JULY 2025

ONE WATER 2100 PLAN

IMPLEMENTATION REPORT 2024

Celebrating 40 Years of Sustainable Water Reuse & Innovation

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 Savings 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*

TUCSON WATER DIRECTOR'S MESSAGE

In 2023, the City of Tucson took a bold step toward long-term water security by adopting the One Water 2100 Plan—our community's roadmap to ensuring a reliable, equitable, and sustainable water future in our arid environment, where prolonged drought, rising demand, and limited resources call for forward-thinking action.

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

Over the past two years, we are proud to report strong early progress toward implementing this vision. The One Water approach—valuing every water source and using each drop wisely—is no longer just a framework. It is actively shaping how we manage water for today and for generations to come. Tucson is one of the first communities in the nation to move from One Water planning into full-scale implementation, and the results are already creating an impact.

Tucson Water is delivering on multiple fronts—modernizing critical infrastructure, expanding customer assistance programs, launching new conservation initiatives, and advancing a major water purification project in collaboration with state and federal agencies. These efforts have already secured over $136 million in funding that will be deployed in the upcoming years to support long-term water resilience.

Importantly, every step forward is grounded in collaboration—with the public, with our Mayor and Council, and with partners across Arizona and the nation. The success of the One Water 2100 Plan depends on shared stewardship. That's why we continue to engage, listen, and adapt, ensuring that our path forward reflects the diverse voices and needs of our Tucson community.

As Sonoran Desert dwellers, we know that resilience is a necessity. Together, through thoughtful planning, community partnership, and strategic investment, Tucson is building a future where water continues to support our vitality, environment, and quality of life.

Thank you to the community, partners, staff, and elected officials who are helping Tucson Water turn the One Water 2100 Plan into action.

John P. Kmiec

Director of Tucson Water
City of Tucson

BACKGROUND

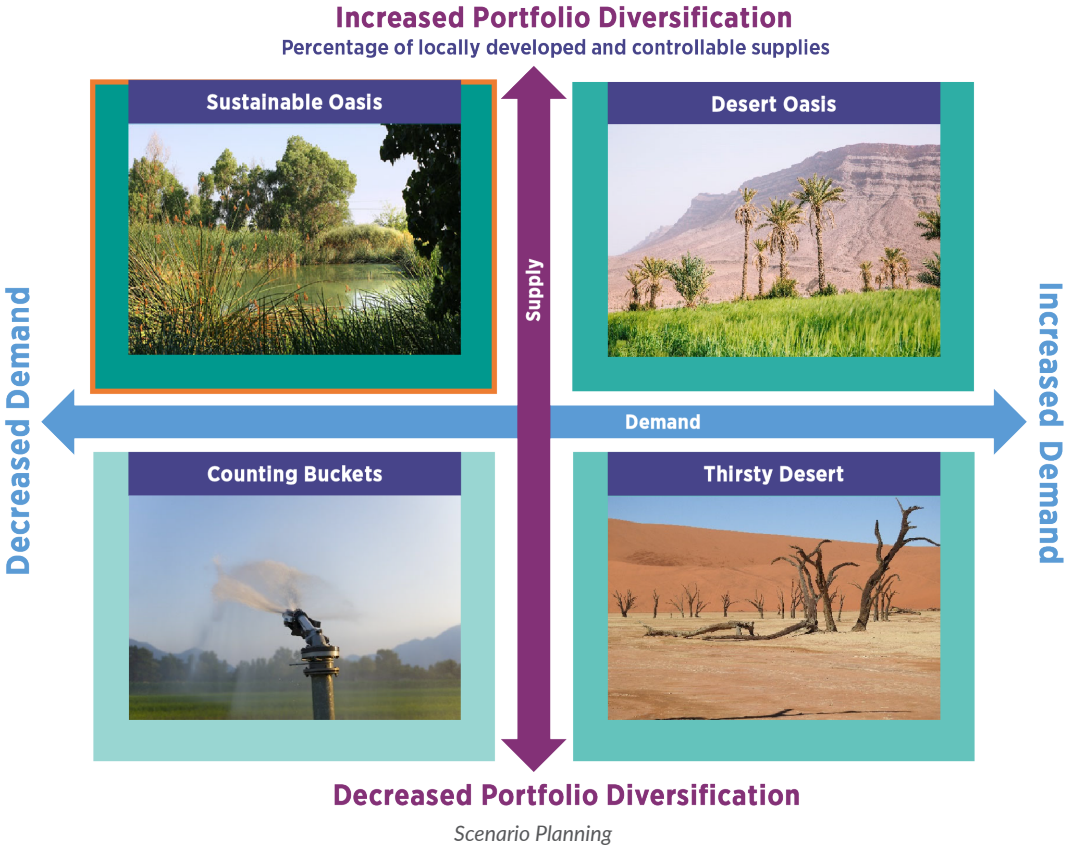
The City of Tucson's Mayor and Council adopted the One Water 2100 Plan (1W2100 Plan) on October 17, 2023, to ensure a sustainable, high quality water supply now and into the future. The 1W2100 Plan replaces the City's long-term water resource plan, Water Plan: 2000-2050 and is linked to the City's Climate Action and Adaptation Plan, Drought Preparedness and Response Plan, and general plans, Tucson Resilient Together and Plan Tucson, respectively. The 1W2100 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 are 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, collaborating 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 to 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. Addressing these complex water management challenges requires institutional collaboration with a broad range of partners at the federal, state, and local levels.

Central Avra Valley Storage & Recovery Project & Brawley Pump Station

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

During 2024, the Colorado River operated under Tier 1 guidelines of the Lower Basin Drought Contingency Plan. While Tier 1 guidelines do not call for reductions in the Colorado River supply for municipal providers, Tucson voluntarily conserved 30,000 acre-feet of its entitlement through the system conservation System Conservation Implementation Agreement (SCIA) to help improve water levels in Lake Mead. Tucson's annual entitlement of renewable Colorado River water is 144,191 acre-feet. The Central Arizona Project (CAP) delivers this Colorado River water to Tucson's Clearwater facilities, the Central Avra Valley Storage and Recovery Project (CAVSARP), and the Southern Avra Valley Storage Recovery Project (SAVSARP), located in the Avra Valley west of Tucson.

Since 2012, Tucson Water's Clearwater facilities have significantly expanded their recharge capacity, enabling them to receive the City's full annual entitlement of Colorado River water. Tucson Water collaborates with various partners to store water in facilities such as the Pima Mine Road Recharge Project (PMRRP) and groundwater savings facilities (GSFs). A GSF is a partnership with an agricultural entity that holds groundwater rights for irrigation. This partnership allows farms to reduce their groundwater usage by utilizing a portion of Tucson's renewable Colorado River entitlement. This approach helps conserve groundwater resources and provides Tucson with long-term storage credits (LTSCs) for future use.

Our Colorado River entitlement and annual order typically exceed our current customers' annual water demand. As a result, the excess recharged water is stored and converted into LTSCs the following year. This process helps accumulate positive storage volumes that can be used in future years. Tracking the balance of LTSC provides guidance on when adaptive management will need to be implemented. For instance, Tucson evaluates the effectiveness of conservation measures through a supply and demand analysis. By focusing on maintaining a lower demand than our surface water supply and utilizing all available water resources, we can create a resilient community that offers flexibility for the future. Tucson Water's ongoing capital investments and maintenance of the Clearwater storage facilities are crucial for successfully executing this strategy as they protect our 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 2024

- Tucson received 114,011 acre-feet of Colorado River water through its Clearwater recharge facilities, Pima Mine Road Recharge Project, and multiple GSFs. The reduction in delivery was to adhere to the SCIA with USBOR to reduce scheduled delivery for up to 30,000 acre-feet in 2024 for the benefit of Lake Mead.
- Renewable Colorado River water was recovered from recharge facilities to produce 93,460 acre-feet of potable water for Tucson Water's Service Area.

