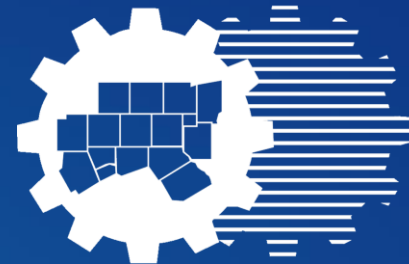


Utilizing Water Reuse to Create Resilient Water Systems

NCTCOG Webinar
July 16th, 2024

Corinne Buckley, NCTCOG
cbuckley@nctcog.org



North Central Texas
Council of Governments

*This project was funded by the U.S.
Environmental Protection Agency through
the Texas Commission on Environmental
Quality.*



Procedures for Webinar

- Please keep your microphone on mute until the Question-and-Answer period at the end of the presentations.
- The webinar is being recorded and will be posted to NCTCOG's website under the green banner called "Webinars" here:
<https://www.nctcog.org/envir/natural-resources/water-resources>
- If you submitted a RSVP for this webinar, you will receive an email with the presentation slides and a subsequent email with a link to the recording. If you did not RSVP and would like these webinar materials, please email cbuckley@nctcog.org

Webinar Agenda

- Welcome and Introduction of Speakers
 - **Municipal Water Reuse** – David Sloan, PE, BCEE
 - **A Tale of 2 Cities** – Jennifer Walker & Usman Mahmood
 - **Enabling Water Reuse** – Sharlene Leurig
- Q&A Session



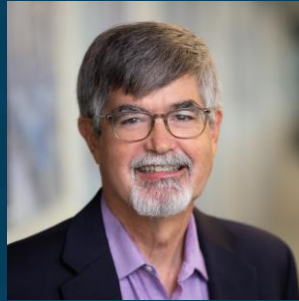
Speaker Introduction

David Sloan, PE, BCEE

Senior Process Engineer
Freese and Nichols, Inc.

Municipal Water Reuse

David Sloan, P.E.



FREEZE AND
NICHOLS

Overview

- What is Water Reuse?
- Types of Reuse at Municipal Scale
- Case Studies



What is Water Reuse?

- Also known as water recycling or water reclamation
- EPA definition: “reclaims water from a variety of sources then treats and reuses it for beneficial purposes”



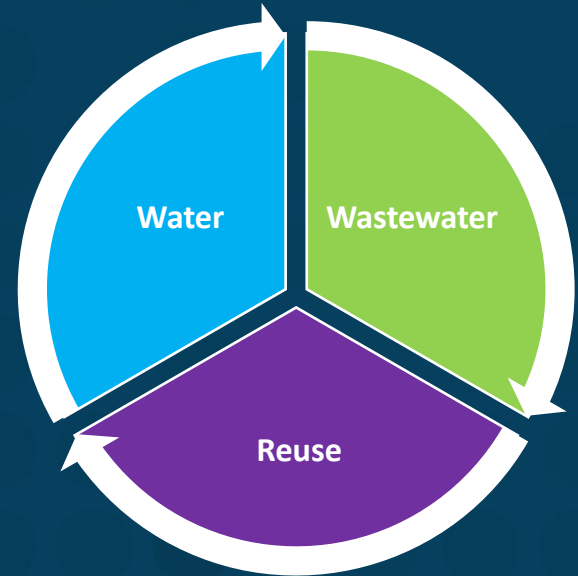
Uses of Reclaimed Water

- Non-Potable
 - Industrial
 - Irrigation
 - Construction
 - Toilet Flushing
 - Ornamental
- Potable
 - Water Supply Augmentation



Non-Potable Implementation Considerations

- Institutional Home – Water, Wastewater or New Entity?
- Public acceptance usually good
- Non-potable water pricing
- Apparent payback may be slow
- Large customers often key to covering costs



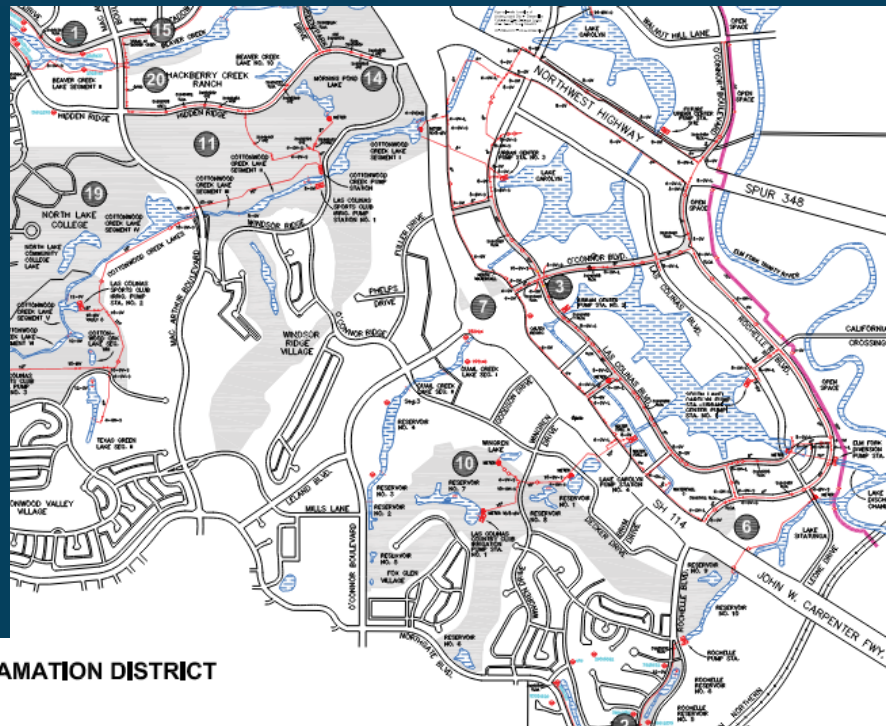
Non-Potable Reuse Design Issues

- Cross-contamination prevention
- Labeling
- Separation
- Delivery on demand-only basis
- Leakage and runoff



Landscape Irrigation – Las Colinas Development (Dallas County U & R District)

- Pioneering Application of Reclaimed Water for Non-potable Uses
- Golf Courses and other Irrigation
- Maintain Water Level for Chain of Amenity Lakes
- Began Operation in mid-1980s
- Preceded Implementation of Reclaimed Water Rules in Texas



DALLAS COUNTY UTILITY AND RECLAMATION DISTRICT
RAW WATER SYSTEM CUSTOMERS

Industrial Reuse – City of Cleburne

- Power Plant Cooling Tower
- Dedicated Reclaimed Water Delivery System
- Started Up Approximately 1998



Reclaimed Water Utilities – Fort Worth, Frisco and Others

- Landscape Irrigation
- Primarily Municipal & Commercial
- Golf Courses, Parks, etc.



