DECEMBER 2024

ONE WATER 2100 PLAN

INAUGURAL IMPLEMENTATION REPORT 2023-2024

The Seven Falls Trail, Santa Catalina Mountains, Tucson, Arizona

CITY OF TUCSON | TUCSON WATER

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ACRONYMS

ADEQ	*Arizona Department of Environmental Quality*
AMA	*Active Management Area*
AMI	*Advance Metering Infrastructure*
AOP	*Advanced Oxidation Process*
ARC	*Arizona Reconsultation Committee*
AWP	*Advance Water Purification*
AZWIFA	*Water Infrastructure Finance Authority of Arizona*
CAB	*Community Advisory Board*
CAP	*Central Arizona Project*
CAVSARP	*Central Avra Valley Storage and Recovery Project*
CAWCD	*Central Arizona Water Conservation District*
CCR	*Consumer Confidence Report*
CEC	*Contaminants of Emerging Concern*
CIP	*Capital Improvement Program*
CIS	*Customer Information System*
City	*City of Tucson*
CTPP	*Central Tucson PFAS Project*
DAWS	*Designation of Assured Water Supply*
DCP	*Drought Contingency Plan*
DES	*Department of Economic Security*
DIY	*Do-It-Yourself*
EPA	*Environmental Protection Agency*
EPDS	*Entry Points to the Distribution System*
GAC	*Granulated Activated Carbon*
GHG	*Greenhouse Gas*
GPCD	*Gallons Per Capita Per Day*
GSFs	*Groundwater Saving's Facilities*
GSI	*Green Stormwater Infrastructure*
HFPO-DA	*Hexafluoropropylene oxide-dimer acid*
HOAs	*Homeowners Associations*
ICS	*Intentionally Created Surplus*
IGA	*Intergovernmental Agreement*
LCRR	*Lead and Copper Rule Revisions*
LIAP	*Low-Income Assistance Program*
LID	*Low-Impact Development*
LIHWAP	*Low Income Housing Water Assistance Program*
LSCRMRP	*Lower Santa Cruz River Managed Recharge Project*
LSCRP	*Lower Santa Cruz Replenishment Project*
LTSC	*Long Term Storage Credits*
MCLGs	*Maximum Contaminant Level Goals*
MGD	*Million Gallons Per Day*
NPDWR	*National Primary Drinking Water Regulation*
PCFCD	*Regional Flood Control District*
PAG	*Pima Association of Governments*
PFAS	*Per and Polyfluoroalkyl Substance*
PFBS	*Perfluorobutane sulfonic acid*
PFHxS	*Perfluorohexane sulfonic acid*
PFNA	*Perfluorononanoic acid*
PFOA	*Perfluorooctanoic acid*
PFOS	*Perfluorooctyl sulfonate*
1W2100 Plan	*One Water 2100 Plan*
PMRRP	*Pima Mine Road Recharge Project*
Reclamation	*The United States Bureau of Reclamation*
RFCD	*Regional Flood Control District*
RWS	*Reclaimed Water System*
SAVSARP	*Southern Avra Valley Storage and Recovery Project*
SCIA	*System Conservation Implementation Agreement*
SDWA	*Safe Drinking Water Act*
SHARP	*Shirley C. Scott Southeast Houghton Area Recharge Project*
S2S Program	*Storm to Shade Program*
TAG	*Technical Advisory Group*
TARP	*Tucson Airport Remediation Project*
TCE	*Trichloroethylene*
UMCR	*Unregulated Contaminant Monitoring Rule*
US	*United States*
USBOR	*United States Bureau of Reclamation*
USGS	*United States Geological Survey*
UV	*Ultra Violet*
WRAP	*Water Reuse Action Plan*
WQARF	*Water Quality Assurance Revolving Fund*

DIRECTOR'S COMMENTS TO TUCSONANS

John P. Kmiec, Director of Tucson Water, City of Tucson

In the fall of 2023, Tucson's Mayor and City Council approved the City of Tucson's One Water 2100 Plan (1W2100 Plan). The 1W2100 Plan provides a roadmap for Tucson Water to optimally manage the City of Tucson's water resources under changing conditions. Although the 1W2100 Plan was recently approved, we have made substantial progress implementing several strategies in support of Tucson's sustainable and integrated One Water approach for the benefit of Tucson and the region. Our goal is to achieve water resilience, water equity, serve as stewards of the Sonoran Desert, and champion quality of life for all Tucsonans as Sonoran Desert dwellers.

Collaboration and community engagement are the cornerstone of successful One Water 2100 planning and implementation. Working together with community members in addition to our local, state, and federal partners has had outstanding positive impacts on Tucson Water's water management strategies. The collaboration highlights the City of Tucson and our water utility's eagerness and efficiency in championing Tucson's water needs now and into the future by securing several pillars for success. We have been and continue to be ahead of the curve when it comes to innovation and strategy. Highlights include:

- Leading the regional charge to conserve water in Lake Mead and the Colorado River by becoming one of the first cities to sign the U.S. Bureau of Reclamation's (USBOR) System Conservation Implementation Agreement (SCIA).
- Funding critical infrastructure and water conservation projects via the Arizona Water Infrastructure Finance Authority (AZWIFA) and Congressionally Directed Funding thanks to the U.S. Congressional appropriations.
- Generating approximately $44 million in funding from the System Conservation Implementation Agreement, approximately $50 million in grants, and forgivable or low interest loans, and $28 million from other sources to improve and update critical infrastructure.

The City of Tucson and Tucson Water are proud of the progress that has taken shape over the past year. As we look to the future, we are optimistic about upcoming projects that bring together community action, technological advancement, sustainable economic development, and utilizing our four water sources—stormwater, groundwater, surface water, and recycled water—to meet Tucson's needs through next generation scenario planning and action.

Lastly, Tucson Water would like to thank our Mayor and Council members for their continued support. The development of the 1W2100 Plan is the result of generous stakeholders throughout the community who participated in the 1W2100 project.

John P. Kmiec

Director of Tucson Water
City of Tucson

BACKGROUND

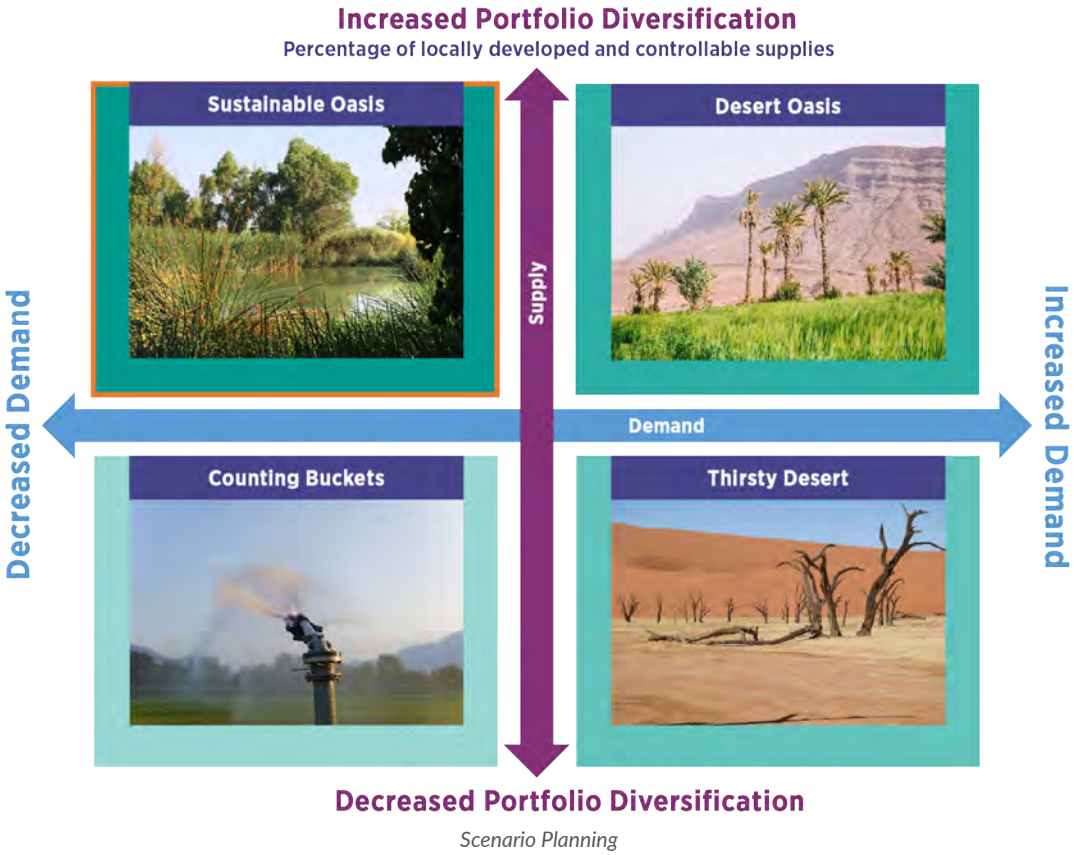
The City of Tucson's Mayor and Council adopted the 1W2100 Plan on October 17, 2023, with a goal of ensuring a sustainable, high quality water supply into the future. The Plan's outlook spans the next 77 years, bringing us to year 2100, and replaces the City's long-term water resource plan, Water Plan: 2000-2050. The Plan is linked to the City's Climate Action and Adaptation Plan, Drought Preparedness and Response Plan, and general plans, Tucson Resilient Together and Plan Tucson, respectively. The Plan outlines a One Water approach, which values the interconnectedness of all water: surface water, groundwater, recycled water, rain and stormwater harvesting, with the guiding principles for commitment to resilience, equity, water stewardship, and maintaining a great quality of life.

The elements of the Plan are based around four plausible future scenarios: two are more desirable, and two less attractive outcomes. The two desirable outcomes are the Sustainable Oasis (decreased demand and increased supply), and Desert Oasis (both increased demand and supply) scenarios. The two less attractive outcomes are the Thirsty Desert (increased demand and decreased supply), and Counting Buckets (both decreased demand and supply) scenarios. Long-range water resource management through 2100 is accomplished through 16 strategies and 68 implementation actions to protect the reliability and quality of Tucson's water supply under changing conditions. The strategies and actions to mitigate the risk of undesirable outcomes were the result of community engagement workshops and interviews, community surveys, Mayor and Council input, Citizens Water Advisory Committees, and feedback from Tucson Water staff. These collaborative efforts, completed over several years, were key components to developing Tucson's One Water future. Each strategy is accompanied by a relative cost (high, low) and effort (1 low - 3 high). Each action has an implementation timeline that spans Ongoing (0- 26 years), Near-Term (1-10 years), Mid-Term (11-25 years), and Long-Term (> 26 years).

The Plan will be used as a guide for developing, implementing, and refining important water policies, as well as making water management and system investment decisions. Therefore, the Plan also ties to Tucson Water's Capital Improvement Program (CIP) budget for long range guidance on future infrastructure projects to address specific actions and strategies.

The Plan's implementation is intended to serve as a framework for the City's efforts to develop and maintain community support and partnerships between City departments and organizations, other Arizona utilities, and government agencies such as the Arizona Department of Water Resources (ADWR), Arizona Department of Environmental Quality (ADEQ), Central Arizona Project (CAP), and Federal partners.

Implementation of the Plan strategies and actions will be shared with the public through this annual progress report provided on the One Water website at tucsononewater.com. Communication will also occur through the Water Matters newsletter, social media, water bill inserts, and community events.



Scenario Planning

I. SURFACE WATER

I. SURFACE WATER

Tucson's effective management of surface water is helping increase local groundwater supplies. The strategies under Tucson Water's surface water resources are aimed at maximizing the beneficial use of Tucson's Colorado River water allocation while taking cooperative actions to promote the long-term viability of this resource for future generations. These are complex water management challenges that require institutional collaboration with a broad range of federal, state, and local partners.

Central Avra Valley Storage and Recovery Project aerial view

SW-1 Maximize the benefits of our current Colorado River supply

During 2023, the Colorado River operated under Tier 2 guidelines of the Lower Basin Drought Contingency Plan. Although Colorado River supply is not reduced under Tier 2 guidelines for municipal providers, to benefit Lake Mead water elevations, Tucson voluntarily conserved a large volume of our entitlement through the System Conservation Implementation Agreement (SCIA).

Tucson's annual entitlement of renewable Colorado River supplies is 144,191 acre-feet. The CAP delivers Colorado River water to Tucson's Clearwater facilities, Central Avra Valley Storage and Recovery Project (CAVSARP) and the Southern Avra Valley Storage and Recovery Project (SAVSARP), located in Avra Valley west of Tucson. Since 2012, Tucson Water's Clearwater facilities recharge capacity had sufficiently expanded to receive its full annual entitlement of CAP water. Tucson Water also uses a range of partnerships to either store its water in partners' facilities, such as Pima Mine Road Recharge Project (PMRRP), or at groundwater savings facilities (GSFs). A GSF is a partnership with the agriculture community to irrigate with a portion of our CAP entitlement instead of extracting groundwater to preserve these resources.

Our CAP entitlement and annual order usually exceeds current customers' annual water demand; therefore, the excess recharged water stored is converted into long-term storage credits (LTSCs) in the following year. This accumulates positive storage volumes to be used in future years if needed. Tracking the balance of LTSC provides a guide for when adaptive management will need to be implemented. For example, Tucson tracks the effectiveness of conservation measures through a supply and demand analysis. By targeting lower demands than our surface water supply, through utilization of all water resources, a resilient community with flexibility is achieved.

Also related to executing this strategy successfully are Tucson Water's periodic capital investments and maintenance of the Clearwater storage facilities, which safeguards local storage capacity.

SW-1 Action A:
Continue to fully utilize Colorado River water with the use of CAVSARP, SAVSARP, Pima Mine Road Recharge Project, and groundwater savings facilities.

High Priority

Ongoing

Actions taken in 2023

- Tucson took delivery of 92,670 acre-feet of Colorado River water through its Clearwater recharge facilities, Pima Mine Road Recharge Project, and multiple groundwater savings facilities. The reduction in delivery was to adhere to the SCIA with Reclamation to reduce scheduled delivery for up to 50,000 acre-feet in 2023 for the benefit of Lake Mead elevation.
- Tucson and Central Arizona Water Conservation District (CAWCD), the operator of the CAP, renewed for an additional ten years an agreement to allow Tucson to store some of its CAP water in CAWCD's Lower Santa Cruz Replenishment Project (LSCRP) facility. The agreement allows for Tucson to store up to 30,000 acre-feet per year within that facility. Having an extended agreement with CAWCD to store water at LSCRP gives Tucson Water additional operating flexibility.

SW-1 Action B:
Annually update the projected balance of long-term storage credits to inform the adaptive management of Plan strategies.

