WATER FORWARD

2024 PLAN REPORT

AUSTIN'S 100 YEAR PLAN

Water Forward 2024 Plan Report

FINAL – November 4, 2024

Director's Message

Austin Water is doing important work to make sure Austin has a strong and reliable water supply, even as our city faces the challenges of growth, drought, and a changing climate.

Over the past few years, Austin Water has put smart strategies in place that have already made a big difference. We've focused on conservation, encouraging our customers to use water wisely through recent hot and dry years. We've also launched GoPurple, a program that will expand our reclaimed water system and includes requirements and incentives for developments to reuse water onsite. We are pursuing water storage strategies to stretch our existing supplies. And working closely with our regional partners, we've strengthened Austin's ability to bridge droughts and provide a sustainable water supply to meet all our community's water needs.

Our work doesn't stop here. Climate science tells us that we must do even more to protect our future. The challenges we face are real, and we need to stay ahead of them. That's why we're committed to learning from our past efforts and adjusting as we go. We've been using an adaptive management approach to closely monitor how our plans are working and make changes as needed. This is a key part of Water Forward 2024, which provides a roadmap for Austin's water future.

We've been working hand in hand with the Water Forward Task Force, a group of dedicated community members who help inform our efforts. Together, we've updated the 2018 plan, adjusted our strategies, and responded to the needs we've identified along the way. This collaborative approach has resulted in updates that not only address today's needs but also prepare us for tomorrow's challenges.

At Austin Water, work is already underway to carry out this updated plan. We're focused on staying transparent and accountable to you, our community, as we move forward. We know that water is essential to our quality of life, and we're determined to protect this precious resource.

As we look to the future, we at Austin Water hold a hopeful vision. Austin is a leader in water conservation and sustainability and we see a future where our city continues to thrive, and where every resident has access to clean and reliable water, no matter what challenges come our way. Together, we can build a water-secure future for Austin, and I'm excited to continue this journey with you.

Thank you for your support and for being a part of Austin's water story.

Shay Ralls Roalson, P.E.

Austin Water Director

ACKNOWLEDGMENTS

Austin Water prepared the Water Forward 2024 Plan with support from the Council-appointed Water Forward Task Force, Community Ambassadors Group, and Climate Technical Advisory Group. Thank you to the many community members who took part in the process to update the plan. Your feedback helped to create a plan that is reflective of Austin's values and will create a sustainable future for our community.

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ABBREVIATIONS

AF	Acre Feet
AF/yr	Acre Feet Per Year
AMI	Advanced Metering Infrastructure
ASR	Aquifer Storage and Recovery
AW	Austin Water
BCP	Balcones Canyonlands
CIP	Capital Improvement Project
City	City of Austin
COA	City of Austin
COM	Commercial
CTAG	Climate Technical Advisory Group
DCP	Drought Contingency Plan
DDM	Disaggregated Demand Model
DPR	Direct Potable Reuse
DTI	Delphi, Trends, and Imagine Austin
DWDR	Drought Worse than the Drought of Record
GCM	Global Circulation Model
GIS	Geographic Information Systems
GPCD	Gallons Per Capita Per Day
IPR	Indirect Potable Reuse
LCRA	Lower Colorado River Authority
MFR	Multifamily Residential
MGD	Million Gallons Per Day
OWRS	Onsite Water Reuse System
Plan	Water Forward 2024 Plan
SER	Service Extension Request
SFR	Single Family Residential
SOP	Standard Operating Procedure
TCEQ	Texas Commission on Environmental Quality
TM	Technical Memorandum

TWDB ..... Texas Water Development Board

UT Austin ..... The University of Texas at Austin

WAM ..... Water Availability Model

WCP ..... Water Conservation Plan

WF18 ..... Water Forward 2018 Plan

WF24 ..... Water Forward 2024 Plan

WHL ..... Wholesale Customers

WQPL ..... Water Quality Protection Lands

WTP ..... Water Treatment Plant

WWTP ..... Wastewater Treatment Plant

EXECUTIVE SUMMARY

Introduction and Purpose

Water Forward 2024 is Austin's 100-year integrated water resource plan. The purpose of Water Forward is to develop and implement diverse and environmentally conscious water management strategies to adapt to growth, drought, and climate change and ensure a sustainable, resilient, equitable, and affordable water future for our community for the next 100 years. Austin Water has developed this plan to address near- and long-term water needs through a collaborative process in alignment with guiding principles crafted to reflect the Austin community's values.

Water Forward Guiding Principles

Water Forward 2024 was created through a collaborative process led by Austin Water and involving the Water Forward Task Force, outside experts and consultants, and community stakeholders. This approach allowed for the integration of community values and scientific expertise, making the plan both data-driven and responsive to public concerns. Public workshops, surveys, and one-on-one meetings with community organizations provided valuable insights into community priorities, particularly around affordability, equity, and conservation. The Climate Technical Advisory Group and other technical experts provided climate projections and technical data to guide plan development.

The resulting plan includes a suite of conservation, reuse, and supply strategies for the next 50 years and an adaptive management plan through 2120. It builds on the original 2018 Water Forward Plan, integrating new climate and water demand data into an updated approach to plan for future uncertainty. The plan is strategic in nature and is intended to guide the development of future projects, programs, and policies, which are summarized in terms of near-term five-year implementation actions.

Planning for Uncertainty

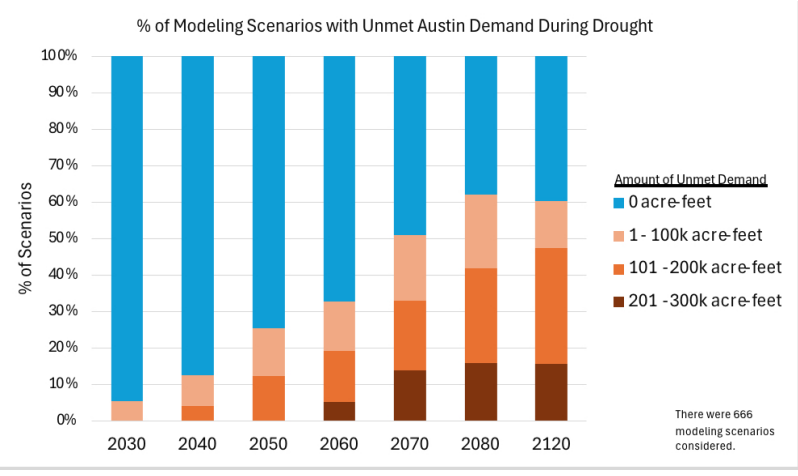
Water Forward 2024 identified three key areas of uncertainty in planning for Austin's water resources: 1) growth in population and water demands, 2) drought and climate change, and 3) development of regional supplies.

1. **Population and Demand Growth:** The plan included low, medium, and high population growth scenarios, with Austin Water's current served population of just over a million people growing to approximately 3.2 million people by 2120 in the medium projection. Water Forward anticipates increased water demand from residential, commercial, and other customers. The plan also considered the impact of regional growth within the Colorado River basin.
2. **Drought and Climate Change:** Austin depends on the Colorado River and Lakes Travis and Buchanan for its water. During the 2008-2016 drought and again in 2022 and 2023, inflows to these reservoirs reached record lows. Climate models project higher temperatures, increased evaporation, and more variable rainfall patterns, which will lead to more intense droughts and lower river flows in the future. Water Forward incorporated updated climate data and plans for droughts worse than those we have experienced in the past.
3. **Regional Supply Development:** The Lower Colorado River Authority (LCRA) has plans to develop additional supply projects that would contribute to the shared resources of the lower Colorado River and help meet growing water needs for the City of Austin and others in the basin. To address the uncertainty of how much water would be produced by these projects and when they would be completed, Water Forward incorporated low, medium, and high projections of regional supply development.

The Water Forward plan used a more robust approach by testing many water management strategies against hundreds of plausible future scenarios to plan for these uncertainties.

Future Water Supply Needs

Austin's projected water supply needs increase with climate change impacts over time and with the increasing demands of other water users within the Colorado River basin. By 2070, if no new strategies are implemented, about half of the more than 600 scenarios modeled show no additional need, 13% of scenarios show a need of less than 100,000 acre feet per year, and 37% of scenarios show a need of more than 100,000 and less than 300,000 acre feet per year. Addressing these potential shortfalls requires a diversified water resource portfolio sized to meet this range of future water supply needs. With Water Forward 2024 strategies in place, less than 3% of scenarios evidence a shortage through 2060 and approximately 15% of scenarios in 2070 and 2080 evidence a shortage.

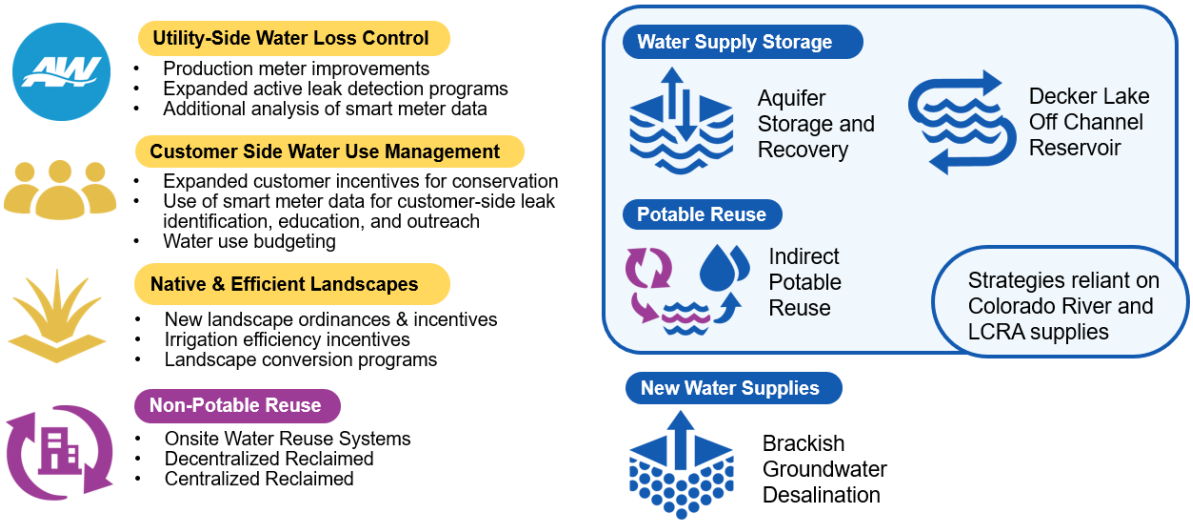


Acknowledging that the lack of a reliable and affordable water supply would likely have the greatest impacts on marginalized communities, Austin Water created an Equity and Affordability

Roadmap to help identify strategies that had greater benefits for marginalized communities and to find ways to mitigate potentially inequitable impacts of strategies. Austin Water also evaluated portfolios of water management strategies against objectives like water supply reliability, protecting the environment, being cost-effective, and reducing risks in the implementation of strategies.

Future Water Strategies

Water Forward 2024 includes multiple strategies that, together, form a resilient water resource portfolio. These strategies include conservation and non-potable reuse strategies to reduce potable water demands, potable water storage and reuse strategies to stretch our Colorado River supplies, and new water supplies. The plan also includes land conservation strategies to protect Colorado River water quality.



1. **Conservation:** Water conservation is a cornerstone of the plan. Austin Water will enhance its conservation programs through rebates, public education, and regulations that promote efficient water use. This will include leveraging the data and insights provided by the My ATX Water smart meter program and working toward establishing customer water use budgets. Austin Water will also seek to reduce utility-side water losses by implementing actions identified in a third-party evaluation of the utility's water loss programs.
2. **Non-Potable Reuse:** Austin Water's GoPurple Program includes requirements for connection to Austin's centralized and decentralized reclaimed water systems or installation of onsite reuse, while offsetting affordability impacts through cost-sharing, incentives, and funding mechanisms. Water Forward envisions future expansion of these systems and requirements to further reduce potable water demands.
3. **Potable Supply:** Storage strategies to stretch our existing supplies include Aquifer Storage and Recovery (ASR) and use of Lake Water E. Long ("Decker Lake") as an off-channel reservoir with the lake level fluctuating only during drought periods.
4. **Land Conservation:** Conserving land in the Colorado River Basin upstream of Austin helps preserve drinking water quality for the City. Austin Water will begin further community engagement to develop a land conservation program that will expand the utility's current and ongoing wildland conservation efforts.

Water Forward Strategies	Average/ Drought	Estimated Yield (Acre Feet per Year) 2030	2040	2050	2060	2070	2080	Total Annual Community Cost ($ per acre foot per year)*
Water Conservation Strategies								
Utility-Side Water Loss Control	Both	2,800	7,500	9,400	11,300	13,200	15,000	$267
Customer-Side Water Use Management	Both	2,400	4,700	6,400	8,100	9,800	11,400	$52
Native & Efficient Landscaping	Both	1,300	2,700	3,800	4,800	5,900	7,000	$5,112
Water Conservation Strategies Sub-Total	-	**6.500**	**14,900**	**19,600**	**24,200**	**28,900**	**33,400**	
Non-Potable Water Reuse Strategies								
Centralized Reclaimed	Both	1,100	8,200	12,900	17,600	22,300	26,900	$2,243
Decentralized Reclaimed	Both	0	200	500	800	1,100	1,300	$5,158
Onsite Reuse	Both	1,100	4,000	5,700	7,300	9,000	10,600	$8,957
Non-Potable Reuse Strategies Sub-Total	-	**2,200**	**12,400**	**19,100**	**25,700**	**32,400**	**38,800**	
Potable Water Supply Strategies								
Aquifer Storage and Recovery	Both	0	44,500	44,500	44,500	44,500	44,500	$2,003
Lake Walter E. Long (Decker) Off Channel Reservoir	Both	0	18,300	18,300	18,300	18,300	18,300	$3,033
Indirect Potable Reuse	Drought	**	**	22,400	22,400	22,400	22,400	$880
Capture Local Inflows to Lady Bird Lake***	Average	0	0	3,000	3,000	3,000	3,000	***
Brackish Groundwater Desalination	Both	0	0	0	0	20,000	40,000	$2,688
Water Supply Strategies Sub-Total	-	**0**	**62,800**	**88,200**	**88,200**	**108,200**	**128,200**	
Water Forward Strategies Overall Total		**8,700**	**90,100**	**126,900**	**138,100**	**169,500**	**200,400**	
Current Supplies								
Colorado River and Highland Lakes Supply	Both	325,000						
Centralized and Decentralized Reclaimed Water System	Both	5,000						

* Community cost = Utility cost + Customer cost
** May be implemented earlier in severe drought conditions
*** Infrastructure is included in Indirect Potable Reuse strategy

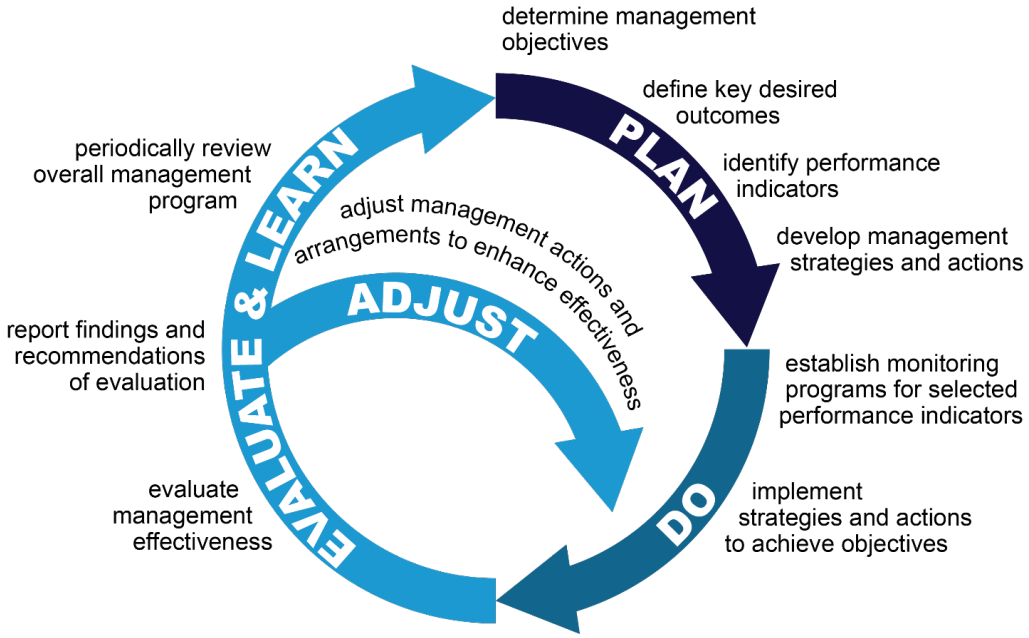
Water Forward 2024 estimates that implementing these strategies will require significant investment. Costs included in the plan are planning level estimates that will be refined through further capital and operations planning. Austin Water is an enterprise department of the City of Austin, funded by water, wastewater, and reclaimed water rates and fees, as well as capital recovery fees (connection fees for new development. Capital investments are funded through a combination of operating cash and debt financing, including low interest loans from state and federal water infrastructure funding programs. The utility will identify various sources of funding for projects and programs through its ongoing financial planning processes with a focus on maintaining affordability metrics and reducing financial impacts on customers.