Potable Reuse

- Water Supply Augmentation Drivers
 - Drought-resilient supply
 - Year-round production & usage
 - Not dependent on large customers
 - As cities grow, supply increases



Potable vs. Non-Potable Reuse

Non-Potable Reuse

- Typically Seasonal
- Demand-Driven
- Separate Transmission System
- New System and Customers
- Gaining Acceptance

Potable Reuse

- Non-Seasonal
- Demand-Independent
- Connects to Existing System
- Greater Treatment Required
- Public skeptical
- Higher Risk

Potable Reuse Scenarios

- Unplanned, or “de facto” Reuse
 - *Rio Grande, Trinity and others*
- Surface Water Augmentation
 - *Lakes Pat Cleburne, Weatherford, Arrowhead*
- River Scalping w/Wetlands Polishing
 - *TRWD, NTMWD*
- Groundwater Replenishment
 - *El Paso (Since 1980s)*
- Direct Raw Water Blending
 - *CRMWD (Big Spring)*
 - *Wichita Falls (Emergency DPR – 2014-15)*
- Direct Finished Water Blending
 - *El Paso (Coming Soon)*

Reservoir Augmentation

- High Quality Reclaimed Water Can Increase Yield
- Modeling Important to Maintain Quality
- Key Concerns:
 - Phosphorous
 - Nitrate
 - Protozoans
 - Salinity
 - Suspended Solids
- Examples: Lake Weatherford, Lake Arrowhead, Lake Pat Cleburne



Potable Reuse Examples – IPR w/Wetlands

- Tarrant Regional WD & North Texas MWD
- Effluent-based flows pumped from Trinity River
- Extracted flows treated through artificial wetlands
- Wetlands effluent directed into large Storage Reservoirs



Potable Reuse Case Study – Wichita Falls Emergency DPR



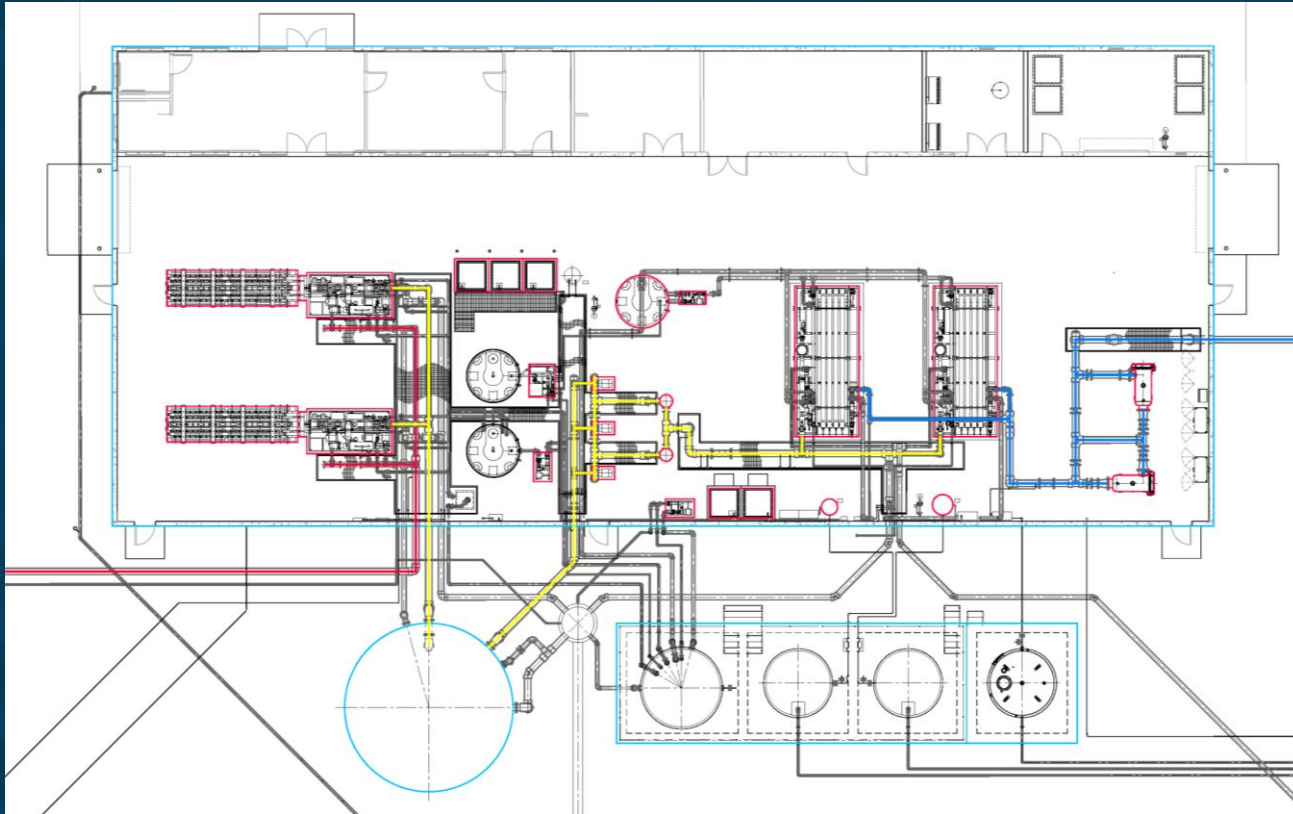
- Adapted from Existing Surface Water Desalination Facility
- Blended 5 MGD of Purified Effluent with 5 MGD Raw
- Operated July 2014-15

Potable Reuse Case Study – CRMWD

- Raw Water Production Facility – Big Spring
- Produces 1.8 MGD of Purified Water from 2.5 MGD Secondary Effluent
- Began Operation April 2013



Treatment Systems



Obstacles and Approaches

- Public Perception
- Project Financing
- Lengthy Regulatory Approval Process
- Emerging Contaminants



Planning Considerations

- Mitigate FUTURE Droughts
- Reuse Systems Take Time
 - Public Education
 - Evaluation
 - Testing (WQ and/or Pilot)
 - Regulatory Review
 - Design
 - Construction
- Start Early!

Conclusions

- Required technology reliable and mature
- Multiple barriers crucial
- Regulatory and stakeholder hurdles take time
 - Start early!
- Public can be educated
- Result can be high utilization of effluent



Water you can't afford to throw away!





Speaker Introduction

Jennifer Walker

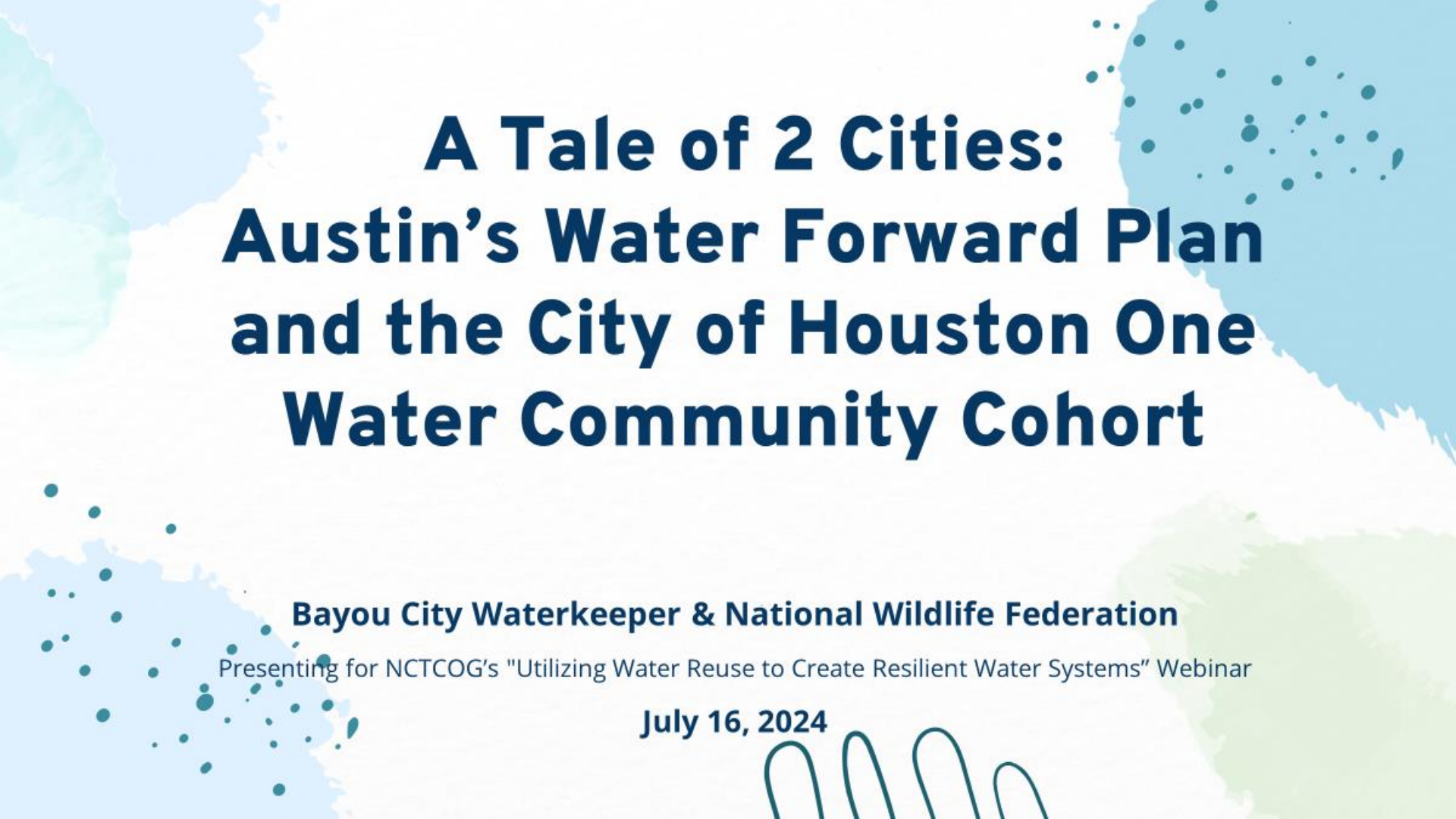
Senior Director, Texas Coast and Water
Program