High Priority

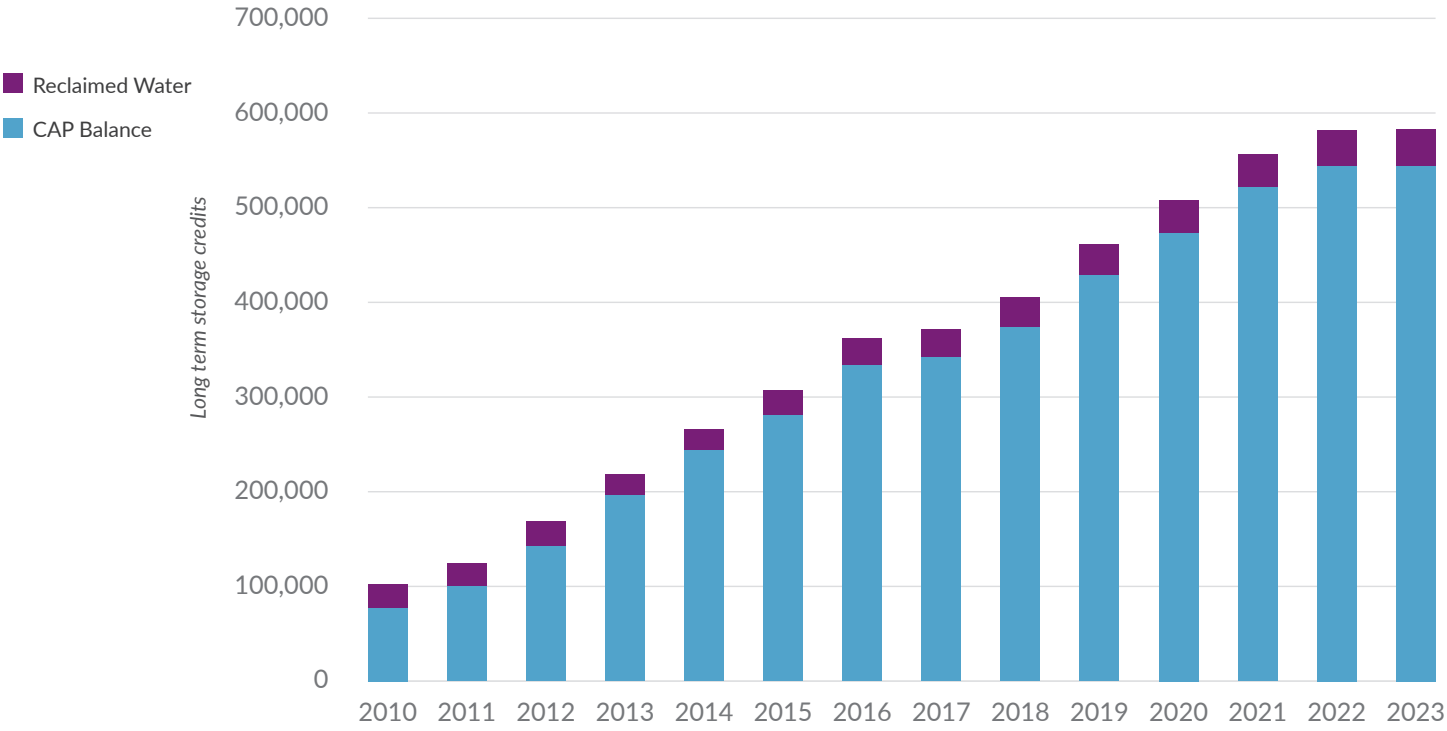
Ongoing

Actions taken in 2023

- Storage credits earned in 2023 were less compared to previous years. This was due to participation in the Colorado River System Conservation efforts. Tucson Water's LTSC cumulative credit balance remains above 580,000 acre-feet, or more than five years of current potable demands.

96" pipeline repair

Figure 1. Historical LTSC Balance



This chart illustrates the progress Tucson has made with its storage credits to accumulate positive storage volumes for future use.

SW-1 Action C:
Maintain and renew/replace infrastructure for storage and delivery of full CAP allocation.

High Priority

Ongoing

Table 1. Surface Water Project Budget

Project	Amount	Project Progress Report	Funding Source	
			SCIA Funds	Tucson Water CIP Funds
CAVSARP Facility Upgrades	$8,000,000	In Progress - Work will continue in 2024	💧	💧

Actions taken in 2023

- Performed routine recharge basin maintenance, flow meter replacement, and production well replacement, at Clearwater recharge facilities, CAVSARP and SAVSARP. Meter replacement is important to accurately measure the deliveries to recharge facilities, while replacing aging wells is essential for keeping our service area's renewable water supply production reliable. CAVSARP well CA-003A was replaced by a new well, CA-003B, and placed into service.
- Completed an engineering design for valve replacements at four of the CAVSARP basins. With the new design, outdated infrastructure will be replaced, while maintaining the storage capacity of the CAVSARP facility as part of a 20-year refurbishment and replacement project. Upgrades to the CAVSARP facility will be funded through SCIA and Tucson Water CIP funds.

SW-1 Action D:
Utilize groundwater storage credits as short-term transitional supplies during CAP allocation shortages while additional supplies are acquired, restored, and/or developed.

Near/Mid Term Priority

Ongoing

Actions taken in 2023

- Tucson recovered 1,148 acre-feet in LTSCs due to Tucson's participation in the SCIA where 50,000 acre-feet of Tucson's allocation was left in Lake Mead in exchange for federal compensation.

SW-1 Action E:
Develop implementation triggers for alternative supplies and enhanced conservation measures to prepare for extended CAP allocation shortages.

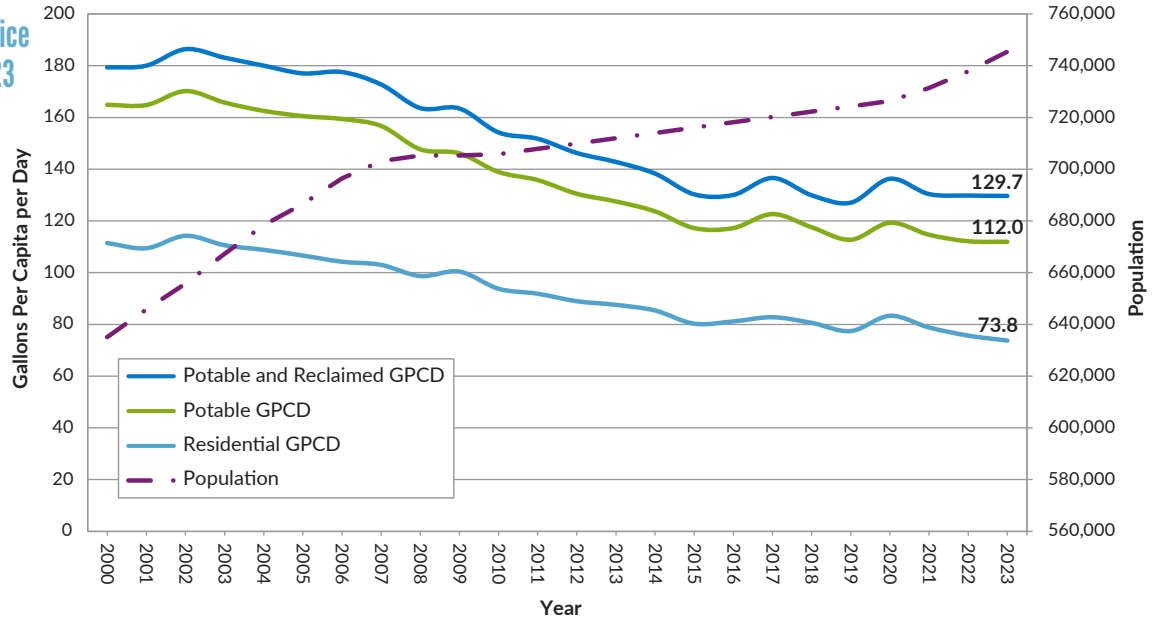
Near/Mid Term Priority

Ongoing

Actions taken in 2023

- Tucson experienced a planned shortage scenario. The Lower Basin operated under Tier 2 guidelines of the Drought Contingency Plan and participation in the SCIA. Therefore, Tucson Water did not implement triggers for alternative supplies, nor require enhanced conservation. The service area's potable demands continued to decrease, which buffered the 2023 planned shortage. Tucson Water continued to perform demand/supply and tracking analysis to our LTSC balance, and service area annual gallons per capita per day (GPCD), both provide reliable metrics for tracking year to year changes in water demands. If our GPCD increases and our long-term storage balance decreases, more robust conservation measures will be implemented.

Figure 2. Tucson Water Service Area GPCD Trends 2000-2023



Tucsonans continue to use water efficiently. Despite population growth, our demand is stable, and our groundwater reserves continue to grow.

SW-2 Work with the State of Arizona to explore additional water supplies for the Central Arizona Project (CAP)

The City collaborates with the Governor's Office, Arizona Department of Water Resources (ADWR), Central Arizona Water Conservation District (operator of the CAP), Tribal partners, agricultural irrigation districts, and other Arizona utilities involved in looking for opportunities to secure additional CAP supplies. Intrastate and interstate water supplies under consideration include importing water from groundwater basins from western Arizona, recovering stored groundwater near recharge locations with access to the CAP canal, transferring water from other instate basins, and importing water from other states. Water quality must take priority when evaluating new water supplies to augment Tucson's CAP supply. Agreements for water exchanges from agricultural areas, where land is left fallow in return for compensation, could increase water supply for utilities.

SW-2 Action A:
Collaborate with CAP, ADWR, and other Arizona utilities to improve regional cooperation on water issues.

SW-2 Action B:
Work proactively with CAP, ADWR, and other Arizona utilities to explore the availability, water quality, accessibility, and cost of alternative water supply options.

Actions taken in 2023 (To support Actions A and B)

- Tucson Water continued to have a voice in the State water conversation. On January 9, 2023, Governor Katie Hobbs issued an Executive Order to establish the Governor's Water Policy Council to protect and manage groundwater. Tucson Water Director John Kmiec was appointed as a member on the council and participated with other members throughout 2023. On November 29, 2023, a letter was addressed to the Governor regarding policy prescriptions. Many of these recommendations are now included in the 2024 legislative agenda for action.
- Mayor and Council approved agreements with the Arizona municipalities of Scottsdale, Gilbert, and Peoria, to store some of their CAP water in Tucson Water's Clearwater recharge facilities, which facilitates water exchanges between Tucson and these other CAP municipal contractors. During years of Colorado River shortage, cities in the greater Phoenix Metropolitan Area can take a portion of Tucson's CAP supply and Tucson can recover the same amount of the Phoenix city's water stored in Tucson Clearwater facilities. Increased operational flexibility is a benefit to Tucson Water customers.
- The Arizona Water Infrastructure Financing Authority (AZWIFA) met to discuss the potential impacts of delivering different water resources.

SW-3 Advocate for Tucson's allocation of Colorado River water through the CAP in state and federal negotiations

The U.S. Department of Interior's Bureau of Reclamation is responsible for managing operations on the Colorado River, which includes an annual determination of any shortages. The current operating guidelines, in place since 2007, are set to expire at the end of 2026.

The City has participated in Colorado River water conservation measures under the 2007 Guidelines, the 2019 Drought Contingency Plan (DCP), and the voluntary compensated conservation program. As the largest municipal subcontractor of the CAP, Tucson Water is strategically focused on negotiating a reduction that will be suitable to meet Tucson's water demands. Accounting for increased conservation measures, to offset projected increase population, and water supply portfolio diversification are metrics that are evaluated during negotiating. To date, Tucson has not faced a mandatory reduction in its entitlement and is actively in consultation with the Colorado River Stakeholders during the Reconsultation period. Reconsultation is the process of negotiating new guidelines to replace the 2007 Guidelines that expire at the end of 2026. The recommended changes in operations are due to be completed before 2026.

SW-3 Action A:
Actively participate in negotiations about how Colorado River water will be shared.

High Priority

Ongoing

SW-3 Action B:
Participate in collaborative efforts to reduce the risk of Lake Mead falling to critical levels.

High Priority

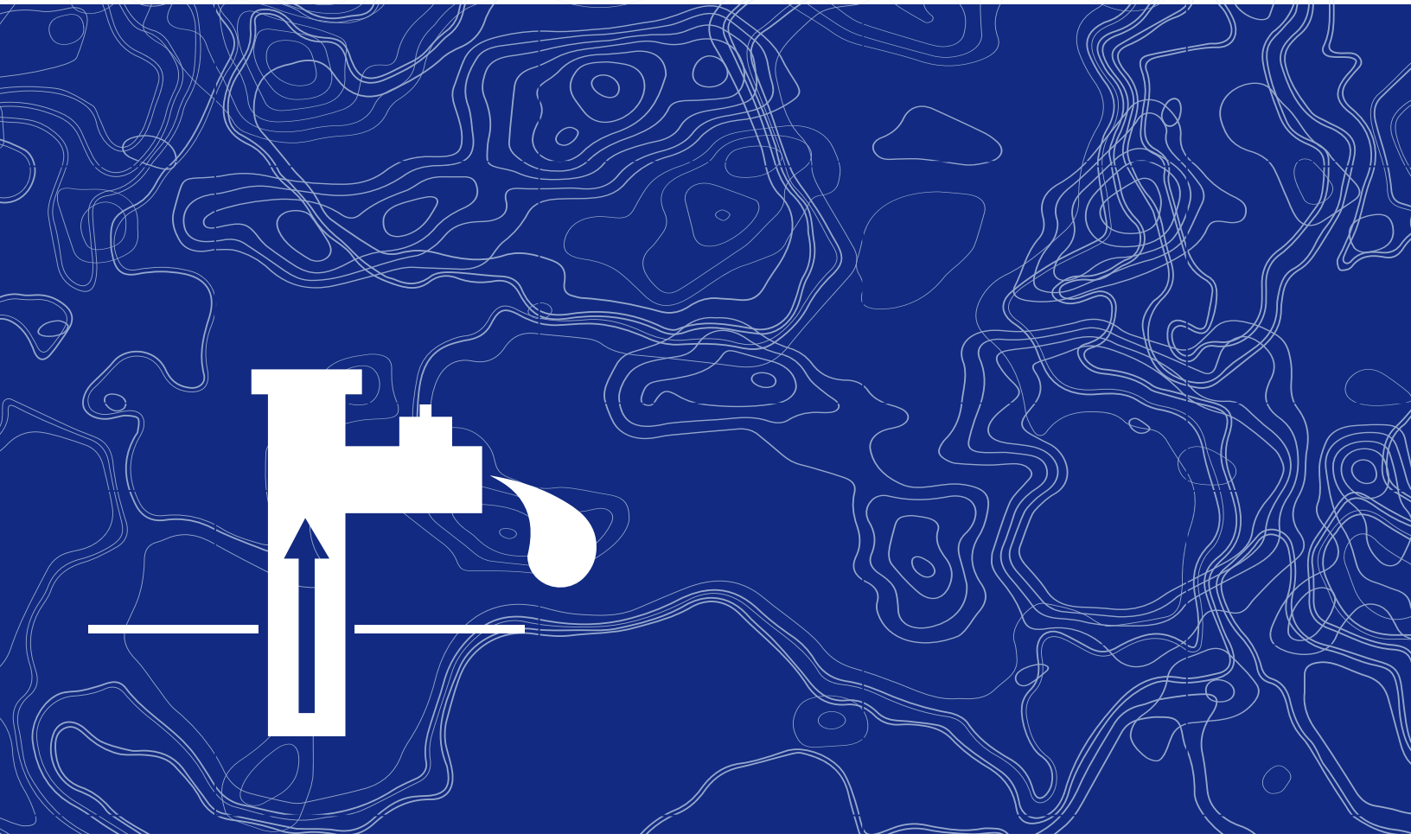
Ongoing

Actions taken in 2023 (To support Actions A and B)

- The City's Deputy City Manager, Tim Thomure, participated in meetings of the Arizona reconsultation committee (ARC), established by ADWR in 2020. This committee works to develop an Arizona perspective on the Reconsultation of Colorado River.
- Tucson continues to be a reliable participant collaborating on voluntary conservation. The years when the City did not accept its full CAP allocation was either to voluntarily reduce demands or take reductions in exchange for compensation. Conservation programs were for the benefit of Lake Mead water levels to protect the Colorado River system.

Southern Avra Valley Storage and Recovery Project recharge basin

II. GROUNDWATER



II. GROUNDWATER

Groundwater continues to be a vital part of Tucson's water resource portfolio. The strategies under Tucson Water's groundwater resources include steps to maintain water quality, address emerging contaminants, and practice sustainable groundwater management to mitigate areas in the region where groundwater levels have continued to decline.

Tucson Water staff installing a new screen at well SC-003A

GW-1 Partner with regional water organizations to protect the aquifer

Through Tucson Water, the City collaborates with other users of the CAP in the Tucson Active Management Area (AMA), the ADEQ, the United States Geological Survey (USGS), as well as with the Pima County Regional Wastewater Reclamation Department and Regional Flood Control District, for monitoring, protection and restoration of Tucson's aquifer. Compliance with state and federal statutes and environmental laws is a continuous priority for protecting drinking water supplies. Along with other utilities nationwide, a portion of Tucson's groundwater resources have been impacted by Per and Polyfluoroalkyl Substance (PFAS). Therefore, addressing these compounds will be an ongoing strategy.

The City partnered on decisions to bolster the integrity of the Assured Water Supply (AWS) program and participated in decisions for ADWR to protect groundwater resources by providing comments and engaged discussions on the Tucson Active Management Area management plans. The Fifth Management Plan of the Groundwater Management Act offers guidance for Tucson area utilities to achieve safe yield by 2025, a major objective of the act.

GW-1 Action A:
Partner with ADEQ and other regional utilities to characterize groundwater contamination.

High Priority | Ongoing

Action C:
Consider regional solutions to address groundwater quality restoration where feasible.