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

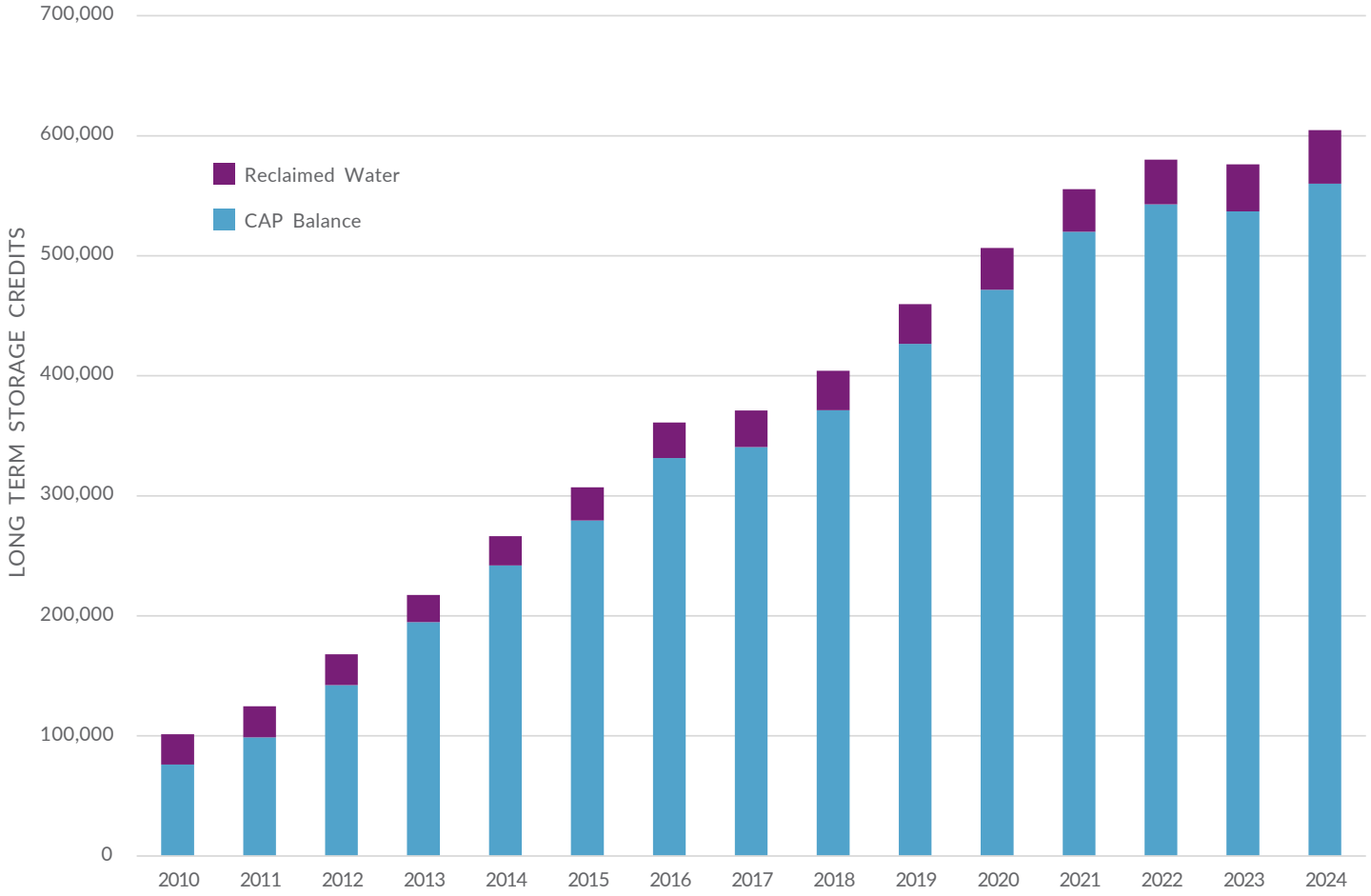
High Priority

Ongoing

Actions taken in 2024

- Storage credits earned in 2024 increased compared to 2023; however, they were lower than in previous years. This was due to participation in the SCIA with USBOR credit balance was 604,759 acre-feet (equivalent to almost six years of current potable demands).

Figure 1. Historic Cumulative Long-Term Storage Balance



This chart illustrates Tucson's progress in accumulating positive storage volumes through its storage credits (LTSCs) for future use.

SW-1 Action C:
Maintain and renew/replace infrastructure for storage and delivery of full Colorado River 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	●	●

Actions taken in 2024

- Performed routine recharge basin maintenance, flow meter replacement, and production well replacement at our Clearwater recharge facilities, CAVSARP and SAVSARP. Meter replacement is important to accurately measure deliveries to the recharge facilities, while replacing aging wells is essential to ensure the reliability of our service area's renewable water supply. The well CA-018A at CAVSARP was replaced by a new well, CA-018B.
- Completed an engineering design for valve replacements at three CAVSARP basins, began the design phase for the remaining basins, and for replacement of two pressure-regulating valves that control water delivery to CAVSARP. With the new design, outdated infrastructure will be replaced while maintaining delivery and storage capacity of the CAVSARP facility as part of a 20-year refurbishment and replacement project. The upgrades to the CAVSARP facility will be funded through SCIA and Tucson Water CIP funds.
- Initiated the expansion of the Old Vail reservoir to a 6-million-gallon storage capacity to meet existing and future needs in Southeast Tucson.
- Designed a transmission main to connect Corona de Tucson, located in the southeast, to the central system. This project will facilitate the delivery of renewable Colorado River water, reducing groundwater extraction in the area.

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

Near/Mid Term Priority

Ongoing

Actions taken in 2024

- Although Tucson conserved 30,000 acre-feet of its Colorado River allocation in exchange for federal compensation through the SCIA, no LTSCs were recovered during 2024.

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

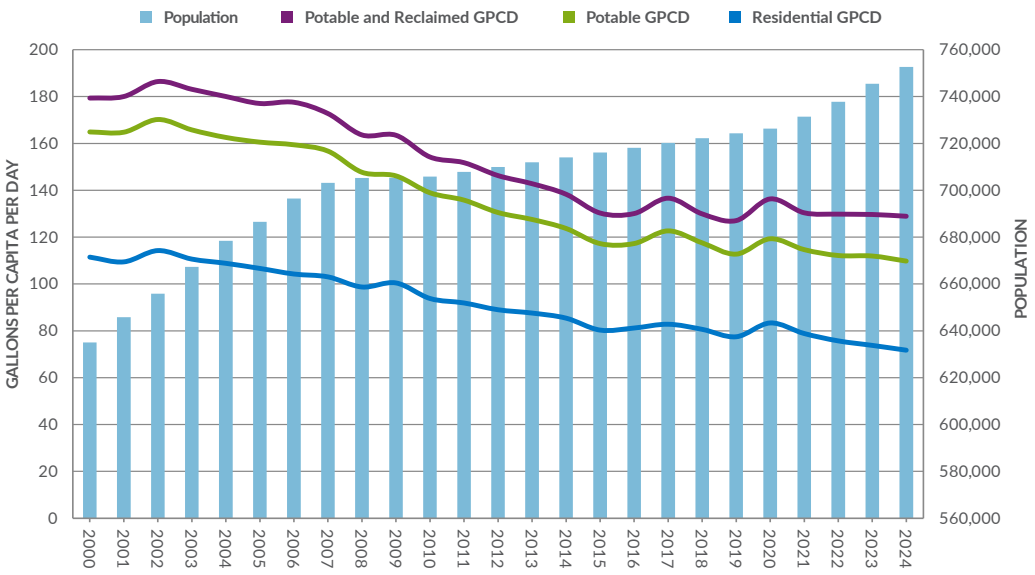
Near/Mid Term Priority

Ongoing

Actions taken in 2024

- Tucson experienced a planned shortage scenario. The Lower Basin operated under Tier 1 guidelines of the Drought Contingency Plan and participation in the SCIA. Therefore, Tucson Water did not implement triggers for alternative supplies; instead, the Drought Preparedness and Response Plan guidelines for Tier 2 shortage were implemented. Tier 2 measures included water audit assistance for customers that exceed water use guidelines. The service area's potable demands continued decreasing, which buffered the planned shortage of 2024. 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 Population and GPCD Trends 2000-2024



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, the Arizona Department of Water Resources, the Central Arizona Water Conservation District (operator of the CAP), AZ Water Infrastructure Finance Authority, 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 in western Arizona, recovering stored groundwater near recharge locations with access to the CAP canal, transferring water from other instate basins, and establishing agreements for water exchanges from other states. Agreements for water exchanges from agricultural areas, where land is left fallow in return for compensation, have been demonstrated as an effective way to increase the water supply for utilities. The AZ Water Infrastructure Authority secured the Long-Term Water Augmentation Fund. The funding supports a mandate to find new water sources to augment Arizona's water supply, with 75% of the funding reserved for importing water and the remaining 25% available for in-state augmentation projects. Water quality is always a priority when evaluating new water supplies to augment Tucson's Colorado River supply.

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 agencies to explore the availability, water quality, accessibility, and cost of alternative water supply options.

Actions taken in 2024 (To support Actions A and B)

- In 2024, 27,997 acre-feet of Colorado River Water were stored collectively for Phoenix, Scottsdale, and Peoria at our Clearwater facilities. During years of Colorado River shortages, cities in the greater Phoenix Metropolitan Area can take a portion of Tucson's Colorado River supply directly off the CAP channel. In turn, Tucson can recover the same amount of water stored by the storage partners in Tucson's Clearwater facilities. This arrangement provides Tucson Water with increased operational flexibility by allowing access to the stored water of its intrastate partners.
- The City of Tucson Manager, Tim Thomure, participated as a member of the Arizona Water Infrastructure Financing Authority, Long-Term Water Augmentation Committee. The committee reviewed responses to a request for ideas to augment Arizona's water supply. In December, a Solicitation for Procurement (request for proposals) was issued with an annual near-term water import augmentation goal of 500,000 acre-feet per year. The involvement of local leadership in water importation projects enhances our regional water supply's resiliency.

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 Colorado River operations, 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 meet Tucson's water demands. Assessing enhanced conservation strategies, anticipated projected population growth, and a diverse water supply portfolio are key metrics during negotiations. 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.