National Wildlife Federation



Usman Mahmood

Policy Analyst
Bayou City Waterkeeper



A Tale of 2 Cities: Austin's Water Forward Plan and the City of Houston One Water Community Cohort

Bayou City Waterkeeper & National Wildlife Federation

Presenting for NCTCOG's "Utilizing Water Reuse to Create Resilient Water Systems" Webinar

July 16, 2024



A little bit about us

Bayou City Waterkeeper protects the waters and people of the Houston region through bold legal action, community science, and creative, grassroots policy to further justice, health, and safety for our region.



National Wildlife Federation's Texas Coast & Water Program works to ensure that Texas manages and uses its water resources for the benefit of both people and wildlife.



A Tale of 2 Cities

Austin

Challenges:

- Population Growth
- Water Supply Challenges
- Climate Impacts

Solutions

- Water Forward – 100 Water Plan
- Currently focused on Implementation
- Plan update under development

Houston

Challenges:

- Population Growth – 4th largest city in US
- Water Supply Challenges
- Climate Impacts

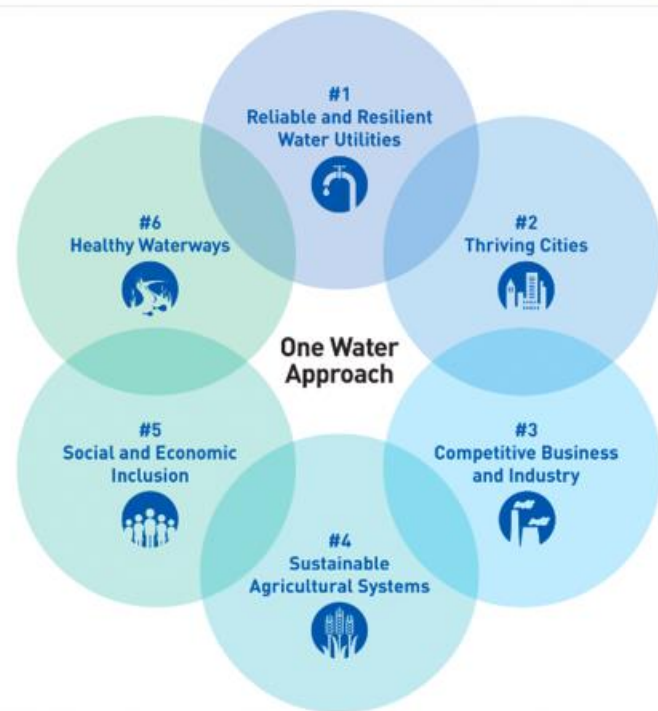
Solutions

- Develop One Water Plan
- Initial focus on stakeholder input

What is One Water?

One Water is a comprehensive and interconnected approach to managing public water systems, encompassing drinking water, wastewater, and stormwater.

It emphasizes sustainability, efficiency, and inclusivity to address the challenges posed by urban water cycles.



Key Principles of One Water

- Managing the urban water cycle as a single integrated system
- Maximizing water conservation, efficiency, and reuse
- Using green infrastructure and nature-based solutions
- Incorporating community values into decision-making
- Planning collaboratively across city departments and utilities
- Intentional investment that achieves multiple community benefits
- Basing decisions on sound scientific data and future projections
- Enhancing climate and community resilience

Why One Water in Houston?

Water Resilience grounded in Equity:

- Planning infrastructure investments holistically
- Expanding green infrastructure and nature-based solutions
- Prioritizing resources for underserved communities
- Enhancing climate resilience across interconnected systems
- Improving water quality through a watershed approach
- Saving costs by optimizing water use across sectors



One Water in Houston

- **Key Players**

- City of Houston
- Jacobs Engineering (Consultants)
- Stakeholders - Community, Industry, Utilities

- **Phase 1 - Stakeholder Outreach and Engagement**

- Develop Guiding Principles and Community Vision
- Complete by July 2024

- **Phase 2 - Development of Houston One Water Plan (2-year process)**

- Drinking Water, Wastewater, Storm Water
- Integrated plan will reflect community input from Phase 1

Engaging with Houston Water

- Sharing expertise from One Water processes in other communities
- Leverage local, state and national expertise
- Support for robust stakeholder efforts...liaison to community members
- Engage with city and state leadership to support efforts
- Resilient water supplies that yield multiple community benefits.

Building Water Champions

- Community Leader Cohort -

- Build community expertise on One Water to facilitate participation in One Water planning process
- Cohort includes leaders working on water in conservation and water justice
- Cohort serves as liaison to community members
- Leveraging community buy-in during dialogue with the city
- Co-learn about One Water through experts and share with community members
- Communications about One Water to community members lifting priorities determined by cohort

Community Leader Cohort Approach

- **Monthly Check-ins** – The Cohort will meet monthly virtually, and when/if convenient, in person. The focus of these meetings will be updates on the One Water Plan, strategy development, and key learnings.
- **Shared Learning** – BCWK and NWF will invite One Water experts to present to the Cohort to learn more about One Water.
- **Communications** – With the Cohort, BCWK and NWF will develop educational One Water materials to share with community members to better understand how to advocate and participate in the One Water process and advance community needs.

Outcomes

1. Through intentional community engagement from the onset of planning, community members will have a vital role in shaping the Strategic Vision and Guiding Principles that will serve as the foundation of Houston's inaugural One Water Plan.
2. A resilient and adaptable water supply can be secured; flood impacts can be mitigated and people and communities protected; a deliberate mix of green and gray infrastructure can address lingering problems and chart new approaches; and bayous, estuaries, and the environment can be protected now and into the future.
3. If Houston can succeed in developing a One Water plan that is grounded in equity and reflects community priorities and values, it can serve as a blueprint for Texas and the nation. If done well, this plan can be a transformational milestone for Houston and its residents.