Plan Implementation

The plan outlines Austin Water's approach to monitoring, evaluation, reporting, and proactive adaptation of near-term strategies. The plan also includes a 100-year adaptive management framework that maps out alternative long-term strategy implementation pathways. These pathways identify alternatives to respond to changing demand, supply, and climate conditions. The plan's implementation will be guided by near-term five-year implementation actions for each strategy. The plan also includes best management practices that the utility will seek to move forward during the next five years.

Monitoring and Adaptive Management: Austin Water will use an adaptive management approach to track the plan's progress, adjusting strategies as necessary to meet goals. By conducting regular evaluations of implementation progress and strategy effectiveness, Austin Water can make informed adjustments to meet evolving needs. This includes:

- Reviewing strategy yield data and tracking milestones to adjust conservation, reuse, and supply efforts.
- Creating a dashboard to share information and creating systems for community feedback and input on strategy imeplementation
- Quarterly and annual public progress reports and a major Water Forward plan update every five years to incorporate new data and progress made on plan implementation.



Moving Forward

The development of Water Forward 2024 represents a significant step in securing Austin's water future. Through in-depth analysis, collaboration, and proactive adaptation, Austin Water has created a robust plan that addresses the needs of a growing city in a changing climate. The process of updating the plan has highlighted the importance of adaptability in water planning. As conditions change, Austin Water must remain proactive to effectively meet its goals. The 2024 update adds strength to the original plan by integrating new data, responding to community feedback, and incorporating lessons learned to move us forward in achieving our goals.

CHAPTER 1

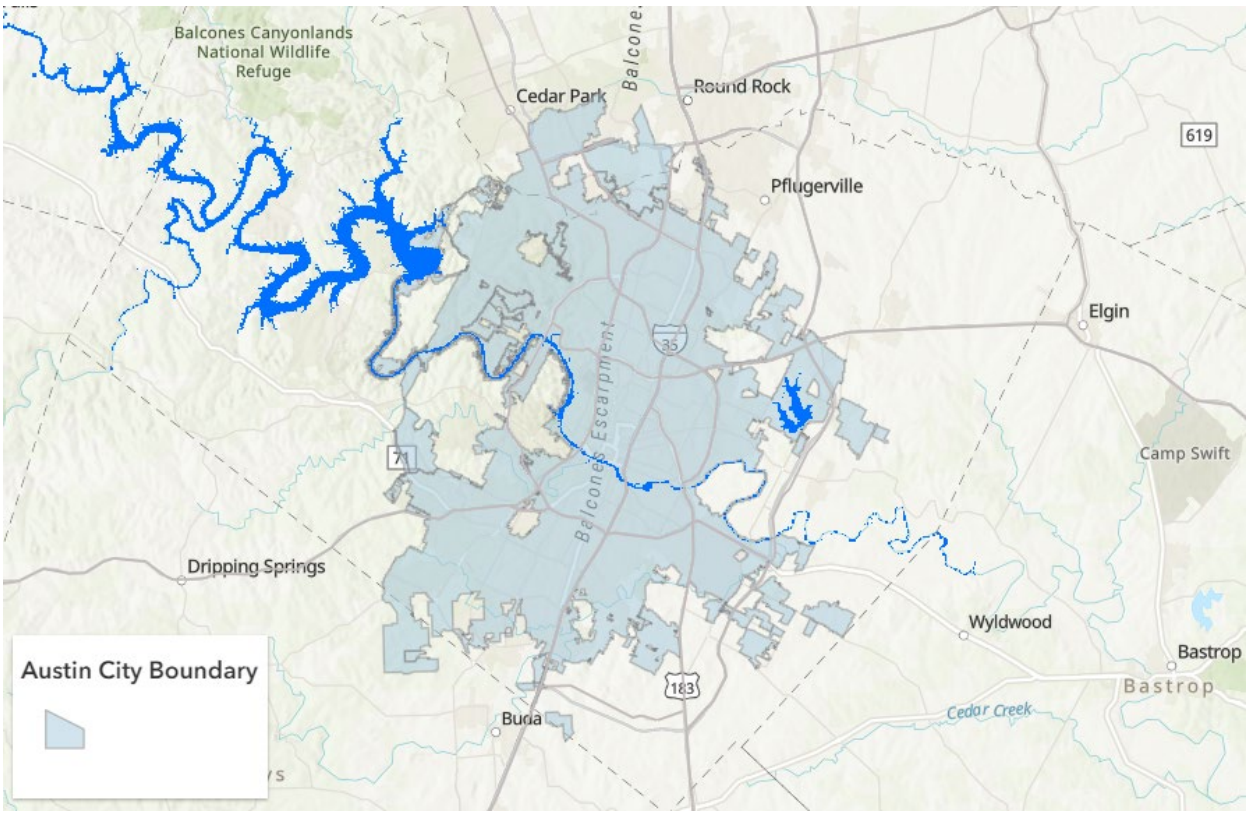
INTRODUCTION

Water is essential to Austin's quality of life.

Austin's water supply comes from the lower Colorado River and Lakes Travis and Buchanan. These two water supply reservoirs, which are managed by the Lower Colorado River Authority, are a part of a chain of lakes called the Highland Lakes. In the future, the lower Colorado River system will likely experience impacts from regional growth, droughts, and climate change. Water Forward provides a roadmap for Austin to meet these challenges and provide a sustainable, resilient, equitable, and affordable water future for our community for the next 100 years. The plan includes a suite of conservation, reuse, and supply strategies to be implemented over the next 50 years. The plan also includes a 100-year adaptive management framework to respond to changing conditions.

About the City of Austin

The City of Austin is the capital of the State of Texas. The City is home to over a million people, with a growing number of residents in small cities surrounding Austin. The Greater Austin area has experienced strong and rapid growth in recent years, with a population of over 2.4 million people. Major employers in Austin include government, higher education, and high-tech industries.

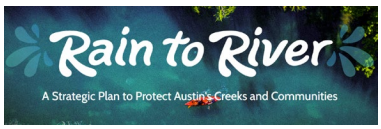


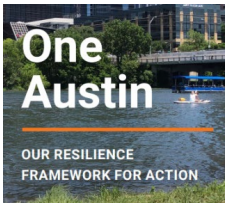
Austin is located on the banks of the Colorado River between the drier Texas Hill Country to the west and the wetter Blackland prairies to the east. Austin falls within a humid subtropical climate zone characterized by long, hot summers and short, mild winters, with an average annual precipitation of 34 inches. The City and the lower Colorado River upstream of Austin receive the highest rainfall amounts during the months of May, June, September, and October.

The City of Austin has a number of plans which are a part of the City's overall approach to preparing for a climate resilient future for the Austin community. Water Forward is one piece of that approach, with a focus on water supply reliability. Austin Water works closely with other City departments on climate resilience initiatives including and beyond Water Forward. Examples of how Water Forward reinforces and complements other key City departments and plans are listed below.

Key City Plan Interactions

- **Rain to River: A Strategic Plan to Protect Austin's Creeks and Communities** – The mission of the City of Austin's Watershed Protection Department is to protect lives, property, and the environment by reducing the impact of flood, erosion, and water pollution. Rain to River is a strategic plan that will guide the work of the Watershed Protection Department for the next ten years. Austin Water and Watershed Protection coordinate on policies that provide local water quality and water conservation benefits. That includes requirements for green stormwater infrastructure, such as rain or storm water harvesting.
- **Imagine Austin, the City's Comprehensive Plan** – Prepared by the City's Planning Department, Imagine Austin is Austin's 30-year plan for our future growth and development. Austin Water and Watershed Protection staff co-lead the Sustainably Manage Our Water Resources Priority Program. The departments coordinate on water resource management efforts from the local to regional scale.
- **Austin Climate Equity Plan** – the City's Office of Sustainability developed the Climate Equity Plan to achieve net-zero greenhouse gas emissions by 2040. The plan includes water conservation strategies to reduce the energy used to treat and distribute water.
- **One Austin: Resilience Framework for Action** – The City's Office of Resilience has created a summary of climate shocks and stresses that impact Austin. The framework includes an outline of key issues and aspirations as documented in existing City plans.

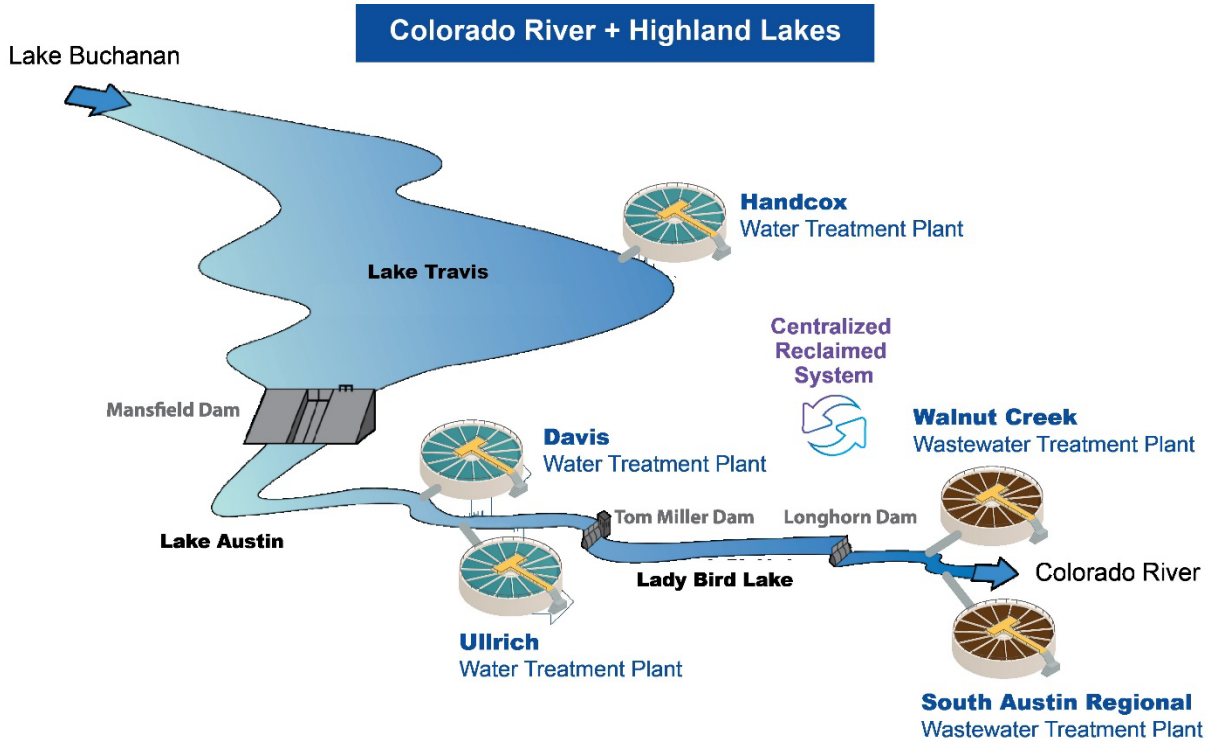




About Austin Water

Austin Water is a department of the City of Austin. The department serves as the City's water, wastewater, and reclaimed water utility. Austin Water serves 1.17 million retail and wholesale customers across a 538 square mile service area. Austin Water owns and operates three major water treatment plants with a combined treatment capacity of 335 million gallons per day. Austin Water's water distribution system has over 4,000 miles of pipe and 21 major pump stations. This system delivers water to customers in nine major pressure zones.

Austin Water operates two major wastewater treatment plants with a combined treatment capacity of 150 MGD. These plants discharge treated effluent into the Colorado River. The utility also operates several smaller wastewater treatment plants, a biosolids management plant, and participates in the Brushy Creek Regional Wastewater System. Austin Water consistently meets or exceeds state and federal drinking water quality and treated wastewater discharge standards.



Austin Water employs sustainable water practices through its Water Conservation and Reclaimed Water programs. To protect water quality and endangered species habitat, Austin Water manages 14,000 acres in the Balcones Canyonlands Preserve and 34,000 acres of Water Quality Protection Lands.

Recognizing the importance of strong regional partnerships, Austin Water has established a Water Partnership with the Lower Colorado River Authority. The Partnership collaboratively addresses issues related to water supply, water quality, and water conservation. Austin Water is also an active participant in the State Water Planning process through the Lower Colorado (Region K) Regional Water Planning Group. Strategies included in the Water Forward plan are included in the Region K water plan.

Planning for Drought and Climate Change

During the most recent drought from 2008 to 2016, rainfall and the flow of water into Lakes Travis and Buchanan (known as “inflows”) were at historic lows. In 2011, the worst year of the drought, inflows were 11% of the historical average. In response to this severe drought, Austin City Council created the 2014 Austin Water Resource Planning Task Force to evaluate the City's water needs and make recommendations regarding future water planning. The 2014 Task Force recommended that Austin Water develop an Integrated Water Resource Plan. Council then created the Austin Integrated Water Resource Planning Community Task Force, informally called the Water Forward Task Force, to support the plan’s creation. Austin Water worked with the Water Forward Task Force, consultants, and the community over a three period to develop the first Water Forward plan. The resulting plan was unanimously approved by Council in November 2018.

Following Council approval of the 2018 Water Forward plan, Austin Water began implementing near term plan strategies. The Water Forward Task Force continued to meet regularly to participate in the implementation phase. Key implementation milestones during this time included:

- Including the Water Forward 2018 strategies in the 2021 Region K Water Plan, making these projects eligible for low-interest State loans
- Council adoption of an onsite reuse regulatory framework and pilot incentive
- Council adoption of code requiring water use benchmarking applications with all new site plan submittals
- Completing the OSCAR and CLARA onsite reuse pilot project at the City’s Permitting and Development Center
- Council adoption of the GoPurple program to increase use of onsite reuse and centralized reclaimed water through regulatory requirements, cost-sharing, grants, and other incentives
- Replacing all 250,000 analog meters in Austin Water’s service area with digital meters as part of the My ATX Water Advanced Metering Infrastructure (AMI) project (currently 95% complete)
- Developing an Aquifer Storage and Recovery (ASR) desktop analysis to identify favorable areas for an ASR pilot project
- Initiating emergency Indirect Potable Reuse planning and permitting activities
- Completing a third-party evaluation of Austin Water’s water loss program
- Initiating landscape transformation code changes for new single family residential homes

Austin Water celebrates these achievements, and we recognize the need to do more, as well as to proactively adjust strategies in response to lessons learned. Austin Water began updating the Water Forward plan in late 2021. In 2022 and 2023, exceptionally hot and dry weather resulted again in record-breaking low inflows to the Highland Lakes. These historic conditions so soon after a severe drought have reinforced the importance of implementing strong and effective drought response, water conservation, reuse, and supply strategies.

During the update to Water Forward, Austin Water also completed updates to the state-mandated Water Conservation Plan (WCP) and Drought Contingency Plan (DCP). In response to feedback from the Water Forward Task Force, Austin Water committed to revising these plans and bringing them back to Council alongside Water Forward 2024. Austin Water has aligned Water Forward with these revised plans, including the Water Conservation Plan 5- and 10-year gallon per capita per day goals.

Role of the Water Forward Plan

Water Forward 2024 includes a suite of conservation, reuse, and supply strategies for the next 50 years. The plan is strategic in nature and is intended to guide the development of projects, programs, and policies. The plan includes a timeline of five-year actions for near-term strategies. The plan outlines Austin Water's approach to monitoring, evaluation, reporting, and proactive adaptation of near-term strategies. The plan also includes a 100-year adaptive management framework that maps out alternative long-term strategy implementation pathways. These pathways identify alternatives to respond to changing demand, supply, and climate conditions. Austin Water will continue to update Water Forward every five years. Each update will incorporate progress made, new data, and lessons learned.

CHAPTER 2

COLLABORATIVE PLAN UPDATE

Mission Statement

Austin Water and the Water Forward Task Force worked collaboratively to update the 2018 Water Forward Statement of Purpose and reflect a refreshed vision for the 2024 plan.

Water Forward Mission Statement

The purpose of Water Forward is to develop and implement diverse and environmentally conscious water management strategies to adapt to growth, drought, and climate change and ensure a sustainable, resilient, equitable, and affordable water future for our community for the next 100 years.

Guiding Principles

Austin Water, in collaboration with the Water Forward Task Force, updated the plan's guiding principles to reflect the Austin community's values. The guiding principles informed the process to update the plan and the objectives the plan is trying to achieve.

Water Forward Guiding Principles

1. Create a plan that is resilient to growth, drought, and climate change.
2. Include diverse water management strategies that make use of all water sources, including reuse, conservation, and efficiency.
3. Use a holistic and inclusive approach to water resource planning that incorporates the Austin community's values.
4. Use an equity and affordability lens to develop and implement the plan.
5. Protect the health of the Colorado River and natural environment.
6. Minimize implementation and operational risk.
7. Focus on locally available water supplies.