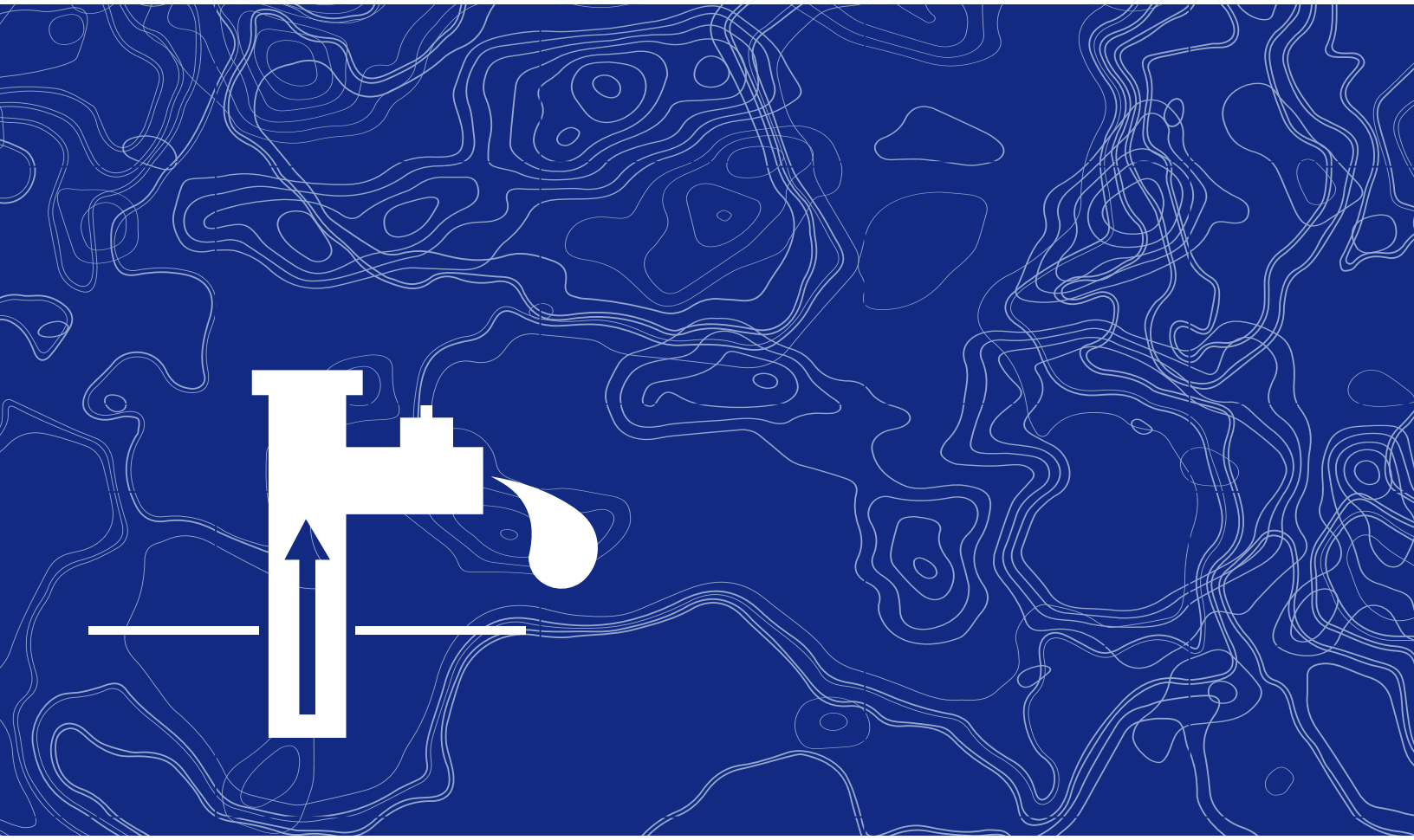
High Priority | Ongoing

Actions taken in 2024 (To support Actions A and B)

- The City of Tucson Manager, Tim Thomure, participated in the Arizona Reconsultation Committee (ARC), established by ADWR in 2020. The ARC committee works to develop an Arizona perspective on the Reconsultation of the Colorado River. Alternative approaches for reservoir operations and reductions were developed based on modeling a variety of flexible methods.
- Tucson continues to be a reliable participant collaborating on voluntary conservation. The City did not accept its full Colorado River allocation in certain years either to voluntarily reduce demands or to accept reductions 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

Before the introduction of renewable water supplies from the Colorado River in the early 2000s, Tucson relied entirely on groundwater for over a century, resulting in significant declines in water levels due to over-pumping. While groundwater is still essential to Tucson's water resources, the city's One Water Plan focuses on maintaining water quality, addressing emerging contaminants, and implementing sustainable management practices to restore groundwater levels in areas where groundwater levels have continued to decline.

Tucson Water staff installing a new screen at well AV-001B

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

The City of Tucson, through Tucson Water, collaborates with other users of the CAP in the Tucson Active Management Area (AMA), ADEQ, the United States Geological Survey (USGS), and Pima County's Regional Wastewater Reclamation Department and Regional Flood Control District. This collaboration focuses on monitoring, protecting, and restoring Tucson's aquifer. Ensuring compliance with state and federal statutes, as well as environmental laws, remains a continuous priority for safeguarding drinking water supplies. Like many utilities across the nation, a portion of Tucson's groundwater resources have been impacted by Per and Polyfluoroalkyl Substance (PFAS). As of April 2024, six PFAS compounds became federally regulated by EPA. Addressing these compounds has been, and will continue to be, a high-priority strategy for the City.

The City worked collaboratively to strengthen the integrity of the Assured Water Supply (AWS) program and contributed to discussions with ADWR aimed at protecting groundwater resources. This included providing comments and engaging in discussions regarding the Tucson Active Management Area management plans. The Fifth Management Plan of the Groundwater Management Act provides guidance for utilities in the Tucson area to achieve safe yield by 2025. Safe yield is defined as a long-term balance between withdrawal and natural or artificial recharge.

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

High Priority

Ongoing

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

High Priority

Ongoing

Actions taken in 2024 (To support Actions A and B)

- Tucson Water continued to support local, state and federal characterization of the extent of Per and Polyfluoroalkyl Substance (PFAS) impacted groundwater. Tucson Water participated in the Tucson International Airport Area (TIAA) Technical Working Group (TWG), which includes staff from the EPA, Air Force, ADEQ, and Tucson Airport Authority. The TWG worked on developing a regional groundwater transport model that will guide a regional solution to mitigate PFAS in groundwater.
- The City continued to participate in 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. We also aimed to confirm that remediation efforts are on track to meet clean-up goals and to stay informed of newly identified contaminants.
- The City continues to partner with ADEQ to share aquifer water quality information in support of the WQARF Program and general water quality characterization.
- The City continued collaboration with regional stakeholders to protect Tucson AMA groundwater resources, through new policy or standardized practices.

GW-1 Action C:
Consider regional solutions to address groundwater quality restoration where feasible.

High Priority

Near-Term

GW-1 Action D:
Expand the groundwater monitoring network to support groundwater management activities and decision-making.

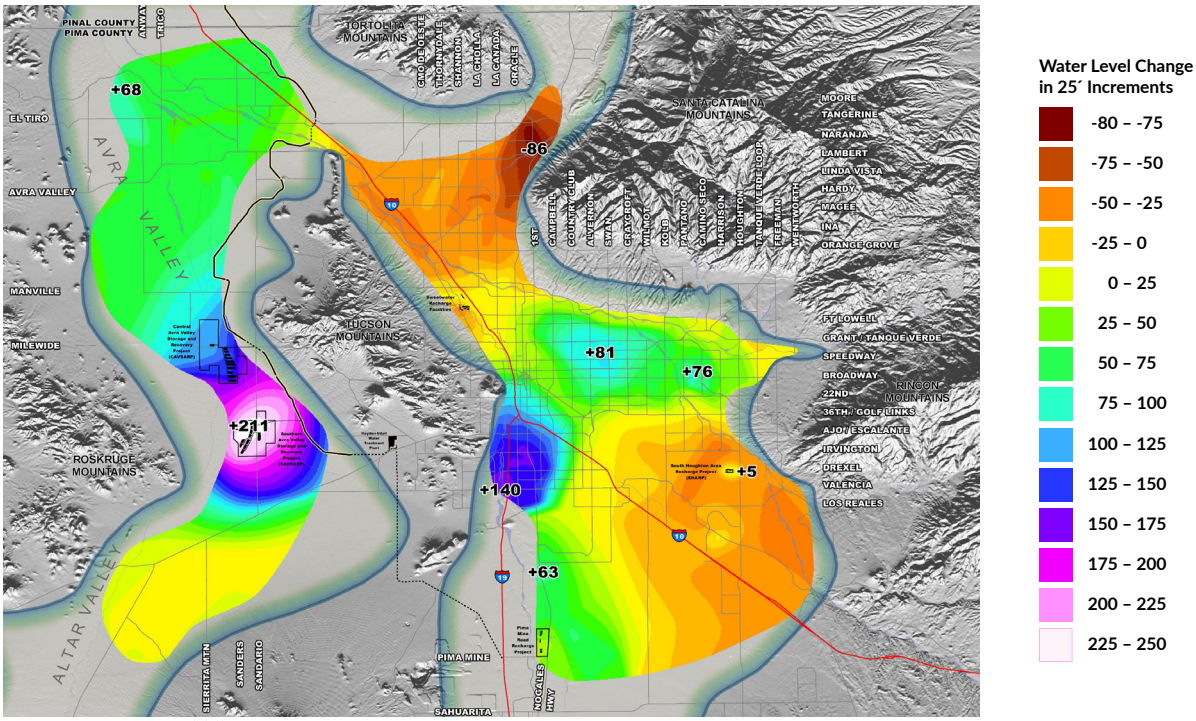
High Priority

Near-Term

Actions taken in 2024 (To support Actions C and D)

- We continue to have a voice in the State water conversation. Tucson Water Director John Kmiec participated as a member of the Governor's Water Policy Council. The Council was established following Governor Katie Hobbs's Executive Order to modernize Arizona's Groundwater Management Act. Areas of focus included strengthening the integrity of the Assured Water Supply (AWS) program, a critical framework for the protection and management of the state's groundwater resources. The AWS program ensures that long-term growth is not reliant on groundwater depletion.
- Tucson Water continued working with ADWR on the City's Designation of Assured Water Supply (DAWS) application. The City applied to modify our DAWS for another ten-year term in January 2023. The application provided an itemized inventory of City water resources to demonstrate a one-hundred-year water supply for Tucson Water's service area to continue a sustainable path of steady economic and population growth.
- The City (in partnership with other regional utilities, Pima County, and ADWR), continued to contract the United States Geological Survey (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 monitored and shared groundwater level information from approximately 750 wells during the annual groundwater level round-up. The information is used to produce groundwater level contour maps, that provide a snapshot of aquifer's 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 continued to deliver a portion of Tucson's Colorado River entitlement to local groundwater storage facilities. These efforts place less demand on local groundwater resources, thereby supporting safe yield goals.