High Priority | Near-Term

Actions taken in 2023 (To support Actions A and C)

- Tucson Water continued to support ADEQ's characterization of the extent of Per and Polyfluoroalkyl Substance (PFAS) impacted groundwater. Tucson Water assisted ADEQ contractors by providing access to groundwater wells and to perform voluntary strategic sampling at select wells near landfills, lakes and ponds, parks, major drainages, and north of Davis Monthan Air Force Base and Tucson Airport. This program is in cooperation with the City Environmental and General Services Department, ADEQ, other water utilities, and the U.S. Air Force.
- The City continued to participate with ADEQ's Water Quality Assurance Revolving Fund (WQARF) program. The program was created under the 1986 Environmental Quality Act to support ADEQ in identifying and resolving the threat of contaminated soil and groundwater sites in the state. The City reviewed reports and attended two Community Advisory Board (CAB) meetings to ensure that the identified locations pose no threat to our groundwater resources, remediation efforts are on track to meet clean-up goals, and to stay aware of newly identified contaminants.

GW-1 Action B:
Participate in regional efforts to achieve and maintain safe yield for the Tucson AMA.

High Priority

Ongoing

Action D:
Expand groundwater monitoring network to support groundwater management activities and decision-making.

High Priority

Near-Term

Actions taken in 2023 (To support Actions B and D)

- The City submitted an application to modify our Designation of Assured Water Supply for another ten-year term in January 2023. The City continues to demonstrate a one-hundred-year water supply for Tucson Water's service area. The application provided an itemized inventory of City water resources.
- The City participated with the Governor's Water Policy Council. Areas of groundwater focus included strengthening the integrity of the Assured Water Supply (AWS) program, protecting aquifers, and ensuring that long term growth is not reliant on groundwater depletion.
- The City (in partnership with other regional utilities, Pima County, and ADWR), continued to contract the USGS to perform microgravity studies. Since 1992, these surveys have proved to be a highly sensitive method of tracking aquifer storage change and groundwater movement. This provides the Tucson AMA with a reliable tool for monitoring the goal of safe yield. Data releases are posted online at: https://www.usgs.gov/centers/arizona-water-science-center
- Tucson Water monitors and shares groundwater level information from over 900 wells during an annual groundwater level round-up. The information is used to produce groundwater level contour maps that provide a snapshot of aquifer health (supply, and locations where groundwater levels are increasing or decreasing). The groundwater levels from active wells are submitted to ADWR as part of annual reporting and the maps with all the data are published online at: https://www.tucsonaz.gov/Departments/Water/Water-Resources-and-Drought-Preparedness
- The City continues to deliver a portion of Tucson's Colorado River entitlement to local agriculture farms. These efforts place less demand on natural groundwater resources.
- Tucson Water continued monitoring Tucson area-wide aquifer health through collection of groundwater levels and sampled its active production wells under the regulation of the Safe Drinking Water Act (SDWA).

GW-2 Accelerate groundwater cleanup efforts to make local supplies more available

The City has been managing groundwater cleanup efforts since the early 1980s when the U.S. Environmental Protection Agency listed the Tucson International Airport Area (TIAA) as a Superfund Site and closed a handful of wells from a contaminated plume of TCE. In response to EPAs Record of Decision, Tucson Water constructed Tucson Airport Remediation Project (TARP), specifically to address groundwater remediation of TCE using air stripping process. The contaminant 1,4-Dioxane was identified in 2002, which eventually expanded the remediation system process by adding Advanced Oxidation Process (AOP). Contaminants of concern like PFAS have emerged over the past few years at TARP and other areas within the aquifer that now need to be addressed. Solutions to restore areas of the aquifer through multiple projects, partnerships, and funding sources has accelerated clean-up efforts. The placement of selected treatment systems provided in the Table below was directed by the need to mitigate groundwater contamination, control migration of contaminants, thus protecting downgradient groundwater resources, and to restore system redundancy in locations where capacity was lost because of contamination.

Table 2. Groundwater Projects Budget

Project	Amount	Progress Report	Funding Source				
			SCIA Funds	AZ WIFA Grant/Loan	ADEQ Grant	Congressional Member Directed Funding	Tucson Water CIP Funds
TARP Connection to Santa Cruz River	$2 million	Completed November 2021			●		
TARP Connection to Reclaimed System	$28.4 million	Completed April 2023					●
TARP PFAS Treatment Facility	$24.9 million	In progress. Projected completion in December 2026			●		
Central Tucson PFAS Project (CTPP)	$3.3 million	Completed December 2021			●		
Randolph Park PFAS Project	$7.5 million	In progress. Projected completion in 2024	●			●	
Northwest Wells Treatment Project	$33.52 million	In progress. Projected completion in 2030	●	●			

GW-2 Action A:
Implement water treatment solutions to address water quality issues from emerging contaminants.

High Priority — Near-Term

GW-2 Action B:
Prioritize and address areas of contamination and restore availability of groundwater wells.

High Priority — Near & Mid-Term

GW-3 Action E:
Implement advanced water treatment to address high quality emerging water quality issues.

Medium Priority — Mid & Long-Term

Actions taken in 2023 (To support Actions A and B and GW-3E)

- Collaboration on groundwater PFAS investigations between ADEQ, the City, the U.S. Air Force, and other utilities has refined the areas of concern to be addressed. While this work is ongoing, the areas of highest impact are consistent with concentrations identified since 2016, when Tucson Water voluntarily initiated sampling. The criteria for prioritization locations for treatment are: 1. high concentrations of contaminants; 2. proximity to drinking water wells; 3. restoring system capacity due to impact; and 4. direction of groundwater flow.
- Since 2021, ADEQ has continued to operate a demonstration PFAS treatment facility at Tucson Water's Well C-007A, known as the Central Tucson PFAS Project (CTPP). The project is designed to remediate PFAS contamination and limit movement of the plume from Davis-Monthan Air Force Base toward Tucson's central wellfield. Quarterly water quality monitoring and testing was performed. Approximately 308 acre-feet of water was recovered and treated at C-007A with treated water discharged into Citation Wash.
- Design coordination with ADEQ began for the Randolph Park PFAS treatment facility. The design includes one remediation well, RP-001A, to recover PFAS contaminated groundwater for conveyance to a treatment facility within the Randolph Park Golf Course. Treated groundwater will be beneficially reused for turf irrigation at the park. The projected annual treatment volume was estimated at 480 acre-feet.
- A preliminary design for the Northwest Wells Treatment System was initiated. The project will address groundwater wells placed out of service due to PFAS impacts. This project will consist of a cluster of three wells, raw water pipeline, one treatment plant, and a pipe connection to the potable system to restore as much as 3.7 MGD of lost potable production.
- Tucson Water continues to operate the TARP treatment system which includes various treatment technologies, Granulated Activated Carbon (GAC) treatment, an AOP, and Ultraviolet (UV) Light Disinfection to clean up contaminated groundwater. ADEQ allocated funds for the design and installation of a new treatment system for PFAS removal at TARP. Design planning and construction of an ion exchange pilot project was completed. The pilot will test the effectiveness of sediment removal on ion exchange as a pre-treatment process for the removal of PFAS concentrations before water is routed through the other TARP treatment technologies.

GW-2 Action C:
Fully remediate contaminated groundwater.

Actions taken in 2023

- Ongoing operations and the addition of more extraction wells are steps to fully remediate contaminated groundwater from the TIAA Superfund Site, the area with the highest historical impacts. The TARP connection to Tucson Water's reclaimed water system (RWS) was completed in April, delivering, on average, about 5.4 million gallons/day (MGD) of remediated groundwater to the recycled water system. Throughout 2023, approximately 7,000 acre-feet of groundwater was treated at TARP and was either delivered to the reclaimed system or the Santa Cruz River. Pursuant to agreement with the EPA, the Santa Cruz River has received TARP treated groundwater since 2021. This action is important for hydraulic containment of the groundwater contamination plume, while providing beneficial use of treated groundwater, but also affords time to implement additional treatment for PFAS contamination. The river continues to receive approximately 250 gallons per minute of treated water today to maintain a small riparian habitat. Concentrations for all contaminants were monitored to verify that the treatment system was meeting facility remediation (or clean-up) goals.

GW-3 Explore and invest in new treatment technologies to address unregulated, emerging water quality issues

The Sentry Program is one of the most successful voluntary programs the City has implemented to track unregulated and contaminants of emerging concern. EPAs Unregulated Contaminant Monitoring Rule is another program that enhances Tucson's knowledge about the occurrence of emerging contaminants.

Tucson Water and City staff routinely monitor developments in groundwater treatment technologies that address unregulated, emerging contaminants. Staff regularly attend conferences and workshops with national and global attendance that feature water treatment and groundwater remediation technologies. National and regional partnerships are important to keep pace with information on new technologies being researched.

Tucson Water has engaged in forums with other utilities around the world to exchange knowledge and best practices on similar issues experienced in Tucson. Information sharing has the potential to save time and money for local project implementation.

The City partners with university researchers and foundations, and actively participates in the Arizona chapters of nationwide water associations.

GW-3 Action A:
Monitor the development of new Federal and state water quality regulations that could affect Tucson's future groundwater utilization potential.

Medium Priority

Ongoing

Actions taken in 2023

- The EPA proposed maximum contaminant levels (MCLs) for six of the PFAS compounds; 4.0 parts per trillion (ng/L) for perfluorooctanoic acid (PFOA) and perfluorooctyl sulfonate (PFOS); and a weighted Hazard Index of 1.0 for four lesser-known compounds, perfluorononanoic acid (PFNA), perfluorohexane sulfonic acid (PFHxS), perfluorobutane sulfonic acid (PFBS), and hexafluoropropylene oxide-dimer acid (HFPO-DA; commonly known as GenX chemicals). Maximum contaminant level goals (MCLG) were also established. A MCLG is a non-enforceable health goal that allows for a margin of safety. Whereas an MCL is enforceable as the highest level of contaminant allowed in drinking water.

Table 3. EPA PFAS National Primary Drinking Water Regulation

Compound	Final MCLG	Final MCL (enforceable levels)
PFOA	Zero	4.0 parts per trillion (ppt) (also expressed as ng/L)
PFOS	Zero	4.0 ppt
PFHxS	10 ppt	10 ppt
PFNA	10 ppt	10 ppt
HFPO-DA (commonly known as GenX Chemicals)	10 ppt	10 ppt
Mixtures containing two or more of PFHxS, PFNA, HFPO-DA, and PFBS	1 (unitless) Hazard Index	1 (unitless) Hazard Index

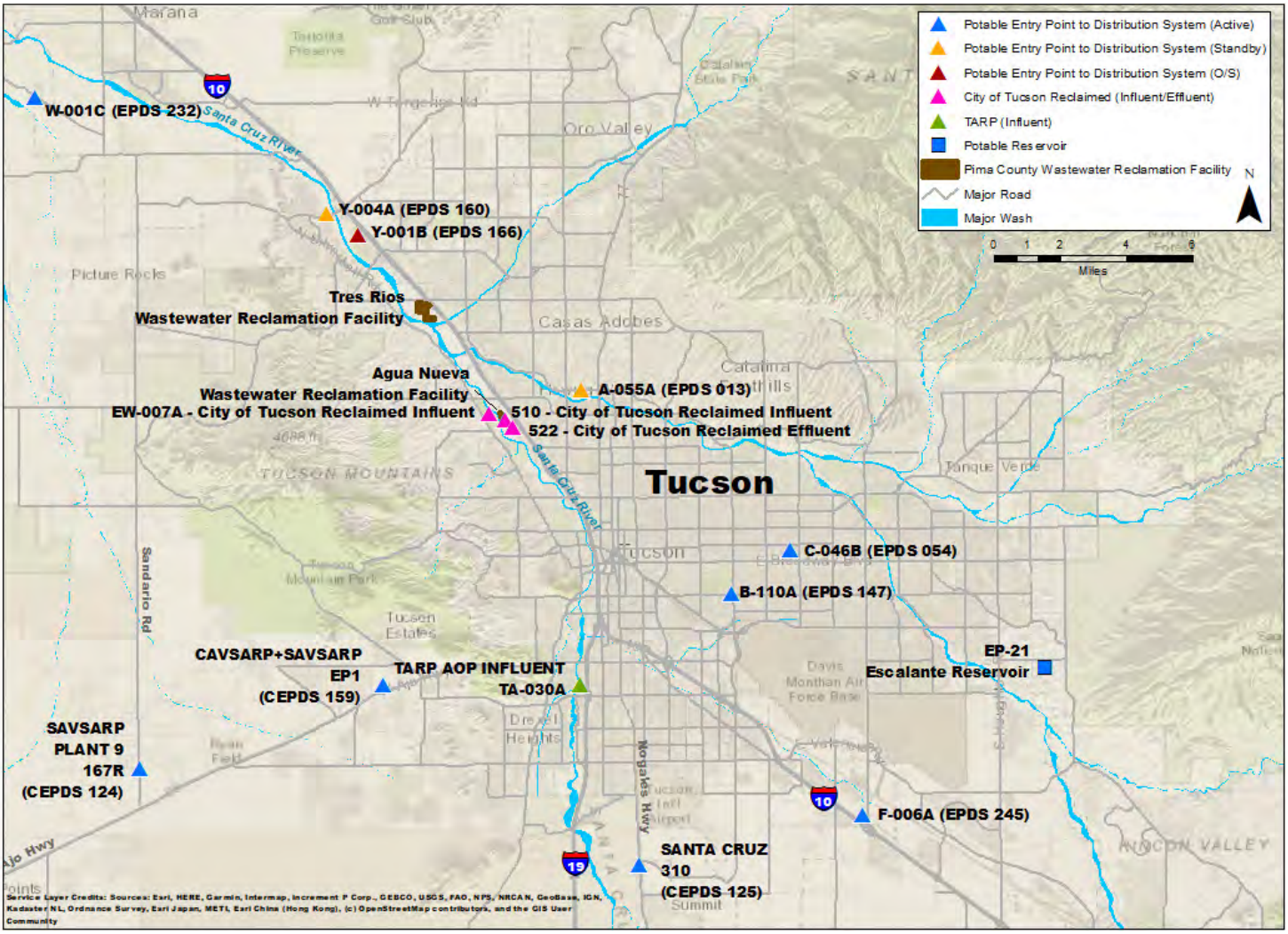
Note: Equation Hazard Index = ([HFPO-DA]/ [10 ppt]) + ([PFBSwater]/[2000 ppt]) + ([PFNAwater]/[10 ppt]) + ([PFHxSwater]/ [9.0 ppt]) (EPA Fact Sheet)

GW-3 Action B:
Continue the Tucson Water Sentry Program to monitor unregulated and emerging contaminants in groundwater supplies.

Medium Priority

Ongoing

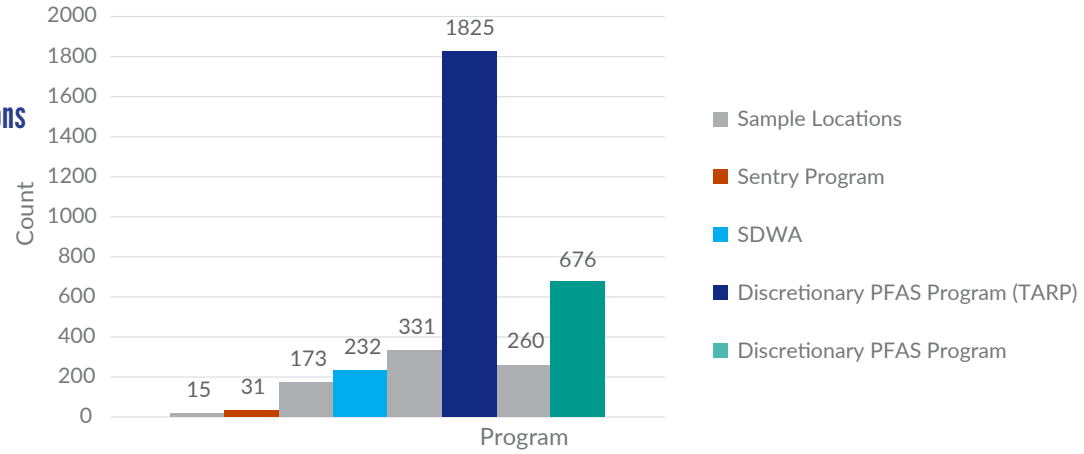
Figure 3. CEC Sentry Program Sampling Plan-2023



Actions taken in 2023

- Tucson Water continues to perform voluntary water quality sampling as part of the Sentry Program to monitor contaminants of emerging concern (CEC) that may pose health risks, and that are currently not regulated under the SDWA. Unregulated CECs may include pharmaceuticals, personal care products, and pesticides. The program was started in 2008, to identify CECs within the potable and recycled distribution systems. The CEC list changes year to year based on CECs observed nationwide. The list typically includes approximately 153 analytes. A total of 15 sample locations, representing different areas and facilities within the distribution system, were sampled in 2023. Reports are stored on the website linked below.
  https://www.tucsonaz.gov/Departments/Water/Water-Quality/Water-Quality-Monitoring/Contaminants-of-Emerging-Concern

Figure 4. Count of Sample Locations and Samples Collected in 2023



Sentry Program

Monitor: compounds that are not regulated

Maintain: high quality source water

Collect: data to support and prepare for future

Serve: as good stewards of our water resources

GW-3 Action C:
Monitor the relative risk of emerging contaminants by comparing concentrations in groundwater supplies against Drinking Water Health Advisory levels and contamination risk for additional wells.