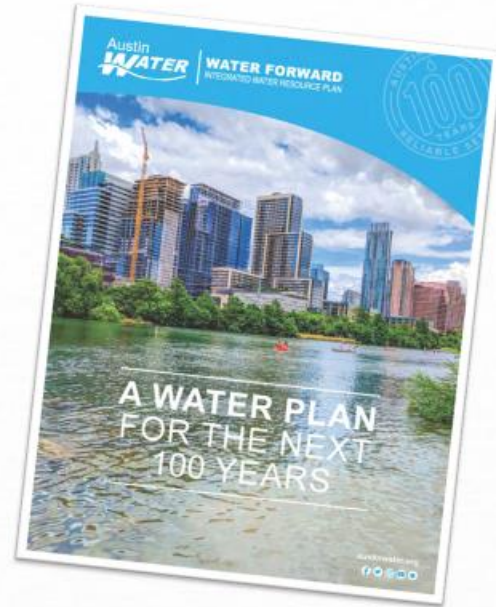
Austin



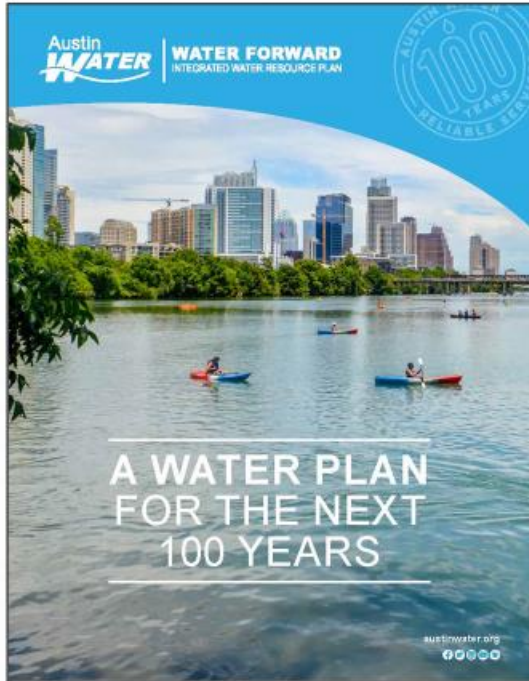
Water Forward

Water Forward is Austin's 100-year water supply plan. The plan puts efficiency and locally available water supplies at the forefront of Austin's water supply management approach. Elements of the plan include expanding reuse projects at the city and building scale, incentivizing water wise landscaping, and developing an ASR facility.

Community involvement is a big part of the plan development & implementation.



Water Forward



Water Forward 2018 is Austin's city Council-approved 100-year integrated water resources plan.



Water Forward is updated on a regular cycle to incorporate new data and adapt to changing conditions.

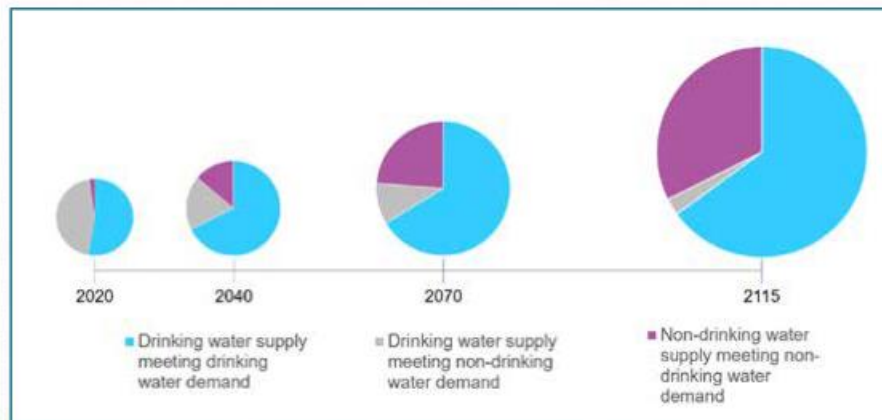


The current Water Forward plan update is underway and planned to be completed by end of calendar year 2024.