Figure 3. Tucson Groundwater Level Change 2000-2023



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 (EPA) listed the Tucson International Airport Area (TIAA) as a Superfund Site and closed several wells due to a contaminated plume of TCE. In response to EPA's Record of Decision, Tucson Water constructed the Tucson Airport Remediation Project (TARP) to address groundwater remediation of TCE using air stripping process. In 2002, the contaminant 1,4-Dioxane was identified, which led to the expansion of the remediation system to include an Advanced Oxidation Process (AOP). In recent years, contaminants of concern such as PFAS have emerged at TARP and other areas within the aquifer, requiring additional attention. Efforts to restore areas of the aquifer through multiple projects, partnerships, and funding sources have accelerated clean-up activities. The selection of treatment systems, provided in Table 2 below, was guided by the need to mitigate groundwater contamination, control migration of contaminants, protect downgradient groundwater resources, and 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
Randolph Park PFAS Project	Up to $7.5 million	In progress. Projected completion in 2026	●			●	
TARP PFAS Treatment Facility	$24.9 million	In progress. Projected completion Summer 2026			●		
Northwest Wells Treatment Project	$33.52 million	In progress. Projected completion in 2030	●	●			

Note: Total project costs are estimated and will vary according to the market value of materials.

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

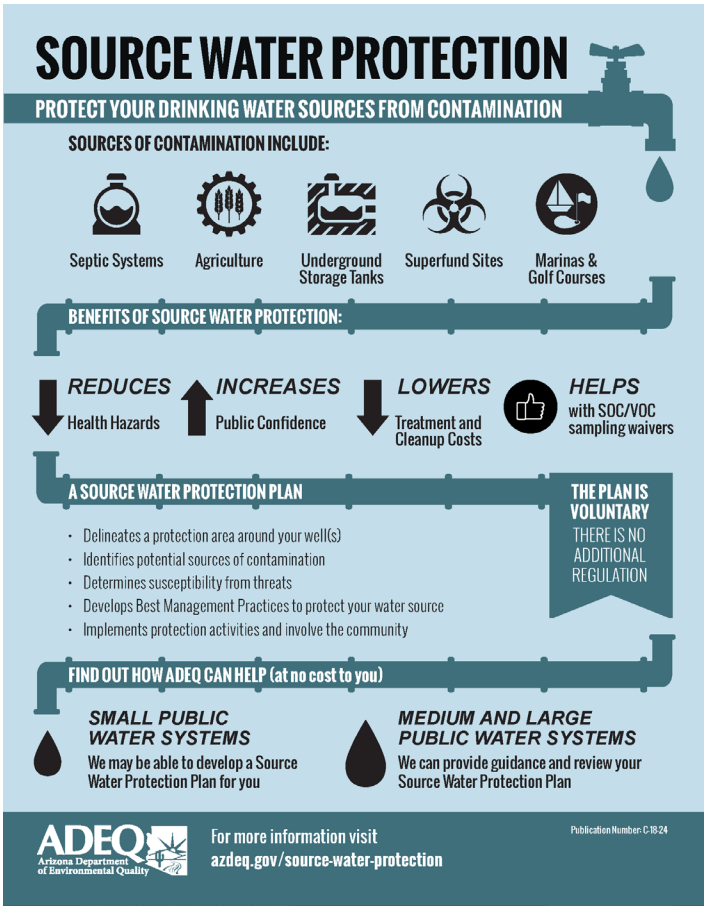
GW-3 Action E:
Implement advanced water treatment to address high quality emerging water quality issues.

Medium Priority — Mid & Long-Term

Actions taken in 2024 (To support Actions A and B and GW-3E)

- Tucson Water continues to operate the TARP treatment system, which includes various treatment technologies, including Granulated Activated Carbon (GAC) treatment, an Advanced Oxidation Process (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. In 2024, Tucson Water operated an ion exchange pilot project as a pre-treatment process for the removal of PFAS concentrations before water is routed through the other TARP treatment technologies. Based on the pilot project's success, engineering designs were completed for a full-scale ion exchange system at TARP. It is expected that the full-scale system will be constructed and operational by Fall 2026.

- 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 were performed. Approximately 307.93 acre-feet of water were recovered and treated at C-007A with treated water discharged into Citation Wash.
- Coordinating with ADEQ, design continued for the Randolph Park PFAS treatment facility. During 2024, remediation well RP-001A was constructed to recover PFAS-contaminated groundwater. The projected annual treatment volume was estimated at 480 acre-feet for conveyance to a proposed treatment facility within the Randolph Park Golf Course. Although RP-001A was intended to supply the required volume, the completed well will not produce the projected supply capacity. The utility, in consultation with ADEQ and its consultants are assessing additional supply options and treatment system configurations that will provide an optimal treatment solution. Treated groundwater will be beneficially reused.
- Progress continues for the Northwest Wells Treatment System Project. The project addresses groundwater wells placed out of service due to PFAS impacts and will consist of a cluster of three wells, one treatment plant, and a pipe connection to the potable system to restore as much as 3.7 MGD of lost potable production. Activities included selecting a contractor to design and oversee construction, purchasing an adjacent property west of recovery well Z-013A that provides additional space for the treatment system, and designing the three recovery wells.
- Tucson staff attended an ADEQ workshop on developing a Source Water Protection Plan for the utility. Currently, having a Source Water Protection Plan is voluntary; however, ADEQ is providing more information and support for this program to public water systems in Arizona.



ADEQ's guidance on Source Water Protection.

GW-2 Action C:
Fully remediate contaminated groundwater.

High Priority | Long-Term

Actions taken in 2024

- In 2021, a new extraction well (R-127A), was added to the TARP recovery wellfield located in the area that observes the highest PFAS concentrations to expedite the clean-up of contamination. This well operated as needed in 2024, to replace production wells that were periodically out of service for maintenance. Routine operation of R-127A will commence once the ion exchange pre-treatment facility is constructed, expediting the removal of groundwater contaminants. With the addition of R-127A, the treated groundwater annual volume may increase to 11,000 acre-feet.
- TARP continued operations in 2024 to fully remediate contaminated groundwater from the TIAA Superfund site. Pursuant to the EPA amended Record of Decision, alternative uses for TARP treated groundwater includes, pumping to the recycled water system, and gravity discharge to the Santa Cruz River. Throughout 2024, groundwater was treated at TARP, with approximately 6,628 acre-feet delivered to the reclaimed system and 488 acre-feet delivered to the Santa Cruz River to maintain a small riparian habitat. The Santa Cruz River under an Arizona Pollution Discharge Elimination System permit, has received TARP-treated groundwater since 2021. The recycled water system has received treated groundwater since 2023. This action is important for the hydraulic containment of the groundwater contamination plume while providing beneficial use of treated groundwater. It also allows time to implement additional treatment for PFAS contamination. The river receives approximately 250 gallons per minute of treated water. Concentrations of all contaminants were monitored to verify that the treatment system was meeting the facility's treatment 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 contaminants of emerging concern. EPA's Unregulated Contaminant Monitoring Rule is another program that enhances Tucson's knowledge about the occurrence of emerging contaminants. Tucson Water and City staff regularly monitor advancements in groundwater treatment technologies that target unregulated and emerging contaminants. Staff regularly attend conferences and workshops with national and global attendance that focus on water treatment and groundwater remediation technologies. Collaborating with national and regional partners is essential for staying informed about new technologies under research. Tucson Water has participated in global forums with other utilities to share knowledge and best practices regarding challenges like those faced in Tucson. This exchange of information can save time and money in implementing local projects. 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 2024

- On April 10, 2024, the EPA established National Primary Drinking Water Regulations for the six types of PFAS. The determination of enforceable levels will guide clean-up goals for groundwater-contaminated areas and the design criteria of treatment systems. Since 2016, the City has been monitoring PFAS. The initial three-year monitoring criteria that are due in 2027 have been completed. The EPA established 2029 as the year that solutions to address impacts to public drinking water systems be implemented to avoid violations. The City is already meeting these standards. The City's policy is not to serve drinking water with any detection of PFAS, and includes operational targets that exceed the federal enforceable standards.

