



A WATER PLAN FOR THE NEXT 100 YEARS

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Water Forward

For more than 100 years, Austin Water has been committed to providing clean, safe, reliable, high quality, sustainable, and affordable water services to our customers. Austin's Water Forward Integrated Water Resource Plan will support that enduring commitment for the next 100 years and beyond. The Water Forward plan recommendations were developed using a holistic planning approach that balances multiple objectives such as water reliability, social, environmental, and economic benefits, and ease of implementation. The guiding principles of Water Forward, which helped inform these objectives and provided direction throughout the planning process, are listed to the right. The Water Forward Plan also sought to align with the Austin City Council's Strategic Outcomes related to Economic Opportunity and Affordability, Safety, Health and Environment, and Government That Works for All.

The recommendation to develop an integrated water resource plan emerged from the historic drought Central Texas endured from 2008-2016. During the drought, the lakes that supply Austin's drinking water fell to historically low levels. While Austin successfully weathered the drought, the event highlighted the need to increase the sustainability, reliability, and diversity of Austin's water supplies through an integrated water resource plan. Water Forward addresses these issues by modeling potential climate change effects on Austin's water supplies and evaluating multiple future scenarios to plan for droughts worse than what we have experienced in the past. The recommended plan is the culmination of a robust effort that involved the Austin community, the Water Forward Task Force, an outside consultant team, City staff, and others.

Water Forward recommended strategies include both major water supply projects and incremental solutions such as demand management or reuse. As Austin grows, new development can help to implement these demand management and reuse strategies to incrementally meet growing demands. The major water supply projects included in the plan are recommended largely to augment Austin's access to water during drought when our core surface water supplies are severely limited.

In a changing climate and growing community, there will always be uncertainty and risks to manage. The Water Forward plan recommendations will be implemented using an adaptive management approach, which means that we will be able to make adjustments to respond to changing conditions. Implementation of Water Forward recommendations will help Austin Water continue its commitment to providing clean, safe, reliable, and affordable water services to our customers.



WATER FORWARD GUIDING PRINCIPLES

Austin's Water Forward is a program to develop a long-term integrated water resources plan for the next 100 years. The following represents the plan's guiding principles:

- Recognizing that Colorado River water is Austin's core supply, continue a strong partnership between the City and LCRA to assure its reliability
- Continue Austin's focus on water conservation and water use efficiency
- Strengthen long-term sustainability, reliability, and diversity of Austin's water supply through maximizing local water resources
- Avoid severe water shortages during times of drought
- Focus on projects that are technically, socially, and economically feasible
- Continue to protect Austin's natural environment, including source and receiving water quality
- Ensure Austin's water supply continues to meet/exceed all federal, state and local public health regulations
- Align with Imagine Austin's "Sustainably Manage Our Water Resources Priority Program"
- Maintain coordination and communication with regional partners
- Engage the public and stakeholders throughout the plan development process

Need for an Integrated Water Resource Plan (IWRP)

1. Need for an Integrated Water Resource Plan (IWRP)

Austin's continued population growth and development, the lessons of the historic 2008-2016 drought, and climate change pose challenges that require creative and robust solutions. An integrated water resource plan is an effective tool for planning how to address these challenges. The strength of this holistic planning method is that it allows the community to evaluate tradeoffs between potential solutions and to build solutions that achieve the most benefit in many objectives. To ensure that the plan reflects our community's values, the project team attended over 80 community events to gather feedback to inform the plan recommendations.

1.1 Population Growth

Austin has long been one of the fastest-growing cities in America. This growth is reflected in the Water Forward demand projections. Regional growth was also captured in river basin modeling that simulated future demands on the Colorado River and Highland Lakes. Water Forward includes conservation and supply strategies, including reuse, to meet the additional demand created by a growing City of Austin population. One of the ways to gauge the effectiveness of water conservation and reuse is to calculate how much water is used per person per day across the City, a measure known as gallons per capita per day (GPCD). **Figure 1** shows the projected Austin Water served population, customer demand, and calculated long-term average GPCDs assuming implementation of the recommended Water Forward strategies.

The Water Forward plan was developed to meet needs identified through a preliminary analysis of current supplies and potential shortages. Potential future demand management and supply options were then combined to meet those identified needs. After determining the recommended plan strategies, the resulting GPCD amounts were calculated. The Water Forward plan was not developed to meet specific long-term average GPCD targets, but GPCD can be used to track progress in implementing plan strategies. When evaluating GPCDs, it is important to consider that divergence from projected population growth estimates and climate and weather variation, among other factors, can lead to differences in projected strategy yields, customer demands, and ultimately GPCDs. More information on GPCD as a metric can be found in the Water Forward Plan Report.

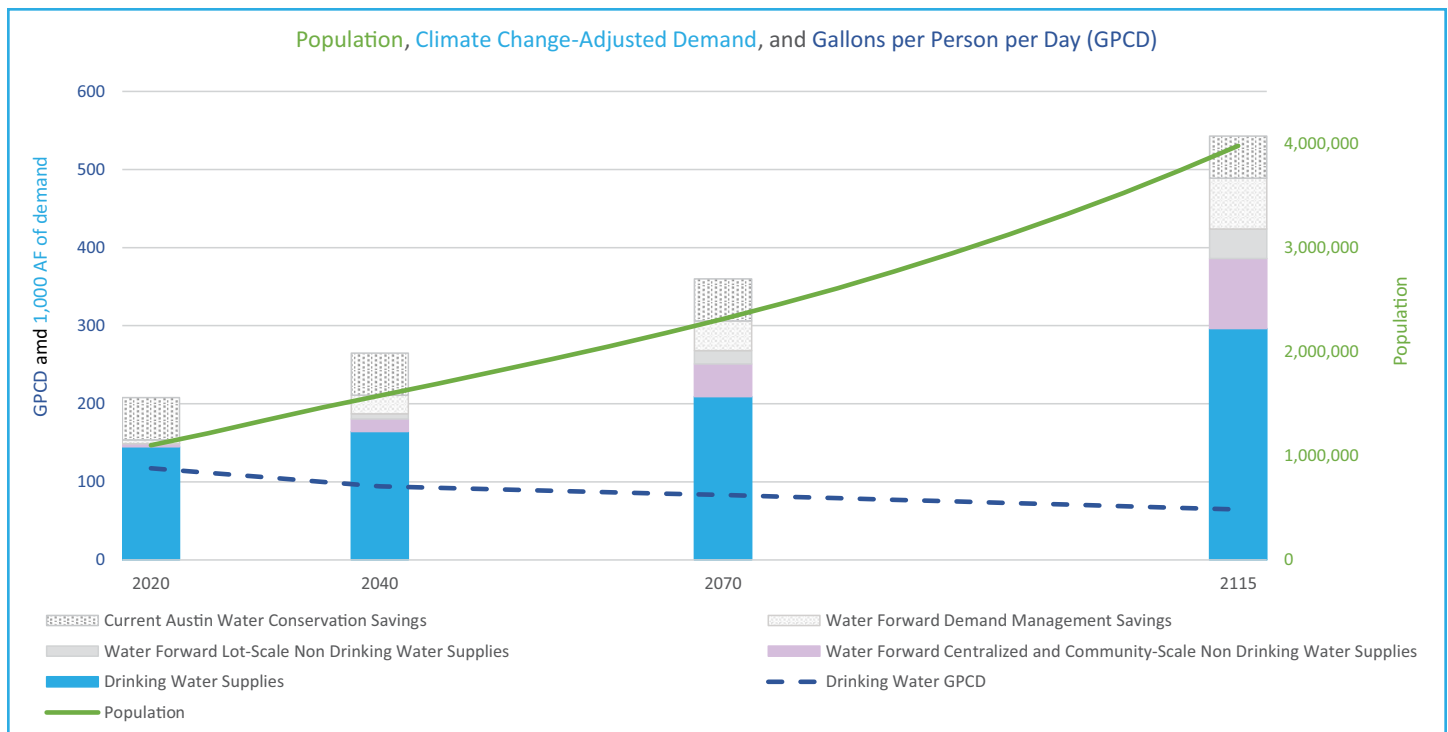


Figure 1. Population, Climate Change-Adjusted Demand, and GPCD for Water Forward Planning Horizons

Need for an Integrated Water Resource Plan (IWRP)



1.2 Drought

During the historic 2008-2016 drought, Austin's water management portfolio was made up of its Colorado River and Highland Lakes supply, reclaimed water supply, conservation water savings, and drought contingency plan water savings. The drought caused storage in the Highland Lakes to drop to near-record lows and the inflows that we rely on to refill the lakes were lower than they had ever been. During the drought, Austin was evaluating a number of emergency strategies on an accelerated schedule. With Water Forward, Austin has taken the opportunity to proactively develop future demand management and supply strategies to avoid potential water shortages.



Figure 2. Lake Travis During the Historic 2008-2016 Drought

1.3 Climate Change

Climate scientists project that in the future the Austin region will see longer and deeper periods of drought punctuated by heavy rain events. Figure 3 illustrates the projected increase in temperature and changing precipitation in the Austin region, which will likely have profound impacts on flood and drought patterns. Water Forward evaluated multiple future scenarios which considered climate change effects and droughts worse than those experienced in the past to ensure reliability of the plan recommendations through a range of possible futures.