Medium Priority

Ongoing

Actions taken in 2023

- Tucson Water continues to place groundwater wells out of service if there is any detection of PFAS compounds, regardless of concentrations being below EPA health advisory levels. As a result, dozens of groundwater wells have been placed out of service due to the presence of PFAS chemicals since 2016. As shown on Figure 4, extensive monitoring occurred during 2023.

GW-3 Action D:
Participate in research projects to test novel treatment technologies for emerging contaminants.

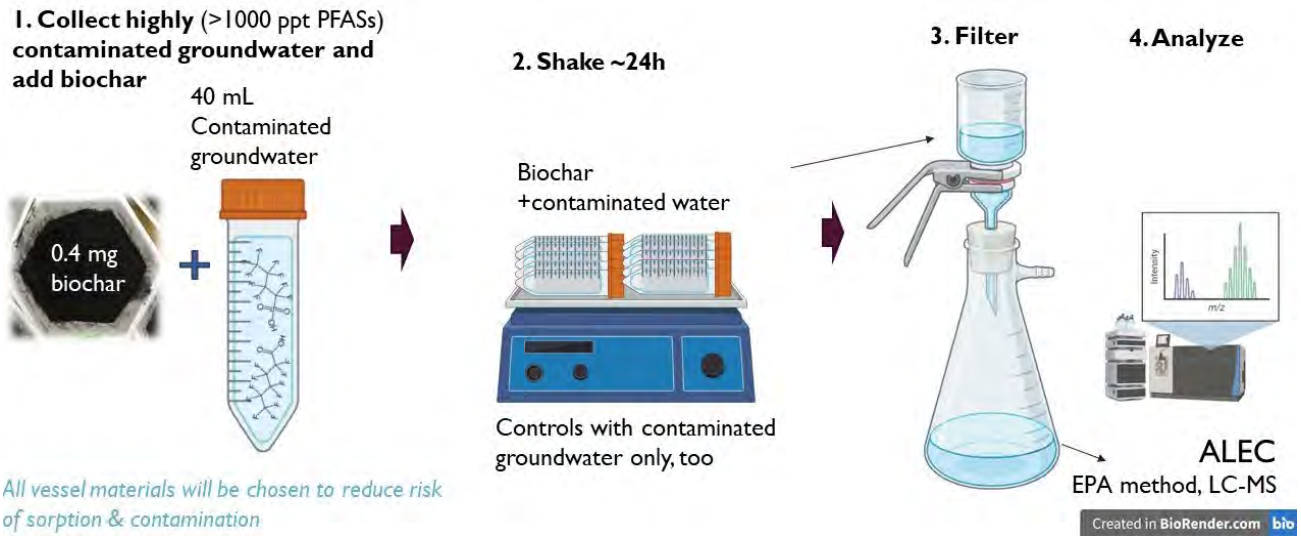
Medium Priority

Mid-Term

Actions taken in 2023

- Tucson Water has been participating with the University of Arizona Department of Environmental Science on novel treatment technologies to remove PFAS concentrations. Research was performed using biochars, an organic material to determine contaminant removal rates through sorption compared to other sorbents. A biochar bench test was conducted using groundwater from Tucson Water's wells C-007A and EW-007A, to compare PFAS removal rates between biochars and resins, and to study ways that biochars and resins interact to help break down contaminants.

Figure 5. PFAS Concentration Removal Process



III. RECYCLED WATER

III. RECYCLED WATER

Tucsonans overwhelmingly support expanding uses for recycled water. The recycled water strategies aim to maximize the use of this renewable water resource. These strategies address the onsite reuse of recycled water for non-potable purposes, such as irrigation, toilet flushing, and cooling. Strategies also include options for purifying recycled water to drinking standards, such as Advanced Water Purification (AWP). The technologies utilized for purifying recycled water intersect with treating all types of water resources. The City is successfully operating water treatments systems at TARP, which prepares us to take the next steps to purify recycled water along with other utilities in Arizona.

RW-1 Adopt new policies for water reuse in buildings

Onsite water reuse utilizes alternative water sources to offset the use of drinking water for non-drinking water purposes. As the utility begins to implement its 1W2100 Plan, a major diversification strategy is increasing its recycled water production and use. This effort requires identifying new customers of Tucson Water's treated high-quality recycled water. Commercial, industrial, and multi-family residential properties are potential future customers, through replumbing of devices or direct uses for onsite purposes like manufacturing, cooling towers, irrigation, and other non-potable site demands like toilet flushing. The following actions in the RW-1 section extend to potential development of ordinances and outreach programs to reach these prospective new customers. As Tucson Water seeks to broaden its base of recycled water customers, we are evaluating best practices and risk.

RW-1 Action A:
Research what other cities have done to promote, incentivize, and regulate onsite reuse for industrial, commercial, and large residential developments.

High Priority

Near-Term

RW-1 Action B:
Provide regulatory and technical guidance for implementation of onsite reuse systems.

High Priority

Near-Term

Actions taken in 2023 (To Support Actions A and B)

- Research was conducted by staff during the year to identify other cities' efforts to develop onsite reuse for their commercial, industrial, multi-family, and large-scale residential developments.
- Tucson Water continued its participation in the National Blue-Ribbon Panel for Onsite Reuse through the WateReuse Association. This group examines the safe and effective policies and procedures necessary for the development of onsite reuse applications.

Tucson Reclaimed Water Treatment Plant

RW-2 Begin purifying recycled water to drinking water standards

During 2023, draft rules for purifying recycled water to drinking water standards were available to review, marking a historical time in Arizona's water history. Implementing a treatment process to purify recycled water as a drinking water source is officially called Advanced Water Purification (AWP), and it will be carefully considered to evaluate benefits, barriers, and cost. The ultimate objective of this strategy is to strengthen Tucson Water's resiliency by beneficially reusing all available water to diversify our water portfolio with a reliable local water supply.

All the actions under this strategy have relatively high investment costs. The actions extend from Tucson Water's active participation in ADEQ rulemaking process for AWP to implementation. Considerations include designing and constructing an AWP demonstration facility for educational and operator training purposes, comparing the cost, benefits, and evaluating the need for AWP, and the extensive public outreach and acceptance required. The process to complete all actions under this strategy will take multiple years to demonstrate that the treatment process produces high-quality drinking water.

Table 4. Recycled Water Projects Budget

Project	Amount	Project Progress Report	Funding Source			
			SCIA Funds	AZ WIFA Grant / Loan	Congressional Member Directed Funding	Tucson Water CIP Funds
Demonstration Scale Direct Potable Reuse / Demonstration Scale AWP	$10,000,000	Will start in 2025				●
Northwest Reclaimed System Augmentation	$10,000,000	In progress. Projected completion by Summer 2025	●		●	●
Shirley C. Scott Southeast Houghton Area Recharge Project (SHARP) Expansion	$4,000,000	In progress. Projected completion by 2026		●	●	●

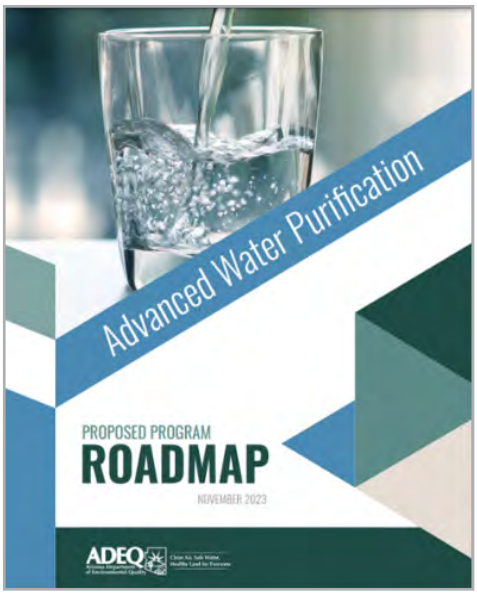
RW-2 Action A:
Participate in the ADEQ regulation development process for direct potable reuse.

High Priority

Near-Term

Actions taken in 2023

- ADEQ led a technical advisory group (TAG) to develop a draft of the AWP Roadmap that outlined guidelines for treatment requirements, permitting, and operations for inclusion in the revised Arizona Administrative Code. Tucson Water reviewed the TAG's roadmap. On December 1, 2023, Tucson Water and Pima County Regional Wastewater submitted a joint letter of recommendations to ADEQ on the AWP program.



RW-2 Action B:
Evaluate benefits and costs for direct potable reuse of recycled water.

High Priority | Near-Term

Actions taken in 2023

- Although no activity occurred in 2023, a cost benefit analysis was performed while drafting the 1W2100 Plan. The supply and demand for tanks, pipes, and equipment will vary along with cost for the foreseeable future. Once a pilot treatment system is designed, the cost benefit analysis will be updated.

RW-2 Action C:
Conduct a survey to identify barriers to direct use of recycled water.

High Priority | Near-Term

RW-2 Action D:
Develop a public outreach program to build confidence and support.

High Priority | Near-Term

Actions taken in 2023 (To support Actions C and D)

- Although no activity occurred in 2023, community engagement through town halls and surveys were extensive during the development of the Plan.

RW-2 Action E:
Implement demonstration-scale projects to address potential customer or stakeholder concerns.

High Priority | Mid-Term

RW-2 Action F:
Implement a full-scale direct potable reuse project to fully utilize effluent recycled water as a water supply.

High Priority | Mid-Term

Actions taken in 2023 (To support Actions E and F)

- Conceptual discussions occurred towards development of a demonstration-scale AWP project at a future reclaimed water treatment facility.

RW-2 Action G:
Beneficially use all recycled water within the Tucson AMA.

High Priority

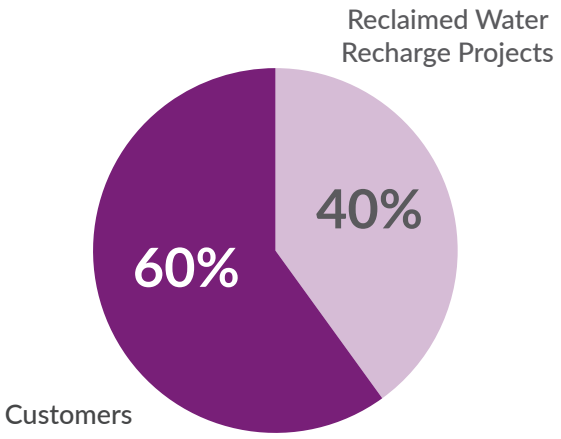
Mid-Term

Actions taken in 2023

Bens Bells mural illustrating recharge at the Shirley C. Scott Southeast Houghton Area Recharge Project

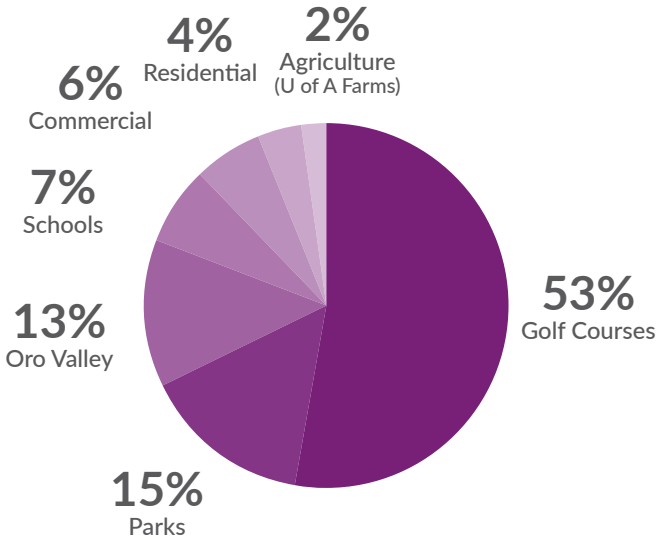
- Tucson Water commenced engineering design work for expansion of the Shirley C. Scott Southeast Houghton Area Recharge Project (SHARP). SHARP stores recycled water for the benefit of aquifer replenishment in an area that has experienced declining water levels in recent years. Expansion of SHARP will increase storage capacity from 4,000 acre-feet per year to almost 8,000 acre-feet per year. This recharged water will be available for future use.
- Tucson Water and its regional partners submitted a renewed underground storage permit application to the ADWR for the Lower Santa Cruz River Managed Recharge Project (LSCRMRP). The effluent recharge project is a jointly operated facility that spans 17.9 miles along the Santa Cruz River with a terminus just south of the Pinal County line. The total annual volume requested in the application was 36,000 acre-feet. The project's continuity demonstrates the coordination and cooperation with peer agencies to recharge effluent within the Tucson AMA for the future benefit of residents.
- Tucson Water owns a portion of the effluent produced by Pima County's Tres Rios Water Reclamation Facility that is currently being discharged to the Santa Cruz River. In 2023, SCIA compensation was set aside for the Northwest Reclaimed System Augmentation Project, which will add a connection from Tres Rios at Ina Road to the existing reclaimed water distribution system located in Ina Road. This project will help maximize our retention and use of locally generated recycled water.

Figure 6. 2023 End Uses of Recycled Water



Recycled water is delivered to customers and to aquifer recharge projects.

Figure 7. Recycled Water Users by Category



Recycled water meets 13% of Tucson's overall water demand. This chart illustrates customers that utilize recycled water.

RW-6 Implement treatment technologies to address unregulated, emerging water quality issues

Treatment technologies to address unregulated emerging contaminants in recycled water is a new strategy for Tucson Water. Historically, the main use for recycled water in the community is for outdoor irrigation, which was a valuable step to conserve drinking water supplies. With knowledge of unregulated emerging contaminants in recycled water, diversifying recycled water use in Tucson may require additional water treatment. Tucson Water's Sentry Program will continue to include monitoring at specific locations within the recycled water system to determine impacts and fate of emerging unregulated contaminants. Another important partnership is with the University of Arizona, which performed extensive research on treatment for pathogens and is continuing research now on emerging contaminants found in recycled water. These studies, along with others, will provide direction on effective treatment technologies for end use customers. Water quality staff also collaborates with research foundations.

RW-6 Action A:
Continue the Tucson Water Sentry Program to monitor emerging contaminants in recycled water.

Medium Priority

Near-Term

RW-6 Action B:
Monitor the relative risk of emerging contaminants considering the end use.

Medium Priority

Near-Term

Actions taken in 2023 (To support Actions A and B)

- Tucson Water performed sampling at designated recycled water locations. The Sentry Program had three, twice-a-year, sampling sites for recycled water: 1) 510, which monitors untreated influent to the Sweetwater reclamation facility; 2) 522, which monitors treated effluent from the facility; and 3) EW-007A, a Sweetwater Recharge Facility extraction well.

RW-6 Action C:
Participate in research projects to test novel treatment technologies for emerging contaminants.

Medium Priority

Near-Term

Actions taken in 2023

- Tucson Water continues to collaborate with the University of Arizona's Departments of Environmental Science, Environmental and Chemical Engineering and others to evaluate remediation technologies for emerging contaminants. Studies have evaluated the efficacy of PFAS and pathogens removal at the Sweetwater recharge facility via natural attenuation. Biochar (organic waste material) as a carbon source for PFAS removal is also being studied.