Table 3. EPA PFAS National Primary Drinking Water Regulation

Compound	Final MCL (enforceable levels)	Tucson Water Operational Targets
PFOA	4.0 parts per trillion (ppt) (also expressed as ng/L)	<2 ppt
PFOS	4.0 ppt	<2 ppt
PFHxS	10 ppt	9 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	

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

- Tucson Water began testing for compliance with the EPA's Fifth Unregulated Contaminant Monitoring Rule (UMCR 5), which occurs at five-year intervals. Unregulated contaminants are defined as contaminants that might be present in drinking water systems but do not have health-based standards set under the SDWA. The results provide a clear understanding of the national occurrence of contaminants in drinking water. In every UCMR round, the EPA selects 30 different compounds. The current UCMR 5 requires testing for 29 PFAS compounds and lithium to be analyzed between 2023 and 2025. Samples are collected at select entry points to the drinking water distribution system. Approximately 97% of the sampling was completed in 2024 and the remaining sampling will be finished in 2025, after which the results will be submitted to the EPA. Access to the national dataset is available via web link: https://www.epa.gov/dwucmr
- Tucson Water continued to engage with ADEQ and EPA on groundwater regulatory requirements and findings by attending informational presentations, providing comments on new proposed rules, and building on existing relationships.

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

Medium Priority

Ongoing

Actions taken in 2024

- 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, 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. In 2024, the sampled locations increased from 15 to 17, representing different areas and facilities within the distribution system. Tucson Water will continue to enhance its Sentry Program to screen groundwater wells for PFAS compounds and protect public health from other emerging contaminants. Reports are stored on the website linked below.
  https://www.tucsonaz.gov/Departments/Water/Water-Quality/Water-Quality-Monitoring/Contaminants-of-Emerging-Concern
- Published the 2023 Contaminants of Emerging Concern Sentry Program report in 2024.

Figure 4. CEC Sentry Program Sampling Plan-2024

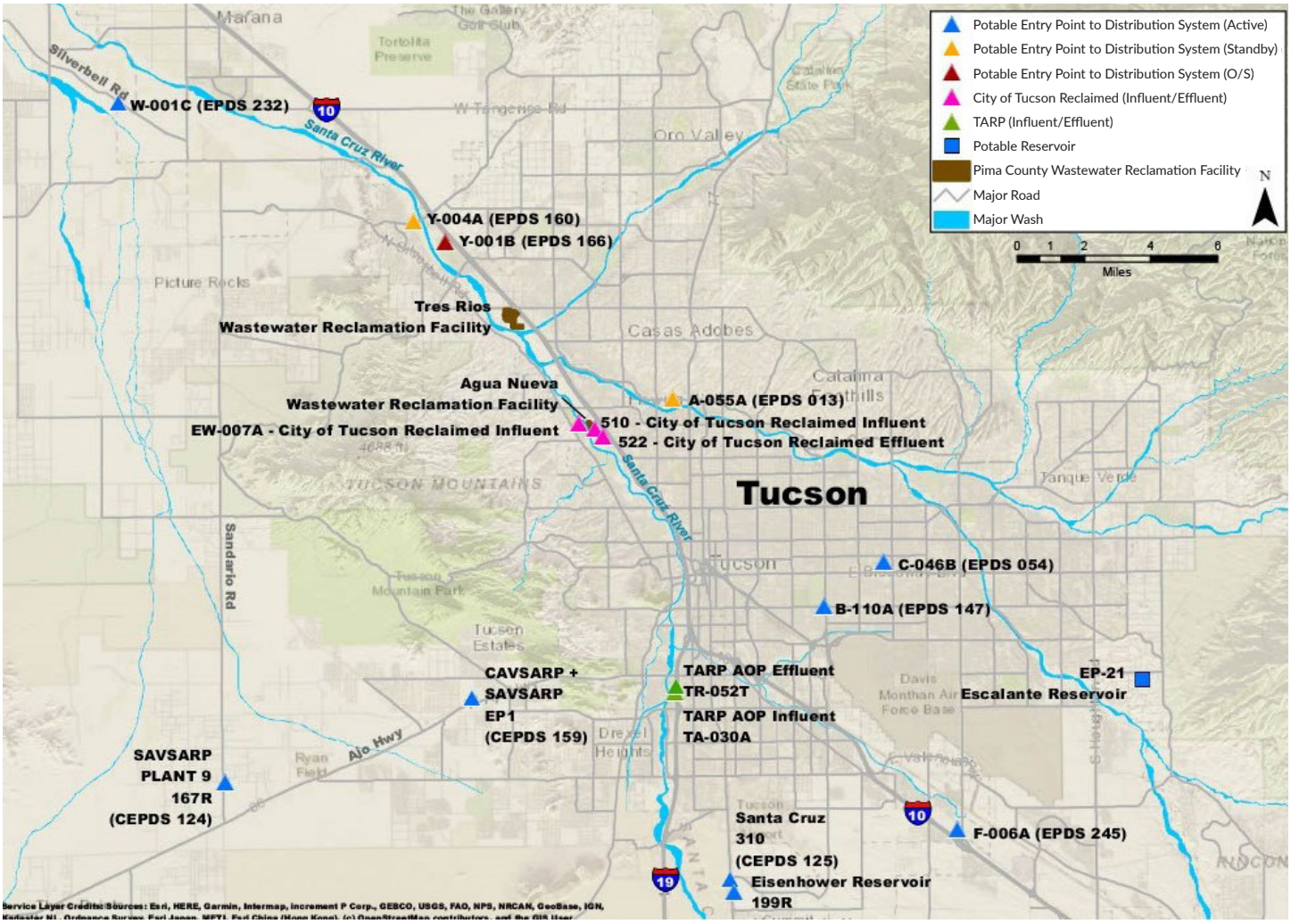
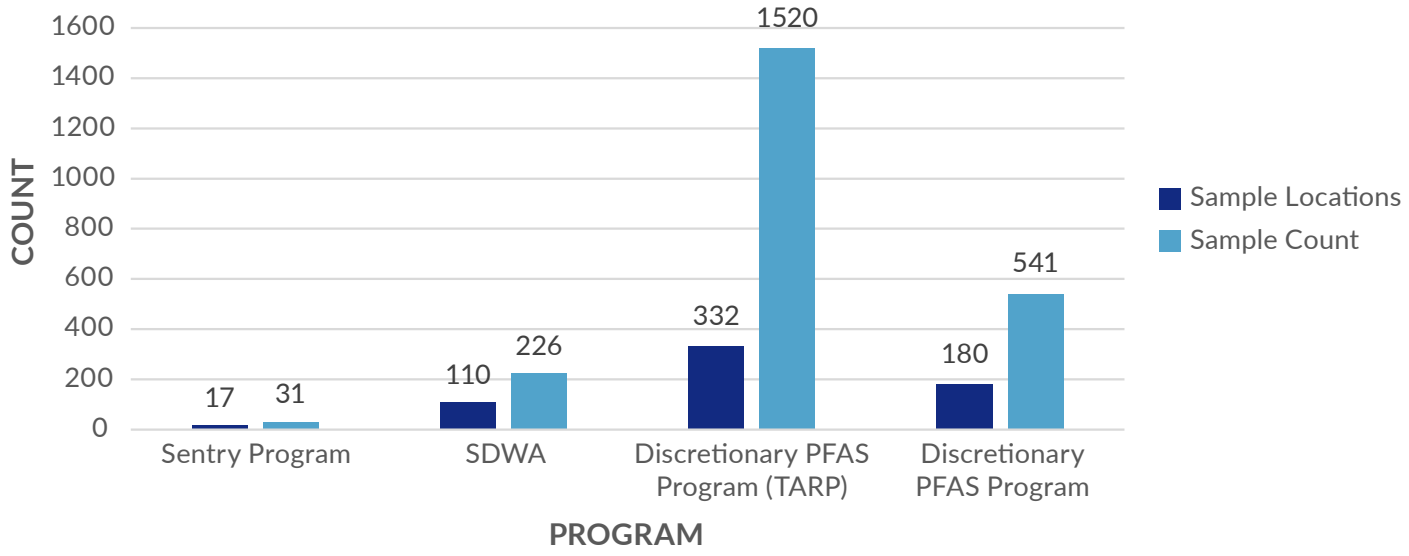


Figure 5. Count of Sample Locations and Samples Collected in 2024



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 2024

- The City continues to monitor Tucson area-wide aquifer health through collection of groundwater samples from its active production wells under the regulation of the Safe Drinking Water Act (SDWA) and National Primary Drinking Water Regulation (NPDWR). Additional groundwater quality locations are voluntarily monitored for emerging contaminants as new health advisory standards are made available and new contaminants are discovered.
- Tucson Water continued to take groundwater wells out of service upon any detection of PFAS compounds, even if the concentrations are below EPA's health advisory levels.