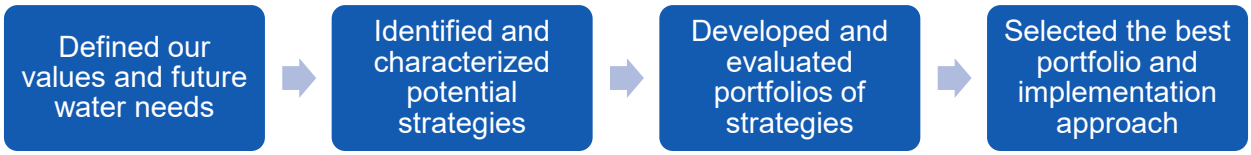
Planning Objectives

The Water Forward plan objectives are the broad goals of the plan. They include ensuring water reliability, increasing equity, protecting the environment, being cost-effective, and reducing risks in implementing strategies. Each objective is related to one or several sub-objectives. Each sub-objective is tied to a performance measure. Portfolios of water strategies were evaluated using these performance measures. The results of the evaluation were translated into scores that were weighted by the relative importance of the sub-objective. These weighted scores were then combined to create an overall portfolio score that was used to compare portfolios.

Objective	Objective Weight	Sub-Objective	Sub-Objective Weight
Water Supply Benefits	40%	Maximize reliability and resiliency, minimize vulnerability	35%
		Maximize portfolio diversity	5%
Economic Benefits	20%	Maximize cost-effectiveness	20%
Equity Benefits	8%	Maximize positive benefits and minimize negative impacts for marginalized communities	8%
Environmental Benefits	20%	Minimize ecosystem impacts	4%
		Minimize net energy use	6%
		Maximize water use efficiency	6%
		Minimize water quality impacts	4%
Implementation Benefits	12%	Minimize implementation and operational risk	3.5%
		Maximize distribution and collection system resiliency	3.5%
		Maximize local control/local resource	5%

Planning Process

Austin Water prepared the Water Forward 2024 plan with support from the Water Forward Task Force, Community Ambassadors Group, and Climate Technical Advisory Group. Feedback from advocacy organizations and the community also informed the plan. The plan builds on the Water Forward 2018 plan and followed the planning process outlined below and further described in Appendix C:



1. **Defined our values and future water needs** – Austin Water, in collaboration with the Water Forward Task Force, incorporated the Austin community's values into an updated plan mission statement, guiding principles, and objectives. Austin Water also updated projections of water demand, climate, hydrology, and future regional supplies. These projections were combined to create many different plausible future scenarios that were modeled to define the range of potential future water supply needs.

2. **Identified and characterized potential strategies** – Austin Water compiled a list of potential conservation, reuse, and supply strategies based on the strategies that had been considered in Water Forward 2018. Community input and input from the Water Forward Task Force added strategies to this list. Austin Water then consolidated similar strategies to create a list of 17 strategies to characterize in terms of potential water yield and cost.

3. **Developed and evaluated portfolios of strategies** – Austin Water tested many groupings of conservation, reuse, and supply strategies against many plausible future scenarios to identify groupings that provided the greatest water supply reliability across a range of costs. Top performing groupings were selected for further evaluation as water resource portfolios. Ten portfolios were evaluated using a multi-criteria decision making framework to understand which portfolio did the best job of meeting objectives such as water reliability, equity, environmental benefits, economic benefits, and implementation benefits.

4. **Selected the best portfolio and implementation approach –** Working with the Water Forward Task Force, Austin Water selected the portfolio that did the best job of achieving multiple objectives. Austin Water and the Water Forward Task Force collaborated to define an actionable implementation approach for the strategies in the preferred portfolio.

Community Engagement

Austin Water engaged the community through public workshops and open houses, webinars, surveys, social media, event tabling, and digital newsletters. Austin Water also held one-on-one meetings with advocacy organizations. Key themes from community feedback included concern about growth in Austin, concerns about water supply reliability through drought, and concerns about affordability. Community feedback related to specific water strategies included support for prioritizing conservation and demand management strategies, support for more restrictions and enforcement for outdoor water usage, support for considering innovative supply strategies like direct potable reuse, concerns and potential misunderstandings about Aquifer Storage and Recovery, and support for land conservation activities. The table below includes a summary of community engagement activities, with further detail provided in Appendix A.

Community Engagement Activity	Engagement
Number of Workshops/Open Houses Held	6
Number of Workshop/Open House Attendees	167
Number of One on One Meetings with Community Organizations	25
Number of Surveys Launched	3
Number of Survey Responses	694
Number of Webinars Held	4
Number of Webinar Attendees	61
Number of Impressions of Water Forward Related Social Media	45,052
Number of newsletters sent	26

Representatives from organizations serving marginalized communities shared that thinking about water supply reliability or source water quality may not be a high priority for marginalized people who may have other concerns related to their day-to-day needs. A key question asked was, “Why should black and brown people care about this?” Other feedback pointed out that it's easy to forget the load that is on marginalized people with decision making and stress and that solutions should be designed to provide them with easily accessible benefits. The importance of establishing relationships with people connected to marginalized communities to expand Austin Water’s reach was emphasized.

Equity and Affordability

Acknowledging that the lack of a reliable and affordable water supply would likely have the greatest impacts on marginalized communities, Austin Water created a Community Ambassadors Group to help develop an Equity and Affordability Roadmap for the Water Forward 2024 plan. This document emphasizes the importance of addressing inequities faced by marginalized communities in Austin by ensuring equitable access to water resources. For the purposes of the plan, marginalized communities were defined as communities of color and low-income communities. The Roadmap is grounded in a historical understanding of racial and economic disparities in Austin and uses the key concepts of procedural and distributive equity to identify best practices related to transparent decision-making processes and equitable distribution of the benefits and burdens from implementing Water Forward strategies. The Equity and Affordability Roadmap is included in Appendix B.

Reliable Supply Protect Public Health Accountable Affordable

The Community Ambassadors Group guided the development of the Equity and Affordability Tool that was used by Austin Water to assess the impacts of conservation, reuse, and supply strategies. The Tool includes themes related to areas of community concern, including water supply reliability, public health, accountability, and affordability, all viewed through an equity lens. The Tool identifies key questions associated with each of these themes, creating a framework to evaluate water strategies. One of the goals of this evaluation was to identify strategies that had greater benefits for marginalized communities and to find ways to mitigate potentially inequitable impacts of strategies. The results of this evaluation are included in Appendix G.

CHAPTER 3

CURRENT WATER RESOURCES

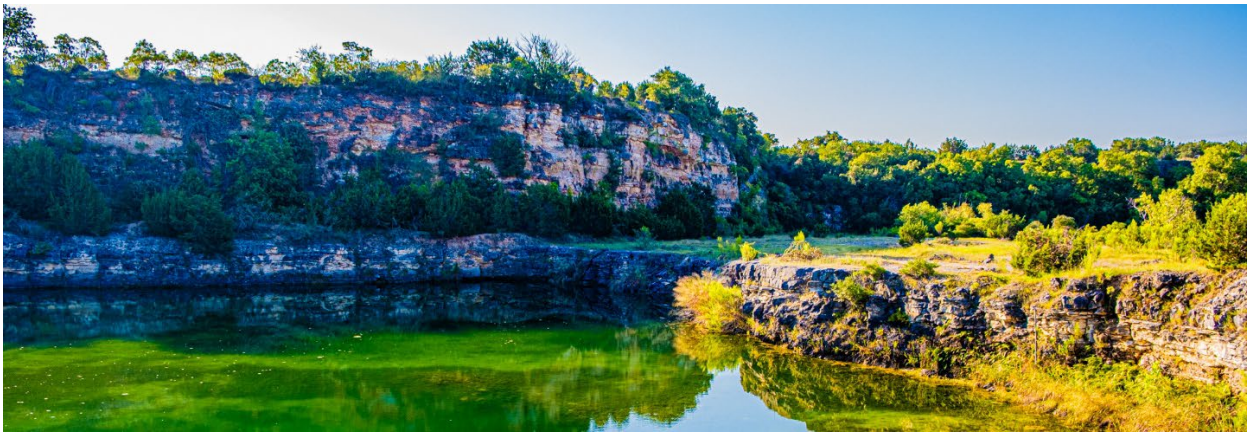
Austin's Water Supplies

All of Austin's drinking water comes from the lower Colorado River. The lower Colorado River is generally known as the section of the river downstream of Lakes O.H. Ivie and Brownwood down to the Gulf of Mexico. The lower Colorado is dammed six times upstream from Austin, forming the Highland Lakes. Two of the Highland Lakes, Lakes Buchanan and Travis, act as the region's water supply and flood control reservoirs. The Lower Colorado River Authority (LCRA) manages Lakes Buchanan and Travis in alignment with a State approved LCRA Water Management Plan that was last updated in 2020.

Austin Water sources its potable water supply from the lower Colorado River. Three separate major water treatment plant intake facilities on Lakes Travis and Austin divert water from the river. To use river water, Austin Water has senior run-of-river water rights granted by the State. The City also has a water supply contract with the LCRA for firm water, which is water that is expected to be available without shortage through a repeat of the drought of record. The drought of record in the Lower Colorado River Basin was the 1950s drought for many decades. However, the recent historic drought in this basin from 2008 to 2016 has become the new drought of record.

Austin's firm water supply contract was approved in October 1999, when Austin entered into a key agreement with LCRA. This agreement was an amendment to a previous 1987 agreement and provides firm backup (including stored water from Lakes Travis and Buchanan) for Austin's run-of-river rights and additional firm water totaling up to 325,000 acre feet per year. Under the 1999 agreement, Austin prepaid $100 million for supply reservation and use fees. Future water use payments to LCRA will be triggered when Austin's annual average use for two consecutive calendar years exceeds 201,000 acre feet per year. The year after this trigger is reached, Austin will begin paying LCRA for diversions of water above 150,000 acre feet per year. The term of the 1999 agreement extends through the year 2050 with an option for the City to renew the agreement for an additional 50-year period through the year 2100.

Existing Land Conservation Programs



Water Quality Protection Lands

Since 1998, Austin Water's Water Quality Protection Lands (WQPL) Program has conserved over 34,000 acres of land through a mix of fee simple land acquisition and conservation easements. The goal of the program is to protect Barton Springs in perpetuity. The program protects land located in the recharge and contributing zones of the Barton Springs segment of the Edwards Aquifer. These lands drain into the Colorado River Basin below Lake Travis. Management of these lands focuses on the ecological restoration of vegetation to native prairie and savanna ecosystems. These ecosystems enhance water recharge and provide biodiversity. Activities to restore vegetation combined with active karst aquifer management effectively protect water quality and quantity.

Balcones Canyonlands Preserve

Since 1996, the City's Balcones Canyonlands Preserve (BCP) Program has protected over 14,000 acres via fee simple land acquisition. The BCP system includes a number of partners including Travis County, the Nature Conservancy, Travis Audubon and others. Lands protected by the BCP program and partners total over 32,000 acres in Western Travis County. The goal of the BCP program is to protect the habitat of endangered songbirds and karst invertebrates. BCP lands are managed to provide habitat for seven endangered species and twenty-eight species of concern that call the preserve home. This Preserve system is required to be permanently protected and provides mitigation for a streamlined permitting process for habitat impacts from development and infrastructure in Western Travis County. One of the secondary goals of the BCP lands is to protect water quality in the City's drinking water basins. Most of the land is located within the Lake Travis and Lake Austin watersheds. Research has shown that land conservation leads to higher water quality downstream.

Existing Water Conservation Programs

For many years, the City has emphasized water conservation in normal weather as well as during a drought. Austin Water has both a Water Conservation Plan and a Drought Contingency Plan, as required in Texas for large municipal water suppliers. Both plans were last updated on May 2, 2024, in compliance with the 5-year review and update cycle. They are currently undergoing revision in coordination with the 5-year review and update of the Water Forward plan. The City's Water Conservation Plan details incentive programs, educational efforts and regulations designed to reduce both peak and average day water use. The City's Drought Contingency Plan specifies how the City will respond and manage the water system during drought, as well as during demand or infrastructure events that constrain water supply.

Education and Outreach

Austin Water leads extensive water conservation efforts, engaging the community through education, outreach, and innovative programs. Austin Water raises awareness about water use restrictions by participating in a variety of community events, as well as through school programs, such as the Dowser Dan School Assembly and the Mobile River exhibit, which target young students with interactive learning. The Water Conservation Speakers Bureau further extends Austin Water's educational reach.

Austin Water also employs marketing campaigns across various media platforms to promote water conservation, using branded materials for consistency. In 2024, Austin Water transitioned to online fillable forms for conservation programs, improving customer access and processing efficiency. The utility leverages social media and the My ATX Water portal to share information and engage with the public. Workshops, including the WaterWise Irrigation Professionals

Seminar, provide targeted education, while Austin Water collaborates with regional partners through the Central Texas Water Efficiency Network.

Residential and Commercial Customer Programs

Austin Water offers a variety of residential and commercial programs to promote water conservation. For residential customers, Austin Water provides digital garden hose meters and sunlight calculators through the Austin Public Library to help manage water use. Free water-saving tools like showerheads and soil moisture meters are also available, with distribution now streamlined through direct mailing. Austin Water also offers rebates for irrigation upgrades, landscape improvements, and graywater systems.

For commercial customers, Austin Water's "Bucks for Business" program incentivizes water-efficient practices, offering rebates for equipment upgrades and process changes that reduce water consumption. Additional rebates are available for installing rainwater harvesting systems, efficient kitchen equipment, and pool filter upgrades. Austin Water also supports the connection of commercial properties to reclaimed water mains and offers rebates for converting landscapes to native plants.

Regulatory Programs

Austin Water enforces a comprehensive Water Conservation Code that applies to all retail customers, with year-round restrictions such as limiting automatic irrigation to once a week and hose-end watering to twice a week. Additional restrictions apply during drought stages, including time-of-day limitations and specific watering schedules based on property type. Austin Water also prohibits water waste and offers variances for newly installed xeriscape landscapes.

To ensure compliance, Austin Water conducts routine patrols, investigates public reports, and enforces penalties, with a progressive penalty structure that increases based on usage tiers. AustinWater also mandates water efficiency assessments for commercial facilities, irrigation systems, cooling towers, and vehicle washes, with penalties for non-compliance.

Water Loss Program

Austin Water ensures all customer water connections are metered, meeting American Water Works Association accuracy standards. Large meters undergo rigorous testing before and after installation, with annual checks to maintain accuracy. The My ATX Water smart metering program, set to be completed in 2025, will replace analog meters, enhancing accuracy and reducing apparent losses. Austin Water conducts annual Water Loss Audits and has partnered with a consulting firm to improve water loss management. The results of this study are documented in the Water Loss Program Review, Analysis, and Optimization report.. Leak detection is prioritized, with $2 million annually allocated for inspecting over 500 miles of water lines using advanced technology. The "Renewing Austin" program focuses on replacing aging water lines to prevent future leaks, while an accelerated leak response program addresses most emergency leaks within a day. Austin Water also works to reduce non-revenue water through data analysis, investigating suspicious usage patterns, and preventing water theft.

Water Use Benchmarking

Since 2021, Austin Water has required that Water Benchmarking Applications be submitted with each site plan. This helps applicants assess how water will be used within their development projects and identify water reuse and water conservation opportunities before construction begins. Applicants of large developments with 250,000 gross square feet or greater are also required to meet with Austin Water staff to review their Water Benchmarking Application and

available incentives for conservation and reuse. Each applicant is provided with a set of recommendations for how to improve water use efficiency within their specific project as well as information on the benefits of incorporating these recommendations into their project, such as water utility bill savings and available rebates or incentives. This initiative aims to establish annual water budgets for commercial development projects, with 439 applicants having undergone this process by December 31, 2023. Eventually, AustinWater may institute excess usage charges for commercial projects that exceed an annual water budget. Following the effective date of the mandatory onsite reuse requirement, water benchmarking meetings have also included ensuring compliance with onsite water reuse and reclaimed water connection ordinances.

Existing Reuse Programs

Centralized and Decentralized Reclaimed Water Programs

Austin Water began providing reclaimed water in 1974. Reclaimed water is used for non-potable uses including irrigation of golf courses, ballfields, parks, and commercial properties. Other major non-potable uses include cooling towers, manufacturing, and toilet flushing. Austin's reclaimed water system provides a low-priced source of non-potable water, helps conserve treated potable water, contributes to deferral of treatment plant construction and water contract payments, and provides other environmental benefits.

Historically, Austin Water directed reclaimed system growth toward existing large-volume commercial and industrial potable water users that could convert a portion of their potable water use to reclaimed water. As a result, the system grows from the east, where the reclaimed water is generated, to the City's center, where most customers can be found.