RW-6 Action D:
Implement advanced water treatment to address unregulated emerging water quality issues considering the end use.

Medium Priority

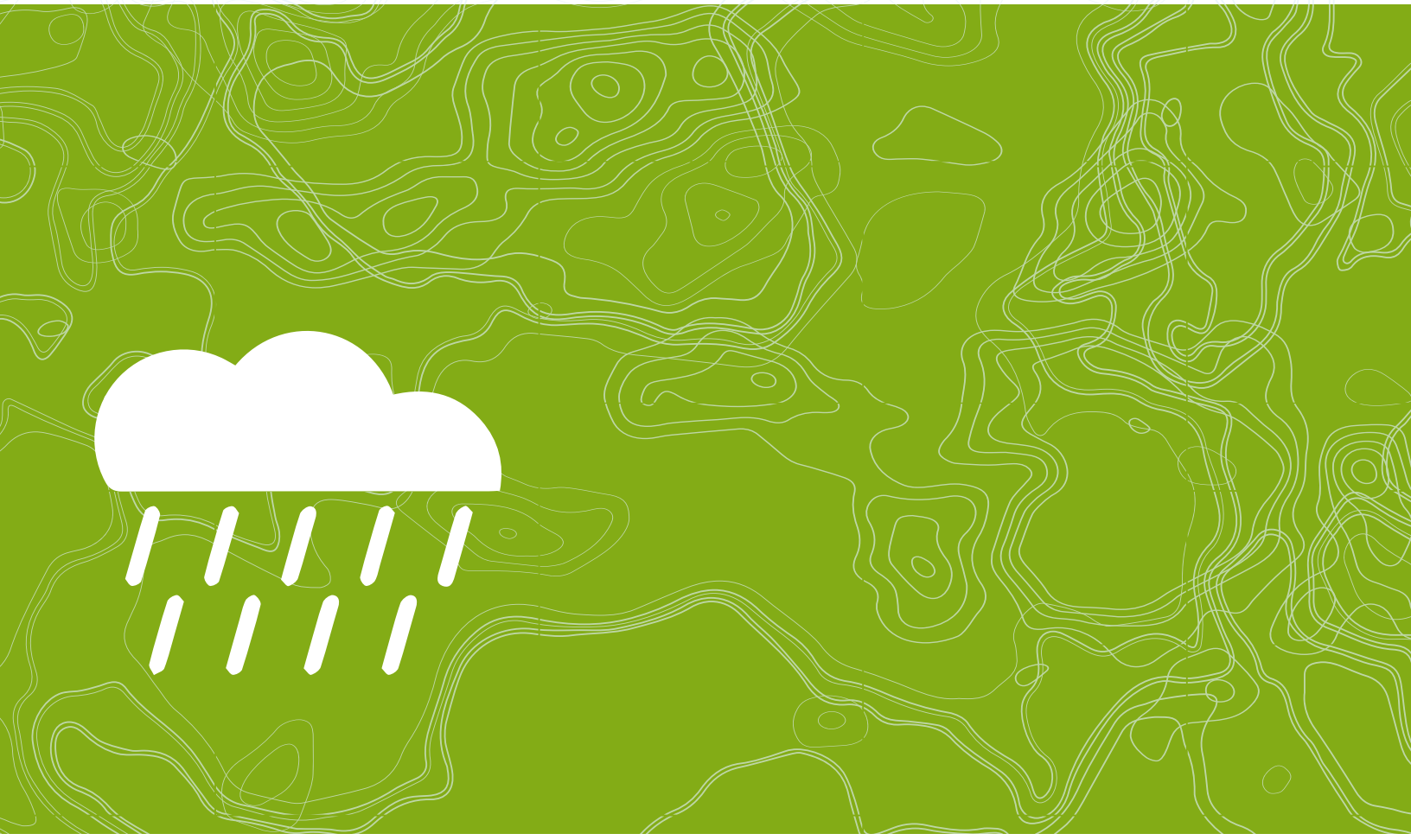
Mid-Term

Actions taken in 2023

- No action taken in 2023. In the future an evaluation of where advanced water treatment should be implemented to address emerging contaminants in recycled water. Then, AWP technologies will be chosen to remove emerging water quality contaminants.

Tucson Water chemist testing water quality

IV. STORMWATER



IV. STORMWATER

Stormwater is a relatively new component of Tucson's water supply portfolio and there is growing interest in expanding the use of this supply. Stormwater strategies aim to integrate stormwater management into the built environment in a socially, economically, and environmentally beneficial way. This includes community education, development of additional institutional standards and practices, and support and funding. These strategies will require ongoing collaboration with other City and Pima County departments with responsibilities for flood control and management.

El Vado Stormwater Park

S-1 Explore opportunities for large scale stormwater projects with multiple benefits

Tucson's Storm to Shade (S2S) Program was established in 2020 and is funded by the Green Stormwater Infrastructure (GSI) fee levied on Tucson Water utility statements for City of Tucson residents. Stormwater provides an opportunity to offset the use of potable and reclaimed water for irrigation. Tucson has been a national leader in rain and stormwater harvesting, and in January 2022, Tucson Water further expanded the S2S program by partnering with Pima County Regional Flood Control District (RFCD) to develop and fund the implementation of large-scale stormwater management projects under an intergovernmental agreement (IGA) between Pima County and the City.

The success of the City-County partnership on these projects is guided by the IGA that delineates specific roles and responsibilities of each entity as it pertains to maintenance of stormwater harvesting basins built by RFCD on RFCD- or City-owned property within the City. The City's S2S program and Parks staff maintain the vegetation and landscape elements of projects, which provide ecosystem services including mitigating urban heat island effect, providing habitat for native plants and wildlife, and conserving water.

An important distinction from rainwater harvesting is that large-scale stormwater capture uses spreading basins, recharge basins, and injection wells to assist in infiltrating larger quantities of stormwater into the ground. Large-scale stormwater projects not only attenuate areas of localized flooding, benefit the natural environment, and provide urban runoff water quality benefits, but also have the potential to recharge the aquifer with a local, renewable resource. There is currently no regulatory framework to receive water storage credits for recharged stormwater in Arizona.

Seneca Basin was designed and constructed by Pima County on a 1.67-acre property to combat decades of flooding suffered by the surrounding neighborhood. The basin can harvest 321,662 gallons of stormwater flowing off Seneca Street. Seneca Basin was designated a City Park in 2022.

Cherry Avenue storm water capture project captures and retains up to 77,049 gallons of stormwater in a two-cell vegetated basin, mitigating nuisance flooding in the surrounding neighborhood.

Table 5. Stormwater Projects Budget

Project	Amount	Project Progress Report	Funding Source
			Pima County RFCD
Seneca Basin	$257,152	Completed 2019	
Richey Basin	$267,818	Completed 2020	
Cherry Avenue	$302,075	Completed 2022	
El Vado Stormwater Park	$1,093,055	Completed 2023	
Sunland Vista Wash	$789,733	Completed 2023	

Note: Projects were constructed by Pima County RFCD with their funds; these projects are maintained jointly by RFCD and the City's S2S Program. S2S maintenance is funded through the GSI fee.

S-1 Action A:
Use the IGA with Pima County Flood Control to implement large scale stormwater projects.

High Priority — Ongoing

S-1 Action D:
Prioritize and implement large scale stormwater projects.

High Priority — Mid-Term

Actions taken in 2023 (To support Actions A and D)

- The El Vado Flood Forest Project was completed under the IGA partnership. The 2-foot-deep basin has a 402,511-gallon capacity. It is designed to harness storm water runoff, diverting it from flooding the adjacent neighborhood, and instead using it to support a native, self-sustaining, food forest to benefit the local community. The project improvements included planting Mission Era fruit trees, and when these plants mature, their fruit can be harvested by the public.
- The Sunland Vista Wash was completed under the IGA. This linear project includes a series of 1-foot-deep basins that manage 155,781 gallons of stormwater. The project slows and infiltrates stormwater flows and adds dozens of native trees and shrubs to the landscape.
- Meetings and site visits occurred, during which Pima County RFCD and the City collaborated on project identification, prioritization, and implementation. Per the IGA, Pima County RFCD funds project design and construction and the City funds operation and maintenance through the GSI customer fee. Tucson Water and Pima County RFCD began evaluating large scale stormwater projects with the specific goal to recharge the local aquifer. Based on runoff patterns and available space, two potential locations for pilot projects were identified. As a first step, the team performed a review of hydrologic and geologic data near the potential sites and created lithologic profiles.

Stormwater capture in action at Sunland Vista Wash

Figure 8. Example of Basic Drywell Cross Section

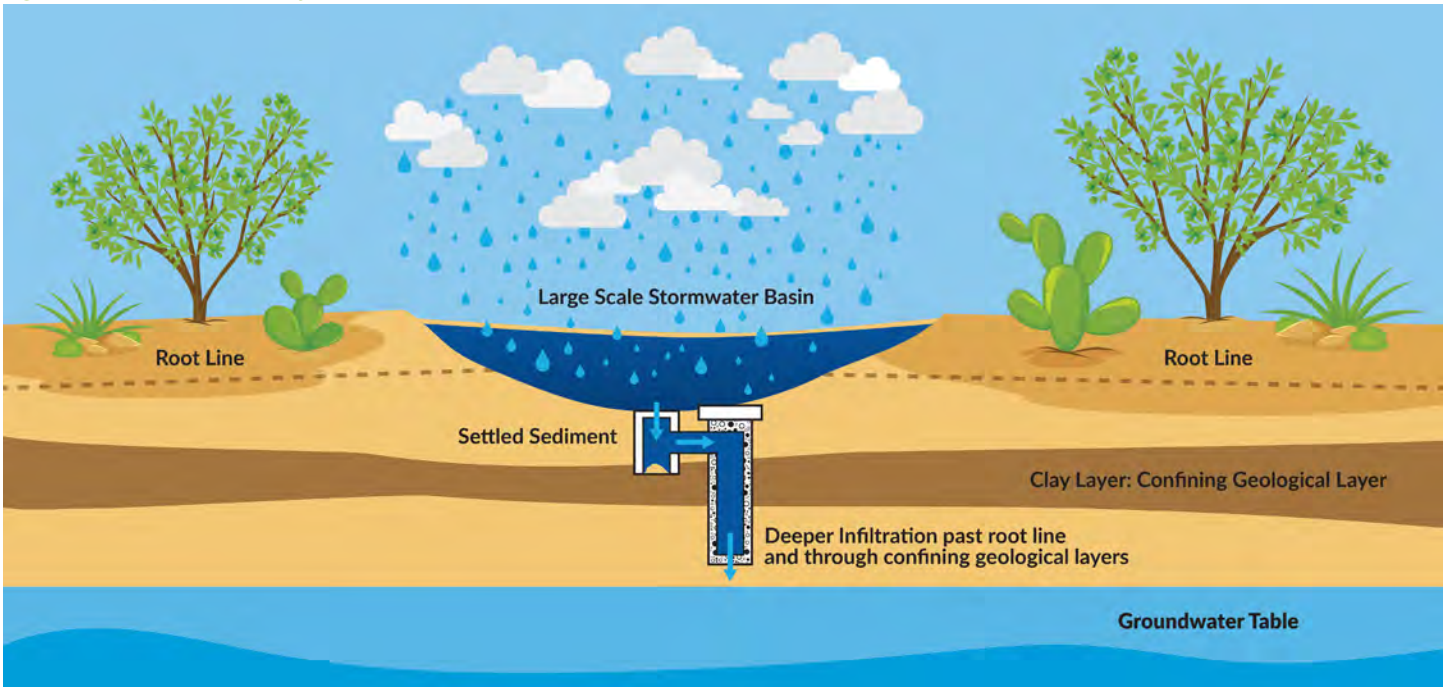


Diagram of a potential method to achieve large-scale stormwater aquifer recharge using a drywell to enhance infiltration through confining geologic layers and to a deep-water table.

S-1 Action B:
Establish additional governance and funding structures and strategies necessary to implement large scale stormwater projects.

High Priority | Near-Term

Actions taken in 2023

- In March, Tucson's Mayor & Council approved permanently instituting a GSI Fee. Previously, the GSI Fee existed as a pilot fee program from April 2020 through June 2023. The GSI Fee is levied on residents and businesses inside the City at the rate of $0.13 per hundred cubic feet of water usage. This permanent funding source helps the S2S Program budget more predictably in planning for projects and conducting ongoing maintenance.

S-1 Action C:
Conduct a study to identify areas that have the greatest potential for implementing large scale stormwater projects with multiple benefits.

High Priority | Near-Term

Actions taken in 2023

- Pima County RFCD developed an online, publicly available dashboard modeling stormwater runoff called the "Stormwater Net Increase (Delta) from Developed Areas." This tool was developed with many data sources including rainfall, soil, tritium tracing, open space area, and building data, and assists planners in identifying and ranking potential catchment areas and yields. The tool has helped Pima County RFCD and City staff estimate and understand approximate stormwater quantities. An estimated 12,700 acre-feet per year could be harvested if large-scale storm water capture is fully developed. Tucson Water has collaborated with the Pima County RFCD on potential opportunities to develop some of the subbasins identified in the model for stormwater capture. Link to the tool: https://pimamaps.maps.arcgis.com/apps/dashboards/e431d23fbbf040a58627c933c8e5a220

S-2 Integrate and align stormwater standards, policies, and practices from across the region

Stormwater has historically been underutilized compared to reclaimed, surface, or groundwater, because of its unpredictability in timing, quantity, and water quality. Because of this, some GSI guidelines exist, but there is a lack of consistency in installation and maintenance practices. The absence of a unified approach contributes to the difficulty in quantifying the saving benefits derived from stormwater projects. The City's S2S and Residential Rainwater Harvesting Rebate Programs help expand Tucson's stormwater harvesting resource and provide a mechanism for improving and developing stormwater standards and practices. A Low-Impact Development (LID) Ordinance is being developed to further strengthen local stormwater management policy and regulation. Standardizing policies, methods, practices, on a regional level will increase the value of implementing stormwater projects and will require a multi-stakeholder approach.

S-2 Action A:
Develop standardized measures of water savings.

Actions taken in 2023

- Tucson Water developed an equation to estimate the total stormwater capacity of the over 700 existing S2S maintained GSI assets. The current estimate is 4,563,395 gallons; however, Tucson Water staff plans to improve the accuracy of the basin measurements by field verifying the data during the summer of 2024.
- Tucson's Water's Rainwater Harvesting Rebate Program was implemented in September 2011 and was designed to encourage homeowners to install rainwater harvesting systems for landscape irrigation. The program is funded by a conservation fee assessed on all potable water sales. **In 2023, the program funded the installation of 282 rainwater harvesting systems, equating to approximately 2,038,085 gallons of water savings.** Since the program began, the cumulative water savings is 152,281,925 gallons. This data does not capture water savings by customers who constructed their own stormwater harvesting systems outside of the rebate program, however, it serves as a baseline measurement.

S-2 Action B:
Establish a regional task force or working group consisting of representatives from local governments, water management entities, and relevant stakeholders.