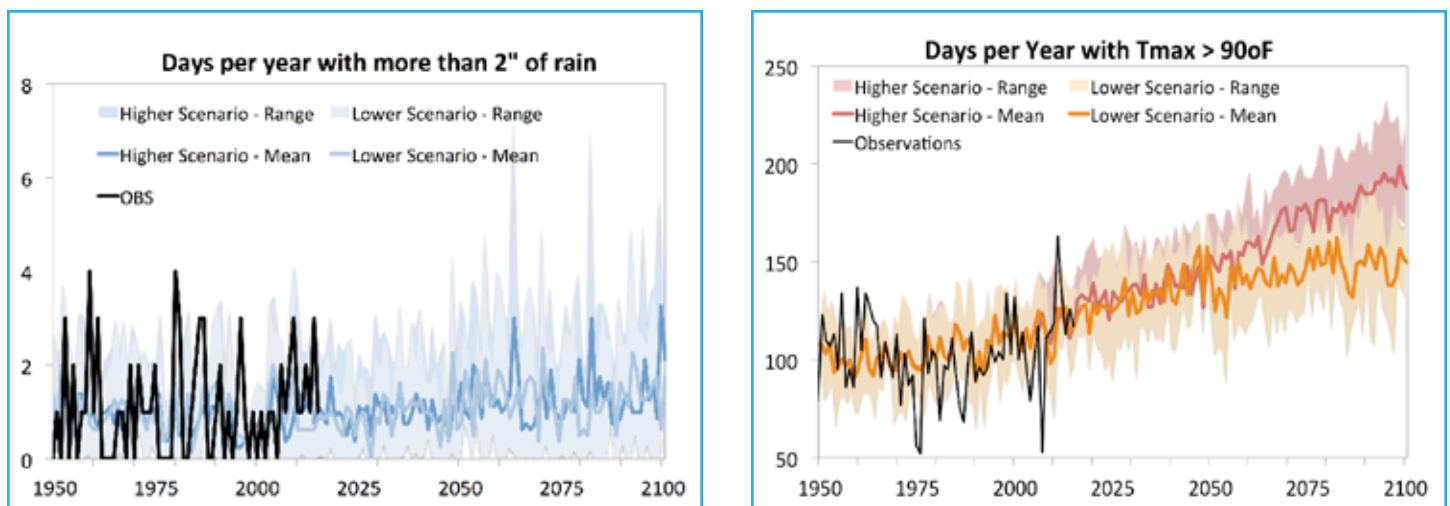


Figure 3. Projected Increase in Temperature and Changes in Precipitation in the Austin Region

Recommendations

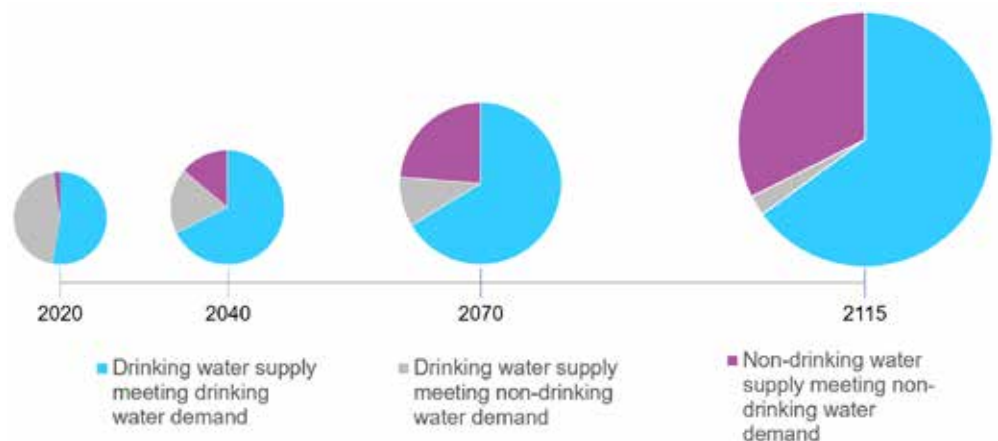
2. Water Forward Recommendations

The Water Forward plan includes a robust set of strategies to conserve water and make our buildings and landscapes more water efficient. To help reduce leaks on the customer side, the plan recommends using Advanced Meter Infrastructure technology to alert customers to potential leaks and to help them manage their water consumption in close to real time. The plan also recommends reducing losses from pipes in the utility's water distribution system by enhancing Austin Water's current water loss reduction program.

The plan recommends the expansion of several existing Austin Water rebate programs, including programs to assist customers with the costs of "smart" controllers that help to make irrigation systems more efficient and current incentives to existing development to install water-efficient landscapes. The plan also recommends developing an ordinance to require water efficient landscapes for new single-family homes. To achieve efficient water use for many different types of development, the plan recommends developing benchmarks and water budgets that would initially encourage and eventually require customers to meet water usage targets.

The plan also includes strategies to make use of all water, including rainwater, stormwater, graywater, air conditioning condensate, and wastewater (typically called "alternative waters") that can be treated and reused to meet non-drinking water demands (see Figure 4). To do this, the plan recommends immediately beginning work to develop ordinances to require that new larger commercial and multifamily buildings install dual plumbing and use alternative water generated on-site or from the City's reclaimed water system for both indoor and outdoor non-drinking water purposes. Non-drinking water purposes include demands like toilet flushing and landscape irrigation.

Figure 4
Amount of Non-Drinking Water Demand Being Met by Non-Drinking Water Sources Over Time



To encourage existing development to use alternative water sources, the plan recommends additional enhancements to Austin Water's current rebate programs. The plan also recommends modifying what is currently in code to require more new developments to connect to the City's reclaimed water system and recommends expansion of the reclaimed water system to meet growing non-drinking water demands in the future.

To see our community through future droughts, Water Forward recommends implementing storage strategies like Aquifer Storage and Recovery by 2040 and a new Off Channel Reservoir within the next fifty years. Storage strategies will allow Austin to store water available during wet times so that water can be retrieved and used to meet drinking water demands during dry times. In the event of a severe drought, the plan recommends Indirect Potable Reuse as a short-term emergency strategy. The plan also recommends the City bring on additional supplies by capturing local inflows to Lady Bird Lake in the near term and treating Brackish Groundwater to drinking water quality further into the future.

The Water Forward plan also reflects our continued commitment to Austin's core Colorado River supplies and implementation of best management practices. All of the Water Forward strategies are recommended as additions to Austin's current supplies, which include our core Colorado River supply, reclaimed water program, water conservation program, and drought contingency plan. As Austin's core supply, the City will continue to work with its regional partners to protect and enhance the Colorado River and Highland Lakes system supply.



3. Water Forward Plan Benefits

Implementation of the recommended Water Forward strategies will be transformative for the City of Austin and provide many benefits for our community (see [Figure 5](#)). Water Forward's recommended strategies will help Austin stretch existing supplies by reducing overall demands, being more efficient with the water we do use, and expanding water reuse. Capturing and reusing water at the point of use increases our community's ability to access all local water sources and adds to supply diversity and resiliency. Expanding reuse supplies, whether at the building scale or from the City's reclaimed water system, allows us to use non-drinking water to meet demands that do not require drinking water quality. This "fit for purpose" approach offsets demand for drinking water supplies while providing a source of supply that is less affected by changes in climate. In addition, increasing water supply reserves through Aquifer Storage and Recovery will help to provide water to the City through the longer periods of drought that we may experience in the future. During the implementation phase, further benefits such as delaying additional payment for currently contracted water supplies and potentially delaying infrastructure improvements may be realized by the Water Forward strategies. The extent of these potential benefits will be explored through modelling and analysis to be performed in the plan implementation phase and will inform strategic deployment of the strategies.

By diversifying Austin's water supply and demand management portfolio, Water Forward increases the City's ability to maintain a reliable supply for the next 100 years. [Figure 6a](#) and [Figure 6b](#) show modeling results that illustrate how the strategies perform through a repeat of the historic 2008-2016 drought. [Figure 6a](#) shows that the identified needs are met if demands are set at projected 2020 levels and Water Forward strategies are implemented. [Figure 6b](#) shows that with the Water Forward strategies implemented, the City's demands are also met when demands are set at the higher projected 2115 levels. In [Figure 6c](#), the drought that was simulated to mimic the 2008-2016 drought was made more severe to reflect potential climate change impacts. Using this simulation, with demands set at higher 2115 levels and with the Water Forward strategies implemented, a portion of the City's demands are met with a future regional supply source rather than Water Forward strategies. For the further-out planning horizons, planning to meet a portion of the City's future demands with a regional supply source was an intentional decision that reflects the uncertainty inherent in planning over a 100-year horizon. This reinforces the need to work with the City of Austin's partners in the Colorado River Basin to protect and enhance our future supplies, the results of which will be reflected in future plan updates.