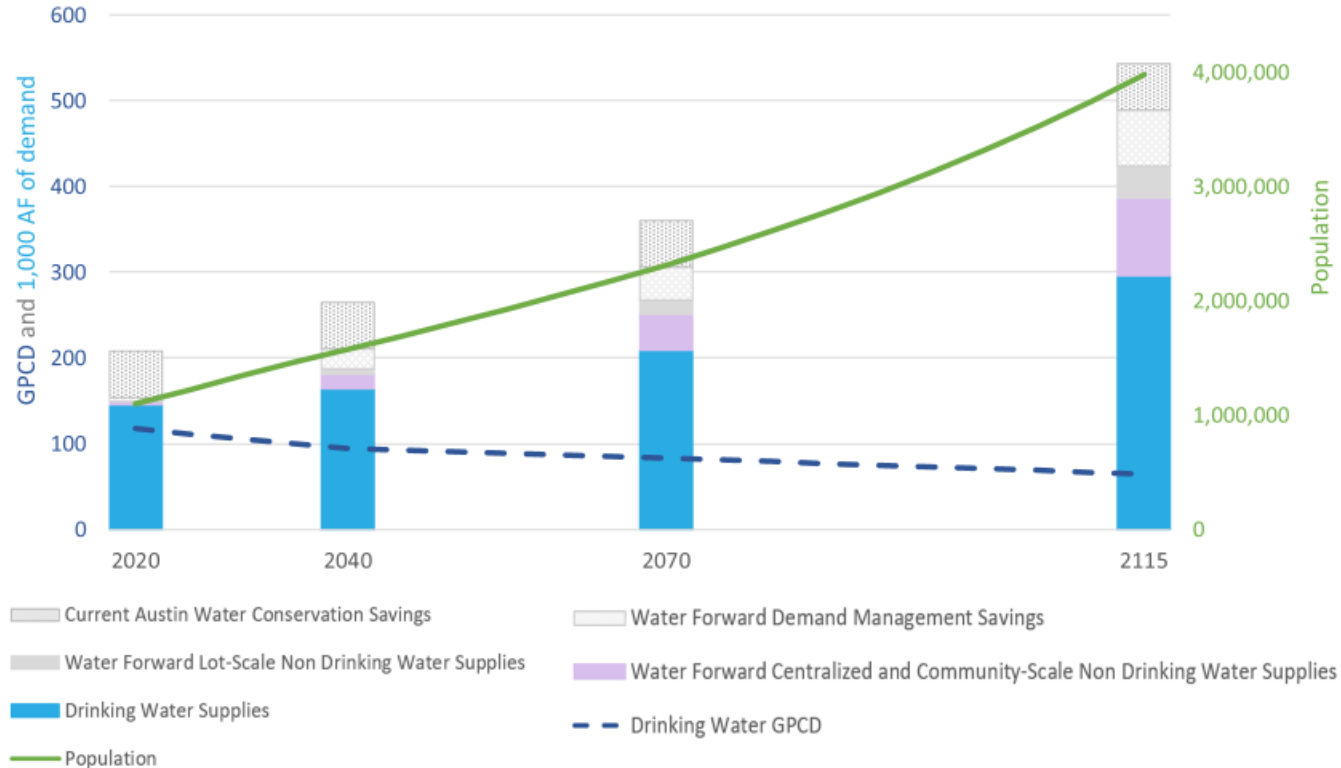
Water Forward

Recommended Strategies	Average/ Drought	Estimated Yield (Acre Feet per Year) ¹			
		2020	2040	2070	2115
Demand Management Strategies					
Advanced Metering Infrastructure (AMI)	Both	600	3,880	5,770	9,370
Utility Side Water Loss Control	Both	3,110	9,330	10,918	13,060
Commercial, Industrial, and Institutional (CII) Ordinances	Both	1,060	1,060	1,060	1,060
Water Use Benchmarking and Budgeting	Both	-	5,950	11,670	25,230
Landscape Transformation Ordinance	Both	-	3,040	7,430	15,050
Landscape Transformation Incentive	Both	-	320	630	930
Irrigation Efficiency Incentive	Both	40	210	430	390
Lot Scale Stormwater Harvesting	Both	-	330	870	2,280
Lot Scale Rainwater Harvesting	Both	-	1,550	4,030	9,250
Lot Scale Graywater Harvesting	Both	-	2,130	5,620	12,670
Lot/Building Scale Wastewater Reuse	Both	-	1,320	3,670	7,880
Air Conditioning (AC) Condensate Reuse	Both	100	1,080	2,710	5,150
Demand Management Strategies Sub-Total	-	4,910	30,200	54,810	102,320
Water Supply Strategies					
Aquifer Storage and Recovery	Drought	-	60,000	60,000	90,000
Brackish Groundwater Desalination	Both	-	-	5,000	16,000
Direct Non-Potable Reuse (Centralized Reclaimed Water System)	Both	500	12,000	25,000	54,600
Indirect Potable Reuse (IPR) through Lady Bird Lake	Drought	-	11,000	20,000	20,000
Capture Local Inflows to Lady Bird Lake (infrastructure also included as part of IPR, above)	Average	-	3,000	3,000	3,000
Off Channel Reservoir	Both	-	-	25,000	25,000
Distributed Wastewater Reuse	Both	-	3,150	14,470	30,050
Sewer Mining	Both	-	1,000	2,210	5,280
Community Scale Stormwater Harvesting	Both	-	160	240	500
Drought Supply Strategies	-	-	71,000	80,000	110,000
Average/Both Supply Strategies	-	500	19,310	74,910	134,440
Water Supply Strategies Sub-Total	-	500	90,310	154,910	244,440
Water Forward Recommend Strategies Overall Total		5,410	120,510	209,720	346,750

**Austin is growing
non-potable water supply to
meet non-potable water needs**



Future Water Demands with Water Forward



Growing Reuse in Austin

💧 New Affordability Incentives

Incentives to support expansion and adoption of reuse strategies

💧 Reclaimed Water System

Expanding AW's centralized reclaimed water system

💧 Community-scale Reclaimed Water

Localized treatment facilities and distribution systems

💧 Onsite Water Capture and Reuse

Commercial and multifamily rainwater, stormwater, graywater, and air conditioning condensate



Austin's Onsite Water Reuse Ordinance

Development Size	Current Requirements Effective 12/1/2021	New Requirements Effective 4/1/2024
Small <250,000 square feet	• Water Benchmarking • Connect to centralized reclaimed water within 250 feet	• No change
Large ≥250,000 square feet <u>without multifamily</u>	• Water Benchmarking • Connect to centralized reclaimed water within 500 feet	• Connect to centralized reclaimed water within 500 feet; OR • Install an onsite water reuse system
Large ≥250,000 square feet <u>with multifamily</u>	• Water Benchmarking • Connect to centralized reclaimed water within 250 feet	• Connect to centralized reclaimed water within 500 feet; OR • Install an onsite water reuse system <i>Exclude projects accredited for Affordability Unlocked or State Low Income Housing Tax Credit</i>

Austin Public Library

The Austin Central Library is a 200,000 sq. ft. equipped with various onsite water reuse strategies. The a is connected to Austin's centralized reuse system and also generates water onsite by collecting rainwater and AC condensate.

This system provides 90% of the water needed by the building thus relieving pressure on Austin's potable water supply. The water is collected and stored in a 700,000 tank before being treated and transferred to 1,200 cistern where it is then used for landscape irrigation and flushing toilets and urinals.



Questions?

Contact us:

Jennifer Walker
Director, Texas Coast and Water Program
National Wildlife Federation
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Policy Analyst
Bayou City Waterkeeper
usman@bayoucitywaterkeeper.org





Speaker Introduction

Sharlene Leurig

Founder
Texas Water Trade

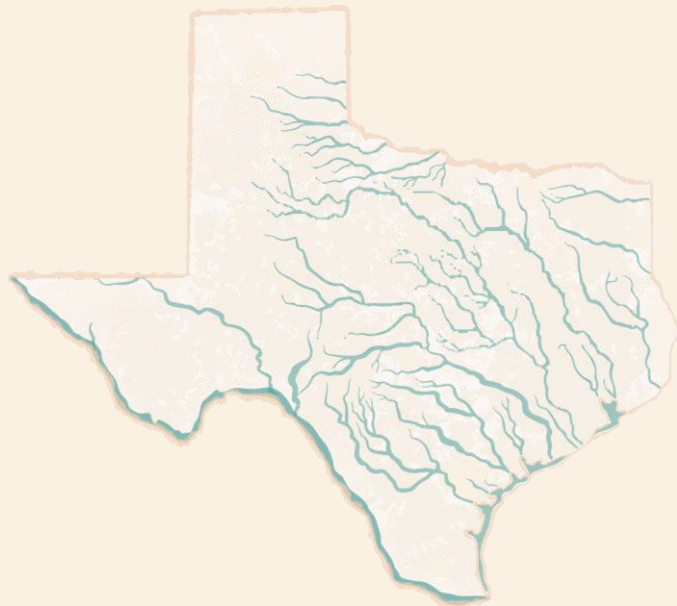
Enabling Water Reuse

North Central Texas Council of Governments

Sharlene Leurig



About Texas Water Trade

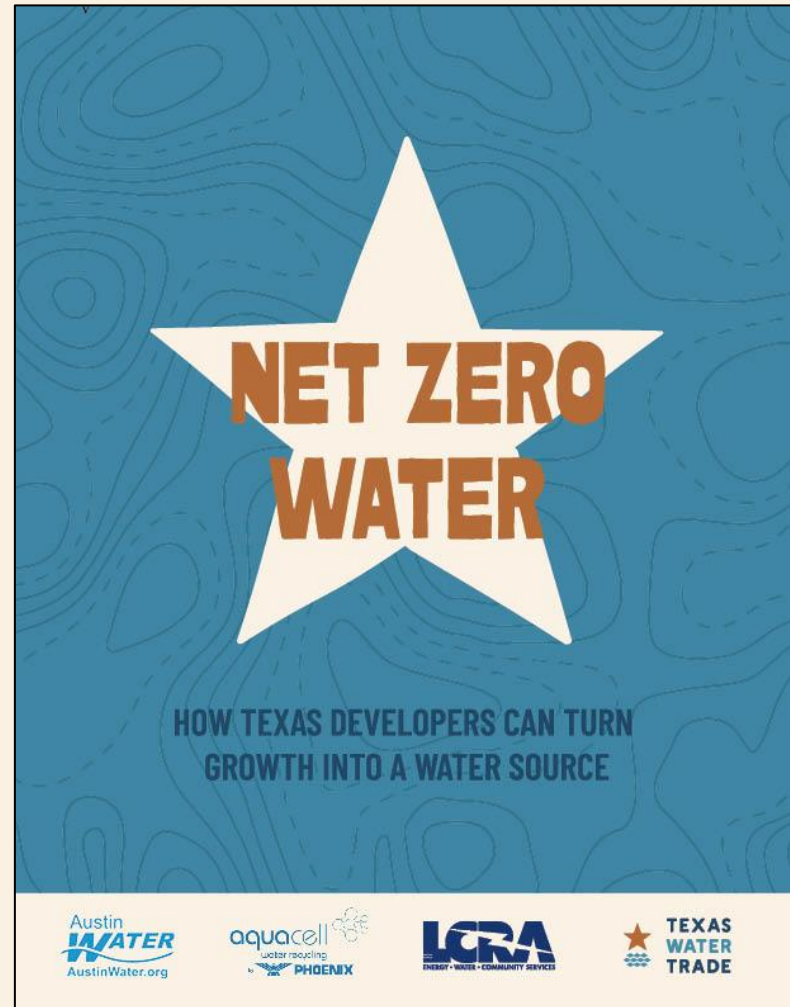
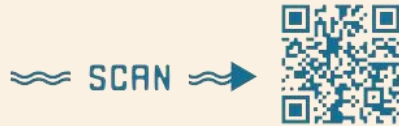


Texas Water Trade (TWT) is a non-profit organization whose mission is to catalyze sustainable water transactions in Texas to ensure **clean, flowing water for people and nature.**

Our work is focused on developing **reliable water access for all water users in Texas.**

Now Available!

