In 2011, NWRI was asked to form and coordinate an Independent Advisory Panel to provide expert peer review of the Tucson Water *Recycled Water Master Plan*. The Panel was comprised of seven members representing local and national expertise in environmental engineering, water reuse regulations, toxicology, hydrogeology, microbiology, environmental planning, public relations, and other relevant fields. Panel members included:

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Executive Director
E-mail: jmosher@nwri-usa.org

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P.O. Box 8096
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Fax: (714) 378-3375

www.nwri-usa.org

"It is the unanimous conclusion of the Panel that the efforts described in the *Recycled Water Master Plan* will be a **landmark development** in the acceptance and implementation of IPR and will contribute to the **City of Tucson's renewable water resources portfolio**. The proposed new recycled water programs identified in the *Recycled Water Master Plan* will supplement existing sources and provide a greater degree of independence, thus improving the **reliability and sustainability** of existing water supplies."

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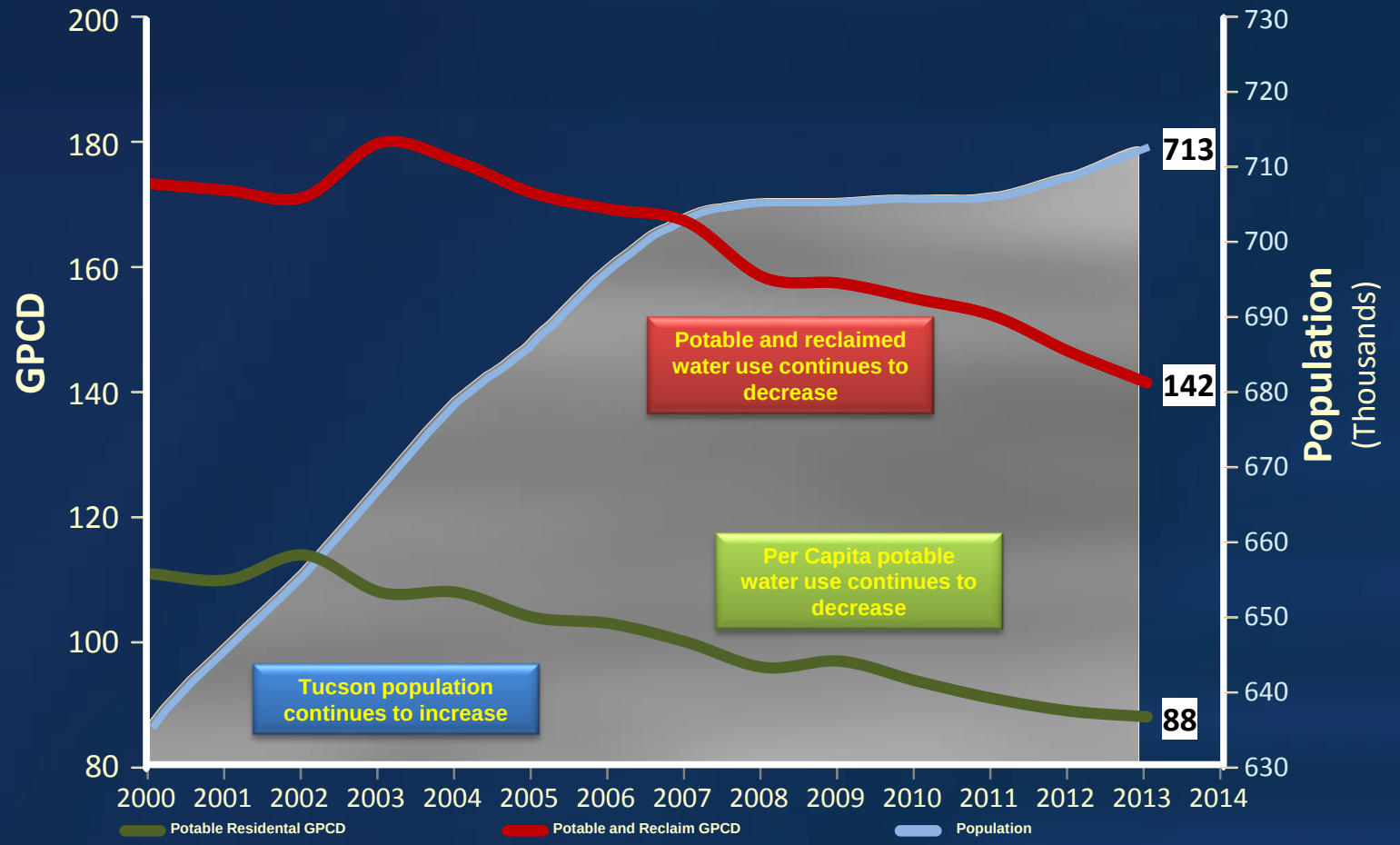
Slide with GPCD vs Pop.