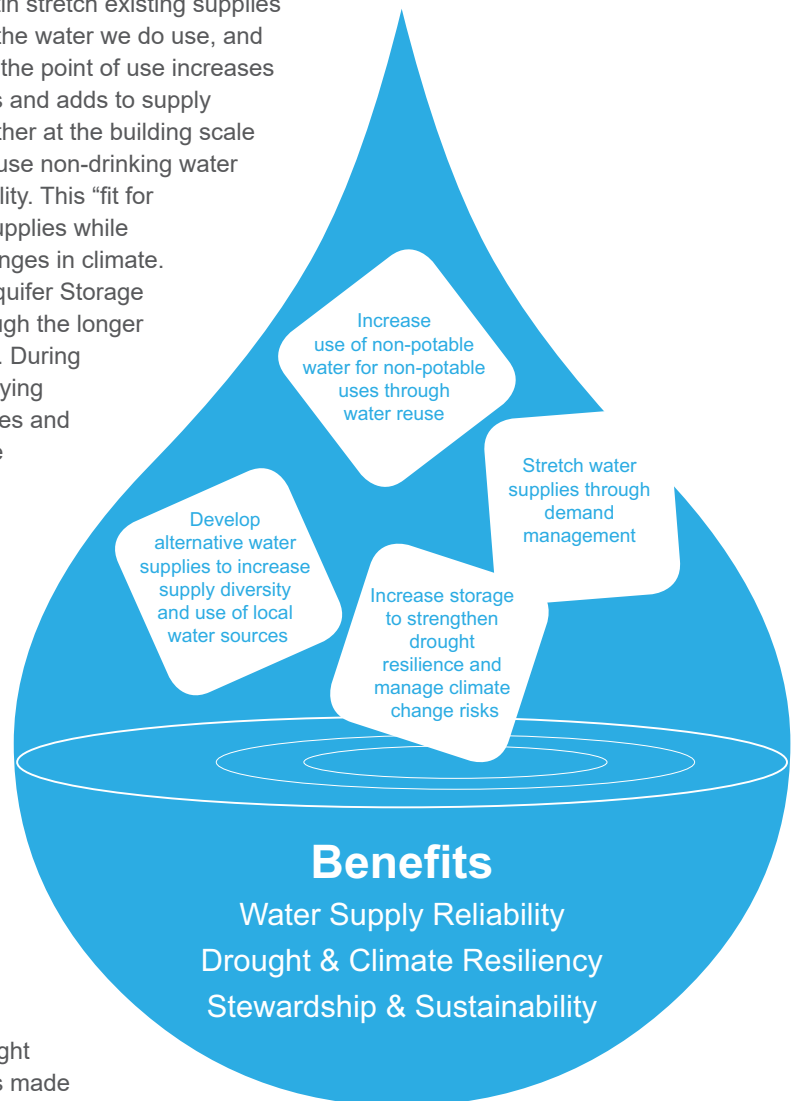


Figure 5
Water Forward Plan Benefits

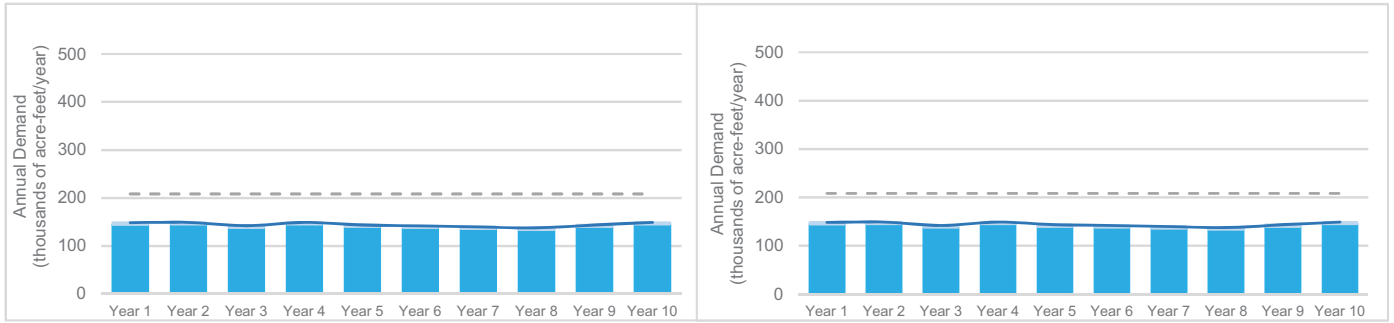
Strategies to Meet Austin's Projected Water Demands

Water Forward Modeling Results for Drought Hydrology

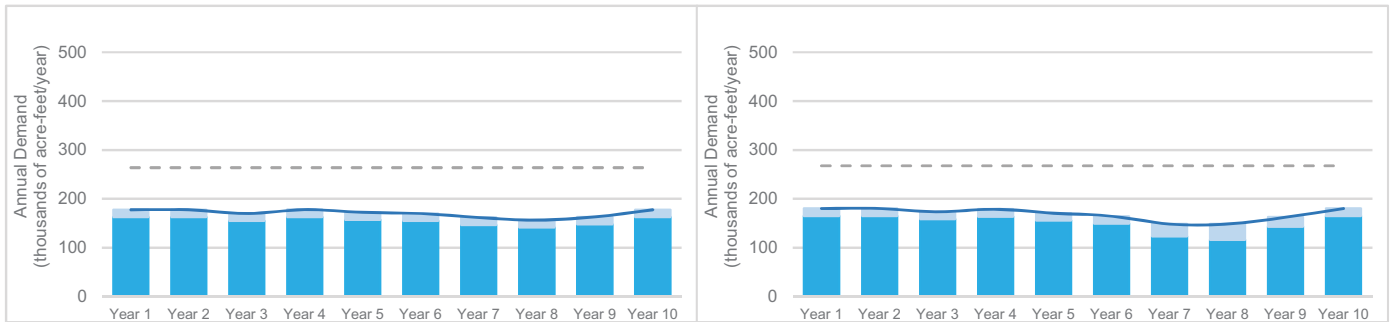
Stationary Climate

2020

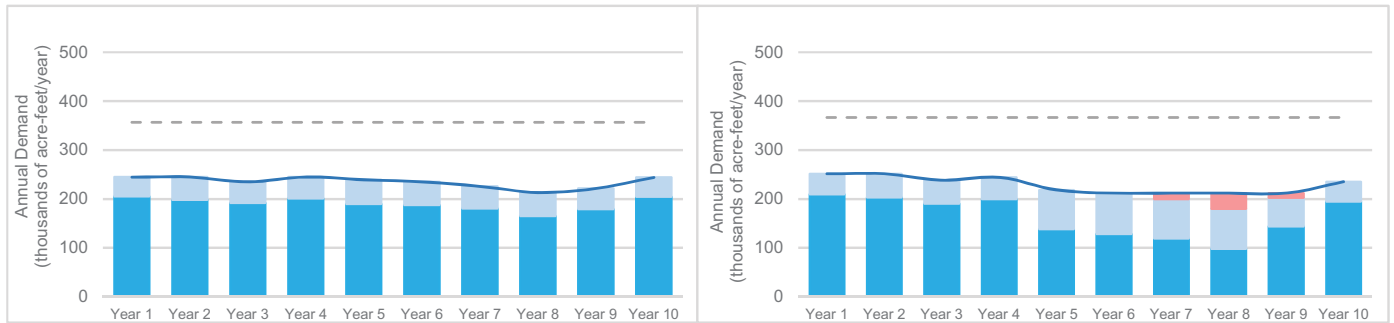
Climate Change Demands and Hydrology



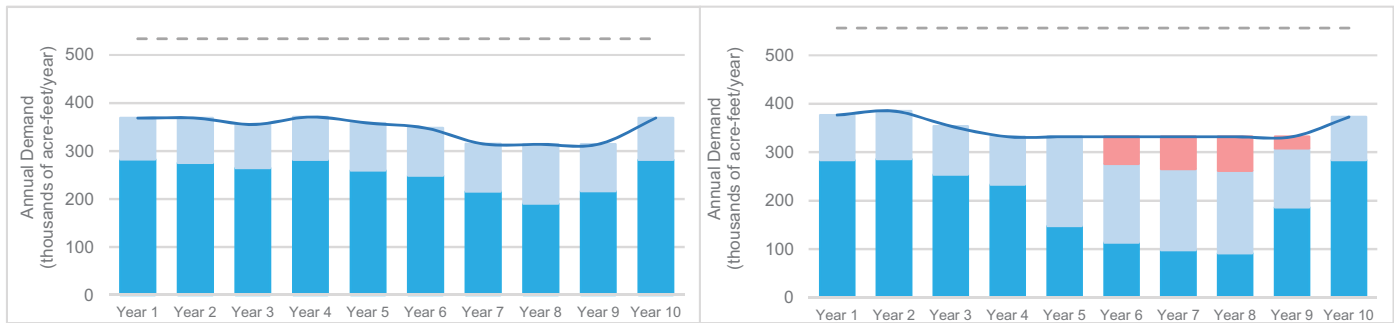
2040



2070



2115



- Remaining Regional Supply
- Water Forward Supply Strategies
- Existing Colorado River Supply
- - - Baseline Demand
- Baseline Demand Minus Current and Water Forward Conservation Savings

Figure 6

Recommended Water Forward Strategies Modeled Through a Ten-Year Drought Sequence in Stationary and Climate Change Scenarios

Adaptive Management Plan and Implementation

4. Adaptive Management Plan and Implementation

Austin Water plans to begin the implementation process immediately after City Council approval of the Water Forward Plan. During the next five years Austin Water will take actions that are described in more detail in the sidebar. The Water Forward plan will be updated on a five-year cycle, using new data about changing conditions to inform potential adjustments to the planned implementation strategy and ensuring that we are on a path to meeting our goals.