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

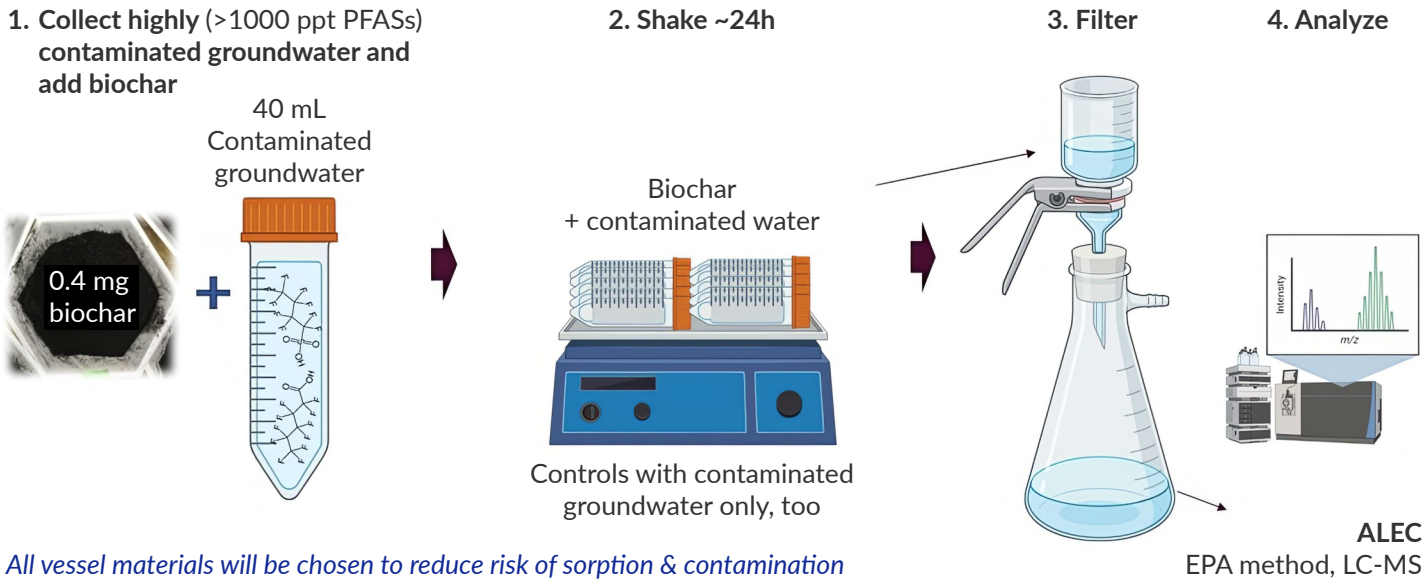
Medium Priority

Mid-Term

Actions taken in 2024

- The City participated in a PFAS treatment project in collaboration with the EPA's Office of Research Development in 2024. The City shipped approximately 10 gallons of spent resin from the ion exchange pilot project at TARP, to the EPA. The project is exploring new methods for resin regeneration instead of disposing and/or incinerating them.
- Tucson Water continued participating with the University of Arizona Department of Environmental Science on a novel treatment technology to remove PFAS concentrations from drinking water and recycled water. In 2024, the research project was centralized at the University of Arizona's Water and Energy Sustainable Technology Center at the Agua Nueva Reclamation facility. Research continued to evaluate the effectiveness of biochar (a charcoal-like material produced from organic feedstock through pyrolysis), in removing PFAS from groundwater. Bench test using groundwater from Tucson Water's wells C-007A and EW-007A compared PFAS removal rates of biochars to GAC and assessed their ability to sorb contaminants. In 2024, the study expanded to include column testing, currently ongoing, to evaluate if one configuration is performing better than others. This phase will continue into 2025.
- The City participated in research regarding a novel technology for well-site treatment.

Figure 6. PFAS Concentration Removal Process



III. RECYCLED WATER

III. RECYCLED WATER

Tucson Water's recycled water system celebrated its 40th anniversary in April 2024. In 1984, Tucson was one of the first cities in the country to begin recycling water by treating wastewater for irrigation and other non-drinking or non-potable water uses as a step to conserve groundwater.

Commemorative coins designed by the staff of Tucson Water.

Tucson Water's recharge and recovery system balances the demands of its reclaimed water system and is recognized globally as one of the earliest and most innovative methods for utilizing treated wastewater. This system helps to reduce the reliance on potable water sources and enhances the local water supply. The first customer was a golf course, but the reclaimed system now delivers recycled water via purple pipes to parks, schools, municipal properties, and golf courses throughout the region, in addition to some residential customers. Any excess reclaimed water produced during the off-peak period that is not used by customers is put to good use and is delivered to the multiple recharge projects, replenishing the groundwater aquifer. In 2024, Tucson Water made additional investments in the reclaimed system to ensure the continued reliable delivery of high-quality recycled water.

Link to 40th Anniversary video: https://www.tucsonaz.gov/Departments/Water/Water-Quality/Reclaimed-Water

Tucson Water continues to invest in maintenance and expansion of the recycled water system. Rehabilitation of the roof and a liner replacement began at La Paloma recycled water reservoir in 2024 and will be completed in 2025.

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 water standards, also known in Arizona as Advanced Water Purification (AWP), or previously referred as Direct Potable Reuse. The City has many years of experience operating water treatment systems, like TARP, which uses many of the same technologies used for purifying recycled water. This experience has prepared 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 implements its 1W2100 Plan, a major diversification strategy is to increase 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 2024 (To Support Actions A and B)

- The City is actively researching which incentives and ordinances effectively promote onsite reuse in other cities. The goal of this research is to identify successful operational and maintenance practices. Collaborative discussions will take place during conferences and through regional and national associations.
- 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.
- A commercial and industrial project manager position went out for solicitation in 2024 and is expected to be hired in early 2025. Their primary responsibilities for this role will include customer outreach, administration of a turf replacement program, and managing customer relations for the reclaimed water system. Additional duties will involve developing ordinances for the onsite use of recycled water, including the creation of incentives, guidelines, and training programs.

Tucson Reclaimed Water Treatment Plant

RW-2 Begin purifying recycled water to drinking water standards

During 2024, draft rules for purifying recycled water to drinking water standards continued to advance at the state level, 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 final rule was adopted by ADEQ on March 4, 2025, and Tucson Water has been working with consultants on conceptual design options for a demonstration-scale AWP facility.

The ultimate objective of this strategy is to strengthen Tucson Water resiliency by beneficially reusing all available water to diversify our water portfolio with a reliable local water supply. Purifying recycled water for use as drinking water is identified as a potential long-term strategy to supplement supply in our 1W2100 Plan, but it is not yet a necessity.

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 AWP Project	$1,500,000 Preliminary cost	In Progress				●
Northwest Reclaimed System Augmentation	$10,000,000	In Progress	●	●		
Shirley C. Scott Southeast Houghton Area Recharge Project (SHARP) Expansion	$4,000,000	In Progress		●	●	●

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

High Priority — Near-Term

Actions taken in 2024

- Tucson Water staff continues collaborating with ADEQ and other stakeholders in the development of the final rulemaking process. Alongside other utilities across Arizona, Tucson Water submitted comments and recommendations to ADEQ. The final rule was adopted by ADEQ on March 4, 2025.
- Tucson Water and a representative from ADEQ presented the AWP guidelines to the Citizen's Water Advisory Committee to gather feedback.

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

High Priority — Near-Term

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 2024 (To support Actions B, E, and F)

- Tucson Water selected a consultant to provide program management support for the development of a full-scale AWP Facility at the Tres Rios Water Treatment Plant.
- Tucson Water applied to the U.S. Bureau of Reclamation for funding an Advanced Water Purification Facility. The proposal included the U. S. Bureau of Reclamation providing funding for the design and construction of a 2.5 MGD advanced water purification facility in return for the City conserving a total of 56,000 acre-feet of Colorado River Water over 10 years.
- A consultant was selected to complete the conceptual design of the demonstration scale AWP project, and design work is set to begin in early 2025. The demonstration facility will be located at Tucson Water's Reclaimed Water Treatment Plant located adjacent to Pima County's the Aqua Nueva Water Reclamation Facility. The filter room, which was no longer being used as part of the water treatment process at the facility, was cleared in preparation for the AWP demonstration facility. The vision for the demonstration facility is to prove effective consistent water treatment and provide onsite public engagement and education. Initially the treatment system size will limit the total treated flow to ~50 gallons per minute. Treated water will not be connected to the drinking water system, a beneficial use of treated water is still under consideration.

Before and after the removal of the filter tanks at the Sweetwater Reclamation Plant. The room is now ready to house the equipment for the AWP demonstration facility.

RW-2 Action C:
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 2024 (To support Actions C and D)

- In 2024, Tucson Water began developing a public engagement program aimed at building trust and support among community members and stakeholders. This initiative is not only part of the state guidelines, but also a fundamental aspect of responsible water stewardship, particularly regarding innovative water resource solutions like Advanced Water Purification. A cornerstone of this Public Engagement effort is encouraging community participation. The City of Tucson and Tucson Water will offer multiple opportunities for individuals from various sectors to engage in the decision-making process related to all water sources, including Advanced Water Purification. Tucson Water will also submit the required outreach plan to comply with regulatory requirements.

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

High Priority

Mid-Term

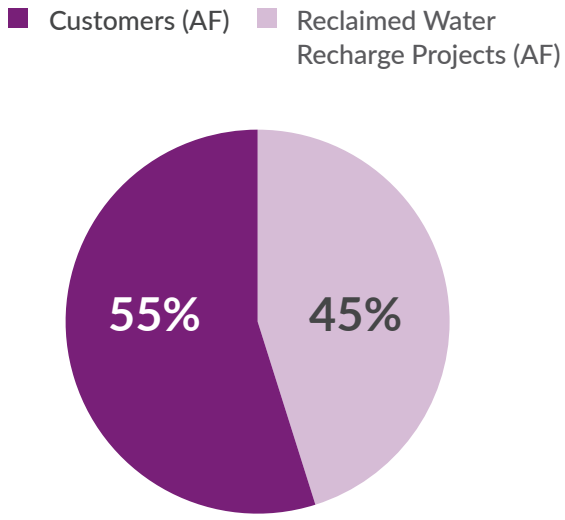
October 2024, Tucson Water used goats for vegetation management in the basins at the Sweetwater Recharge Facility instead of heavy equipment. This initiative cut down on maintenance costs and decreased Tucson Water's carbon footprint. Watch this short video to learn more!
https://www.youtube.com/watch?v=dfr6BDgTia4

Actions taken in 2024

- Tucson Water is nearing 100% engineering design and began the permitting process for expansion of the Shirley 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.
- An underground storage permit application for the Lower Santa Cruz River Managed Recharge Project (LSCRMRP) was under review by the Arizona Department of Water Resources. Tucson Water and its regional partners submitted the application in 2023, and 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 coordination and cooperation with peer agencies to recharge effluent within the Tucson AMA for the future benefit of residents.
- Engineering designs were under development 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 owned by the City and produced by Pima County's Tres Rios Water Reclamation Facility.