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Recycled Water Customer Survey Completed in December 2013

% of Tucson Water Customers Surveyed	Description
85%	Believe Tucson will need additional water supplies in the future
91%	Believe it is “very important” Tucson Water increase water recycling to meet long term needs
65%	Believe current technology can be used to further purify reclaimed water to make it pure and safe for drinking
33%	Are highly comfortable with Tucson Water purifying wastewater for future use as drinking water

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Recycled Water Customer Survey Results (cont'd) water

The 67% that were not comfortable were asked: What measures would improve their comfort level?

Likelihood to Increase Comfort Level for Potable Reuse*	Action to Increase Comfort Level for Potable Reuse
67%	Knowing that nationally recognized health and medical experts endorse the safety of the water
61%	Knowing that Tucson Water is the utility that will be producing and purifying the water
57%	Hearing about other communities that are already drinking purified water
66%	A tour of a facility to see how advanced technology is used to produce purified water
54%	Tasting the purified water

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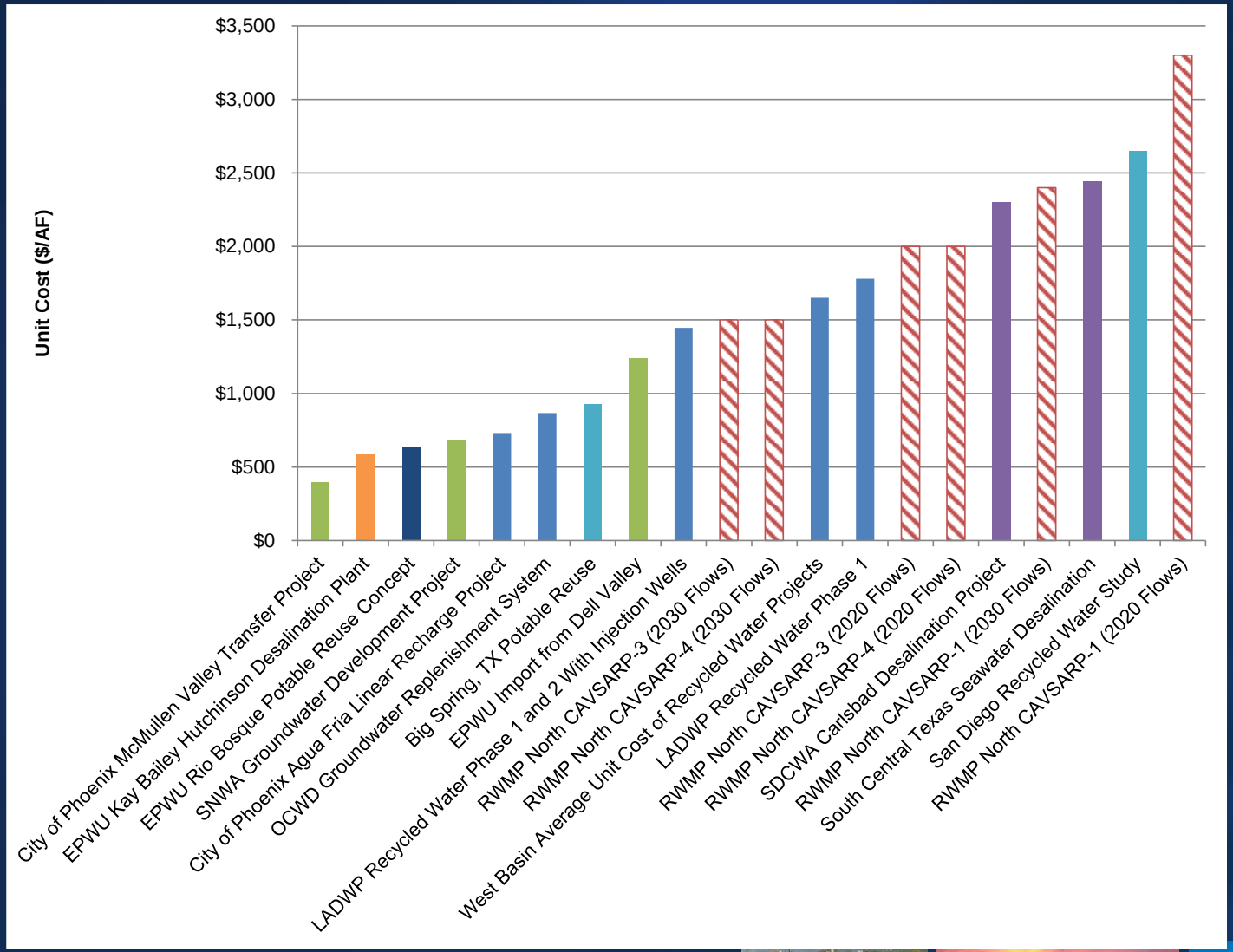
Comparison with other New Water Supply Projects



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