The Water Forward plan is a high-level strategic plan intended to provide a roadmap to guide development of future programs, projects, and ordinances. The planning-level estimated costs to implement the recommended options through the 2040 planning horizon are presented in the main Water Forward Plan Report, and further detail can be found in the appendices of the report. The estimated capital and operations and maintenance (O&M) costs presented reflect community costs, which include costs to be paid by Austin Water and its ratepayers, as well as costs to developers and program participants, with potential cost offsets through utility incentives. The costs are generally grouped into three categories. The cumulative capital cost planning-level estimates between 2019 and 2040 for the three categories are: current utility strategic initiatives in the capital plan—\$614M, new utility strategies—\$429M, and developer/program participant-owned strategies with potential cost offsets through utility incentives—\$274M.

Cost and affordability were key community values communicated to the project team throughout the public input process for Water Forward. The recommended Hybrid 1 portfolio contains several conservation and reuse strategies, which help in stretching our existing supplies through delaying the cost of paying for water under our current municipal water supply contract or purchasing additional supply that would be needed every year. The cost of implementing the recommended strategies could be funded through, among other methods, Austin Water revenues, low-interest bonds or other outside funding, development costs, or shared community investments. In some cases, Austin Water investments could be combined with investments from the community, as in rebates and other incentive programs. Austin Water will work to determine what funding and resource requirements are most suitable to consider for implementing plan strategies and programs. More detailed cost estimates and funding approaches for each recommended strategy will be developed in the implementation phase and will be subject to future Council action as required.



Major Water Forward Implementation Actions in the Next 5 Years

Ordinances (new or changes to existing)

- Develop alternative water ordinance for new larger commercial and multifamily development
- Develop dual plumbing ordinance for new larger commercial and multifamily development
- Expand current reclaimed water system connection requirements
- Develop ordinance to require submittal of water use information for new development
- Monitor existing ordinances related to air conditioning condensate reuse and cooling tower and steam boiler efficiency

Incentives

- Expand alternative water incentive program
- Expand landscape incentive program
- Expand irrigation efficiency incentive program

Projects and Programs

- Study and begin design, construction, and testing of an Aquifer Storage and Recovery pilot
- Implement Advanced Metering Infrastructure
- Enhance utility water loss reduction program
- Expand the centralized reclaimed water system
- Explore opportunities for community-scale decentralized reclaimed water systems
- Refinement of Indirect Potable Reuse emergency strategy
- Refinement of Capture Lady Bird Lake Inflows strategy
- Begin preliminary analyses to support five-year Water Forward plan update

Implementation Actions in the Next Five Years

Implementing the Water Forward recommendations will require a thoughtful approach that protects public health, considers social equity, and maintains affordability and utility financial resilience. Austin Water is committed to implementing the Water Forward plan as quickly as possible, with appropriate time to hear from the community and develop implementation approaches that mitigate unintended consequences.

Future Water Forward efforts will continue the plan's emphasis on public outreach and community involvement. The plan recommends convening the Water Forward Task Force on a quarterly basis to support plan implementation efforts. With hard work and community support, implementation of Water Forward will create a more sustainable, reliable water supply for Austin for the next 100 years and beyond.

The recommended Water Forward strategies are presented in [Table 1](#) and can generally be grouped into two categories: demand management options and supply options. Demand management options are strategies which reduce the demand on Austin's drinking water supply system, either by removing a demand (for example, transforming landscapes to require less water) or by offsetting drinking water demands (for example collecting rainwater to use for irrigation rather than drinking water). Certain demand management options, such as lot scale rainwater harvesting, were generally modeled to provide only the amount of yield that was needed to meet non-potable demands. Supply options are strategies which produce additional water to meet demands. This water includes strategies for drinking water supplies and non-drinking water supplies where appropriate. Supply options that are primarily for use during drought may not contribute yield on a year-to-year basis. In the table, "Estimated Yield" represents the target yields in each planning horizon. Actual yield from the Water Forward strategies will vary based on a number of factors depending on the type of option. Key factors include climate and weather variability, hydrology, and growth in population with subsequent growth in demand.



Social Equity and Affordability

Water Forward began with the goal of conducting public outreach so that input from our community would equitably reflect the diversity of Austin's population and the utility's customers. The project team worked toward this goal through various means, including in-person outreach at community group meetings and online surveys and webcasts (see [Appendix A](#) in the plan report for more information). Social equity was also included as a measure used to evaluate potential Water Forward strategies.

During the implementation phase, social equity will continue to be a key consideration in the development of ordinances, incentive programs, and water supply projects. The implementation process will also include evaluation of ways to mitigate affordability impacts on ratepayers and residents. Public outreach efforts will continue during implementation to continue community dialogue and engagement.



Option #/ Type	Recommended Strategies	Average/ Drought	Estimated Yield Capacity (Acre Feet per Year) ¹			
			2020	2040	2070	2115
Demand Management Options						
D1	Advanced Metering Infrastructure (AMI)	Both	600	3,880	5,770	9,370
D2	Utility Side Water Loss Control	Both	3,110	9,330	10,918	13,060
D3	Commercial, Industrial, and Institutional (CII) Ordinances	Both	1,060	1,060	1,060	1,060
D4	Water Use Benchmarking and Budgeting	Both	-	5,950	11,670	25,230
D5	Landscape Transformation Ordinance	Both	-	3,040	7,430	15,050
D6	Landscape Transformation Incentive	Both	-	320	630	930
D7	Irrigation Efficiency Incentive	Both	40	210	430	390
D8	Lot Scale Stormwater Harvesting	Both	-	330	870	2,280
D9	Lot Scale Rainwater Harvesting	Both	-	1,550	4,030	9,250
D10	Lot Scale Graywater Harvesting	Both	-	2,130	5,620	12,670
D11	Lot/Building Scale Wastewater Reuse	Both	-	1,320	3,670	7,880
D12	Air Conditioning (AC) Condensate Reuse	Both	100	1,080	2,710	5,150
	Demand Management Strategies Sub-Total	-	4,910	30,200	54,810	102,320
Water Supply Strategies						
S1	Aquifer Storage and Recovery	Drought	-	60,000	60,000	90,000
S2	Brackish Groundwater Desalination	Both	-	-	5,000	16,000
S3	Direct Non-Potable Reuse (Centralized Reclaimed Water System)	Both	500	12,000	25,000	54,600
S1a	Indirect Potable Reuse (IPR) through Lady Bird Lake	Drought	-	11,000	20,000	20,000
S1b	Capture Local Inflows to Lady Bird Lake (infrastructure also included as part of IPR, above)	Average	-	3,000	3,000	3,000
S7	Off Channel Reservoir	Both	-	-	25,000	25,000
S9	Distributed Wastewater Reuse	Both	-	3,150	14,470	30,050
S10	Sewer Mining	Both	-	1,000	2,210	5,280
S11	Community Scale Stormwater Harvesting	Both	-	160	240	500
	Drought Supply Strategies	-	-	71,000	80,000	110,000
	Average/Both Supply Strategies	-	500	19,310	74,910	134,440
	Water Supply Strategies Sub-Total		500	90,310	154,910	244,440
Water Forward Recommend Strategies Overall Total			5,410	120,510	209,720	346,750
Water Forward Recommended Implementation Strategies to Realize Estimated Yields Above						
	Phase 1 and 2: Water Use Benchmarking and Budgeting Ordinance					
	Phase 1 and 2: Alternative Water Ordinance					
	Expansion of Alternative Water Incentive					
	Phase 1 and 2: Dual Plumbing Ordinance Development					
	Ordinance to Expand Existing Centralized Reclaimed Water Connection Requirements					
Current Supplies and Conservation						
	Colorado River and Highland Lakes Supply	Both	325,000			
	Drought Contingency Plan	Drought	Varies			
	Austin Water Conservation Programs*	Both	54,320			
	Centralized Reclaimed Water System	Both	3,960			

*Note: Austin Water conservation program savings were estimated based on savings calculated during 2012-2015

Table 1 Water Forward Recommended Strategies with Planning Horizon Yields

Landscape Transformation Incentives or Ordinances

Landscape transformation to regionally-appropriate landscapes can reduce water needs for outdoor irrigation and provide additional benefits.

The Water Forward recommendations are to implement incentives and ordinances to encourage water use efficiencies and reduce water needs for outdoor irrigation. Implementation of an ordinance option could include implementing limitations on turf grass area, and/or irrigation area.