Actions taken in 2023

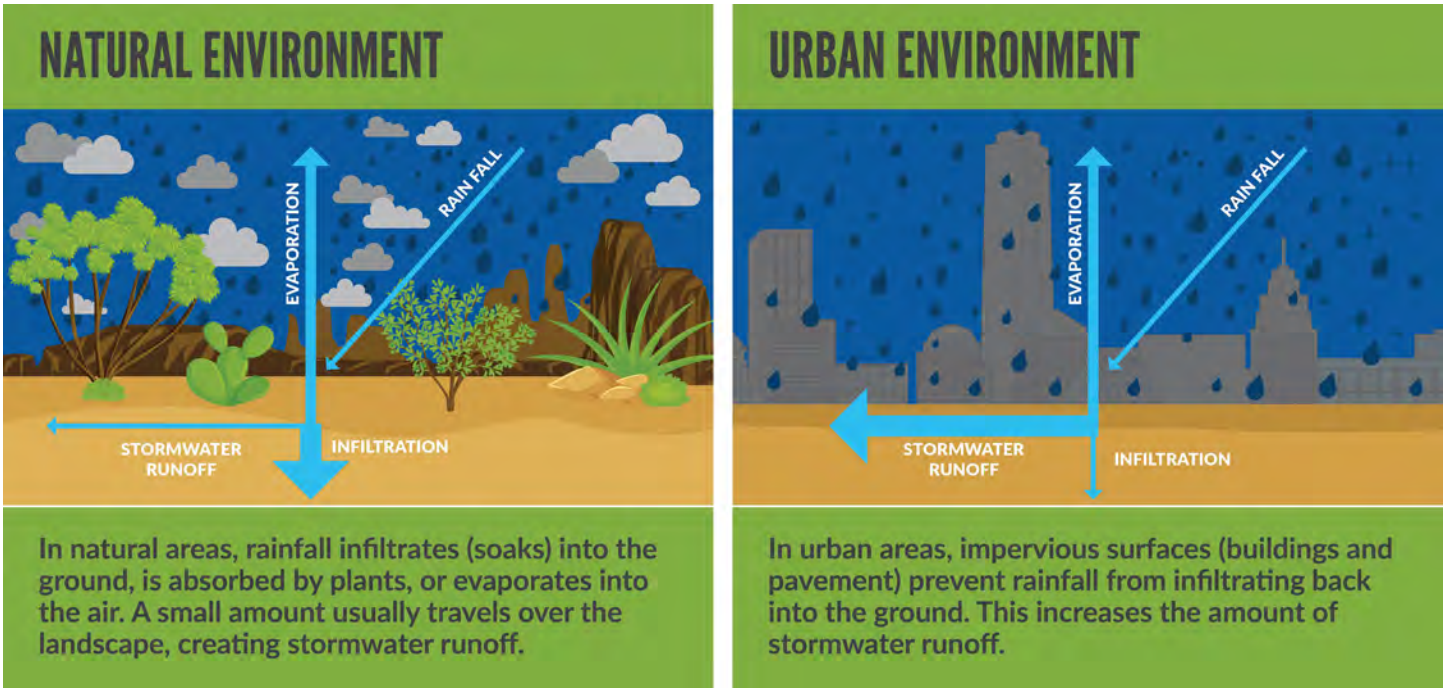
- The City participates in a regional working group that evaluates GSI and LID development guidelines. The group includes representatives from the City, RFCD, Pima Association of Governments (PAG), the University of Arizona, and others, and meets on a quarterly basis to discuss policy.

S-2 Action C:
Conduct an inventory and analysis of existing stormwater standards and policies across the region.

Actions taken in 2023

- The City worked with a consultant to develop the LID ordinance to strengthen local stormwater regulations. As part of water conservation efforts, the ordinance intends to update and streamline codes to promote the use and management of stormwater onsite for landscaping and to increase shade and native vegetation. The proposed ordinance will be available in 2024 and employs LID practices that mimic the natural environment such as rain gardens, permeable pavements, and rainwater harvesting basins. These practices help retain, absorb, and store rainwater in the ground and at its source, mitigating rainwater from flooding onto the street.

Figure 9. Stormwater Runoff and Infiltration Offset in Natural and Urban Environments



This diagram of the stormwater illustrates the increase in runoff and reduction of stormwater infiltration into the ground in an urban vs. natural environment.

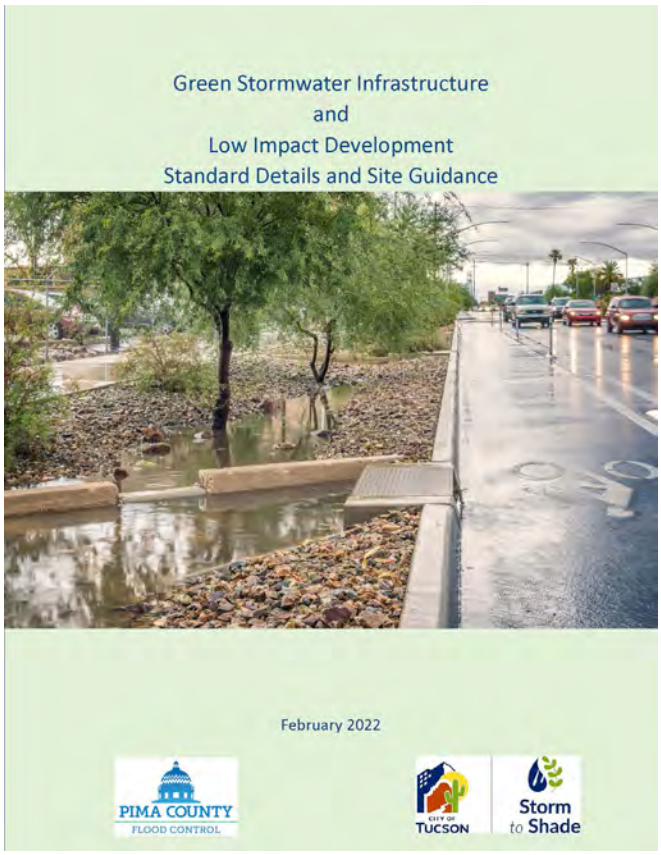
S-2 Action D:
Develop a toolkit or guidance document to support local governments in adopting and implementing consistent stormwater standards and policies.

High Priority

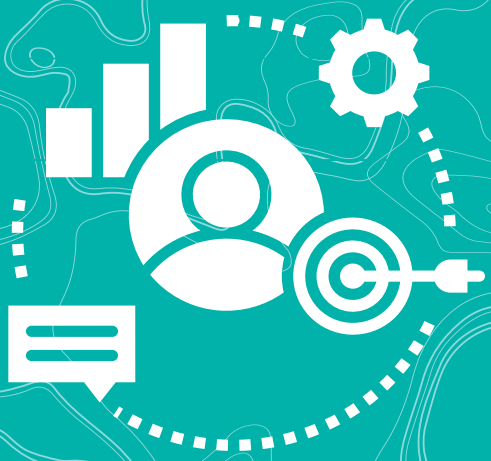
Near-Term

Actions taken in 2023

- The S2S program developed the "GSI and LID Standard Details and Site Guidance" document, which is publicly available to provide planners, designers, and contractors with clear documentation of best management practices for planning, design, and construction of GSI and LID for the City and Pima County. Link to document: www.tucsonaz.gov/files/sharedassets/public/v/1/fire/dtm/documents/divisions/floodplain/stormwater/cot_pcrfcd_gi_lid_site_guidance_final_draft.pdf
- As a result of the LID ordinance process, progress was made towards developing resources that could support a toolkit and guidance document.



V. DEMAND MANAGEMENT

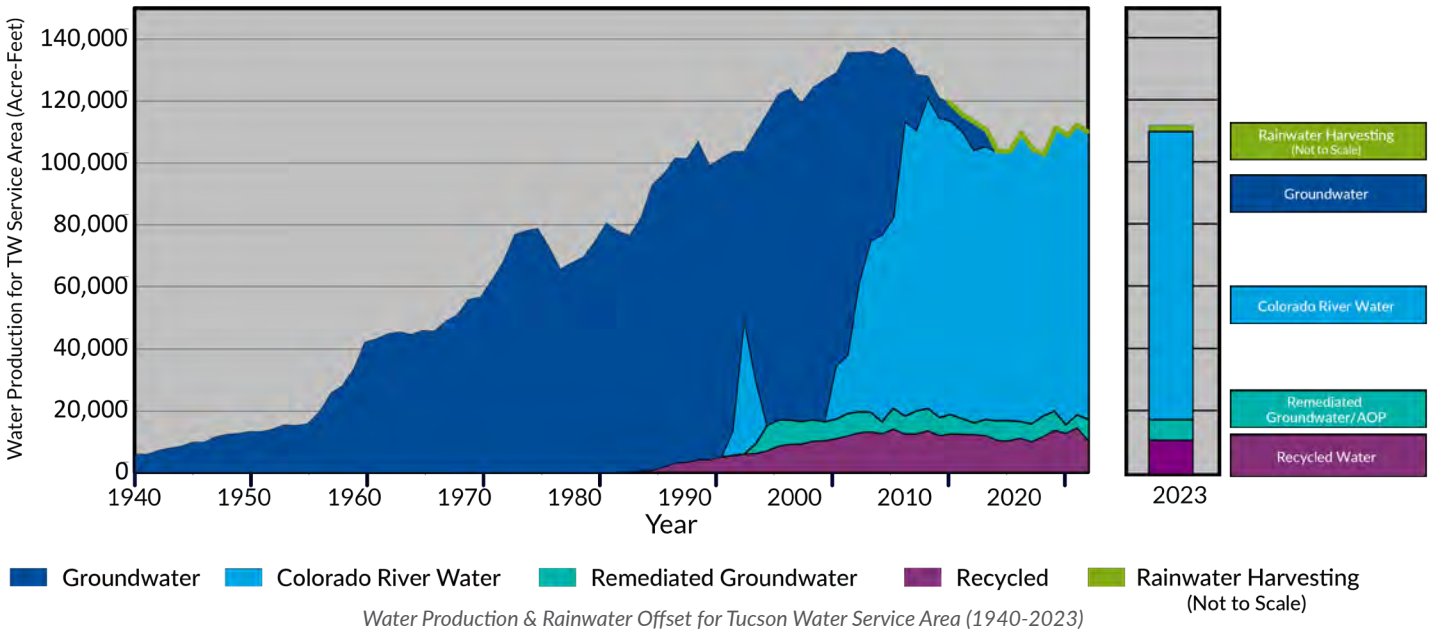


V. DEMAND MANAGEMENT

Tucsonans have long embraced a culture of conservation and Tucson Water continues to be a national leader in implementing water conservation policies and programs. Through decades of conservation initiatives, the Tucson Water service area has successfully reduced its overall water usage despite a growing population. As a result, the per capita water use has steadily decreased from 170 GPCD in 2002 to 130 GPCD in 2023. Through its 1W2100 Plan and its supporting strategies, Tucson Water aims to assess existing conservation programs and identify opportunities for improvement while also continuing to protect vulnerable communities.

Demand management includes education, incentives, technology, equity, for the entire water portfolio, surface water, groundwater, recycled water, and stormwater. Having the flexibility to adapt to changing, uncertain conditions, while delivering safe, reliable water to customers requires managing water demands in an equitable manner. Demand management strategies are focused on expanding the success of Tucson Water's conservation program.

Figure 10. Tucson's Historical Water Production



Water Production & Rainwater Offset for Tucson Water Service Area (1940-2023)

Table 6. Demand Management Projects Budget

Project	Amount	Project Progress Report	Funding Source			
			Conservation Fund	AZWIFA Grant/ Loans	AZWIFA Conservation Grant	Tucson Water CIP Funds
Advanced Metering Infrastructure (AMI) Implementation Phase I	$4,000,000	In progress			●	●
AMI Implementation Phase II	$4,000,000	Grants awarded 2023 and 2024			●	●
Turf Replacement & Non-functional Turf Removal Rebate	$1,500,000	Grants awarded 2023	●		●	
Water Efficiency Retrofits for City of Tucson Affordable Housing	$1,239,649	Grant awarded March 2024	●		●	
Water Efficiency Retrofits for Underserved Multi-family Customers	$1,305,000	Grant awarded May 2024	●		●	
Lead Service Line Inventory	$6,950,000	Funds awarded December 2022		●		●

Demand Management – Incentive (I) Strategies

I-1 Improve outreach for low-income assistance programs for homeowners and renters

Access to affordable, safe, and reliable drinking water is a fundamental human right. Tucson Water offers a Low-Income Assistance Program (LIAP) to qualifying customers and has continued to monitor participation in the program to identify opportunities to improve outreach and increase program utilization. Tucson Water strives to improve outreach with bilingual customer service representatives and creating outreach and educational materials in both Spanish and English. In 2023, the City applied for two AZWIFA grants to complement the LIAP program. The grants will fund the development and implementation of a new program for retrofitting and replacing outdated appliances in affordable housing rental units and underserved multifamily customers within Tucson. Tucson Water's Conservation Fund will finance the match requirement of these grants. Tucson has been proactively removing older service lines on the public side of the service line and mapping this progress, prior to the revised LCRR. A key aspect of the LCRR is public education and outreach, which includes updating the Consumer Confidence Report (CCR) with LCRR implementation progress, granting public access to the service line inventory and replacement plan, and issuing direct notifications to customers when exceedances occur, followed by investigations into the distribution system. Tucson Water received AZWIFA funding to develop lead service line inventories for each of our nine public water systems. Once established, the inventory will be helpful to use as a guide to develop a plan to replace lead service lines in the community on the private side to improve drinking water quality for residents. This guide will help Tucson Water better serve customers who live in low-income and disadvantaged communities.

I-1 Action A:
Continue to monitor participation in low-income assistance programs.

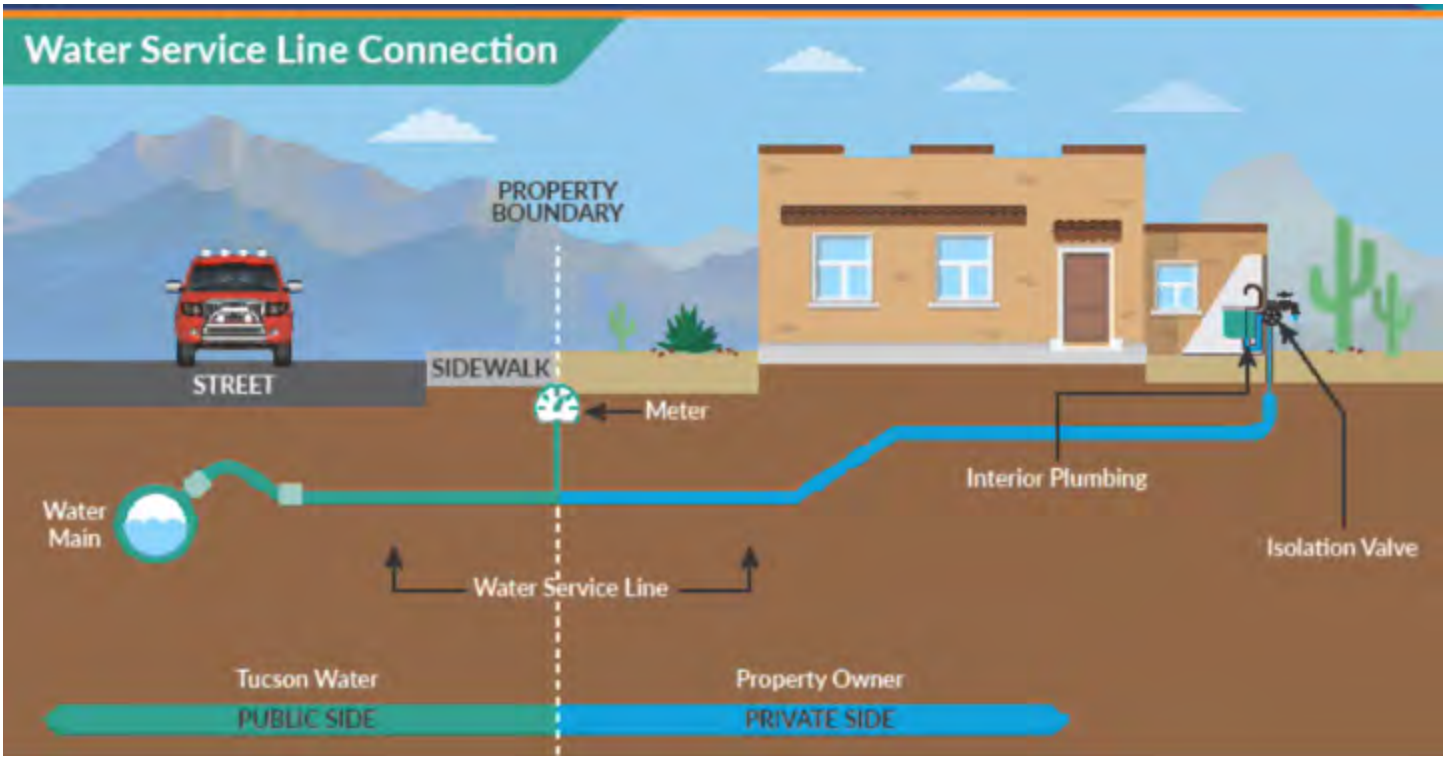
High Priority

Ongoing

Actions taken in 2023

- Tucson Water continued to investigate drinking water service connections to comply with the EPA 2021 Revised Lead and Copper Rule Revisions (LCRR).
- Tucson Water provides financial assistance to qualified low-income customers by offering a monthly discount on their water charges. The Low-Income Assistance Program has three tiers, and the graph right illustrates the program's participation. Additionally, Tucson Water distributed $7.6 million in federal Low-Income Household Water Assistance Program (LIHWAP) funds to nearly 6,500 customers.
- Completed the material inventory of the water system to meet the LCCR compliance deadline of October 2024.