Austin Water's reclaimed water is treated and distributed via the centralized reclaimed water system from Austin Water's two major wastewater treatment plants. The centralized reclaimed water system is made up of four pump stations, two pressure zones, 72.8 miles of main, and six water storage facilities. An additional 12.9 miles of reclaimed main pipelines are either in the design phase or under construction. Additionally, three public bulk water filling stations facilitate reclaimed water distribution. The system supplies approximately 5,100 acre feet of water to 185 properties annually. Austin Water also treats and provides reclaimed water from three small-scale decentralized wastewater treatment plants. Bulk reclaimed water is also available to customers at three bulk fill stations.

Centralized reclaimed water system construction has two current priorities. The first priority is referred to as "Completing the Core" and can be described as main looping. Increased looping of the distribution system improves the reliability of system operations in the event of power outages and main breaks. The second priority is an additional transmission main from the South Austin Regional Wastewater Treatment Plant to the Montopolis Reclaimed Water Reservoir. This main will help meet growing demands in the Central Service Area and allow the Montopolis Reservoir to better support those growing demands.

The Reclaimed Water Mandatory Connection Ordinance, adopted by Austin City Council in September 2021, mandates that any development project within 250 feet of a reclaimed water line must connect to the reclaimed water system for irrigation, cooling, toilet flushing, and other significant non-potable water uses. For large developments with 250,000 square feet or more of gross floor area, the connection mandate extends to 500 feet. In April of 2024, Austin City Council updated the ordinance to exempt certain affordable housing projects but directed staff

to look at the feasibility of fully subsidizing the cost of reclaimed connections and dual plumbing for these projects by April 2025.

Onsite Reuse Program

Austin Water has been promoting onsite water reuse for over a decade, encouraging the utilization of non-potable water sources like rainwater, graywater, reclaimed water, and others for irrigation, cooling, and toilet flushing. Several changes to City Codes and Ordinances have facilitated this while ensuring public health and safety. Since September of 2017, new commercial and multi-family projects with cooling towers have been required to reuse condensate or utilize non-potable water to compensate for evaporative losses.

The Onsite Water Reuse System (OWRS) Program was initiated to implement code changes adopted in December 2020 that regulate the collection, treatment, and use of alternative water sources for non-potable uses in multi-family and commercial buildings. Effective April 1, 2024, the collection and treatment of rainwater and condensate for reuse in commercial and multi-family developments of 250,000 gross square feet or greater is required. Additionally, the Onsite Water Reuse Incentive Program provides project reimbursements of up to $500,000 for voluntarily incorporating onsite water reuse systems. Similar to the Reclaimed Water Mandatory Connection Ordinance, certain affordable housing projects are exempt from onsite water reuse requirements, but staff is looking at the feasibility to fully subsidize onsite water reuse for these projects.

GoPurple Program

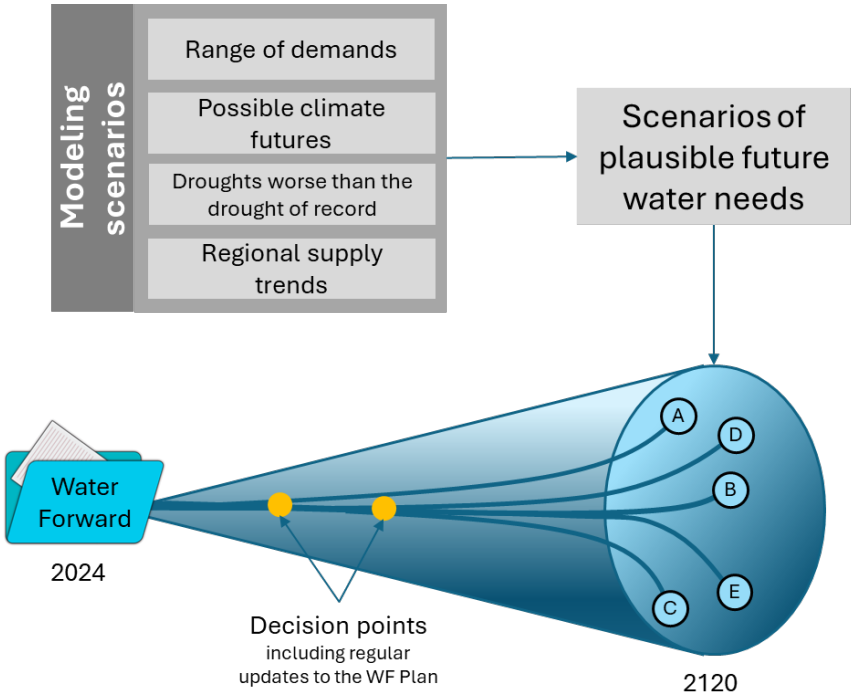
In March of 2024 Austin Water launched a new GoPurple program to increase use of reclaimed water and onsite water reuse systems in and around Austin. The program aims to support various measures like cost-sharing, grants, and other incentives for reuse. It is funded through a new Community Benefit Charge for Austin Water customers and a voluntary rate dedicated to water reuse. Any new commercial or multi-family development that is connecting to the reclaimed water system or installing an onsite water reuse system is eligible to participate in the program and receive financial incentives from Austin Water to reduce the cost of installing water reuse piping or treatment systems. For more information regarding the GoPurple requirements, incentives, and funding sources, please visit the GoPurple website at www.austintexas.gov/page/go-purple.

CHAPTER 4

PLANNING FOR UNCERTAINTY

Modeling Scenarios

The Water Forward planning horizon extends 100 years into the future. There are a wide range of futures that could occur over this timeframe with potential impacts on the City's water supplies. These possible futures include three main drivers: the effects of climate change, growth of Austin's demand for water as population increases, and new water supply projects in the Lower Colorado River basin. Each of these drivers are more uncertain further into the future. Rather than trying to estimate the levels of uncertainty for each driver and select a single future pathway, Water Forward modeling explored a wide range of possibilities for each driver. The combinations of climate change effects on water supply, demand growth, and regional supply development were paired together to explore many possible outcomes, also known as modeling scenarios. The purpose of the modeling scenarios is to find solutions that are reliable across as many possible future conditions as possible.



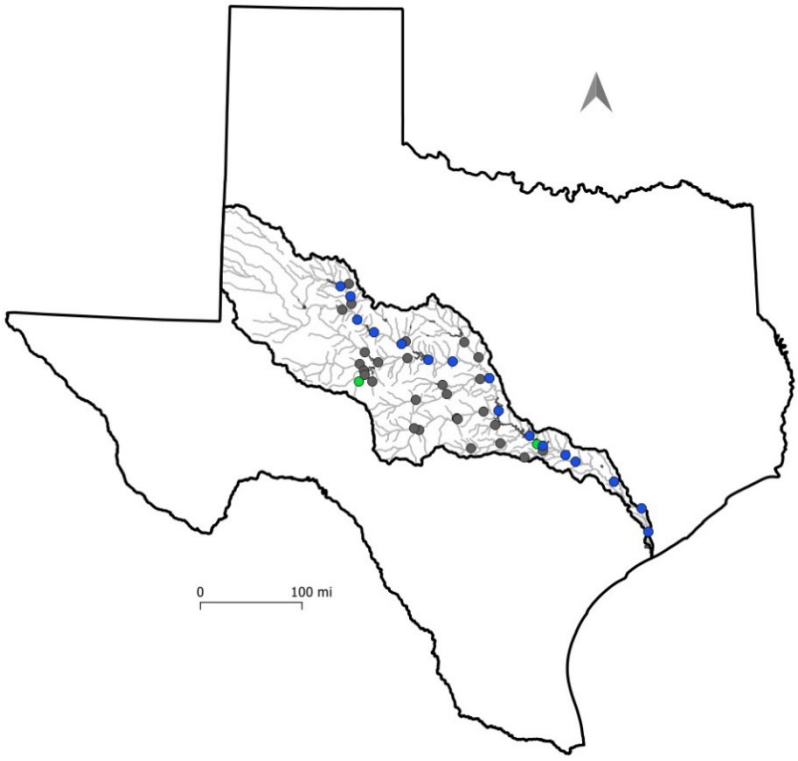
Austin Water selected three climate futures to include in the modeling scenarios. These reflected lower, medium, and higher warming conditions. The temperature and precipitation of the climate models (discussed below) for each warming condition were translated into possible future streamflows for the Colorado River Basin. In general, streamflows during drought were found to decrease in warmer climate futures. Austin Water also created low, medium, and high projections of Austin's water demand and regional supplies. Austin's water demands were estimated based on population growth trends and the water use characteristics of the different

customer sectors, such as residential, commercial, and industrial users. Levels of regional supply growth were developed using the most recent report by the Lower Colorado Regional Water (Region K) Planning Group which is one of 16 planning areas that form the basis of the Texas State Water Plan. Regional supply projects are defined as projects implemented by entities other than the City of Austin that contribute to the shared resources of the lower Colorado River and help meet growing future water needs in the basin.

Climate Change

Austin Water worked with researchers at the University of Texas at Austin (UT Austin) to develop climate projections from Global Circulation Models (GCMs). A GCM is a tool that scientists use to understand how the Earth's climate works and how temperatures, rainfall, and other weather patterns might change in the future. Austin Water also formed a group of climate experts to review and provide input into the Water Forward Climate and Hydrology Analysis. This group was called the Water Forward Climate Technical Advisory Group or CTAG.

The project team assessed and selected GCMs that accurately replicated historical climate data for the Texas Colorado River Basin. Five GCMs were chosen based on factors including their performance and availability of data. The selected models were downscaled and bias-corrected to match the specific needs of the Water Forward plan. Austin Water's consulting hydrologist, Dr. Richard Hoffpauir, then translated the downscaled GCM data into hydrologic data to be used in water availability modeling. This process summarized historical rainfall, temperature, and evaporation data and used an algorithm to select the weather variables that did the best job of predicting historical streamflow at 45 points throughout the lower Colorado River Basin. These weather variables were used to create flow models for each point. Future climate data was fed into these flow models to create projections of future streamflow with climate change.



Colorado River Basin and water availability model control points.

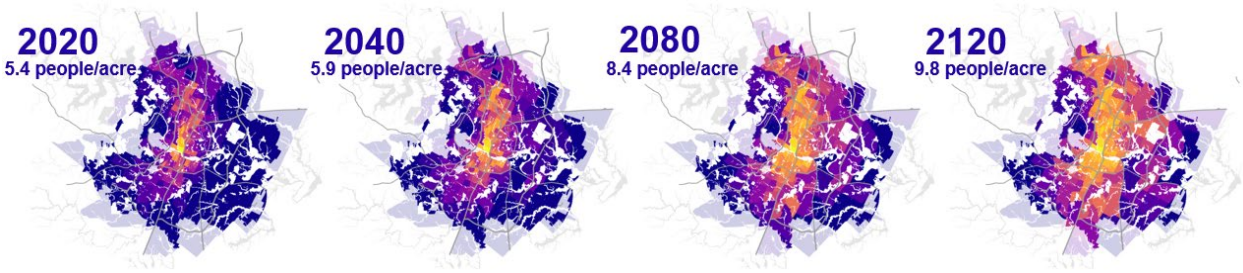
The results of the climate and hydrology analysis show increasing average and maximum monthly temperatures and greater variability in precipitation. This will likely result in more frequent, longer-duration, and more severe droughts as well as more intense rainfall events. These impacts will generally cause lower streamflow in the Colorado River and less inflow into Lakes Travis and Buchanan.

Future Baseline Water Demands

Austin Water used a model developed by the utility, called the Disaggregated Demand Model (DDM), to project future water demands for retail and wholesale customers. The DDM creates estimates of spatially-disaggregated water use by customer sector, subsector, and end use.

To develop growth inputs for the model, Austin Water worked with the City Demographer to perform a detailed evaluation of 2020 Census data in comparison to 2020 water billing data and develop 2020 retail and wholesale population, employment, and residential unit estimates at the parcel level. From this, 100-year total served population projections were developed for low, medium, and high scenarios at key planning years: 2040, 2080, and 2120. Population and employment projections were developed based on historical trends and subject matter expertise and distributed across the City at a small-polygon level in alignment with the Imagine Austin Growth Concept Map and development data.

The table below presents the population projections at each planning year. The graphic shows the spatial distribution of population growth for the medium projection, with more dense population in the brighter colors.

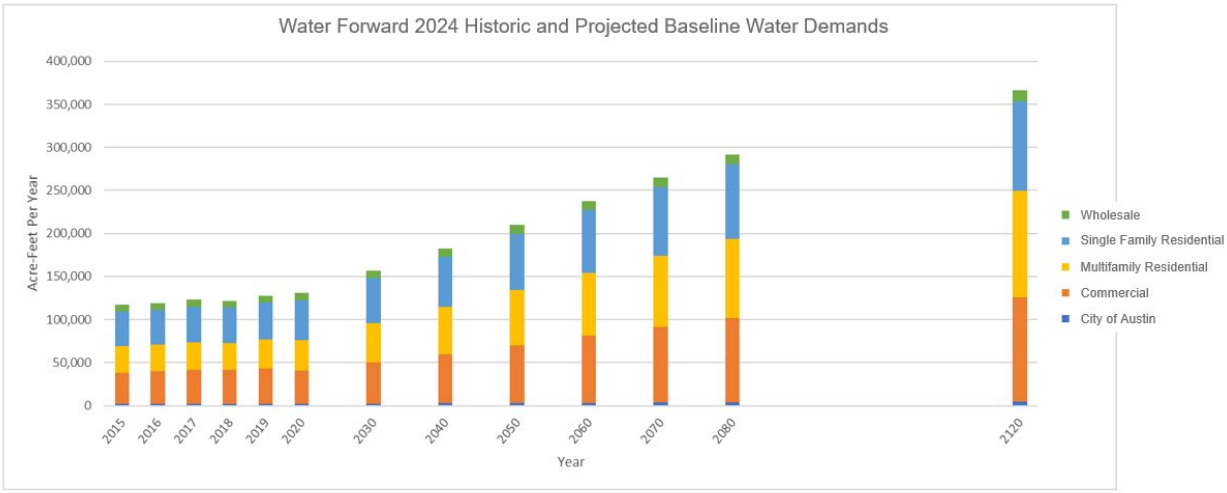


Austin Water Served Population Projections			
Year	Low Projection	Medium Projection	High Projection
2020	1,065,000	1,065,000	1,065,000
2040	1,475,000	1,524,000	1,576,000
2080	2,321,000	2,458,000	2,602,000
2120	2,866,000	3,209,000	3,594,000

Historical billing data from 2015-2020 were categorized by sector, including single-family, multi-family, and commercial customers, as well as City of Austin departments. The model used these data points to calculate baseline indoor and outdoor water use factors. Water use factors also

incorporated adjustments for weather impacts, the effects of the COVID-19 pandemic, and continued passive conservation efforts, such as efficiency improvements in water fixtures. To create water demand projections, residential units and employees were multiplied by the relevant water use factor at the small-polygon level, and demand projections for each polygon were aggregated to create City-wide demand projections. Appendix D includes more information about the development and results of the demand projection process.

Austin Water Baseline Water Demand Projections (Consumption – Acre Feet)			
Year	Low Projection	Medium Projection	High Projection
2020	130,740	130,740	130,740
2040	177,780	182,960	188,310
2080	277,950	291,870	306,620
2120	332,930	366,470	405,390



Projected Baseline Water Demands,
Without Additional Conservation and Reuse Savings

Future Water Supply Needs

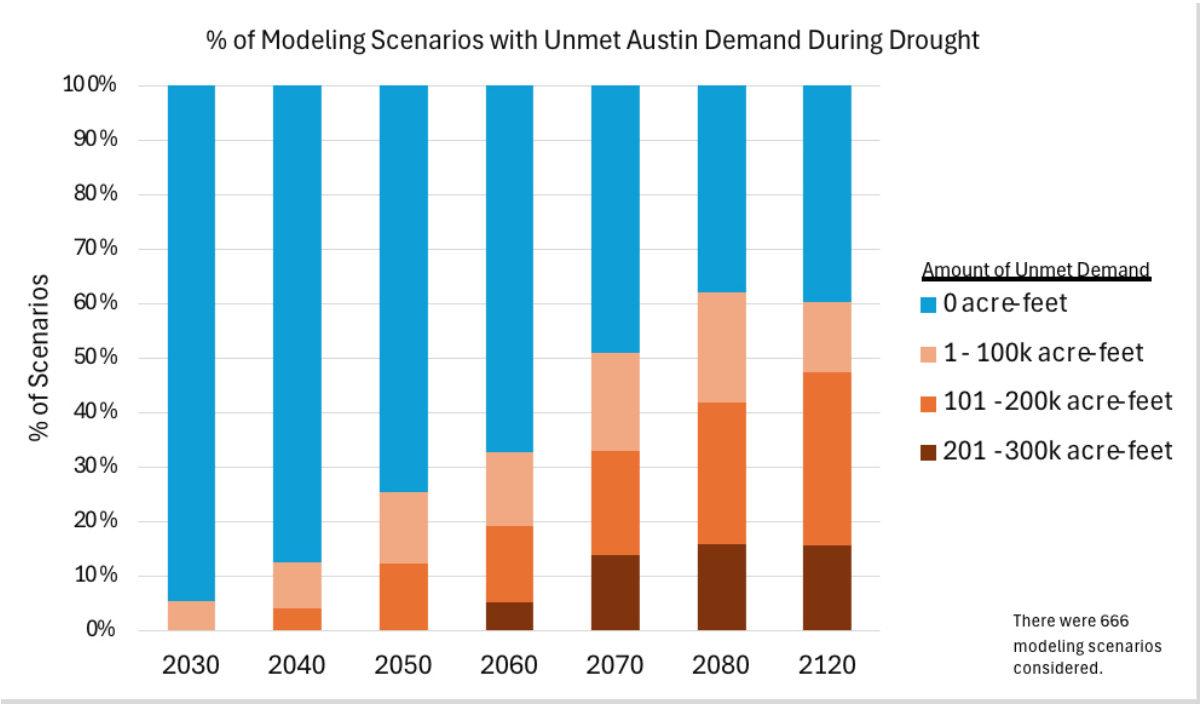
For each future decade from 2030 to 2080, the municipal water supply needs of Austin were estimated using the Texas Commission on Environmental Quality (TCEQ) Water Availability Model (WAM). The WAM is the main model used for evaluating water availability to water rights within the state's river basins. The WAM was used because Austin depends on its state-granted water rights to the Colorado River and its contracts with the LCRA. Using the WAM, Austin's water rights and contractual supplies were considered alongside all other water rights within the shared resources of the Colorado River basin. In the model, as Austin's water demands grow over time along with those of other users, the WAM combines information from all users in the basin to model water availability.