Planning horizon
when option is in effect

2020

2040

2070

2115

Option Category	Demand Management			
Target 2115 yield	16,000 acre-feet/year			
Applicable Customer Category and Types of Uses	Sectors	✓ Single-family residential	✓ Multi-family residential	✓ Commercial
	End Use	Indoor potable	Indoor non-potable	✓ Irrigation
	Type of development	✓ New	✓ Existing	
Climate resiliency indicator	Medium			
Unit cost (\$/acre-foot/year)	\$27			

Irrigation Efficiency Incentives



Irrigation efficiency incentives involve incentivizing customers to improve the efficiency of their automatic irrigation systems, thereby decreasing water consumed for irrigation purposes.

The Water Forward recommendation focuses on expanding current irrigation rebate programs to include rebates for irrigation system controllers and other improvements. Improved irrigation system controllers make flow data such as the amount of water being used for irrigation accessible to the user and are capable of responding to leaks and high flow situations.



Planning horizon
when option is in effect

2020

2040

2070

2115

Option Category	Demand Management			
Target 2115 yield	400 acre-feet/year			
Applicable Customer Category and End-Uses	Sectors	✓ Single-family residential	✓ Multi-family residential	✓ Commercial
	End Use	Indoor potable	Indoor non-potable	✓ Irrigation
	Type of development	✓ New	✓ Existing	
Climate resiliency indicator	Medium			
Unit cost (\$/acre-foot/year)	\$202			

Advanced Metering Infrastructure (AMI)

AMI, or smart meters, record near real-time water use and provide that information through an easy-to-use interface such as a web app or a smart phone app.

As recommended through the Water Forward plan, Austin Water plans to replace existing meters with AMI meters whose data will help reduce potable water loss primarily due to leaks and help customers better understand their water use.



Planning horizon
when option is in effect

2020

2040

2070

2115

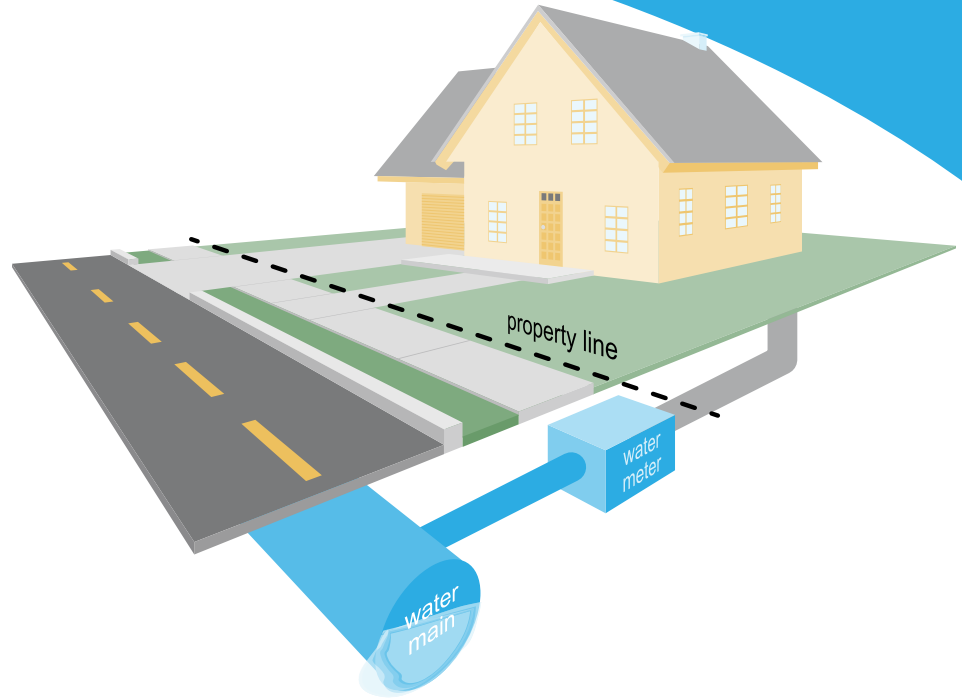
Option Category	Demand Management			
Target 2115 yield	9,380 acre-feet/year			
Applicable Customer Category and End-Uses	Sectors	✓ Single-family residential	✓ Multi-family residential	✓ Commercial
	End Use	✓ Indoor potable	✓ Indoor non-potable	✓ Irrigation
	Type of development	✓ New	✓ Existing	
Climate resiliency indicator	High			
Unit cost (\$/acre-foot/year)	\$2,800			

Utility-Side Water Loss Control



Water loss in the potable water distribution system has been reduced through utility-side programs that focus on preventing leaks, finding and fixing leaks, and improving response times to active leaks between the water treatment plant and the end user.

The Water Forward recommendation is for Austin Water to continue and enhance its ongoing efforts to reduce utility-side water loss



Planning horizon
when option is in effect

2020

2040

2070

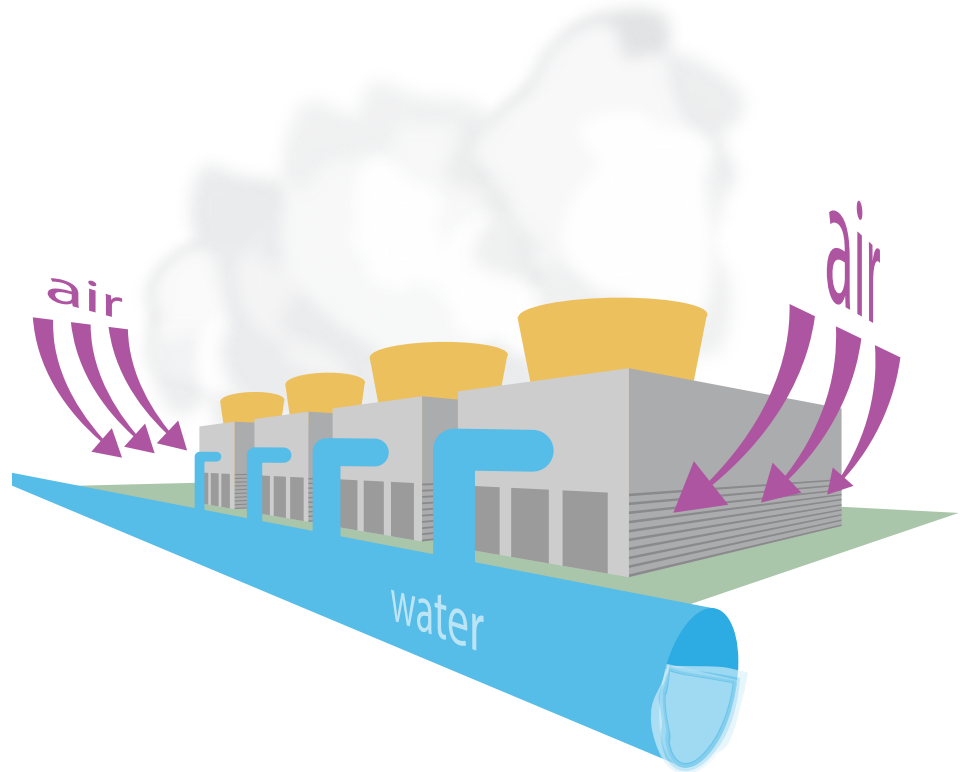
2115

Option Category	Demand Management
Target 2115 yield	13,060 acre-feet/year
Applicable Customer Category and End-Uses	System Wide
Climate resiliency indicator	High
Unit cost (\$/acre-foot/year)	\$3,690

Commercial, Industrial and Institutional (CII) Ordinances – Cooling Towers and Steam Boilers

The Cooling Tower Efficiency Program requires customers to register their cooling towers with Austin Water and submit annual inspection forms. Austin Water developed this program to help customers save money on water and wastewater bills by identifying potential water efficient upgrades and available rebates while meeting cooling and tower equipment water efficiency standards.

This option is a current program and was included as a best management practice as part of the Water Forward plan.



Planning horizon
when option is in effect

2020

2040

2070

2115

Option Category	Demand Management			
Target 2115 yield	1,060 acre-feet/year			
Applicable Customer Category and End-Uses	Sectors	Single-family residential	✓ Multi-family residential	✓ Commercial
	End Use	Indoor potable	✓ Indoor non-potable	Irrigation
	Type of development	New	✓ Existing	
Climate resiliency indicator	High			
Unit cost (\$/acre-foot/year)	\$71			

Water Use Benchmarking and Budgeting

Water use benchmarking and budgeting uses standards to “benchmark” how much water buildings of a certain size would be expected to use. Based on these benchmarks, a “water budget” can be created to track water use in a given building and help users meet their water benchmark.

Developers will provide information about all water-using equipment, fixtures (including counts), proposed water sources and building characteristics associated with the site. The utility will provide potential water use efficiency and alternative water recommendations and information on available incentive and rebate programs.

Based on the water use benchmarking data developed through these programs, this strategy will be expanded in the future to include a water use budget for new development constructed after 2025 (compliance mechanism to be determined).