Net Zero Water Toolkit



What Is Net Zero Water?

A **design mindset** that prioritizes alternative water sources for a project's resilience and reliability.

Buildings that capture & use onsite water can meet their needs with **10-30%** the potable water of a typical building.

Netting out demand is a **design goal**, not a requirement.



8. BLACKWATER

Wastewater from kitchen and utility sinks, urinals, and toilets

9. GRAYWATER

Wastewater including all sources except kitchen and utility sinks, urinals and toilets

10. EVAPORATIVE COOLING BLOWDOWN

The water drained from cooling towers with heavy mineral content

12. FOUNDATION DRAINAGE WATER

Groundwater that infiltrates a foundation

13. STORMWATER

Surface water from rainfall events

14. RAINWATER

Water collected from rooftop runoff only

15. AC CONDENSATE

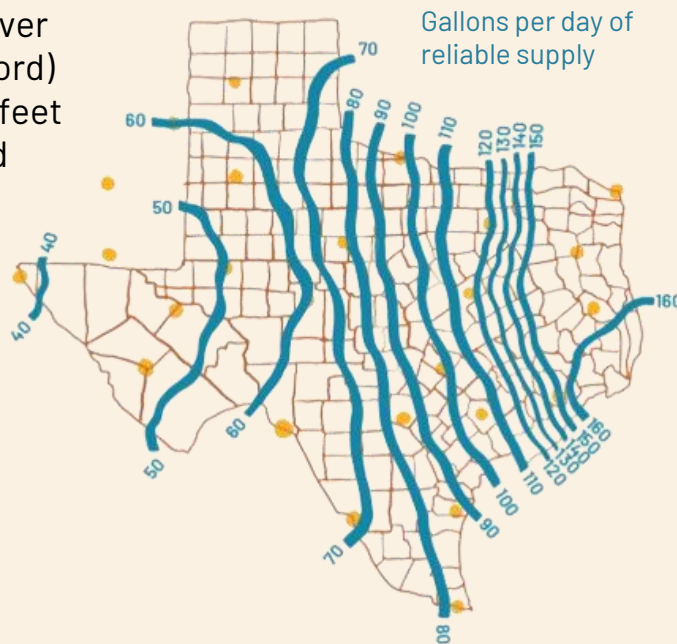
Condensed water from air conditioning equipment and cooling towers

Yield Potential of Onsite Resources

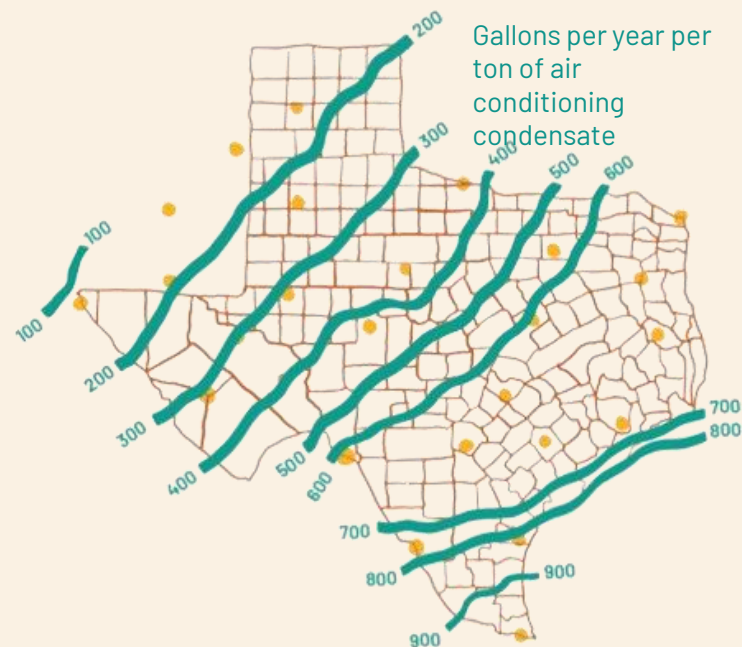
Reliable Rainwater Harvesting

Firm yields (gallons per day reliable over the period of record) for 3,000 square feet of catchment and 30,000 gallons of storage.

In most cases, larger yields can be attained with more catchment and storage.