In the model, City of Austin water supply needs occur during times of severe drought when there is insufficient Colorado River flow and Highland Lakes storage to meet Austin customer demand.

Water supply needs can arise outside of droughts in later decades as the City's demand exceeds its water supply contract with LCRA for 325,000 AFY. Potential future water supply needs cover a range in each decade since the modeling scenarios that were used incorporate a wide range of possible future conditions, from varying levels of climate change impacts to differing Austin demands and regional supply developments.

The results of this modeling show that future water supply needs due to extreme drought increase with climate change impacts over time and with increasing needs of other water users within the basin. Hotter and drier climate change impacts result in lower levels of run-of-river supplies as well as lower inflows that replenish storage in the upstream reservoirs. At the same time, other users with water supply contracts with LCRA or their own state run-of-river rights have increasing demands as time progresses. The additional conservation, reuse, and supply strategies identified in this plan were sized to meet this range of future water supply needs.

The chart below shows the extent of "unmet needs" (when projected water demands exceed available supplies) by decade. For example, in 2070, about half of the modeled scenarios show no unmet needs, while the other half show unmet needs of varying severity up to 300,000 AF. This illustrates the "many possible outcomes" described in the Modeling Scenarios section above.

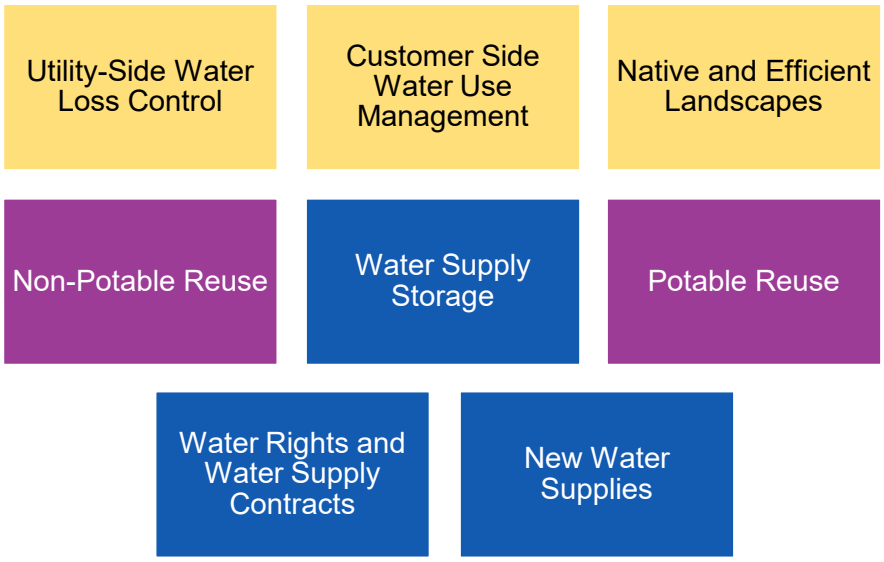


Estimated Future Supply Needs by Volume and Decade

Water Strategy Identification

Austin Water compiled a list of potential conservation, reuse, and supply strategies based on Water Forward 2018 strategies. All strategies considered in the 2018 planning effort were included in the Water Forward 2024 initial strategy list. All strategies were included so that costs and yields could be updated and strategies could be re-evaluated. The Water Forward Task Force provided input on strategies to consider and potential strategy adjustments. Community input gathered at in-person and virtual workshops and an online survey provided community perspectives on the strategies. In total, 38 strategies were included in the initial list of strategies.

These strategies can be broadly categorized as shown below. The top row represents conservation strategies that reduce our overall water use. The middle row represents strategies that maximize the use of our existing water supplies. The bottom row represents strategies that increase our available water supplies.



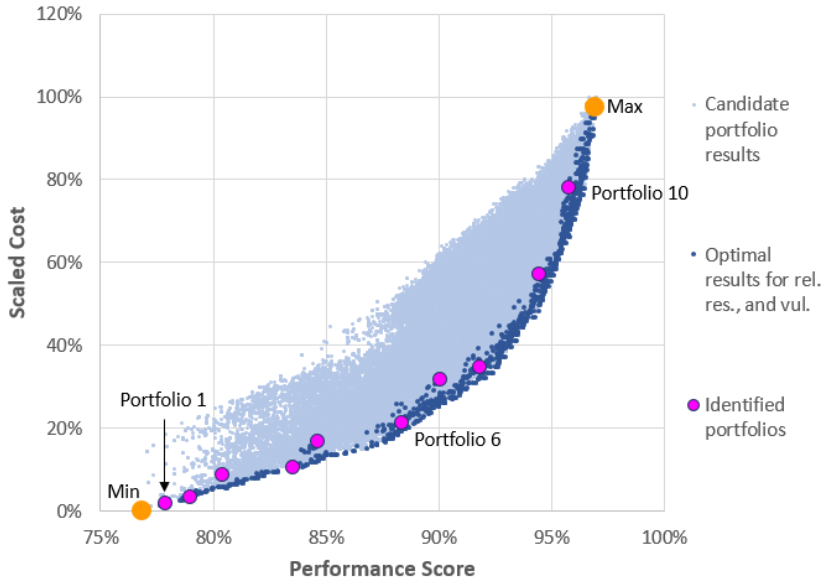
Categories of initially identified water strategies

Austin Water consolidated similar strategies from the initial list to create a streamlined list of 17 strategies. Plummer Associates, Inc. worked with Austin Water to refine strategy definitions and to identify key programs, policies, and infrastructure components for each strategy. The project team estimated potential savings for conservation and reuse strategies using detailed future water demand projections from the Disaggregated Demand Model. Conservation and reuse savings estimates were developed to avoid double counting of potable demand reductions. Plummer then used the Unified Cost Model, a tool developed by the Texas Water Development Board for use in the state water planning process, to create standardized capital, operations and maintenance, and annual costs for each strategy. Strategy costs and modeling yields can be found in Appendix F.

Water Resource Portfolio Development and Evaluation

Austin Water and its consultant RAND Corporation tested many groupings of the identified conservation, reuse, and supply strategies against many plausible future scenarios for 2080, the 50-year planning horizon. This work helped to identify groupings that provided a balance between reliability in meeting future water needs and the overall cost of each portfolio. From this analysis, ten candidate groupings, or portfolios, were identified as optimal, offering the best trade-off between reliability and cost.

This graphic shows all the portfolios modeled as blue and gray dots. The benefit (performance in terms of water supply reliability, resiliency, and vulnerability) and cost of each portfolio was compared against the theoretical highest benefit and highest cost. The blue dots represent the "optimal" portfolios, which have the lowest cost for a given performance. For example, portfolio six has a cost score of 20% of the highest cost, whereas other portfolios that provide the same level of performance have a higher cost score.



Results of water strategy grouping evaluation to identify candidate portfolios

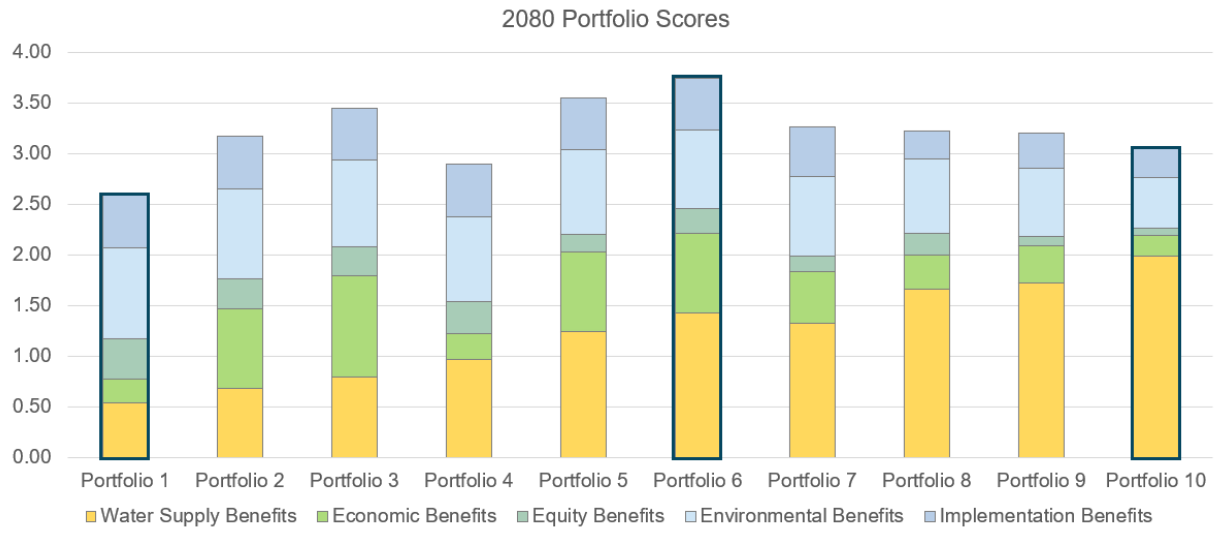
All ten candidate portfolios included Aquifer Storage and Recovery and the most aggressive set of conservation and reuse strategies. For each of the ten portfolios, the project team identified an implementation pathway for the decades leading up to 2080 that gradually built up to the 2080 yield targets of each individual strategy.

		2080 Portfolios									
	Strategy	1	2	3	4	5	6	7	8	9	10
Conservation	Utility-Side Water Loss Control	x	x	x	x	x	x	x	x	x	x
	Customer-Side Water Use Management	x	x	x	x	x	x	x	x	x	x
	Native & Efficient Landscaping	x	x	x	x	x	x	x	x	x	x
Non-Potable Reuse	Centralized Reclaimed	x	x	x	x	x	x	x	x	x	x
	Decentralized Reclaimed	x	x	x	x	x	x	x	x	x	x
	Onsite Reuse	x	x	x	x	x	x	x	x	x	x
Potable Supplies – Water Supply Storage	Aquifer Storage and Recovery	x	x	x	x	x	x	x	x	x	x
	New Off Channel Reservoir							x	x		
	New Off Channel Reservoir with Reuse									x	
	Decker Lake Off Channel Reservoir	x	x		x	x	x				
Potable Supplies – Potable Reuse	Direct Potable Reuse					x		x		x	x
	Indirect Potable Reuse		x	x		x	x	x		x	x
Potable Supplies – Contracts	New Lower Colorado River Supply										
Potable Supplies – New Water Supplies	Brackish Groundwater Desalination				x	x	x	x	x	x	x
	Seawater Desalination										x
	Interbasin Transfer										x
	Conventional Groundwater								x	x	x

Top ten candidate portfolio make-up at the 2080 timestep

The ten portfolios were then evaluated using the objectives, sub-objectives, and measures discussed in Chapter 2 and identified in more detail in Appendix J. These ten portfolios underwent further evaluation, emphasizing planning objectives such as water supply, economics, equity, environmental impact, and feasibility. Based on the scores from this detailed assessment, portfolio six was selected as the preferred portfolio for the Water Forward 2024 plan. The strategies in this portfolio are further described in Chapter 5 and the detailed results of the portfolio evaluation are included in Appendix J.

The graphic below shows the scores for the ten portfolios. As shown, while portfolio six has a lower water supply benefits score (yellow bar) compared to portfolio ten, it has the overall highest total score due to factors of cost, equity, environmental impact, and feasibility.



2080 Portfolio Evaluation Results

Colorado River Land Analysis

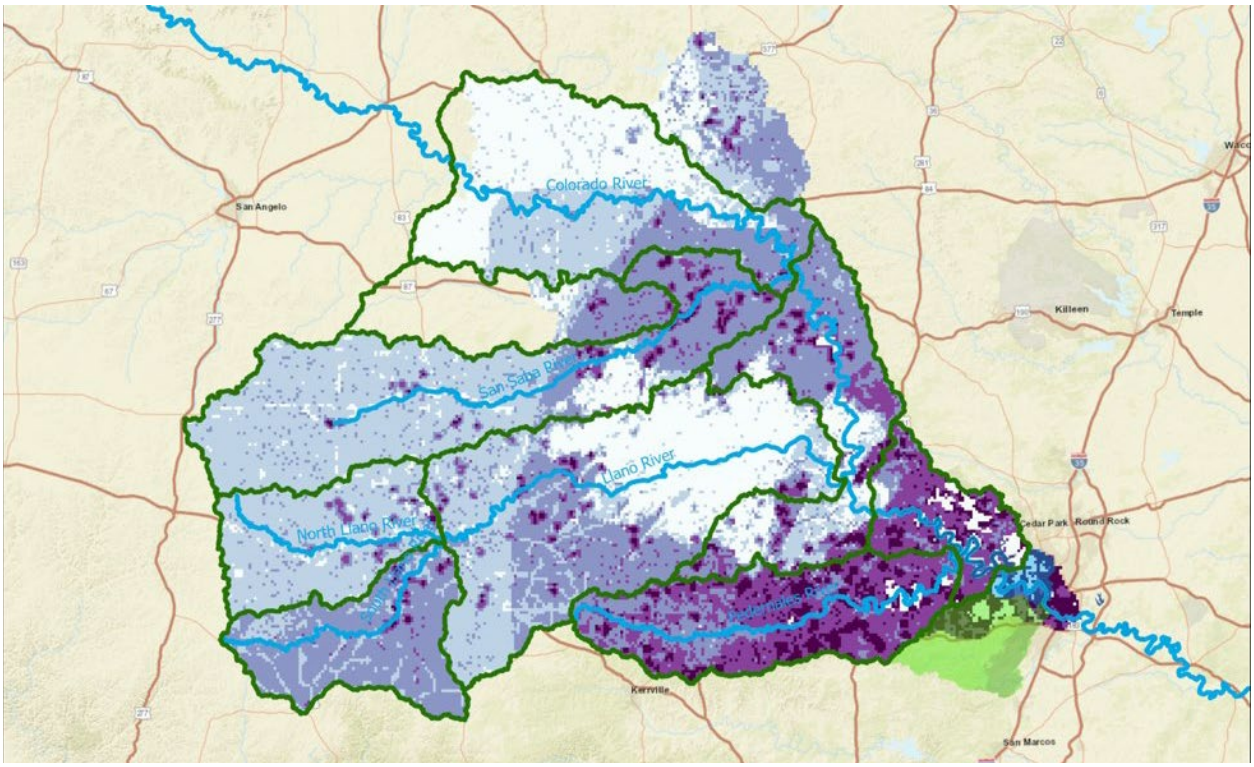
Austin's drinking water supply has benefited from a landscape of rural, largely working lands throughout the Highland Lakes' watershed. However, land use in Texas is changing rapidly as the state's population grows. According to Texas A&M Natural Resources Institute, the 20 counties in the lower Colorado basin have seen an 87% increase in population and the loss of over 108,000 acres of working lands since 1997. The working lands that remain are increasingly being subdivided into smaller and smaller parcels. These trends are likely to continue, emphasizing the need to plan for upstream water quality protection.

Source Water Protection refers to the management of areas through which water travels and the regulation of activities on these lands to prevent pollution and contaminants from entering public drinking water sources. The quality and quantity of a city's drinking water supply, as well as other water bodies used for recreational, environmental, and drainage purposes, can be influenced by both natural and human activities. One of the most effective ways to protect source water is to acquire land over which the water flows or to restrict development on such land through conservation easements or other mechanisms. These protections allow the land to continue acting as a natural filtration system for water as it nears water sources, preventing additional contaminants from development activities.