Planning horizon
when option is in effect

2020

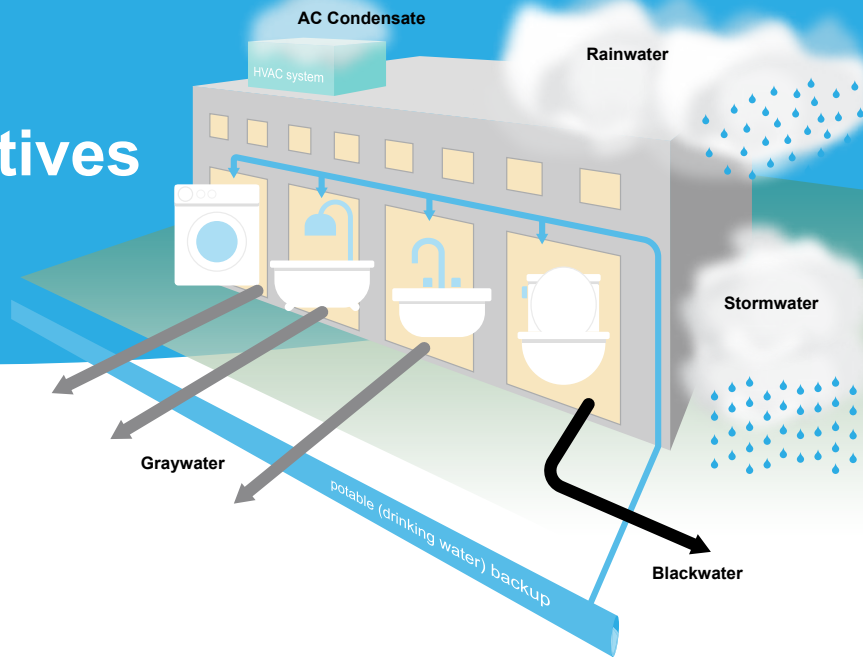
2040

2070

2115

Option Category	Demand Management			
Target 2115 yield	25,200 acre-feet/year			
Applicable Customer Category and End-Uses	Sectors	✓ Single-family residential	✓ Multi-family residential	✓ Commercial
	End Use	✓ Indoor potable	✓ Indoor non-potable	✓ Irrigation
	Type of development	✓ New	Existing	
Climate resiliency indicator	High			
Unit cost (\$/acre-foot/year)	\$21			

Alternative Water Ordinances and Incentives



Require or incentivize, on-site (building-scale) alternative water use (for rainwater, stormwater, blackwater, graywater and AC condensate)

Planning horizon when option is in effect

2020

2040

2070

2115

Rainwater Harvesting (lot-scale)

Lot-scale rainwater harvesting involves the capture and storage of runoff from roofs to supply a range of onsite non-potable demands at the single lot/building scale.

Option Category	Demand Management - Decentralized			
Target 2115 yield	10,600 acre-feet/year			
Applicable Customer Category and Endf Uses	Sectors	✓ Single-family residential	✓ Multi-family residential	✓ Commercial
	End Use	Indoor potable	✓ Indoor non-potable	✓ Irrigation
	Type of development	✓ New	✓ Existing	
Climate resiliency indicator	Medium			
Unit cost (\$/acre-foot/year)	\$2,864			

Planning horizon when option is in effect

2020

2040

2070

2115

Stormwater Harvesting (lot-scale)

Lot-scale stormwater harvesting involves the capture and storage of runoff from impervious surfaces (including roof water) within a single lot boundary to supply a range of onsite non-potable demands at the lot/building scale.

Option Category	Demand Management - Decentralized			
Target 2115 yield	2,280 acre-feet/year			
Applicable Customer Category and Endf Uses	Sectors	Single-family residential	✓ Multi-family residential	✓ Commercial
	End Use	Indoor potable	Indoor non-potable	✓ Irrigation
	Type of development	✓ New	✓ Existing	
Climate resiliency indicator	Medium			
Unit cost (\$/acre-foot/year)	\$6,470			

Planning horizon
when option is in effect

2020

2040

2070

2115

AC Condensate Reuse

Air conditioner (AC) condensate reuse involves the collection and reuse of condensate water from air handling units for multiple non-potable end uses.

Option Category	Demand Management - Decentralized			
Target 2115 yield	5,150 acre-feet/year			
Applicable Customer Category and Endf Uses	Sectors	✓ Single-family residential	✓ Multi-family residential	✓ Commercial
	End Use	Indoor potable	✓ Indoor non-potable	✓ Irrigation
	Type of development	✓ New	✓ Existing	
Climate resiliency indicator	High			
Unit cost (\$/acre-foot/year)	\$2,702			

Planning horizon
when option is in effect

2020

2040

2070

2115

Graywater Reuse (lot-scale)

For the purposes of Water Forward, graywater harvesting is defined as the reuse of water from the laundry, shower, or sinks that are not used for food preparation at the lot/building scale to meet non-potable demands.

Option Category	Demand Management - Decentralized			
Target 2115 yield	12,700 acre-feet/year			
Applicable Customer Category and Endf Uses	Sectors	✓ Single-family residential	✓ Multi-family residential	✓ Commercial
	End Use	Indoor potable	✓ Indoor non-potable	✓ Irrigation
	Type of development	✓ New	✓ Existing	
Climate resiliency indicator	High			
Unit cost (\$/acre-foot/year)	\$9,797			

Planning horizon
when option is in effect

2020

2040

2070

2115

Building-Scale Wastewater Reuse

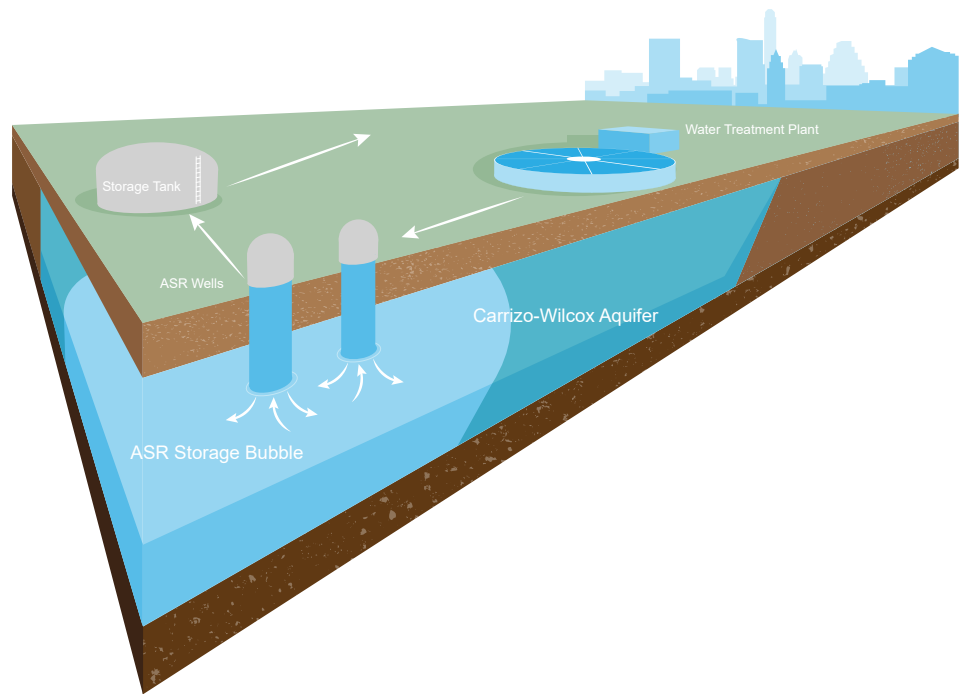
Building-scale wastewater (or blackwater) reuse involves the onsite capture and treatment of the wastewater stream generated from a building for onsite reuse for multiple non-potable end uses.

Option Category	Demand Management - Decentralized			
Target 2115 yield	7,880 acre-feet/year			
Applicable Customer Category and Endf Uses	Sectors	Single-family residential	✓ Multi-family residential	✓ Commercial
	End Use	Indoor potable	✓ Indoor non-potable	✓ Irrigation
	Type of development	✓ New	✓ Existing	
Climate resiliency indicator	High			
Unit cost (\$/acre-foot/year)	\$11,726			

Aquifer Storage and Recovery Carrizo-Wilcox Aquifer

Aquifer storage and recovery is a strategy in which water (ex: potable or drinking water) is stored in an underground aquifer during wetter periods of rainfall and recovered for use during drier periods such as drought. Storing water underground avoids water loss due to evaporation that occurs in surface water storage.

The Water Forward plan includes a recommendation to pipe treated drinking water from the City of Austin's water distribution system to an aquifer storage and recovery well field for injection and storage in the Carrizo-Wilcox Aquifer. During drier periods stored water would be recovered and piped back into the City's water distribution system.