Figure 11. Low Income Program Participation



Service line inventory now includes the private side of the water service line connection

I-1 Action B:
Conduct targeted outreach to increase low-income assistance program utilization.

High Priority | Near-Term

Actions taken in 2023

- Updated the annual means-tested income levels, established by the U.S. Department of Health and Human Services, and posted to the Tucson Water website.
- Tucson Water removed a flat rate discount and will now qualify customers for a 25%, 50% or 75% discount based on their monthly gross income.
- Tucson Water staff presented a television infomercial in English and Spanish, to communicate to customers the ongoing availability of low-income and emergency hardship bill-reduction programs.
- Link to Low-Income Conservation Programs: https://tucsonaz.gov/Departments/Water/Conservation/Low-Income-Conservation-Programs

I-1 Action C:
Simplify the application processes for low-income assistance programs and provide customers with assistance in completing applications.

High Priority | Near-Term

Actions taken in 2023

- Tucson Water continued to maintain an easy-to-use website page that informs potential low-income and emergency-hardship customers.
- Tucson Water removed a requirement for applicants to share their Social Security Number on the Customer Assistance Programs Intake Form. The City also requested that its third-party processor, Pima County Community Action Agency, cease asking applicants for Social Security Numbers.

I-2 Increase water savings opportunities through incentive programs for residential and commercial customers

Reclamation lowered its conservation tier from Tier 2 to Tier 1 in mid-2023 due to improved hydrologic conditions in the Colorado River basin. As directed by Mayor and Council, Tucson Water has maintained its Tier 2 protocol, to encourage conservation and reinforce resilience. Resilience is accomplished through both individual and collective actions that help Tucson conserve its water supplies. These extra conservation measures are sometimes necessary during persistent droughts or climate emergencies. Tucson Water coordinates conservation incentive programs, a tiered rate structure, water audits, and real-time usage information to customers as some of the ways to increase water savings. Tucson Water sought funding opportunities to grow the incentive programs and was awarded a state of Arizona WIFA grant for turf rebates. This funding will convert nearly five acres of non-functional turf to desert adapted landscaping in City parks as well as commercial and multifamily properties throughout the community.

I-2 Action A:
Continue to monitor participation rates, water savings, and return on investment for existing incentive programs.

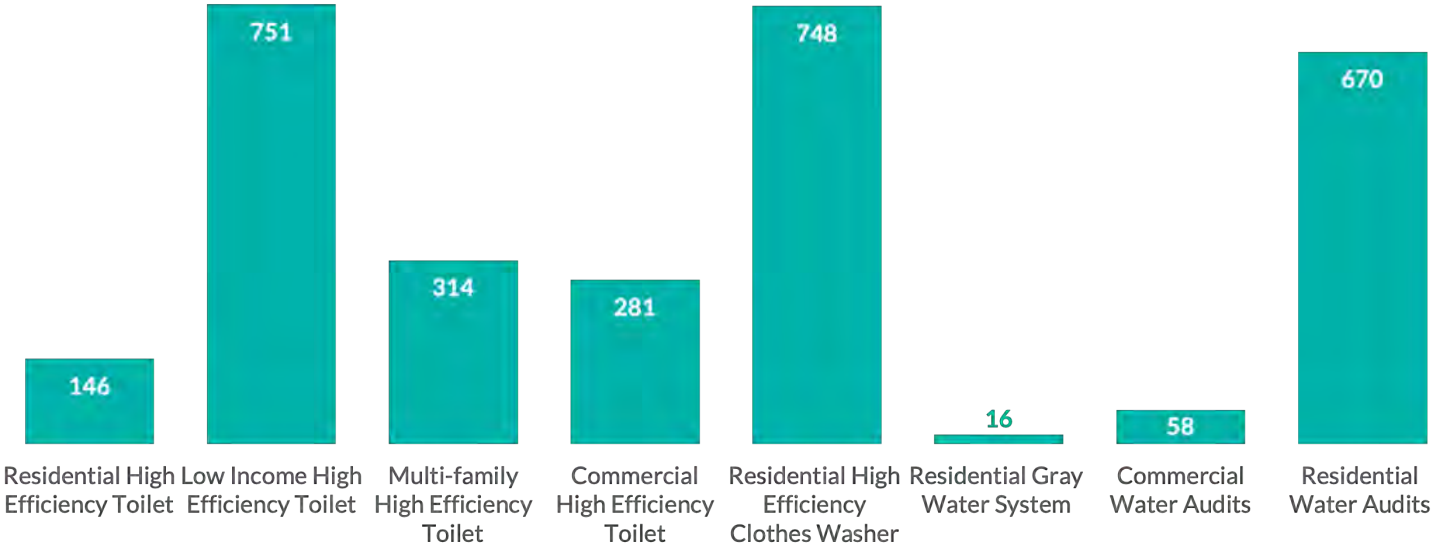
High Priority

Ongoing

Actions taken in 2023

- The first annual "high use letter" campaign was successfully completed by conservation staff in compliance with the Drought Preparedness and Response Plan. Customers that used two and half times more water than their water use guideline received letters that encouraged them to take advantage of conservation program resources like free devices and appliance rebates.

Figure 12. 2023 Annual Rebates and Audits



I-2 Action B:
Conduct targeted outreach to increase incentive program participation for high-demand customers such as multifamily complexes, Homeowners Associations (HOA), commercial properties, schools, and other institutional customers.

High Priority

Ongoing

Actions taken in 2023

- Tucson Water sent direct communication to customers whose water usage exceeded 250% or more than the water use guideline for their user class. These customers received a mailed or digital letter with the goal to educate and provide a range of conservation resources, including information on rebates, water saving devices, helpful guides, and landscaping tips. High-use letters were sent to almost 8,000 high-use residential and non-residential customers.
- Partnered with the University of Arizona Cooperative Extension Service to recruit homeowner associations that are willing to participate in landscape and irrigation audits and retrofits.
- Conservation staff developed multiple do-it-yourself (DIY) tools for Tucson Water customers, including self-help videos, water calculators, and checklists. These tools are available at the Conservation page of Tucson Water's website. Link: tucsonaz.gov/Departments/Water/Conservation/DIY-Water-Audits

I-2 Action C:
Adjust incentives, including rebates, focusing on high water use customers and customers with significant discretionary and/or outdoor water uses.

High Priority

Near-Term

Actions taken in 2023

- To further incentivize high-use customers to apply for rebates for outdoor programs, Tucson Water's Rainwater Harvesting program revamped its program by simplifying the rebate process and expanding eligibility for both passive and active water harvesting rebates up to $2,000 per property.

TucsonWaterRunsDeep.org provides resources for Tucsonans to learn how to be responsible desert dwellers.

Demand Management – Monitoring and Mandates (MM) Strategies

MM-1 Install "smart meters" that monitor water use in real time, provide leak alerts, and inform water use habits.

Advanced metering infrastructure, AMI, along with the use of smart meters, have successfully demonstrated technological benefits for both the customer and the utility in gaining greater results in water conservation. With this technology, leaks are detected early in real-time, resulting in quicker response time for repair, which equates to less water loss. AMI technology provides customers with knowledge about their day-to-day water use, information that can incentivize customers to keep their water bill within a desired range by identifying ways to conserve water. Tucson moved forward with AMI through pilot projects to confirm customer satisfaction, and potential water savings for developing conservation tracking methods. AMI will be the next leap towards achieving additional conservation measures.

Another exciting effect of AMI is the reduction of greenhouse gas emissions, as driving around to monitor 250,737 meters every month will no longer be required. Reductions like these will help us reach Tucson's carbon neutral goal by 2030.

MM-1 Action A:
Conduct pilot programs to evaluate how using smart meters will affect customer consumption.

High Priority

Near-Term

Actions taken in 2023

- Tucson Water hired a project manager to manage the Customer Information System (CIS), a platform for customers to view their real-time water use.
- Tucson Water hired a project manager for the management of AMI upgrades throughout the service area.
- Tucson Water submitted for AMI grant funding for Phase I and II through AZWIFA.
- A pilot program was completed in 2023 that included installation of 100 (residential + commercial) potable AMI endpoints.
- A Request for Proposals for the AMI project was put out to bid in December 2023 to select a vendor in 2024.

MM-1 Action B:
Evaluate options and recommend a systems integration approach to best leverage smart meter data.

High Priority

Near-Term

Actions taken in 2023

- Tucson Water completed initial planning efforts towards system integration of AMI technology and the utility's CIS platform.

Tucson Water technician installing an ultrasonic smart meter

Demand Management – Education (E) Strategies

E-1 Conduct research on new technologies and approaches

Surveying similar municipalities' most successful conservation programs provides Tucson Water with a broader perspective on what is possible and tools to make better informed decisions about demand management. Tucson Water has partnered with research institutions and industry organizations to test new technologies via pilot programs, develop new programs, and improve current programs. Developing a set of standard procedures for piloting conservation programs combined with periodic evaluation of those programs will help ensure Tucson's resilience in long term water resource planning in the face of challenges like climate change. Rebates for high-efficiency appliances and toilets, along with conservation educational outreach, have resulted in continued water reduction in Tucson as reflected by the continued low GPCD.

E-1 Action A:
Regularly research new technology and approaches used in conservation programs in other cities with similar climates.

High Priority

Near-Term

Actions taken in 2023

- Tucson Water's conservation program staff surveyed ordinances, incentives, and rebate guidelines developed by other water utilities to increase outdoor conservation by removing non-functioning turf. Nonfunctional turf is defined as irrigated grass areas that are not used for active or programmed recreational purposes and/or for drainage conveyances, storm basins, or erosion control. Based on this research, on July 6, 2023, amendments to the Unified Development Code (UDC Section 7.6.4) went into effect. The amended code prohibits ornamental turf in new commercial, industrial, institutional, and common areas of residential development. Conservation program staff are currently developing an incentive for removing existing nonfunctional turf by leveraging grant funds from AZWIFA. This program aims to remove 200,000 square feet of nonfunctional turf over the next two years on commercial and multifamily properties.
- Research from the EPA shows that as much as 50% of water in landscape is wasted due to inefficiencies in irrigation methods and systems. Smart controllers were identified as a tool to maximize irrigation efficiency automatically by determining the watering needs of a landscape. With this data in mind, Tucson Water offered smart irrigation controllers (EPA WaterSense) that customers could purchase at a discounted price in March 2023.
- The EPA's WaterSense program is both a labeling system for certified water efficient appliances and a source of information for program partners. Tucson Water and the City's Planning and Development Services Department worked with the Tucson-Pima County Joint Code Committee to modify the 2018 International Plumbing Code and International Residential Code to require the use of EPA WaterSense fixtures in all new development, including toilets, faucets, urinals, and showerheads. Staff conducted research by reviewing municipalities in the region that have already added a requirement for WaterSense fixtures, including the Town of Sierra Vista. Since costs are very similar between WaterSense and conventional fixtures, developers have been generally supportive since the beginning. Estimates show that just for toilets, the customer can save over $140 annually and more than $2,900 over the lifetime of the toilet. If paired with other fixtures, the short- and long-term cost saving could be significant.
- Tucson Water and the Planning and Development Services Department have contracted with outside expertise to update the City's approach to LID. This approach to development seeks to maintain pre-development hydrology and uses green infrastructure to keep stormwater from running off a development site. The team researched LID ordinances in other communities to inform the development of a draft LID ordinance for Tucson.

E-1 Action B:
Collaborate with research institutions, including universities and other industry organizations, to advance knowledge and develop new water conservation measures.

Actions taken in 2023

- Drought response measures are actions that the City and Tucson Water customers will undertake in response to the four drought tiers. Letters to high water users are drought response measures, listed within the City's Drought Preparedness and Response Plan, were administered by the Conservation Program. As part of a collaborative behavior study, to understand how to incentivize customers to conserve, professors from the University of Arizona's Department of Psychology reviewed and provided feedback on letters Tucson Water sent to select customers that use two and a half times more than the water use guideline.
- Tucson Water contracted with outside expertise to explore Net Zero Water approaches in other cities. Net Zero or water neutral development is the idea that new developments are "neutral" to the water supply system by not increasing demand. In practice, other cities often added a surcharge to new homes to offset the cost of retrofitting existing buildings with more efficient water fixtures.
- During 2023, data from a Flume Pilot Study was analyzed. The pilot study was launched in August of 2021 which included installation of Wi-Fi-enabled 50 flume devices attached to the water meter of employees to provide real-time, accurate water use data that communicates with a smartphone. The data shows that leak detection devices are capable of conserving approximately 3,500 gallons per year. This water saving estimate is a valuable data point for Tucson Water's Conservation Program to allocate program resources and inform which incentive packages and rebate programs are most valuable to invest in.

E-1 Action C:
Develop a process for piloting new conservation technologies and evaluating their effectiveness.

E-1 Action D:
Conduct a conservation program review on a fixed frequency that includes a review of all existing programs and an evaluation process for new conservation ideas and suggestions.

Actions taken in 2023 (To support Actions C and D)

- Tucson Water's Conservation Program began drafting a business plan that will evaluate existing programs and create a process for new ideas, suggestions, and pilot programs.

E-2 Provide landscape training to reduce outdoor water use, with emphasis on resilient, desert-adapted landscapes

Tucson Water has been fortunate to serve a customer base that has historically exhibited a strong conservation ethic. Residential and nonresidential sites that use native or desert-adaptive landscape are commonly seen across the service area. To further advance conservation, Tucson Water partnered with the University of Arizona and launched the WaterSmart Program in 1990. The program was initially aimed at homeowners to expand upon the community's conservation ethic, but shortly after the program began, the need for training tailored to landscape professionals was identified, and the Smartscape Program was created. In 25 years, Smartscape has trained over 4,500 landscape professionals and provided classes to over 6,000 community members. Education and training opportunities continue to be an effective demand management strategy for outdoor water conservation, targeting homeowners' associations (HOAs), and residential homeowners through workshops, public events, and the desert dweller guide. Tucson Water has expanded and continues to grow its reach, through partnerships with local experts and universities.

E-2 Action A:
Continue to update and promote desert-adapted landscaping manual and landscape watering guidelines with digital distribution on City's website, brochures at landscaping stores, and in-person outreach at public events.

Medium Priority

Ongoing

Actions taken in 2023

- Tucson Water co-sponsored an in-person outreach event, the 2023 Sustainable Landscapes Expo, held at the University of Arizona's Cooperative Extension. Printed conservation information, guides, and materials were distributed to the public.
- Tucson Water's Public Information Office developed and published the Responsible Desert Dweller Guide. The guide has been distributed to the public in person, at tabling events on the weekends and is also available on the web. This guide celebrates Tucson's heritage of conservation that has made our community one of the most water-resilient cities in the Southwest. Link to the guide: tucsonwaterrunsdeep.org/
- Tucson Water's monthly customer outreach newsletter, "Water Matters," offers periodic stories and features on ways to conserve water, such as applying for rebates for turf replacement, planting native trees that require less irrigation water, stormwater runoff mitigation, and reduced contaminant loads to washes and arroyos.
  Link to sign up for newsletter: tucsonaz.gov/Departments/Water

Residential desert adapted landscaping

E-2 Action B:
Provide landscape training to landscapers and green industry professionals who design, install, and manage landscapes.

Medium Priority

Ongoing

Actions taken in 2023

- The Smartscape Program, in partnership with the University of Arizona's Cooperative Extension, facilitated a workforce development program and training specifically for landscape professionals. The course covers the fundamentals of design, installation, and maintenance of sustainable, desert-adapted landscapes and irrigation systems.
- Through Tucson Water's S2S program, City personnel have received Smartscape training.

E-2 Action C:
Partner with homeowner associations to promote water-efficient landscaping practices in common areas.

Medium Priority

Ongoing

Actions taken in 2023

- Tucson Water and the University of Arizona's Smartscape program continued the HOA Landscape Transformation Pilot Program, which provides guidance and limited funding on transitioning to water efficient landscapes, through training, planning support, and grants. Three HOAs participated in Phase 1 of the HOA Landscape Transformation pilot and a new cohort of HOAs will participate in Phase 2.