Austin Water conducted the Colorado River Analysis to evaluate areas in the lower Colorado river basin upstream of Austin and rank land protection opportunities based on water supply and environmental factors. . Water supply factors included stream flow, spring location, recharge zones, and location of undesirable features such as oil and gas wells. Environmental factors included vegetation, slope incline, impervious cover, protected land, and riparian and flood plain areas. Each factor was assigned a relative weight, as described in more detail in Appendix H.

This analysis was done with the use of geographic information systems (GIS) mapping tools to overlay these factors and combine the assigned point values. The results of this analysis are shown in the image below, with darker purple areas indicating areas with the highest

cumulative scores. These high scores indicate areas that contribute most significantly to water quality and quantity.



Colorado River Land Analysis Study Area, higher priority conservation areas shown in darker shades of purple. Areas shown in green reflect the Barton Springs Zone, which will continue to be an area of higher priority for conservation for the City of Austin.

Additional detail regarding this analysis is available in Appendix H. Next steps for further analysis and engagement related to land conservation strategies are included in Chapter 5, Future Water Strategies.

CHAPTER 5

FUTURE WATER STRATEGIES

The outcome of the Water Forward planning process is to identify future conservation, non-potable reuse, and potable water supply strategies so that all community needs for water are met. Estimated yield targets from 2030-2080 and total annual community costs for these strategies are summarized in the table below. The following strategy sections include further information about each strategy, including a strategy description, further cost information, and actions Austin Water will take over the next five years to implement the strategy.

Summary of Water Forward 2024 Strategies, 2030-2080

Water Forward Strategies	Average/ Drought	Estimated Yield (Acre Feet per Year)						Total Annual Community Cost ($ per acre foot per year)*
		2030	2040	2050	2060	2070	2080	
Water Conservation Strategies								
Utility-Side Water Loss Control	Both	2,800	7,500	9,400	11,300	13,200	15,000	$267
Customer-Side Water Use Management	Both	2,400	4,700	6,400	8,100	9,800	11,400	$52
Native & Efficient Landscaping	Both	1,300	2,700	3,800	4,800	5,900	7,000	$5,112
Water Conservation Strategies Sub-Total	-	**6.500**	**14,900**	**19,600**	**24,200**	**28,900**	**33,400**	
Non-Potable Water Reuse Strategies								
Centralized Reclaimed	Both	1,100	8,200	12,900	17,600	22,300	26,900	$2,243
Decentralized Reclaimed	Both	0	200	500	800	1,100	1,300	$5,158
Onsite Reuse	Both	1,100	4,000	5,700	7,300	9,000	10,600	$8,957
Non-Potable Reuse Strategies Sub-Total	-	**2,200**	**12,400**	**19,100**	**25,700**	**32,400**	**38,800**	
Potable Water Supply Strategies								
Aquifer Storage and Recovery	Both	0	44,500	44,500	44,500	44,500	44,500	$2,003
Lake Walter E. Long (Decker) Off Channel Reservoir	Both	0	18,300	18,300	18,300	18,300	18,300	$3,033
Indirect Potable Reuse	Drought	**	**	22,400	22,400	22,400	22,400	$880
Capture Local Inflows to Lady Bird Lake***	Average	0	0	3,000	3,000	3,000	3,000	***
Brackish Groundwater Desalination	Both	0	0	0	0	20,000	40,000	$2,688
Water Supply Strategies Sub-Total	-	**0**	**62,800**	**88,200**	**88,200**	**108,200**	**128,200**	
Water Forward Strategies Overall Total		**8,700**	**90,100**	**126,900**	**138,100**	**169,500**	**200,400**	
Current Supplies								
Colorado River and Highland Lakes Supply	Both	325,000						
Centralized and Decentralized Reclaimed Water System	Both	5,000						

* Community cost = Utility cost + Customer cost
** May be implemented earlier in severe drought conditions
*** Infrastructure is included in Indirect Potable Reuse strategy

Water Conservation Strategies

Utility-Side Water Loss Control

Utility Side Water Loss Control is a strategy to decrease water lost from the City's water system. Austin Water's efforts to control water loss include managing leaks, reducing non-revenue water, and improving data quality. This strategy will include additional efforts to improve the accuracy of meters at water treatment plants, expanding active leak detection programs, and using new methods to analyze water loss data.

Implementation of water loss control actions is projected to result in savings of 1.92 gallons per capita per day by 2030 and 4.39 gallons per capita per day by 2040.

Total GPCD =

(Total Gallons in System ÷ Permanent Population) ÷ 365

Annual Yield Targets (acre feet per year)					
2030	2040	2050	2060	2070	2080
2,800	7,500	9,400	11,300	13,200	15,000

Capital Cost	Capital Cost including Contingencies	Annual Cost O&M and Debt Service ($ per year)	Total Annual Cost ($ per acre foot per year)
$45,000,000	$69,655,000	$7,031,000	$267

Five Year Implementation Actions
• Continue replacement of polybutylene service lines through the Renewing Austin Program (2024) • Launch a cross-functional Austin Water Water Loss team to implement the recommendations of the water loss report (2024) • Pilot the implementation of two District Metering Areas (DMAs) to reduce water loss through pressure management (2024) • Develop an Austin Water Production Meter SOP which includes production meter measurement improvement recommendations (2025) • Update the Austin Water Meter Testing SOPs for meter testing, sizing, and replacement (2025) • Develop an Austin Water Unauthorized Consumption Mitigation SOP (2025) • Develop an Austin Water Data Handling Errors Mitigation SOP (2025) • Develop an Austin Water Leak Detection Standard Operating Procedure (SOP) for leak detection practices, data management, and continuous training requirements (2025) • Expand the use of District Management Areas across the city and consider partial conversion to Pressure Management Areas (PMAs) (2026) • Update Austin Water operations response procedures to improve management of service line failures (To Be Determined) • Update Austin Water asset management program to improve management of service line failures (To Be Determined) • Create dashboards to integrate SCADA, AMI, pressure monitoring and leak detection data (To Be Determined)

Customer-Side Water Use Management

Existing customer-side water use management efforts include requiring that all site plans for new development include water benchmarking applications, replacing all meters in the City with new smart meters, rolling out the My ATX Water customer portal, and many conservation and reuse rebates and incentives. This strategy includes expanded customer incentives for conservation, use of benchmarking and My ATX Water data to create water use budgets for customers and to expand identification of customer-side water leaks, and water use reduction from customer behavior changes based on near real-time water use data.

Implementation of customer-side water use management actions is projected to result in savings of 1.64 gallons per capita per day by 2030 and 2.75 gallons per capita per day by 2040.

Annual Yield Targets (acre feet per year)					
2030	2040	2050	2060	2070	2080
2,400	4,700	6,400	8,100	9,800	11,400

Capital Cost	Capital Cost including Contingencies	Annual Cost O&M and Debt Service ($ per year)	Total Annual Cost ($ per acre foot per year)
$325,000	$325,000	$681,000	$52

Five Year Implementation Actions
• Provide customer leak alerts (Ongoing) • Pilot an increased rebate for commercial water use audits (2025) • Begin the development of necessary data and program design for water use benchmarking and budgeting of single-family residential, commercial, and industrial customers (2025) • Develop data regarding commercial, industrial, and institutional (CII) customer categorization to assist in benchmarking and the identification of facilities for water conservation outreach (2025) • Work with My ATX Water contractor to develop the necessary data and reports to focus customer engagement (2025) • Investigate additional methods to encourage residential customers to use the My ATX Water portal and water-saving alerts (2025/2026) • Conduct pilot outreach activities to learn the best ways to encourage customers to save water (2025/2026) • Identify opportunities for CII facility owners/managers to benefit from the My ATX Water alerts and information (2026) • Conduct pilot outreach activities to learn the best ways to encourage customers to set and strive towards voluntary water budgets (2026)Undertake public and stakeholder engagement regarding potential residential and commercial mandatory water budgets (2027)

Native and Efficient Landscapes

Austin Water currently has rebate and incentive programs to help customers transition to native and efficient landscapes. This strategy includes additional efforts including new landscape transformation ordinances and incentives, irrigation efficiency incentives, and other approaches to promote conversion to native and efficient landscapes.

Implementation of customer-side water use management actions is projected to result in savings of 0.89 gallons per capita per day by 2030 and 1.58 gallons per capita per day by 2040.

Annual Yield Targets (acre feet per year)					
2030	2040	2050	2060	2070	2080
1,300	2,700	2,900	3,900	5,000	6,100

Capital Cost	Capital Cost including Customer Costs	Annual Cost O&M and Debt Service ($ per year)	Total Annual Cost ($ per acre foot per year)
$75,000	$832,815,000	$55,726,000	$5,112

Five Year Implementation Actions
• Coordinate with COA Development Services Department to increase inspections of new-development soil inspections (Ongoing) • Restrict the use of drip irrigation to two days per week in Conservation Stage and Drought Stages 1-2, and to one day per week in Drought Stages 3-4 (2024) • Inspect new residential irrigation systems (2025)Adjust landscaping and grey water incentives to encourage greater participation (2024) • • Council adoption and implementation of local amendments to the 2024 Uniform Plumbing Code (requiring pressure-reduction devices for irrigation systems, limitation of irrigation area, laundry to landscape) (2025) • Develop necessary data to analyze irrigation water use patterns (2025) • Austin Water inspection of all new residential irrigation systems and offering new homeowners follow-up checkups (2025) • Engage commercial and residential irrigators using the My ATX Water portal and outreach, including developing data management tools, conducting pilot testing, and integrating commercial customers into communications portal (2026)

Non-Potable Reuse Strategies

Centralized Reclaimed

Austin's centralized reclaimed water system, or "purple pipe" system, currently provides highly-treated wastewater effluent for non-potable uses such as irrigation, cooling, manufacturing, and toilet flushing to customers. This strategy represents expansion of existing centralized reclaimed water use, including codes and incentives to require or encourage connection to the centralized reclaimed water system.

Annual Yield Targets (acre feet per year)					
2030	2040	2050	2060	2070	2080
1,100	8,200	12,900	17,600	22,300	26,900

Capital Cost of Infrastructure	Capital Cost including Contingencies and Land Acquisition	Annual Cost O&M and Debt Service ($ per year)	Total Annual Cost ($ per acre foot per year)
$899,162,000	$1,407,041,000	$93,530,000	$2,243

Five Year Implementation Actions
• Implement new projects to increase supply and extend the centralized service area (Ongoing) • Conduct water benchmarking with all new commercial and industrial customers to identify uses appropriate for reclaimed water, and require connection to the reclaimed system in accordance with development requirements (Ongoing) • Evaluate the results of implementation of the GoPurple program and recommend revisions to the program, including distance requirements and incentives (rebates) for connection to the centralized reclaimed system (Annually) • Implement projects to Complete the Core (2024-2027) • Complete Reclaimed Water Long Range Plan update (2026)

Decentralized Reclaimed

This strategy was included as "Distributed Wastewater Reuse" in the Water Forward 2018 Plan. Decentralized Reclaimed is defined for Water Forward 2024 as the collection of wastewater from sewer systems separate from the Austin's centralized wastewater system, and treatment and reuse of that wastewater at the neighborhood scale. Reuse of the treated water via a dual (purple) pipe system will supply irrigation, landscaping, toilet flushing, and cooling demands.

Annual Yield Targets (acre feet per year)					
2030	2040	2050	2060	2070	2080
0	200	500	800	1,100	1,300

Capital Cost of Infrastructure	Capital Cost including Contingencies and Land Acquisition	Annual Cost O&M and Debt Service ($ per year)	Total Annual Cost ($ per acre foot per year)
$138,375,000	$215,071,000	15,991,000	$5,158

Five Year Implementation Actions
• Collaborate with new developments through the service extension request (SER) process to identify opportunities for decentralized reclaimed and appropriate cost participation by Austin Water (Ongoing) • Complete Wastewater System Long Range Plan Update, including identifying existing wastewater treatment plants, future sites, and potential future sites/service areas (2025) • Develop infrastructure planning and design guidance (2025-2029)

Onsite Water Reuse

Austin currently has ordinances requiring onsite reuse of rainwater and air conditioning condensate for new developments over 250,000 square feet. This strategy includes implementation of these existing ordinances as well as future phases of onsite reuse implementation. Onsite reuse water can be sourced from rainwater, stormwater, air conditioning condensate, graywater, or black water.

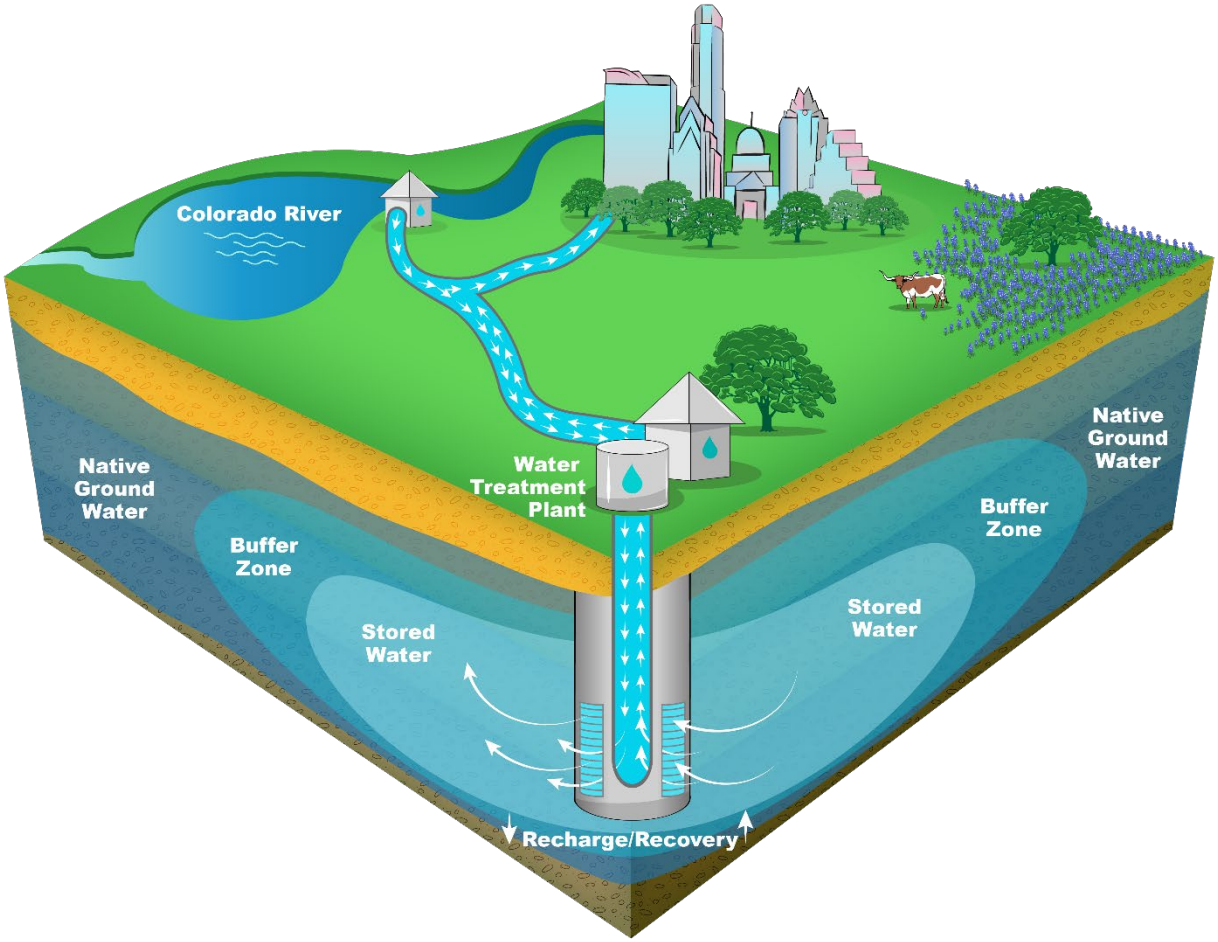
Annual Yield Targets (acre feet per year)					
2030	2040	2050	2060	2070	2080
1,100	4,000	5,700	7,300	9,000	10,600

Capital Cost of Infrastructure	Capital Cost including Contingencies and Land Acquisition	Annual Cost O&M and Debt Service ($ per year)	Total Annual Cost ($ per acre foot per year)
$841,418,000	$950,624,000	$145,994,000	$8,957

Five Year Implementation Actions
• Evaluate the results of implementation of the GoPurple program and recommend revisions to the program, including onsite reuse requirements and incentives (rebates) (Annually) • Determine the feasibility of fully subsidizing the cost of reclaimed connections, onsite water reuse systems, and dual plumbing for deeply affordable housing projects (2025) • Begin planning for expansion of onsite reuse requirements to include new medium-sized developments (2025-2028)