Planning horizon
when option is in effect

2020

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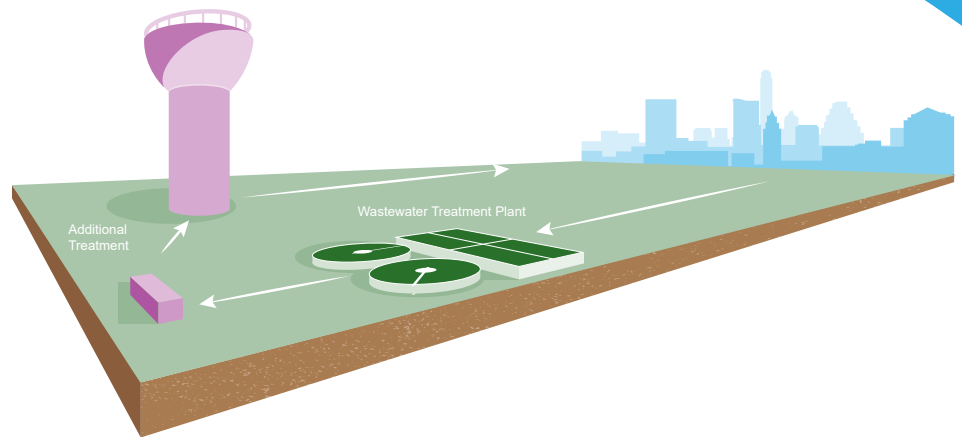
Option Category	Water Supply			
Target 2115 yield	90,000 acre-feet/year			
Applicable Customer Category and Types of Uses	Sectors	✓ Single-family residential	✓ Multi-family residential	✓ Commercial
	End Use	✓ Indoor potable	✓ Indoor non-potable	✓ Irrigation
	Type of Use	✓ New	✓ Existing	
Climate resiliency indicator	High			
Unit cost (\$/acre-foot/year)	\$1,174			

Direct Non-potable Reuse (Centralized Reclaimed or Purple Pipe System)



Austin Water provides highly treated wastewater (through a purple pipe reclaimed water system) for non-potable uses such as irrigation, cooling, manufacturing, and toilet flushing.

The Water Forward plan includes expansion of the existing reclaimed water system and reclaimed water use by 2040 to serve more than three times the amount currently used for meeting non-potable demands.



Planning horizon
when option is in effect

2020

2040

2070

2115

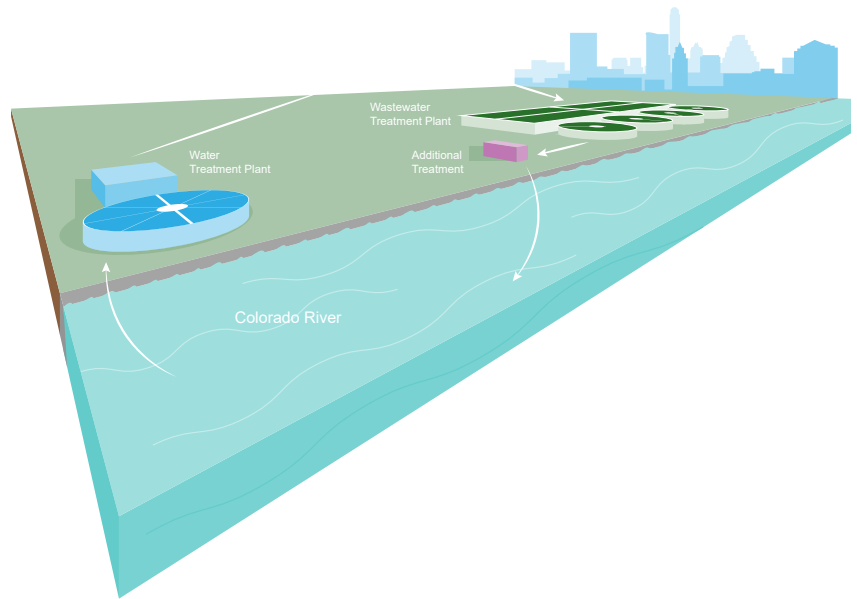
Option Category	Water Supply			
Target 2115 yield	54,600 acre-feet/year			
Applicable Customer Category and End-Uses	Sectors	✓ Single-family residential	✓ Multi-family residential	✓ Commercial
	End Use	Indoor potable	✓ Indoor non-potable	✓ Irrigation
	Type of development	✓ New	✓ Existing	
Climate resiliency indicator	High			
Unit cost (\$/acre-foot/year)	\$1,229			

Indirect Potable Reuse (IPR) and Capture Lady Bird Lake Inflows

Indirect potable reuse uses highly treated reclaimed water discharged into an environmental buffer such as a river before purification to drinking water quality at a water treatment plant.

As part of Water Forward’s recommendations, indirect potable reuse would be used as a deep drought strategy. If the combined storage of lakes Travis and Buchanan reach levels less than 20%, highly treated reclaimed water would be conveyed from the South Austin Regional Wastewater Treatment Plant to Lady Bird Lake. The water would be pumped from Lady Bird Lake to be treated to drinking water quality at Ullrich Water Treatment Plant.

Elements of the infrastructure used in indirect potable reuse will serve multiple functions. Apart from being used for indirect potable reuse during deep drought, most of the infrastructure will be used for other purposes on a more regular basis. Some elements would be used to capture available water flowing into Lady Bird Lake from creeks and springs. This water would also be conveyed to Ullrich Water Treatment Plant. Other elements would be used to provide reclaimed water as part of the purple pipe reclaimed water system.



Planning horizon
when option is in effect

2020

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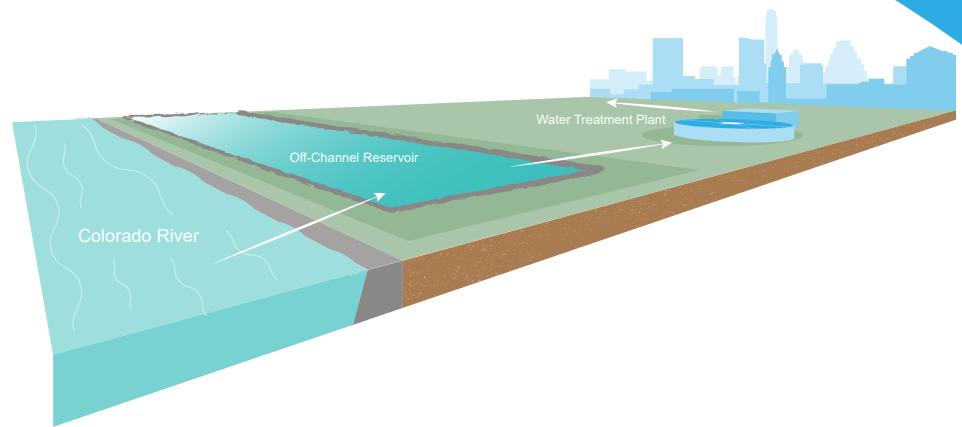
Option Category	Water Supply			
Target 2115 yield	20,000 acre-feet/year			
Applicable Customer Category and End-Uses	Sectors	✓ Single-family residential	✓ Multi-family residential	✓ Commercial
	End Use	✓ Indoor potable	✓ Indoor non-potable	✓ Irrigation
	Type of development	✓ New	✓ Existing	
Climate resiliency indicator	High			
Unit cost (\$/acre-foot/year)	\$605			

Off-Channel Reservoir (OCR) with Lake Evaporation Suppression



An off-channel reservoir is a water storage body constructed near a river. Water can be pumped from the river into the reservoir during wetter periods of rainfall and used as drinking water during drier periods such as drought.

This Water Forward recommendation would involve the construction of a new 25,000 acre-foot off-channel reservoir in the Austin area. A lake evaporation suppressant, such as a thin layer of food-safe material would be applied in the summer to reduce water loss due to evaporation.



Planning horizon
when option is in effect

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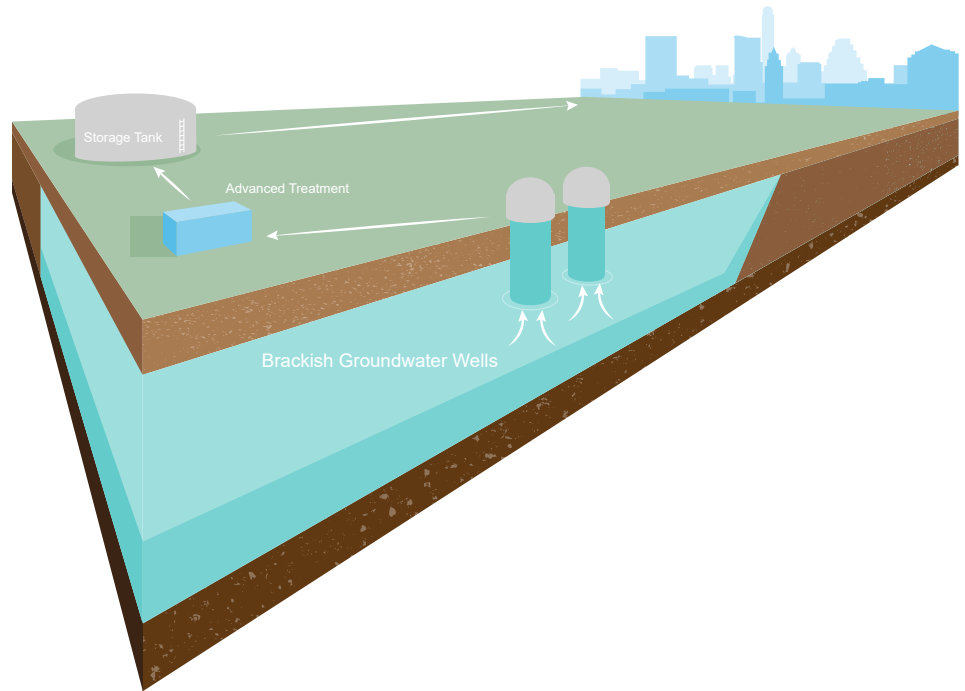
2115

Option Category	Water Supply			
Target 2115 yield	25,000 acre-feet/year			
Applicable Customer Category and End-Uses	Sectors	✓ Single-family residential	✓ Multi-family residential	✓ Commercial
	End Use	✓ Indoor potable	✓ Indoor non-potable	✓ Irrigation
	Type of development	✓ New	✓ Existing	
Climate resiliency indicator	Medium			
Unit cost (\$/acre-foot/year)	\$846			

Brackish Groundwater Desalination

Brackish groundwater is essentially salty groundwater, which generally has lesser salt content than seawater. Desalination is the process of removing dissolved solids such as salts by forcing the water through fine membranes under high pressure.