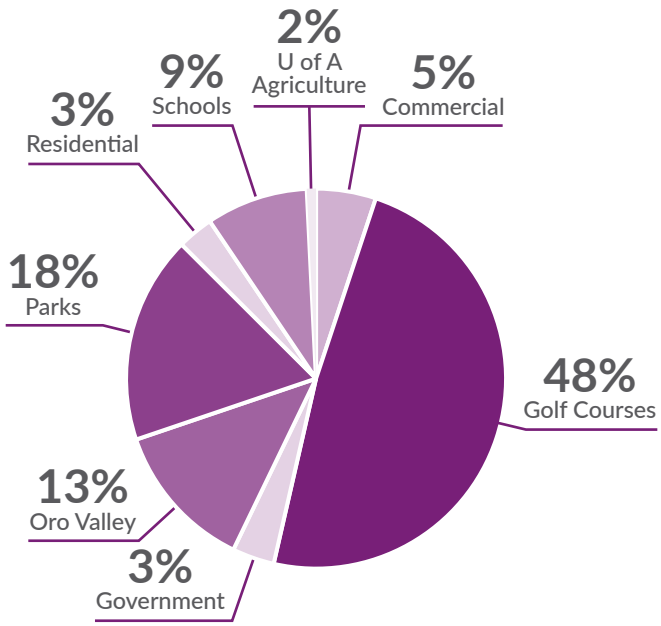
Recharge of reclaimed water at the Sweetwater Recharge Facility, Tucson's first recharge and recovery project.

Figure 7. 2024 End Uses of Recycled Water



Recycled water is delivered to customers and to aquifer recharge projects. Recycled water is effluent and remediated groundwater.

Figure 8. Recycled Water Users by Category



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

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

Tucson Water is implementing new treatment technologies to address unregulated emerging contaminants in recycled water. Historically, recycled water in the community has primarily been used for outdoor irrigation, which has significantly contributed to the conservation of drinking water supplies. However, as awareness of unregulated emerging contaminants in recycled water grows, diversifying its use Tucson may require additional treatment processes. Tucson Water's Sentry Program will continue monitoring specific locations within the recycled water system to assess the impacts and fate of these emerging, unregulated contaminants. An important partnership with the University of Arizona, renowned nationally for its extensive research on pathogen treatment, has also expanded into investigating emerging contaminants in recycled water. These studies, along with others, will help identify effective treatment technologies for end-use customers. Additionally, the water quality staff at Tucson Water also collaborates with research foundations and the local academic scientific community to study the latest treatment technologies.

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 2024 (To support Actions A and B)

- The Sentry program has 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. The 2024 Sentry Program sampling at designated recycled water locations was also completed. The 2023 Sentry Program Report was released in June 2024.

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

Medium Priority

Mid-Term

Actions taken in 2024

- Tucson Water continued collaborating with the University of Arizona's Departments of Environmental Science and Environmental and Chemical Engineering to assess remediation technologies for emerging contaminants. The Sweetwater Recharge Facility serves as an outdoor laboratory for research projects aimed at understanding how contaminants, such as PFAS and viruses, move through soil. Tucson Water provides access for researchers to collect water samples at the inflow point to recharge basins and from multiple recovery wells. This allows them to study contaminant transport and evaluate the effectiveness of soil filtration in removing contaminants.
- In January 2024, the University of Arizona's Water & Energy Sustainable Technology Center published a study titled "Effectiveness of Monochloramine for Inactivation of Coronavirus in Reclaimed Water" in the journal Science of the Total Environment (#906). The study involved collecting recycled water from Tucson Water's reclaimed plant during the SARS-CoV-2 pandemic. The study concluded that monochloramine, the disinfectant used by Tucson Water at the reclaimed plant, is statistically effective in inactivating the virus. Tucson Water continues to collaborate with various departments at the University of Arizona, including Environmental Science and Environmental and Chemical Engineering, to evaluate remediation technologies for emerging contaminants. Recent studies have evaluated the efficacy of removing PFAS and pathogens at the Sweetwater recharge facility through natural attenuation. Additionally, research is underway to explore the use of biochar, an organic waste material, as a carbon source for PFAS removal.

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

Medium Priority

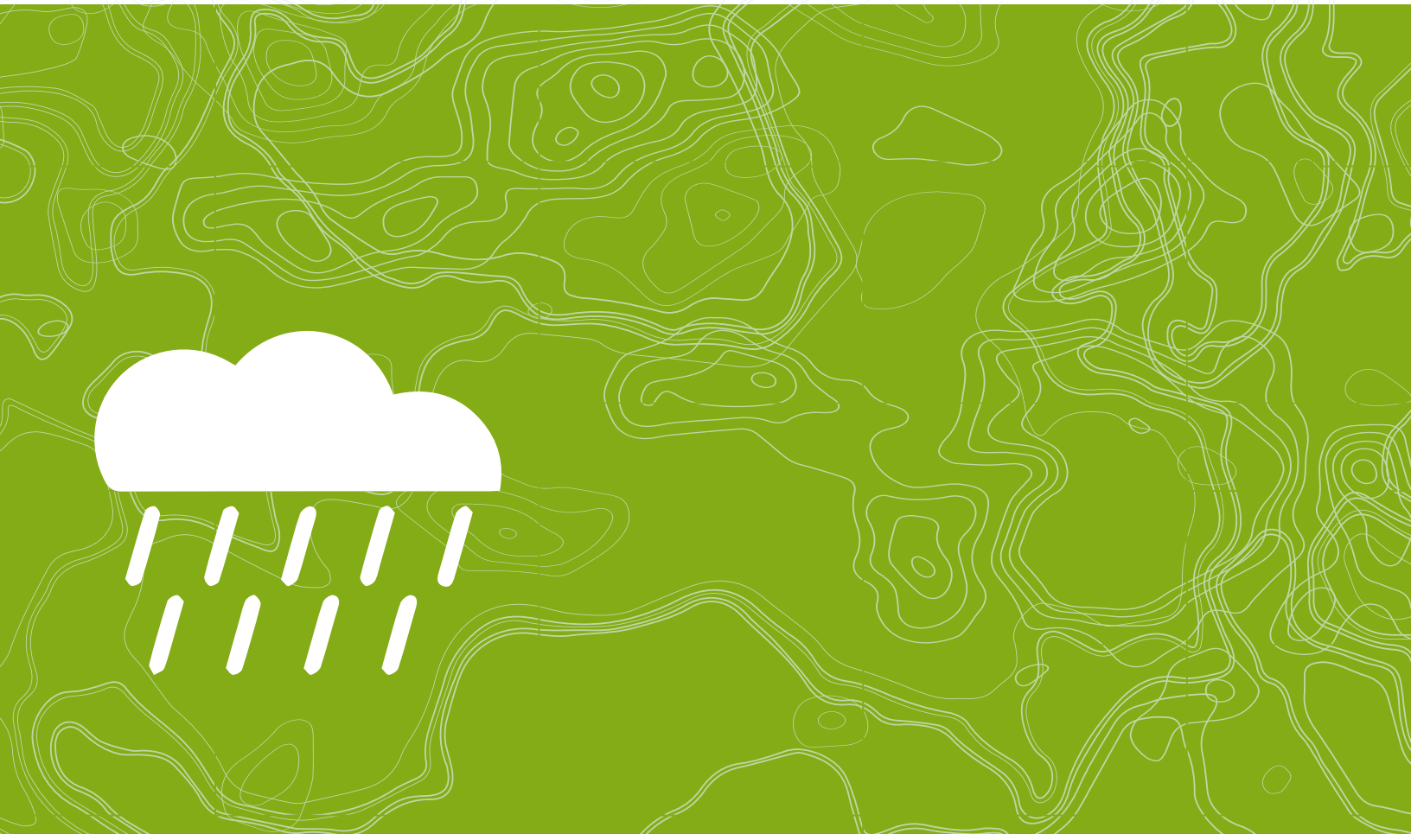
Mid-Term

Actions taken in 2024

- No action taken in 2024. In the future, a feasibility study will be conducted to determine where AWP should be implemented to address emerging contaminants in recycled water. The AWP demonstration facility will incorporate treatment technologies aimed at tackling these contaminants in recycled water.

Water quality sampling at the Santa Cruz River Heritage Recharge Project.

IV. STORMWATER



IV. STORMWATER

Tucson is a national leader in rain and stormwater harvesting. Green Stormwater Infrastructure (GSI), consisting of active and passive harvesting, has been built throughout Tucson over the past 25 years through grassroots and City efforts. Stormwater is a relatively new component of Tucson's water supply portfolio, but there is growing interest in expanding its use through new strategies. By nature, stormwater is regionally sporadic and unpredictable as a water supply; however, stormwater provides an opportunity to offset the use of potable and recycled water for outdoor irrigation.