Potable Water Supply Strategies

Aquifer Storage and Recovery



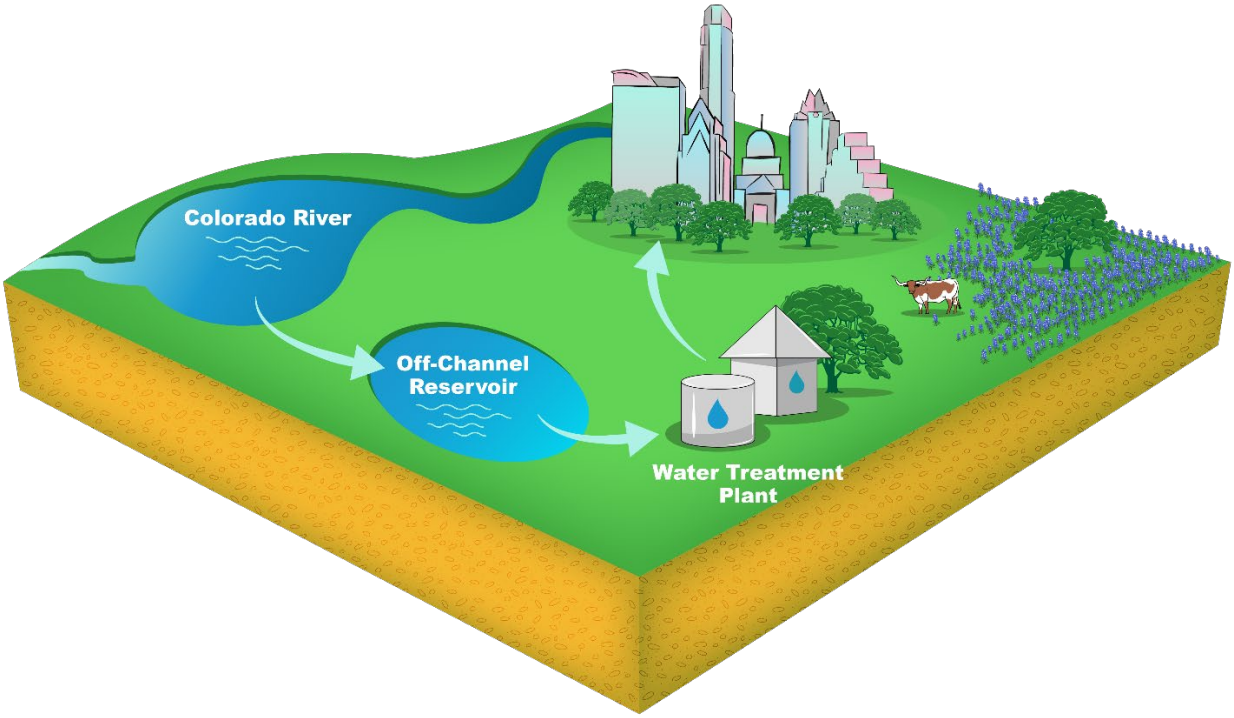
Austin's Aquifer Storage and Recovery (ASR) project will store drinking water from Austin's water treatment plants. This water will be available under Austin's existing water rights and will be stored in the aquifer during periods when water is more plentiful, maximizing Austin's existing supplies. Stored water withdrawn from the ASR project will be treated as needed to be compatible with Austin's drinking water quality and then distributed to customers. Austin Water is currently finalizing a desktop analysis to identify favorable locations for an ASR pilot and full-scale project.

Annual Yield Targets (acre feet per year)					
2030	2040	2050	2060	2070	2080
0	44,500	44,500	44,500	44,500	44,500
Annual Storage Targets (acre feet)					
2030	2040	2050	2060	2070	2080
0	60,000	120,000	180,000	240,000	300,000

Capital Cost of Infrastructure	Capital Cost including Contingencies and Land Acquisition	Annual Cost O&M and Debt Service ($ per year)	Total Annual Cost ($ per acre foot per year)
$941,554,000	$1,526,808,000	$166,747,000	$2,003

Five Year Implementation Actions
• Complete Phase 1A desktop analysis to identify favorable ASR locations (2024) • Conduct Phase 1B field testing and make recommendations for ASR pilot project (2025) • Conduct Phase 2 ASR pilot testing and develop recommendations for full-scale ASR project (2026-2028) • Begin Phase 3 preliminary engineering and design for full-scale ASR project (2029)

Lake Walter E. Long Off-Channel Reservoir



This strategy would use Lake Walter E. Long (formed by Decker Dam) as a water supply reservoir to meet customer demands. Lake Walter E. Long is supplied by water diverted from the Colorado River, and this strategy includes a new intake adjacent to the current intake location. The reservoir would be operated so that lake levels would fluctuate within a limited five-foot range during drought periods. Water from this strategy would be treated for potable use at a new water treatment plant using advanced treatment processes. Lake Walter E. Long is

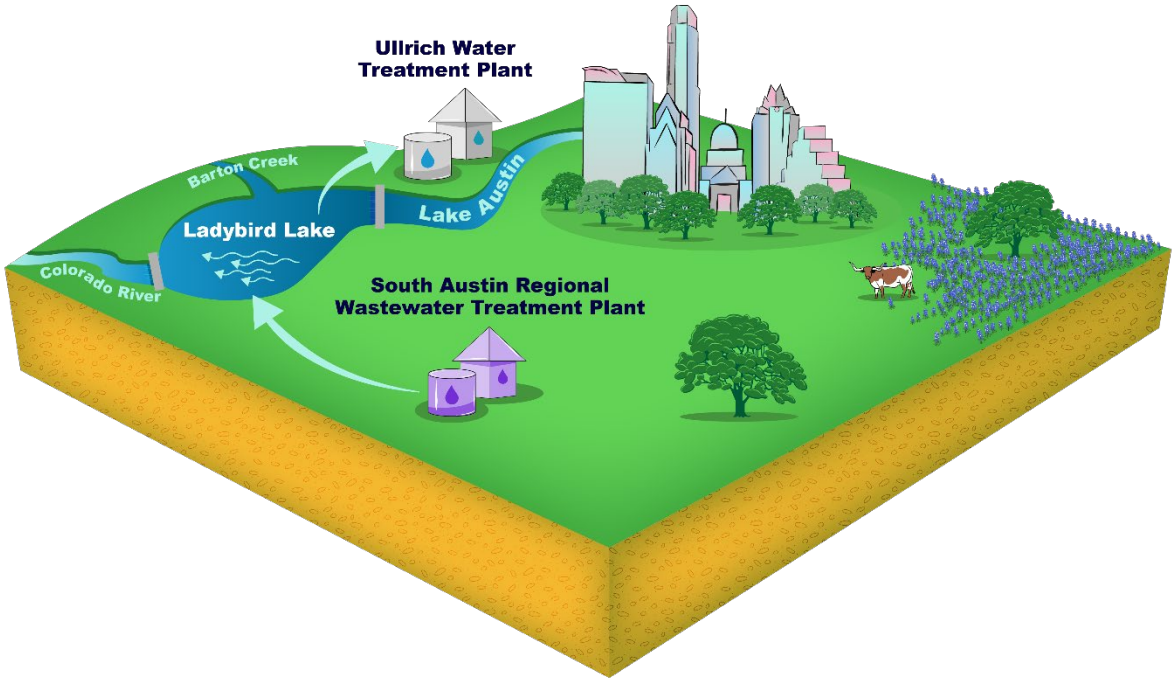
currently used for recreation (managed by the City's Parks and Recreation Department) and for the operation of the Decker Power Plant (managed by the City's electric utility, Austin Energy). This strategy provides co-benefits to those uses and Austin Water is coordinating with those departments in its development.

Annual Yield Targets (acre feet per year)					
2030	2040	2050	2060	2070	2080
0	18,300	18,300	18,300	18,300	18,300
Annual Storage Targets (acre feet)					
2030	2040	2050	2060	2070	2080
0	6,100	6,100	6,100	6,100	6,100

Capital Cost of Infrastructure	Capital Cost including Contingencies and Land Acquisition	Annual Cost O&M and Debt Service ($ per year)	Total Annual Cost ($ per acre foot per year)
$331,634,000	$518,117,000	$55,507,000	$3,033

Five Year Implementation Actions
• Complete feasibility report to evaluate off-channel reservoir configurations and recommend a preferred configuration (2025) • Begin water quality sampling of Lake Walter E. Long (2025) • Begin preliminary engineering of a conceptual project layout for the preferred strategy configuration, including Colorado River infrastructure, improvements to the intake pipeline, water treatment plant infrastructure, intake infrastructure, and distribution system integration. (2026)

Indirect Potable Reuse and Capture Local Inflows to Lady Bird Lake



Indirect Potable Reuse (IPR) through Lady Bird Lake would include pumping highly-treated reclaimed water from new side-stream treatment facilities located near the South Austin Regional Wastewater Treatment Plant into Lady Bird Lake via new reclaimed transmission main. Water would then be pulled from Lady Bird Lake into the Ullrich Water Treatment Plant using a new intake pipe and pump station and treated for potable use. IPR would only be used when the combined storage of Lakes Travis and Buchanan drops below 400,000 acre feet.

Outside of drought emergencies, the intake and pump station from IPR can be used to capture local inflows to Lady Bird Lake, in particular from Barton Creek and Barton Springs. The reclaimed transmission infrastructure would be used to support the centralized reclaimed water system.

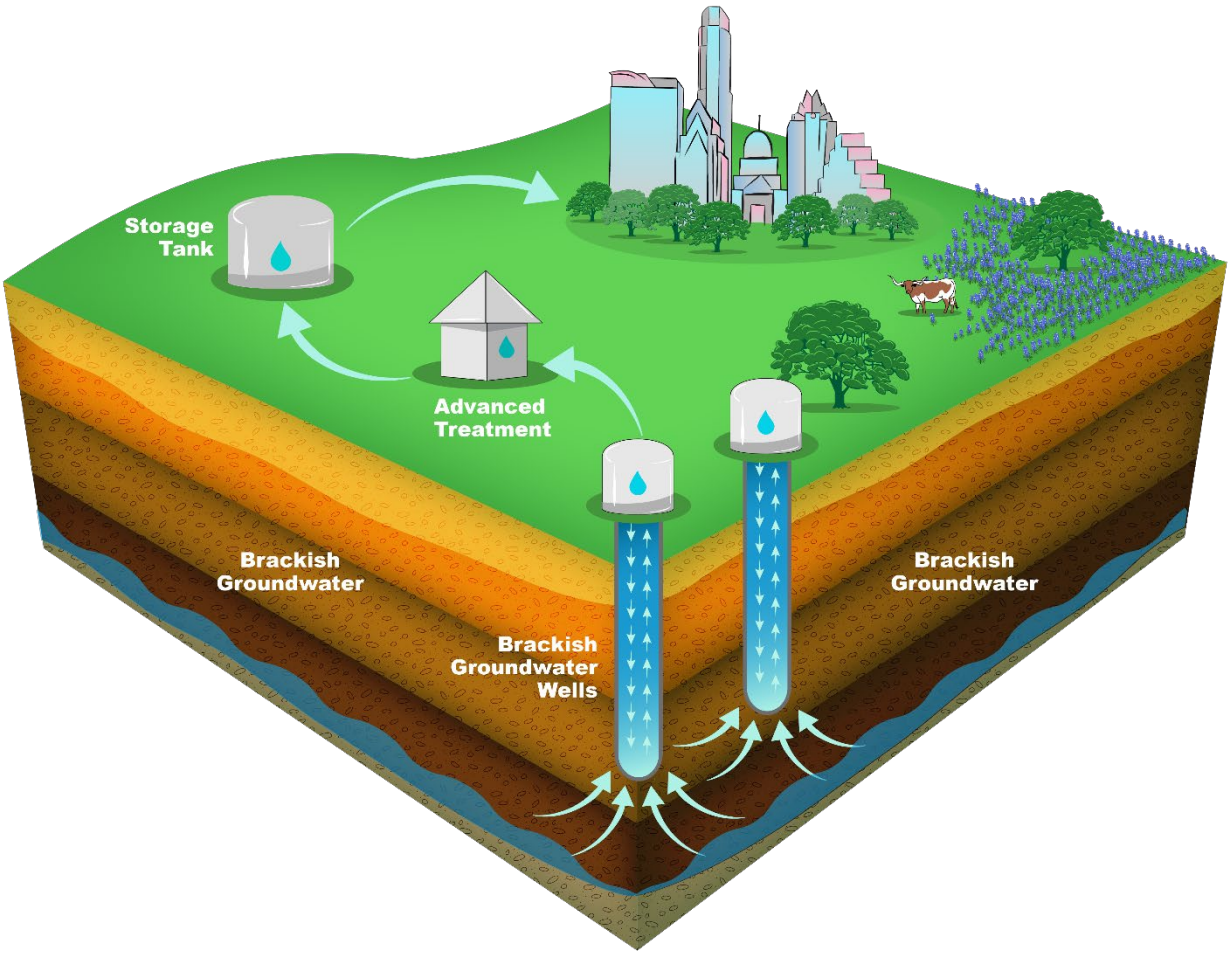
Annual Yield Targets (acre feet per year)					
2030	2040	2050	2060	2070	2080
***	***	22,400	22,400	22,400	22,400

***May be implemented earlier in severe drought conditions.

Capital Cost of Infrastructure	Capital Cost including Contingencies and Land Acquisition	Annual Cost O&M and Debt Service ($ per year)	Total Annual Cost ($ per acre foot per year)
$114,104,000	$180,486,000	$19,710,000	$880

Five Year Implementation Actions
• Develop IPR schematic design, design criteria, technical specifications, to include development of project configuration and sizing components (2024) • Begin design-build procurement process and, pending Council approval, issue design-build contract (2025) • Preliminary target for substantial completion of IPR project construction (2028)

Brackish Groundwater Desalination



Brackish Groundwater Desalination is defined as the withdrawal and desalination of brackish (salty) groundwater for treatment to potable drinking water. This strategy would use water from an aquifer that has salinity levels in excess of TCEQ guidelines and rules for drinking water. The water would be withdrawn through wells, then treated by advanced treatment processes such as reverse osmosis to reduce the salinity and condition the water to be compatible with Austin's drinking water. The water would be conveyed to a connection point with Austin's water distribution system through transmission mains (large pipelines). The treatment process creates

a very salty wastewater (brine) that requires disposal in accordance with state regulations. Development of this strategy will include desktop analysis and pilot testing.

Annual Yield Targets (acre feet per year)					
2030	2040	2050	2060	2070	2080
0	0	0	0	20,000	40,000

Capital Cost of Infrastructure	Capital Cost incl. Contingencies and Land Acquisition	Total Annual Cost – O&M and Debt Service ($ per year)	Annual Cost of Water ($ per acre foot per year)
$429,403,000	$767,453,000	$107,500,000	$2,688

Five Year Implementation Actions
• Begin scoping for desktop analysis to identify favorable locations for brackish groundwater desalination (2028)

Best Management Practices

The following are best management practices for which it may not be possible to calculate a water yield, but which help to achieve the yields of other strategies. These best management practices will be implemented by Austin Water to support successful implementation of the overall plan goals.

- Promote customers' knowledge of watering days through direct customer communications, social media, and collaboration with print, radio, and digital media.
- Continue to provide follow-up information after My ATX Water meters are installed about how to use the portal to monitor and reduce water use.
- Expand the reach of Austin Water's public outreach and education through partnerships with community organizations, nurseries, landscapers, and irrigation installers, among others. Evaluate the budget for these programs annually.
- Clarify and streamline public-facing information on incentive programs. Provide comprehensive and easy-to-understand forms for participating.
- Expand training programs and resources for landscapers, including sample landscape plans and information on native plants.
- Expand outreach to existing developments near the reclaimed system to promote connection.
- Continue to work with new development on "fit-for purpose" water use strategies in accordance with Austin Water's requirements and incentives related to benchmarking, on-site water reuse, and connections to the centralized reclaimed water system. Identify opportunities to leverage the benchmarking process to provide additional transparency related to water use for planned development.

- Investigate the development of a program to provide small grants ($3,000) to community organizations to expand the outreach of water conservation messaging.

Land Conservation Strategies

Water Forward 2024 includes a review of strategies that protect Austin's source water quality and quantity through land management practices. These strategies are in addition to, and work in concert with, Austin Water's management of the Balcones Canyonlands Preserve and Water Quality Protection Lands. Additionally, Austin Water collaborates with the City's Watershed Protection Department and Parks and Recreation Department on streambank restoration, creek water quality protection, and flood risk mitigation, as well as day-to-day land management for environmental outcomes. The strategies below represent both investments to Austin Water's current land protection programs and future opportunities to expand these programs upstream.

Colorado River Land Protection

As described in the Colorado River Land Analysis section, the purpose of the Colorado River Land Analysis was to evaluate how Austin Water could further protect and preserve areas that contribute to Austin's drinking water quality and water quantity in the lower Colorado River basin. Future land conservation efforts upstream of our drinking water intakes could prevent water quality impacts associated with development of impervious surfaces and intense land uses. This protection would not only provide good stewardship of our surrounding natural and working lands, but also help protect water quality and lower costs associated with treating water now and in the future. These lands upstream of Austin represent a future opportunity to implement the types of land conservation and best management practices that have been successful under Austin Water's current land protection programs.