Water Forward recommendations include brackish groundwater desalination as a potable water supply diversification strategy beyond the 2040 planning horizon.



Planning horizon
when option is in effect

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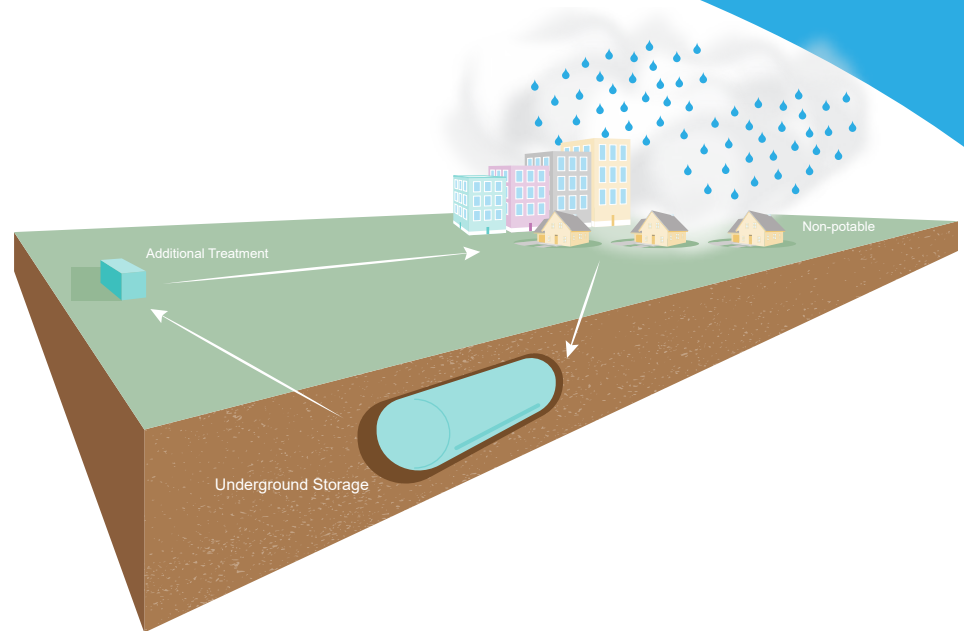
Option Category	Water Supply			
Target 2115 yield	16,000 acre-feet/year			
Applicable Customer Category and End-Uses	Sectors	✓ Single-family residential	✓ Multi-family residential	✓ Commercial
	End Use	✓ Indoor potable	✓ Indoor non-potable	✓ Irrigation
	Type of development	✓ New	✓ Existing	
Climate resiliency indicator	Medium			
Unit cost (\$/acre-foot/year)	\$2,690			

Community Stormwater Harvesting



In the Water Forward context, community stormwater harvesting means capturing runoff from impervious surfaces such as roofs or paved areas and storing it for non-potable uses like toilet flushing or irrigation.

In addition to on-site stormwater harvesting as a demand management option, Water Forward recommends community stormwater harvesting as a strategy to meet non-potable demands at the neighborhood scale.



Planning horizon
when option is in effect

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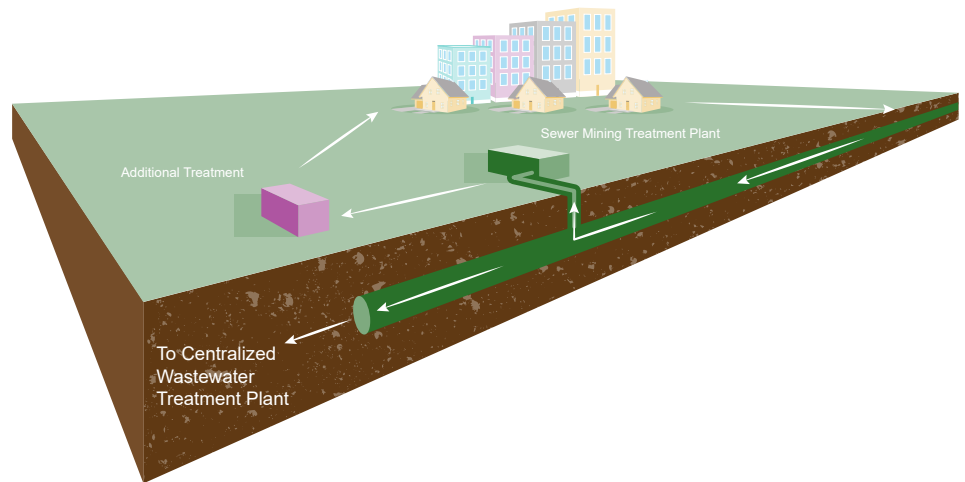
2115

Option Category	Water Supply - Decentralized			
Target 2115 yield	500 acre-feet/year			
Applicable Customer Category and Types of Uses	Sectors	✓ Single-family residential	✓ Multi-family residential	✓ Commercial
	End Use	Indoor potable	Indoor non-potable	✓ Irrigation
	Type of development	✓ New	✓ Existing	
Climate resiliency indicator	Medium			
Unit cost (\$/acre-foot/year)	\$4,261			

Sewer Mining

Although it sounds unusual, sewer mining is a lot like wastewater treatment and reuse but carried out on a smaller scale. It involves extraction of wastewater from centralized wastewater collection pipes, treatment for non-potable uses, and discharge of waste back into the centralized collection system for treatment at a centralized wastewater treatment plant.

The Water Forward recommendation for sewer mining targets meeting non-potable end uses at the neighborhood scale, which could include irrigation, laundry, and water for use in cooling towers.



Planning horizon
when option is in effect

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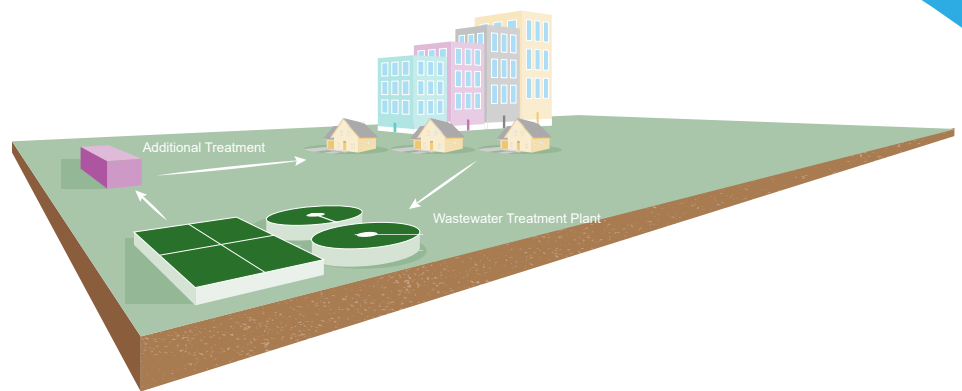
2115

Option Category	Water Supply - Decentralized			
Target 2115 yield	5,300 acre-feet/year			
Applicable Customer Category and End-Uses	Sectors	✓ Single-family residential	✓ Multi-family residential	✓ Commercial
	End Use	Indoor potable	✓ Indoor non-potable	✓ Irrigation
	Type of development	✓ New	Existing	
Climate resiliency indicator	High			
Unit cost (\$/acre-foot/year)	\$2,906			

Distributed Wastewater Systems



Distributed wastewater systems are typically small-scale wastewater treatment plants that operate separately from the centralized wastewater collection and treatment system. They collect water through a local system of wastewater collection pipes, transport it to the distributed wastewater plant, treat the water for non-potable use, and distribute it back out through a small purple pipe reclaimed water system for non-potable use, such as irrigation and cooling, in the surrounding community.



This recommendation targets areas of new development that may be far away from existing centralized wastewater treatment plants.

Planning horizon
when option is in effect

2020

2040

2070

2115

Option Category	Water Supply - Decentralized			
Target 2115 yield	30,000 acre-feet/year			
Applicable Customer Category and End-Uses	Sectors	✓ Single-family residential	✓ Multi-family residential	✓ Commercial
	End Use	Indoor potable	✓ Indoor non-potable	✓ Irrigation
	Type of development	✓ New	Existing	
Climate resiliency indicator	High			
Unit cost (\$/acre-foot/year)	\$1,295			



WATER FORWARD
INTEGRATED WATER RESOURCE PLAN



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