Condensate Harvesting Potential

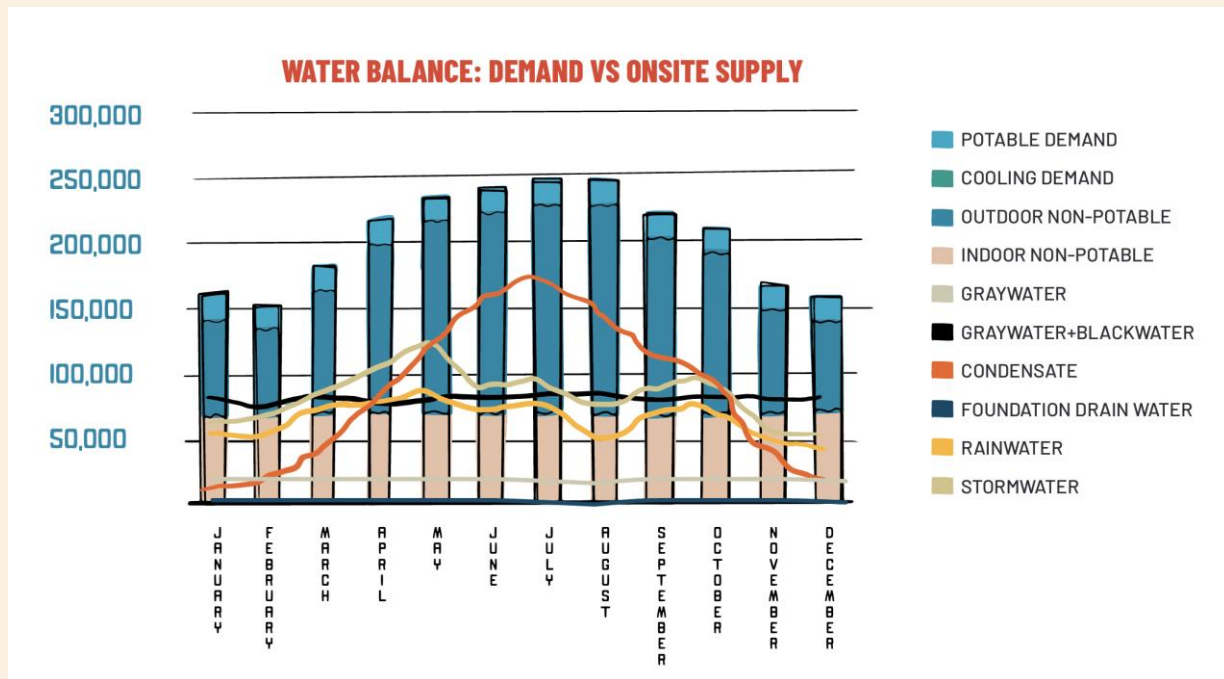


Choosing the Right Onsite Resources

Function of Yield and Cost

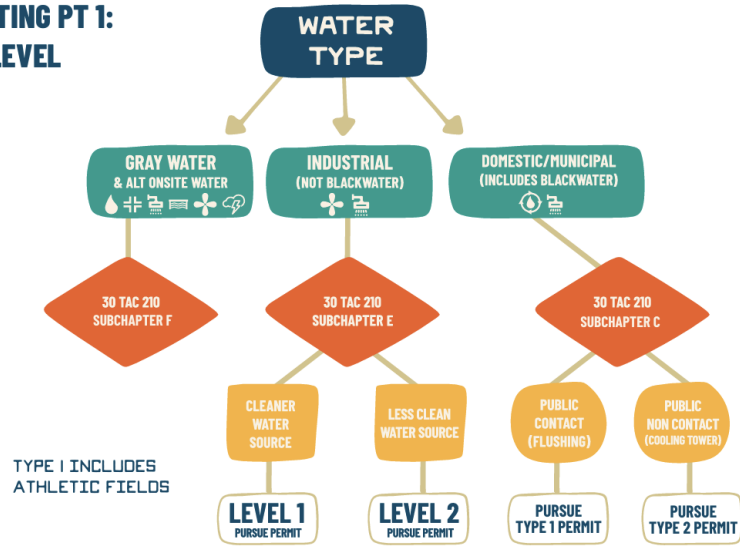
Water balance calculators help identify different options based on the project's demand and supply.

There's no single answer. **The right portfolio of onsite resources will be aligned with cost and timeline constraints.**



Permitting

PERMITTING PT 1: STATE LEVEL



LEGEND

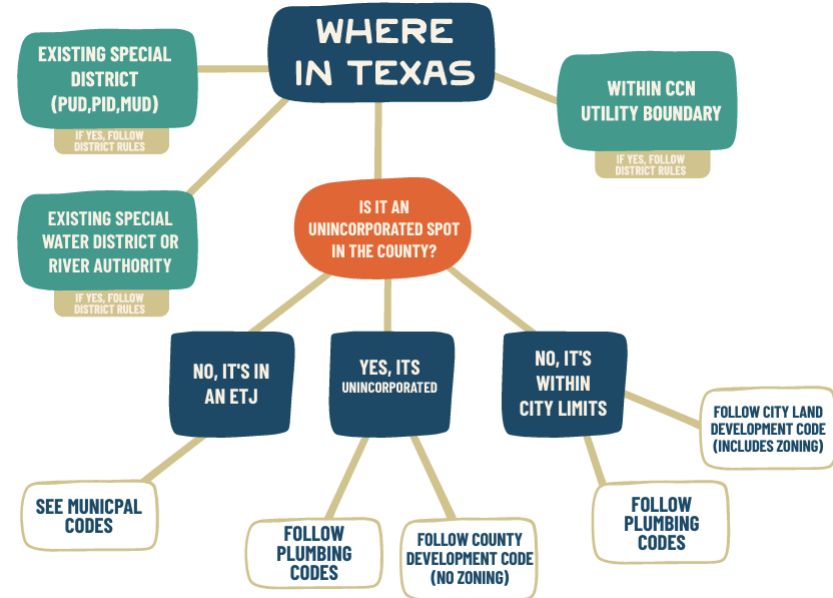
WATER SOURCES

- RAIN WATER
- STORMWATER
- CENTRALIZED PURPLE PIPE
- CONDENSATE
- BLACKWATER
- FOUNDATION
- GRAYWATER

WATER USES

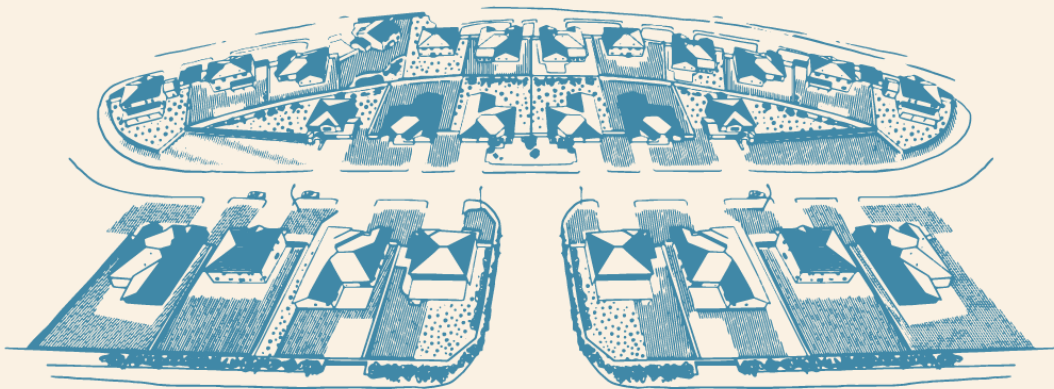
- TOILETS
- LAUNDRY
- IRRIGATION
- COOLING TOWERS
- FIRE PROTECTION
- CONSTRUCTION DUST CONTROL

PERMITTING PT 2: LOCAL LEVEL



Financing Vehicles

Despite all the benefits that onsite water reuse systems create, there are relatively few projects online in Texas. One of the primary reasons is upfront cost, often borne by developers whose ownership of the site may end within a few years of project delivery.



Vehicles Covered in the Toolkit

Municipal Utility Districts-MUDs

Public Improvement Districts- PIDs

Design Build Operate Finance-DBOF

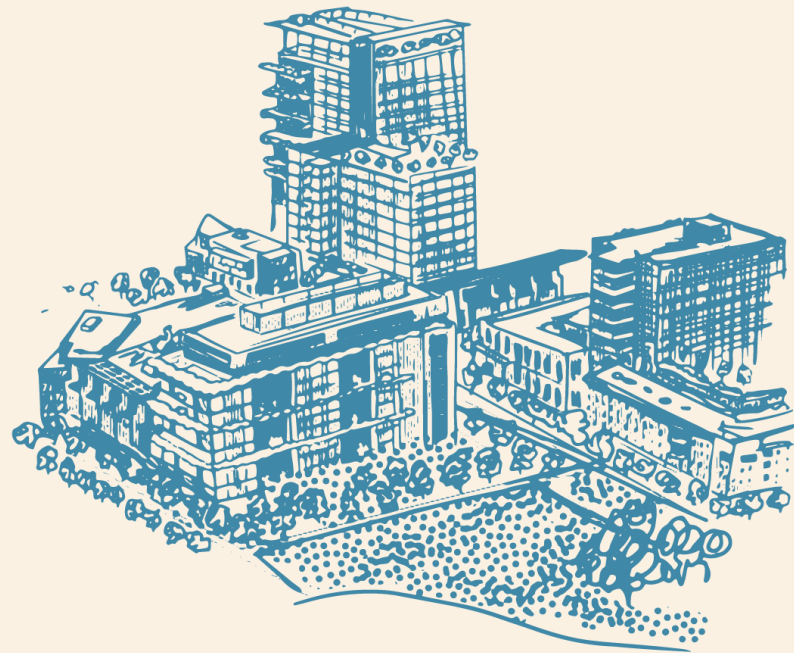
Utility Incentives

Tax Increment Reinvestment Zones-TIRZs

Texas Water Fund Programs

Master Planned Communities- Mixed Use

- The redesign will include 1700 housing units (200 affordable), 200 hotel rooms, 140,000 sq-ft of retail and 1.26 million sq-ft of commercial office space.
- The plan will transform 21 acres of parking into 13 acres of open space.
- Brodie Oaks will capture all rooftop rainwater for beneficial use, including landscape irrigation and cooling towers.
- Rainwater and stormwater reuse systems allowed the project to free up 6 additional acres for negotiated permittable uses while cutting runoff by 2/3.