E-2 Action D:
Conduct residential landscaping retrofit workshops to educate homeowners on desert adaptive landscaping practices.

Medium Priority

Near-Term

Actions taken in 2023

- Residential rainwater harvesting and greywater workshops, both of which are prerequisites for the respective rebates, were made available for anyone in the Tucson Water service area.
- Tucson Water partnered with Watershed Management Group, the Smartscape Program, and the Sonoran Environmental Research Institute to facilitate rebate workshops, which were offered online and in person in both Spanish and English.

Residential rainwater harvesting

Monitoring and Evaluation

The progress of actions and strategies provided in this report will continue to be tracked through metrics outlined for each water type and evaluated in the demand management section. This included annual tracking of groundwater production, surface water, and reclaimed water, conservation rebates, and affordability. While tracking and monitoring for these metrics are well established, stormwater harvesting, and large-scale recharge solutions are still being refined and developed.

The other metrics, agency collaboration, and community engagement will become more quantifiable in the coming years.

Mayor Regina Romero and Director John Kmiec participate in a leadership panel at the national One Water Summit in Tucson (2023).

Community engagement is the cornerstone of successful One Water 2100 planning and implementation. During November 2023, the US Water Alliance's One Water Annual Summit was hosted in Tucson. The summit was a tremendous success, hosting 972 registrants from 322 cities across 46 states. This diverse group of water leaders engaged in conversations that supported knowledge sharing, best practices, and connections with local, regional, national, and global counterparts as we all work towards a One Water future. Tucson's unique and successful water story is the product of an educated community committed to valuing every drop of water.

The last metric, greenhouse gas (GHG) emissions, is monitored by the City. However, Tucson Water knows transporting water is energy intensive and is therefore implementing its own measures to decrease GHG emissions to meet the City's goals.

The action to implement AMI is one of the ways Tucson Water will decrease the utility's GHG emissions. The department has also taken steps to reduce the carbon footprint of transporting water by installing solar facilities at three reservoirs, as well as at CAVSARP, and SAVSARP to offset electricity demands.

Tucson will continue to invest in solar projects and research the application of other types of renewable energy, such as in-pipe power generation as water flows through select areas of our distribution system.

Table 7. Tucson Water uses the following metrics to track progress on its 1W2100 Plan

Metric	Metric Description
Annual Potable Production	*Amount of recovered water produced and served to customers.*
Annual Reclaimed Production	*Amount of reclaimed water served to customers and the end uses of reclaimed water.*
Annual Volume of Harvested Stormwater	*The S2S program is improving the method for measuring the capacity of green stormwater infrastructure projects.*
Annual Groundwater Savings	*The annual volume of groundwater stored by Tucson Water, CAGRD, and AWBA.*
Historic Production Chart	*Total volume of water produced by the utility annually broken down by the source of water (surface water, groundwater, recycled water, and stormwater), as well as relative proportions of each water source.*
Gallons per Capita per Day	*Annual GPCD, a common metric for comparing annual water use and water conservation effectiveness, is derived by dividing the number of people served by the amount of water produced.*
Conservation Program Rebates and Incentives	*Number of customers who take advantage of water efficiency programs (e.g., annual number of rebates or audits) and the level of water savings achieved through those programs.*
Affordability	*Number of low-income customers who receive assistance annually and the associated assistance funding and customers demographics.*
Agency Collaboration	*Number and type of collaborative efforts with other agencies and organizations, such as the number of meetings held, the level of participation, and the quantitative outcomes of the collaborations, such as number of multi-benefit projects, number of new collaboratively developed water policies.*
Community Engagement	*One Water 2100 feedback, presentations, and public events.*
Greenhouse Gas Emissions	*Tucson Water's Greenhouse Gas Emissions inventory will be shared with the team that implements Tucson Resilient Together (the City's Climate Adaption and Action Plan).*

Uncertain climate conditions are another factor that impacts water supply management. Tucson Resilient Together is addressing climate change through several actions to mitigate excessive heat. In 2020, Tucson launched the plant a million trees by 2030 campaign. The campaign continued during 2023 to focus on areas where investments to mitigate the heat island effect were not being addressed, mainly underserved communities. The S2S Program's stormwater harvesting projects provide supplemental water to help sustain a healthy tree life, is another way that the City of Tucson departments work collaboratively for the benefit of the community. Tucson is investing in electric vehicle charging stations, solar installations, and adopted the Resilient Southwest Building Code Collaboration. Tucson's Climate Action Hub developed by Tucson Resilient Together provides valuable information on the goals, actions, and status updates towards a green future.

ClimateAction.TucsonAZ.gov

The submission of the first implementation report provides documentation on the progress of incorporating the 1W2100 Plan approach, to value and manage all water resources in a responsible manner. The guiding principles for Tucson's 1W2100 Plan are a commitment to resilience, equity, stewardship, and quality of life. The strategies and actions support the guiding principles through planning, education, incentives, and technology. For questions and comments on this 1W2100 Plan Implementation report, please email Tucson Water at 1W2100@tucsonaz.gov.

TUCSON WATER

APPENDIX 1: LIST OF STRATEGIES

Supply - Surface Water (SW) Strategies

SW-1: Maximize the benefits of our current Colorado River water.

SW-2: Work with the State of Arizona to explore additional water supplies for the Central Arizona Project.

SW-3: Advocate for Tucson's allocation of Colorado River water through the Central Arizona Project in state and federal negotiations.

Supply - Groundwater (GW) Strategies

GW-1: Partner with regional water organizations to protect the aquifer.

GW-2: Accelerate groundwater cleanup efforts to make local supplies more available.

GW-3: Explore and invest in new treatment technologies to address unregulated, emerging water quality issues.

Supply - Recycled Water (RW) Strategies

RW-1: Adopt new policies for water reuse in buildings.

RW-2: Begin purifying recycled water to drinking water standards.

RW-6: Implement treatment technologies to address unregulated, emerging water quality issues.

Supply - Stormwater (S) Strategies

S-1: Explore opportunities for large scale stormwater projects with multiple benefits.

S-2: Integrate and align stormwater standards, policies, and practices across the region.

Demand Management - Incentive (I) Strategies

I-1: Improve outreach for low income assistance programs for homeowners and renters.

I-2: Increase water savings opportunities through incentive programs for residential and commercial customers.

Demand Management - Monitoring and Mandates (MM) Strategies

MM-1: Install "smart meters" that monitor water use in real time, provide leak alerts, and inform water use habits.

Demand Management - Education (E) Strategies

E-1: Conduct research on new technologies and approaches.

E-2: Provide landscape training to reduce outdoor water use, with emphasis on resilient, desert adapted landscapes.

APPENDIX 2: STRATEGIES & ACTIONS

SW-1 Maximize the benefits of our current Colorado River water.

Priority	Relative Expense	Level of Effort
HIGH	$$	2

A. Continue to fully utilize Colorado River water with the use of CAVSARP, SAVSARP, Pima Mine Road Recharge Project, and groundwater savings facilities. (Ongoing)

B. Annually update projected balance of groundwater storage credits to inform the adaptive management of Plan strategies. (Ongoing)

C. Maintain and renew/replace infrastructure for storage and delivery of full CAP allocation. (Ongoing)

D. Utilize groundwater storage credits as short-term transitional supplies during CAP allocation shortages while additional supplies are acquired, restored, and/or developed. (Near & Mid-Term)

E. Develop implementation triggers for alternative supplies and enhanced conservation measures to prepare for extended CAP allocation shortages. (Near & Mid-Term)

SW-2 Work with the State of Arizona to explore additional water supplies for the Central Arizona Project.

Priority	Relative Expense	Level of Effort
HIGH	$	1

A. Collaborate with CAP, ADWR, and other Arizona utilities to improve regional cooperation on water issues. (Ongoing)

B. Work proactively with CAP, ADWR, and other Arizona utilities to explore the availability, water quality, accessibility, and cost of alternative water resource options. (Ongoing)

SW-3 Advocate for Tucson's allocation of Colorado River water through the Central Arizona Project in state and federal negotiations.

Priority	Relative Expense	Level of Effort
HIGH	$	2

A. Actively participate in negotiations about how Colorado River water will be shared. (Ongoing)

B. Participate in collaborative efforts to reduce the risk of Lake Mead falling to critical levels. (Ongoing)

GW-1 Partner with regional water organizations to protect the aquifer.

Priority	Relative Expense	Level of Effort
HIGH	$	2

A. Partner with ADEQ and other regional utilities to characterize groundwater contamination. (Ongoing)

B. Participate in regional efforts to achieve and maintain safe yield for the Tucson AMA. (Ongoing)

C. Consider regional solutions to address groundwater quality restoration where feasible. (Near-Term)

D. Expand groundwater monitoring network to support groundwater management activities and decision-making. (Near-Term)

GW-2 Accelerate groundwater cleanup efforts to make local supplies more available.

Priority	Relative Expense	Level of Effort
HIGH	$$	2

A. Implement water treatment solutions to address water quality issues from emerging contaminants. (Near-Term)

B. Prioritize and address areas of contamination and restore availability of groundwater wells. (Near & Mid-Term)

C. Fully remediate contaminated groundwater. (Long-Term)

GW-3 Explore and invest in new treatment technologies to address unregulated, emerging water quality issues.

Priority	Relative Expense	Level of Effort
MEDIUM	$	1

A. Monitor the development of new Federal and State water quality regulations that could affect Tucson's future groundwater utilization potential. (Ongoing)

B. Continue the Tucson Water Sentry Program to monitor unregulated and emerging contaminants in groundwater supplies. (Ongoing)

C. Monitor the relative risk of emerging contaminants by comparing concentrations in groundwater supplies against Drinking Water Health Advisory levels and contamination risk for additional wells. (Ongoing)

D. Participate in research projects to test novel treatment technologies for emerging contaminants. (Mid-Term)

E. Implement advanced water treatment to address high priority emerging water quality issues. (Mid & Long-Term)

RW-1 Adopt new policies for water reuse in buildings.

Priority	Relative Expense	Level of Effort
HIGH	$	2

A. Research what other cities have done to promote, incentivize, and regulate onsite reuse for industrial, commercial, and large residential developments. (Near-Term)

B. Provide regulatory and technical guidance for implementation of onsite reuse systems. (Near-Term)

C. Create incentives for onsite reuse in commercial and industrial properties. (Near-Term)

D. Develop a targeted outreach campaign to garner interest from commercial, industrial, and multifamily residential customers to participate in a pilot program. (Near-Term)

E. Implement pilot programs for commercial and industrial customers. (Near-Term)

F. Develop training programs for the operation and maintenance of onsite reuse. (Near-Term)

G. Develop ordinance for onsite non-potable water programs, including design criteria, permitting, reporting, and enforcement. (Mid-Term)

H. Develop criteria to require onsite reuse for certain water uses in commercial and industrial properties. (Mid & Long-Term)

RW-2 Begin purifying recycled water to drinking water standards.

Priority	Relative Expense	Level of Effort
HIGH	$$$	3

A. Participate in the ADEQ regulation development process for direct potable reuse. (Near-Term)

B. Evaluate benefits and costs for direct potable reuse of recycled water. (Near-Term)

C. Conduct a survey to identify barriers to direct use of recycled water. (Near-Term)

D. Develop a public outreach program to build public confidence and support. (Near-Term)

E. Implement demonstration-scale projects to address potential customer or stakeholder concerns. (Mid-Term)

F. Implement a full-scale direct potable reuse project to fully utilize effluent recycled water as a water supply. (Mid-Term)

G. Beneficially use all recycled water within the Tucson AMA. (Mid-Term)

RW-6 Implement treatment technologies to address unregulated, emerging water quality issues.

Priority	Relative Expense	Level of Effort
MEDIUM	$	1

- **A.** Continue the Tucson Water Sentry Program to monitor emerging contaminants in recycled water. (Near-Term)
- **B.** Monitor the relative risk of emerging contaminants considering the end use. (Near-Term)
- **C.** Participate in research projects to test novel treatment technologies for emerging contaminants. (Mid-Term)
- **D.** Implement advanced water treatment to address unregulated emerging water quality issues considering the end use. (Mid-Term)

S-1 Explore opportunities for large scale stormwater projects with multiple benefits.

Priority	Relative Expense	Level of Effort
HIGH	$$$	3

- **A.** Use the intergovernmental agreement with Pima County Flood Control to implement large scale stormwater projects. (Ongoing)
- **B.** Establish additional governance and funding structures and strategies necessary to implement large scale stormwater projects. (Near-Term)
- **C.** Conduct a study to identify areas that have the greatest potential for implementing large scale stormwater projects with multiple benefits. (Near-Term)
- **D.** Prioritize and implement large scale stormwater projects. (Mid-Term)

S-2 Integrate and align stormwater standards, policies, and practices across the region.

Priority	Relative Expense	Level of Effort
HIGH	$	2

- **A.** Develop standardized measures of water savings. (Near-Term)
- **B.** Establish a regional task force or working group consisting of representatives from local governments, water management entities, and relevant stakeholders. (Near-Term)
- **C.** Conduct an inventory and analysis of existing stormwater standards and policies across the region. (Near-Term)
- **D.** Develop a toolkit or guidance document to support local governments in adopting and implementing consistent stormwater standards and policies. (Near-Term)

I-1 Improve outreach for low-income assistance programs for homeowners and renters.

Priority	Relative Expense	Level of Effort
HIGH	$	1

- **A.** Continue to monitor participation in low-income assistance programs. (Ongoing)
- **B.** Conduct targeted outreach to increase low-income assistance program utilization. (Near-Term)
- **C.** Simplify the application processes for low-income assistance programs and provide customers with assistance in completing applications. (Near-Term)

I-2 Increase water savings opportunities through incentive programs for residential and commercial customers.

Priority	Relative Expense	Level of Effort
HIGH	$	1

- **A.** Continue to monitor participation rates, water savings, and return-on-investment for existing incentive programs. (Ongoing)
- **B.** Conduct targeted outreach to increase incentive program participation for high-demand customers such as multifamily complexes, HOAs, commercial properties, schools, and other institutional customers. (Ongoing)
- **C.** Adjust incentives, including rebates, focusing on high water use customers and customers with significant discretionary and/or outdoor water uses. (Near-Term)

MM-1 Install "smart meters" that monitor water use in real time, provide leak alerts, and inform water use habits.

Priority	Relative Expense	Level of Effort
HIGH	$$	2

A. Conduct pilot programs to evaluate how using smart meters will affect customer consumption. (Near-Term)

B. Evaluate options and recommend a systems integration approach to best leverage smart meter data. (Near-Term)

C. Implement utility wide smart meter communication technology. (Near Term)

D. Develop a public education campaign to inform customers of the benefits of smart meters and how to use real-time data to monitor and manage their water use. (Near-Term)

E. Use smart meter data to improve conservation measure effectiveness tracking. (Near-Term)

F. Use smart meter data to create standards against which residential customers can measure their own usage. (Near-Term)

E-1 Conduct research on new technologies and approaches.

Priority	Relative Expense	Level of Effort
HIGH	$	1

A. Regularly research new technology and approaches used in conservation programs in other cities with similar climates. (Near-Term)

B. Collaborate with research institutions, including universities and other industry organizations, to advance knowledge and develop new water conservation measures. (Near-Term)

C. Develop a process for piloting new conservation technologies and evaluating their effectiveness. (Near-Term)

D. Conduct a conservation program review on a fixed frequency that includes a review of all existing programs and an evaluation process for new conservation ideas and suggestions. (Near-Term)

E-2 Provide landscape training to reduce outdoor water use, with emphasis on resilient, desert-adapted landscapes.

Priority	Relative Expense	Level of Effort
MEDIUM	$	1

A. Continue to update and promote desert-adapted landscaping manual and landscape watering guidelines with digital distribution on City's website, brochures at landscaping stores, and in-person outreach at public events. (Ongoing)

B. Provide landscape training to landscapers and green industry professionals who design, install, and manage landscapes. (Ongoing)

C. Partner with homeowner associations to promote water-efficient landscaping practices in common areas. (Ongoing)

D. Conduct residential landscaping retrofit workshops to educate homeowners on desert adaptive landscaping practices. (Near-Term)

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