Water Forward land conservation strategies to protect our drinking water supply are just one component of the City of Austin's long term land conservation planning. Multiple City departments will also be working together to define land conservation strategies and funding mechanisms to meet multiple community goals. Austin Water will continue to identify important areas of land and work to conserve those natural resources for future generations. The following conservation strategies are being considered by Austin Water to help protect the City's water supply in the lower Colorado River basin.

- Fee-simple purchase of land
- Purchase of conservation easements
- Direct payments to landowners
- Landowner education and outreach

More information about these land conservation strategies and possible funding mechanisms is available in Appendix H. Austin Water will continue to engage the public and community regarding these land conservation strategies, considering combinations of the strategies in different priority areas, and will continue the important work of protecting the natural environment and our water supply sources

Actions and Next Steps

- Continue to fund existing Austin Water land protection programs and acquire lands as necessary and feasible to meet program goals.
- Continue stakeholder and community engagement to inform Colorado River land protection priorities.
- Further refinement of conservation prioritization model and analysis.

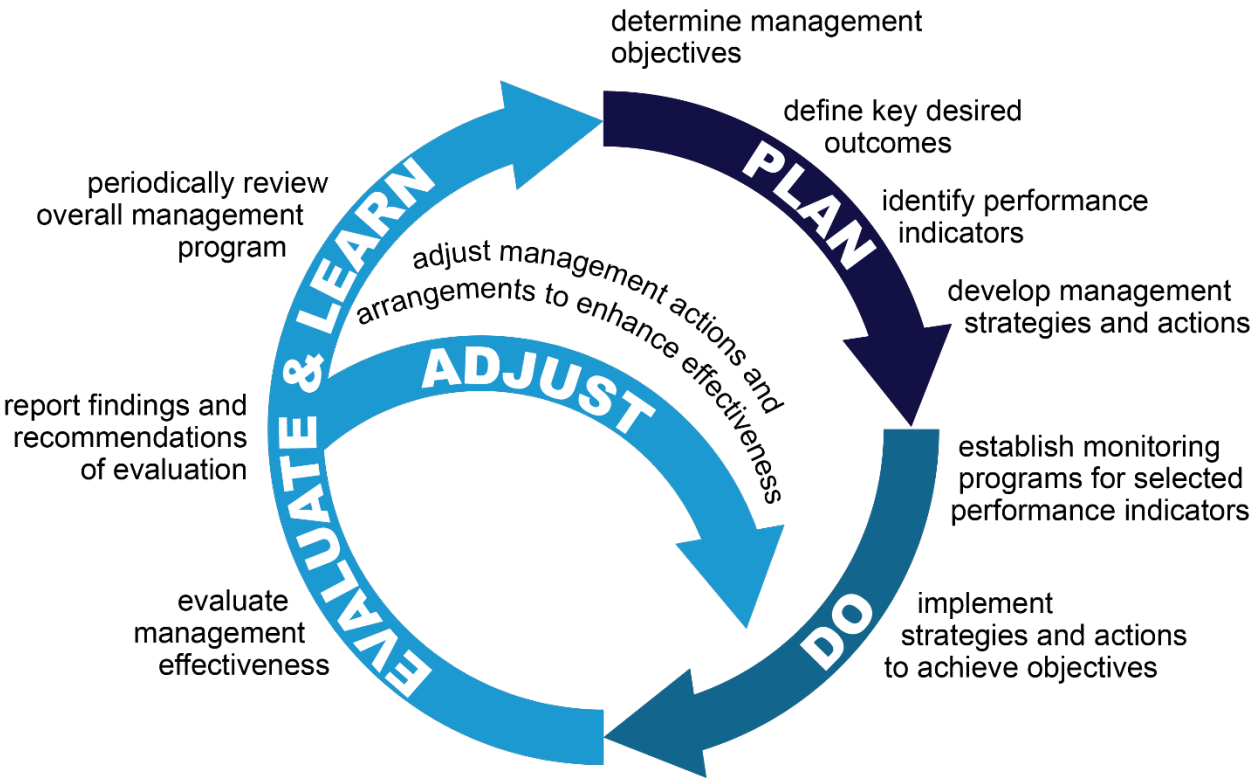
- Narrow conservation priorities based on feasibility and impact.
- Develop a menu of feasible conservation strategies.
- Based upon land protection priorities, identify an effective and cost-efficient mix of land protection strategies to protect source water quality and quantity.
- Work with partners and stakeholders so that future Austin Water investments leverage partnerships, outside funding opportunities, and other opportunities that can maximize land protection outcomes.
- Develop feasible funding strategies, funding levels, and operational support to meet Colorado River land protection goals.

CHAPTER 6

PLAN IMPLEMENTATION

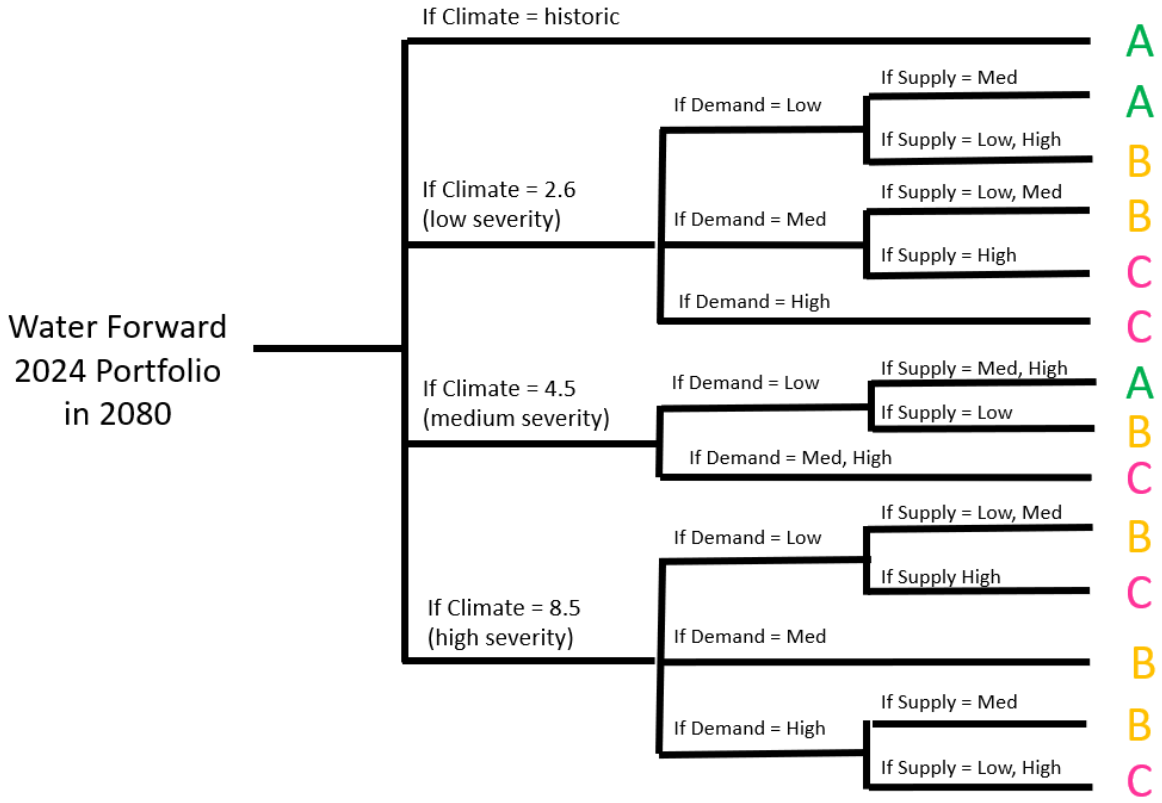
Adaptive Management Approach

Water Forward 2024 provides a roadmap to guide development of future programs, projects, and ordinances. Implementation of Water Forward 2018 strategies are already underway, and Austin Water will begin to implement the additional water strategies included in Water Forward 2024 soon after City Council approval of the Water Forward Plan. During the next five years, Austin Water will act in alignment with the five-year implementation actions included for each strategy in Chapter 5. The plan will use an adaptive management approach. This means that strategy effectiveness will be monitored and evaluated at regular intervals. This evaluation will be publicly reported. The findings will also inform potential adjustments that Austin Water may need to make to specific strategies. The Water Forward plan will also continue to be updated on a five-year cycle to review program effectiveness and incorporate updated data and changing conditions into the overall plan. These steps provide continual feedback that we are on track to meet our goals.



100-Year Adaptive Management Plan

Water Forward 2024 focuses on identifying specific strategies for implementation through 2080. The plan also includes a 100-year adaptive management plan. This plan, outlined below, builds off of the 2080 Water Forward portfolio of strategies. The plan includes a decision tree of potential strategy pathways that Austin Water may need to follow depending on the climate, water demand, and regional supply development scenarios that we experience in the future.



Water Forward 2024 100-Year Adaptive Management Pathways

The outcomes of these potential strategy pathways are characterized as three potential portfolios of strategies for the 2120 planning horizon. These portfolios include the same set of conservation and reuse strategies, building off of the most aggressive 2080 pathway. The portfolios differ in the amount of potable water supply strategies that are developed. For example, in 100 years if Austin experiences a less severe climate change outcome, paired with low water demands and a medium scenario of regional water supply development, Austin Water would only need to develop 20,000 acre feet of additional water supply (2120 Portfolio A) on top of the 2080 Water Forward portfolio to meet community water needs. In a high severity climate change outcome, Austin Water may need to develop more additional water supplies (2120 Portfolio B or C).

There is a high degree of uncertainty regarding future outcomes that Austin may experience in 100 years. This adaptive management plan is a tool to inform pathways Austin Water may need to pursue and is an initial estimate based on current and best available information. This 100 year plan will be updated with every five year update to the Water Forward plan and will serve as a roadmap of potential long term outcomes and needs. This roadmap will change based on the progress we make to implement near term strategies and new information about changing conditions.

Water Forward 2024 100 Year Adaptive Management Portfolios

Water Forward Strategies	Estimated Yield (Acre Feet per Year)			
	Water Forward 2024 Portfolio 2080	**Portfolio A 2120**	**Portfolio B 2120**	**Portfolio C 2120**
Water Conservation Strategies				
Utility-Side Water Loss Control	15,000	26,300	26,300	26,300
Customer-Side Water Use Management	11,400	13,100	13,100	13,100
Native & Efficient Landscaping	7,000	10,900	10,900	10,900
Water Conservation Strategies Sub-Total	**33,400**	**50,300**	**50,300**	**50,300**
Non-Potable Water Reuse Strategies				
Centralized Reclaimed	26,900	41,700	41,700	41,700
Decentralized Reclaimed	1,300	3,100	3,100	3,100
Onsite Reuse	10,600	16,300	16,300	16,300
Non-Potable Reuse Strategies Sub-Total	**38,800**	**61,100**	**61,100**	**61,100**
Potable Water Supply Strategies				
Aquifer Storage and Recovery	44,500	44,500	83,000	44,500
Lake Walter E. Long (Decker) Off Channel Reservoir	18,300	18,300	18,300	18,300
Indirect Potable Reuse	22,400	33,600	22,400	44,800
Capture Local Inflows to Lady Bird Lake	3,000	3,000	3,000	3,000
Brackish Groundwater Desalination	40,000	40,000	40,000	40,000
Additional Colorado River Basin-Independent Supply*	0	20,000	20,000	60,000
Additional Colorado River Basin Supply**	0	0	35,000	30,000
Water Supply Strategies Sub-Total	**128,200**	**159,400**	**221,700**	**240,600**
Water Forward Strategies Overall Total	**200,400**	**280,800**	**343,100**	**362,000**
Current Supplies				
Colorado River and Highland Lakes Supply	325,000			
Centralized and Decentralized Reclaimed Water System	5,000			

* These supplies would be from sources outside of the Colorado River and Highland Lakes basin. The specific make-up of these supplies would be determined in the future.
** These supplies would be from sources inside of the Colorado River and Highlands Lakes Basin. The specific make-up of these supplies would be determined in the future.

Funding

Water Forward 2024 estimates that implementing near-term strategies will require significant investment. Costs included in the plan are planning level estimates that will be refined through further capital and operations planning. Austin Water is an enterprise department of the City of Austin, funded by water, wastewater, and reclaimed water rates and fees, as well as capital recovery fees (connection fees for new development. Capital investments are funded through a combination of operating cash and debt financing, including low interest loans from state and federal water infrastructure funding programs. Austin Water identifies and submits to these funding programs on an ongoing basis and has been successful in securing these funding sources. The utility will identify various sources of funding for projects and programs through its ongoing financial planning processes with a focus on maintaining affordability metrics and reducing financial impacts on customers.

Mitigating Inequitable Impacts

The Equity and Affordability evaluation of water strategies identified possible inequitable impacts of each strategy. Approaches to mitigate these impacts are described in the table below. Many of these approaches are similar across the strategies. These approaches will be incorporated into tailored program, policy, and project planning and design.

Strategy Type	Approaches to Mitigate Inequitable Impacts
Conservation	• Tailor program design and implementation of water budgets to avoid penalizing larger households and imposing inequitable burdens on marginalized communities • Tailor program design, code development, and enforcement of landscape and irrigation requirements to avoid imposing inequitable burdens on marginalized communities • Provide water conservation education, training programs, grants, and financial assistance to marginalized communities to help them keep their water use below water budget allowances and to minimize maintenance burdens
Reuse	• Provide programs for maintenance support, training for building management, etc. for dual plumbed systems. • Promote programs to assist customers in marginalized communities who are trying to navigate the permitting process in accessing education and assistance • Continue to work with the Watershed Protection Department to allow centralized reclaimed water for outdoor irrigation across our community, by mitigating potential water quality impacts from reclaimed irrigation • Continue to identify locations for onsite reuse or sewer mining to make reuse water available in areas of the City where centralized or decentralized reclaimed water is not available • Continued implementation of the GoPurple program, including code exemptions for affordable housing and financial and development incentives
Supply	• Minimize rate impacts through Customer Assistance Programs • Use low cost implementation project funding through Texas Water Development Board (TWDB) programs • Address construction impacts on marginalized communities (traffic, noise, etc.) • Explore options to minimize potential impacts to neighboring communities that may be impacted by strategies located outside of Austin Water's service area • For brackish groundwater desalination, develop effective brine handling methods that consider environmental impacts • For Indirect Potable Reuse, evaluate and implement appropriate treatment processes for water discharged into Lady Bird Lake • Partner with community organizations to provide education on water supply strategies and water quality

Monitoring, Evaluation, and Adaptation

Metrics to monitor implementation and the effectiveness of water strategies are listed below.

Strategy Type	Metric	Adaptation Triggers	Possible Adaptation Actions
Conservation	Strategy yields meet targets based on actual population growth	Annual strategy yield falls below target levels for two years in a row	• Use smart meter data to enhance tailored customer outreach via My ATX Water portal • Re-evaluate and enhance incentive programs • Increase utility water loss control programs • Re-evaluate staffing and funding levels for projects and programs
	Strategy implementation progress	Progress falls behind action timeline	
Reuse	Strategy yields meet targets based on actual population growth	Annual strategy yield falls below target levels for two years in a row	• Re-evaluate and enhance GoPurple incentive program • Re-evaluate and enhance reclaimed marketing • Identify reclaimed system projects that can be accelerated to improve system reliability and meet additional customer demand • Re-evaluate staffing and funding levels for projects and programs
	Strategy implementation progress	Progress falls behind action timeline	
Supply	Annual strategy yield	Annual strategy yield falls below target levels for two years in a row	• Identify supply project delivery methods and tasks that can be accelerated • Evaluate possible alternative supply project configurations or approaches • Accelerate implementation of emergency supply strategies • Re-evaluate staffing and funding levels for projects and programs
	Strategy implementation progress	Progress falls behind action timeline	
	Combined lake storage	Combined lake storage remains below 750,000 AF for four months or longer	

Reporting, Communication, and Collaboration

Austin Water will provide quarterly reports on implementation progress to the Water and Wastewater Commission, the Resource Management Commission, and the Water Forward Task Force. These quarterly reports will include leading demand reduction and supply performance measures. Austin Water will also develop public year-end annual reports including leading performance measures, descriptions of programmatic efforts, conservation performance, and total water use and loss.

Additional best practices that have been identified to incorporate into future strategy implementation phases are listed below.

- Accountability
    - Create an online dashboard providing data and updates about strategy implementation progress including equity and affordability considerations
    - Share implementation progress for strategies in a visually appealing way
    - Create systems for community feedback and input during strategy implementation

- Communication
    - Continue to share and bolster relevant and accessible information about Austin Water programs and incentives
    - Continue to work to provide multiple ways to access information, considering how information may be accessed by people with different abilities and preferences (audio, visual, paper handouts, web content, etc.)

- Collaboration
    - Collaborate with City of Austin departments and workgroups
    - Work closely with regional partners such as the Lower Colorado River Authority and the Lower Colorado River (Region K) Water Planning Group
    - Maintain relationships with community organizations, especially those that serve marginalized communities

APPENDICES