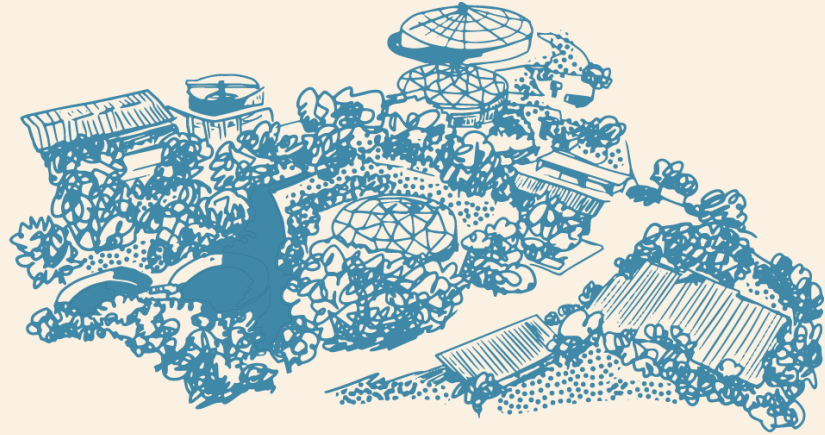
Brodie Oaks, Austin

(Master Planned Community-Mixed Use)

Utility

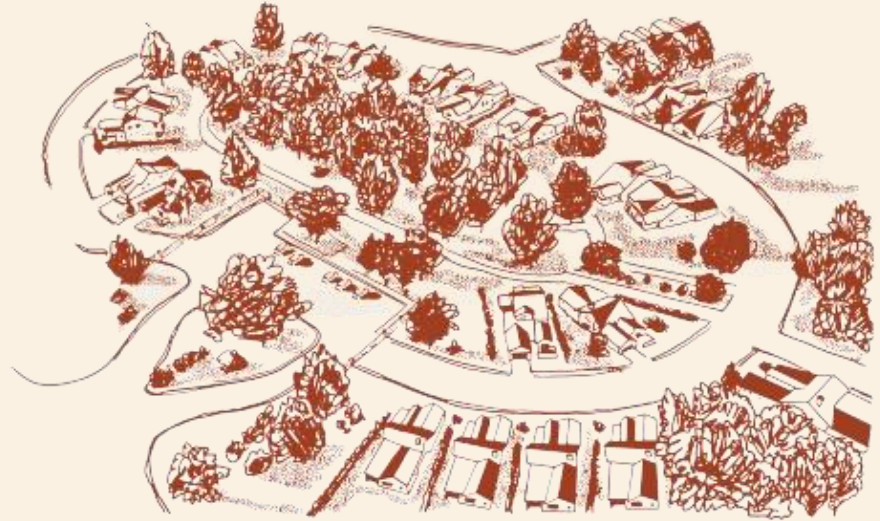
Lakeway Municipal Utility District

- Lakeway captures and reclaims 100% of their wastewater
- Key to compliance with statutory prohibitions from discharging wastewater into the Highland Lakes
- Average of 1.21 million gallons/day of reuse
- Pay for in-district customers with bonds and outside-district customers with cash
- Recently expanded to residential customers in retail model
- Watering schedule for reuse customers based on wet weather statistics, not drought—results in less curtailment
- Reuse freed up 82 acres of TLAP fields, yielding \$12 million for Lakeway MUD's needs



Suburban and Exurban Growth

- Through the delivery of package plants, one New South Wales development increased its maximum developable lots from 8 to 35.
- Increased density due to onsite water reuse led to an \$11 million increase in profit.
- Wastewater reuse: An alternative to traditional TLAP wastewater discharge and direct discharge permits, saving developers land purchase costs and litigation.



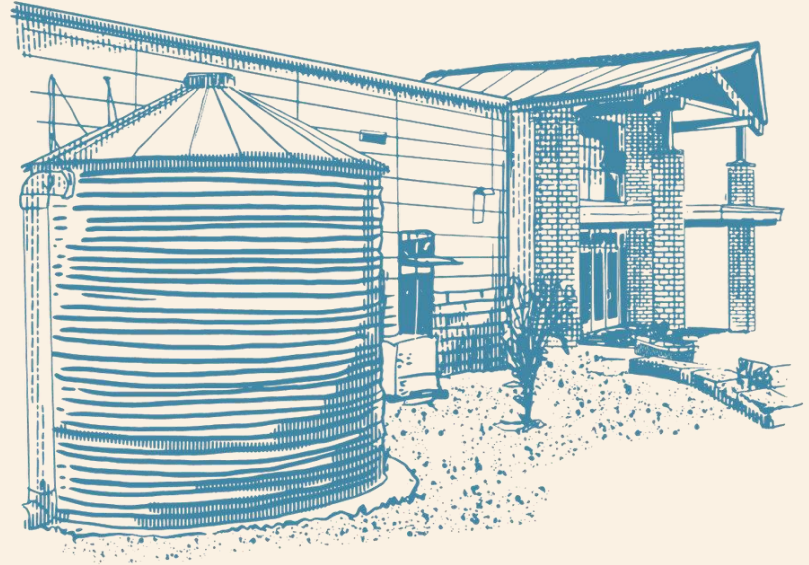
Residential Master Planned Community, New South Wales, Australia

(Master Planned Community- Single Family)(Outside Texas)

Institutional

Blue Hole Primary School, Wimberley

- System designed to contribute 2,800 gallons per week for non-potable needs during AC operation.
- Utilizes UV-treated effluent for subsurface drip irrigation, including a 1.27-acre athletic field behind the school.
- Average daily wastewater flow: <5,000 gallons
- Average daily interior non-potable water demand: 2,280 gallons (2.85 gallons per person)
- Expected annual potable water savings: Projected at 90%
- Actual first-year savings: 554,800 gallons (49.4% less water use than a comparable school)
- Projected 30-year cost savings: \$724,500
- Variance in projected vs real potable water savings the result of lower rainfall and maintenance challenges.



Now Available!

Texas Water Trade's Net Zero Water Engineer

Technical support for private and public decisionmakers

Onsite water & water reuse options analysis

Pricing estimates & permitting analysis

Treatment & monitoring recommendations



Thank You!



Questions?



Wrap-Up

- If you submitted a RSVP for this webinar, you will receive an email with the presentation slides and a subsequent email with a link to the recording.
- All recordings are posted on NCTCOG's website under the green banner called "Webinars" here:
<https://www.nctcog.org/envir/natural-resources/water-resources>
- If you did not RSVP and would like these webinar materials, please email cbuckley@nctcog.org

Webinar Feedback

- Please provide your feedback on today's webinar in this 4-question survey. Thank you!

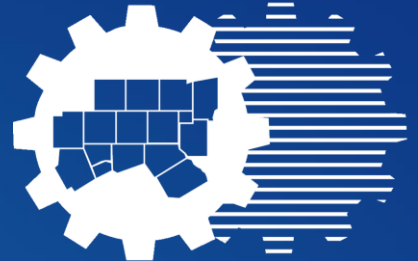
[Provide webinar feedback here](#)

Thank you for attending!

NCTCOG Webinar
July 16th, 2024

Corinne Buckley, NCTCOG
cbuckley@nctcog.org

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