Stormwater strategies aim to integrate stormwater management into the built environment in a way that benefits society, the economy, and the environment. This includes educating the community, developing additional institutional standards and practices, and providing support and funding. These strategies require ongoing collaboration with other City and Pima County departments responsible for flood control and management.

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

Increasing interest and opportunity to grow this component of Tucson's water supply portfolio led to the establishment of Tucson Water's Storm to Shade (S2S) Program in 2020. Initially a pilot fee program, the GSI fee on Tucson Water utility statements was permanently instituted in 2023 by Mayor and Council, who recognized the program's value to Tucson's One Water future. In January 2022, Tucson Water further expanded the S2S Program by partnering with Pima County Regional Flood Control District (RFCD, District) 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, which outlines specific roles and responsibilities for each entity regarding the maintenance of stormwater harvesting basins built by the District on County or City-owned property within the City limits. The City's S2S Program and Parks Department staff maintain the landscape elements of projects, which provide ecosystem services including mitigating the urban heat island effect, offering habitats for native plants and wildlife, and conserving water. In 2024, one project was constructed by the District that is now maintained by Tucson Water's S2S program. In total, six projects have been completed since 2019. Three more are in design.

A key distinction between small-scale GSI and larger-scale stormwater capture under the IGA is that the latter uses large detention and retention basins, infiltration trenches, dry wells, and other methods to help infiltrate larger volumes of stormwater into the ground. Infiltration features may not always incorporate vegetation within infiltration areas, depending on the application. These large-scale stormwater projects not only help attenuate localized flooding, benefit the natural environment, and improve the quality of urban runoff but also have the potential to recharge the aquifer with a local, renewable resource. There is currently no regulatory framework in Arizona for receiving water storage credits for recharged stormwater.

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.

Figure 9. Large-Scale Stormwater Harvesting Sites

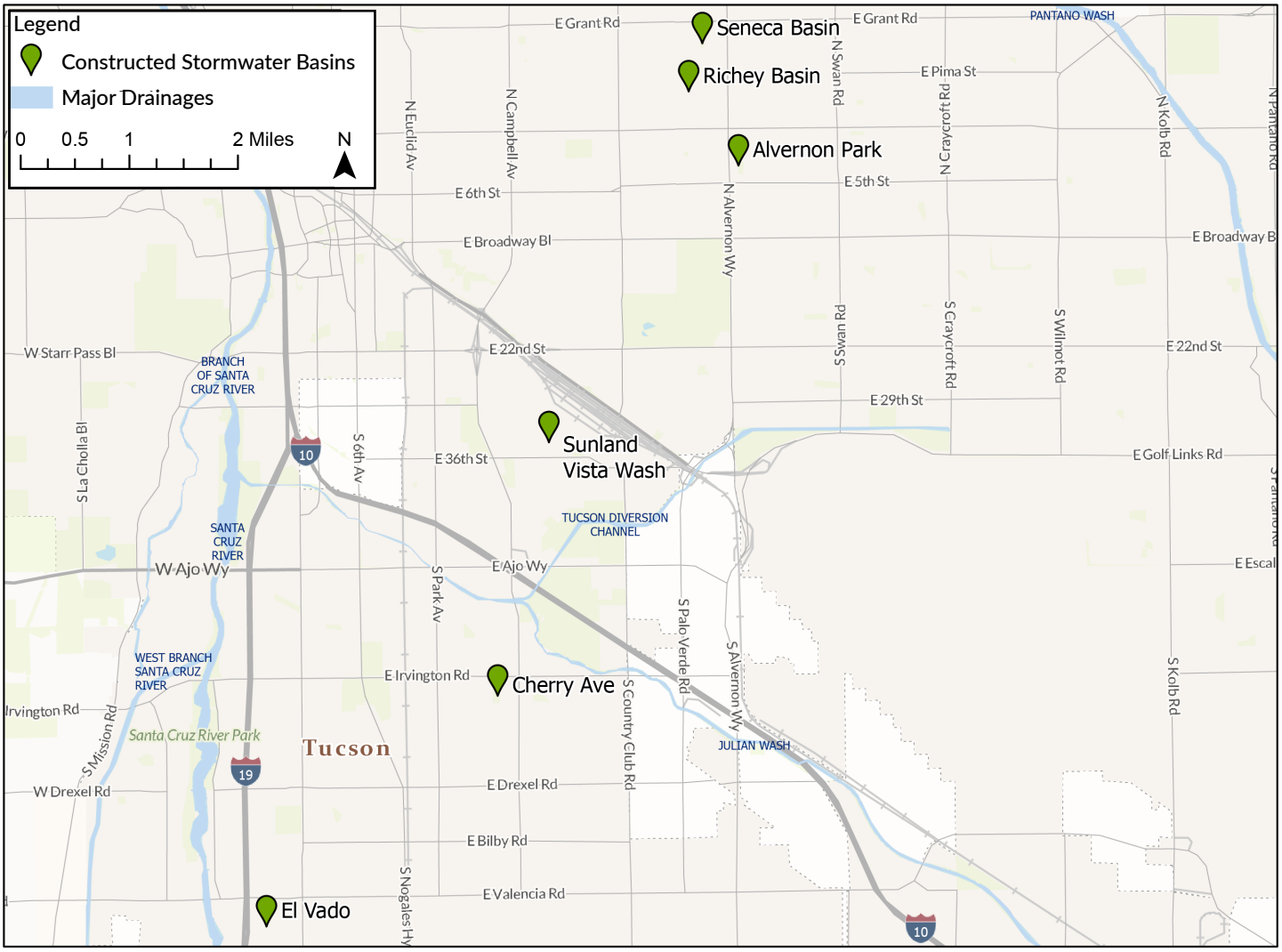


Table 5. Stormwater Projects Budget

Project	Amount	Project Progress Report	Funding Source
			Pima County RFCD
El Vado Stormwater Park	$1,093,055	Completed 2023	
Sunland Vista Wash Stormwater Park	$789,733	Completed 2023	
Alvernon Park Project	$264,532	Completed 2024	

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

The El Vado Stormwater Park Project harnesses stormwater runoff from the adjacent neighborhood and using it to support a native, self-sustaining food forest to benefit the local community. The four 2-foot-deep basins collectively have a total of 400,000-gallon capacity.

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 2024 (To support Actions A and D)

- In accordance with the IGA, the City continued to maintain three existing projects (Seneca Basin, Richey Basin, and Cherry Avenue Park). Additionally, it assumed maintenance responsibilities of El Vado Food Stormwater Park and Sunland Vista Wash stormwater projects in 2024.
- Pima County built the Alvernon Park Project under the IGA. Two large basins were constructed to harvest stormwater flows from the Alvernon Wash. These basins, with a design capacity of 23,000 gallons, are used to irrigate native trees and vegetation. This initiative replaced the non-functional turf that was previously irrigated.

Stormwater capture basin at the Alvernon Park Project.

Preexisting Red Push Pistache Trees at the Alvernon Park Project, which will benefit from additional stormwater runoff.

- Meetings and site visits occurred for the Rita Ranch Detention Basin project. This initiative marks the first collaborative effort between Pima County RFCD and the City to undertake a large-scale stormwater project with the aim of increasing aquifer recharge through enhanced infiltration of stormwater. The site currently functions as a stormwater capture basin for runoff from the Rita Ranch development, and planned development nearby is expected to increase the volumes entering the basin. To kick off the project, the team reviewed hydrologic and geologic data to create lithologic profiles, collected field data, and performed initial hydraulic modeling. In December 2024, flow metering devices were installed, and two infiltration trenches were constructed at the Rita Ranch Basin. These trenches are backfilled with gravel and topped with riprap to promote fast infiltration of stormflow. The team is planning to complete a geophysical survey to evaluate installing a monitor well in 2025.

Flow metering device to measure the rate of stormwater flow into the Rita Ranch Detention Basin Project.

An aerial photograph of an infiltration trench installed in December 2024 to promote aquifer recharge at the Rita Ranch Detention Basin Project.

S-1 Action B:
Establish additional governance frameworks, funding structures, and strategies necessary for the implementation of large-scale stormwater projects.

High Priority

Near-Term

Actions taken in 2024

- A new site-specific IGA between the City and Pima County RFCD was developed for the Rita Ranch Detention Basin Project. The IGA will be used as a template for future project sites and establishes responsibilities and expectations for each entity regarding the design, construction, equipment, and maintenance cost of the project.

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 2024

- Tucson Water and Pima County RFCD collaborated on data collection using drone surveying and ad hoc field monitoring during monsoon storms at the Rita Ranch stormwater basin project. The team also partnered with a University of Arizona student on a project to model prospective pilot project basins and their contributing watersheds. This work was performed to confirm the site selection of the Rita Ranch basin for the first site to implement and study large-scale stormwater capture and recharge.

The City and Pima County RFCD team meeting at the Rita Ranch Detention Basin Project in November 2024. The team is discussing potential locations for infiltration trenches and drywells.

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 due to its unpredictability in terms of timing, quantity, and quality. While some guidelines for GSI exist, there is a lack of consistency in installation and maintenance practices. This inconsistency makes it difficult to quantify the savings and benefits derived from stormwater projects. To enhance Tucson's stormwater capabilities, the City has implemented the S2S and Residential Rainwater Harvesting Rebate Programs. These initiatives provide a framework for improving and developing stormwater standards and practices. Additionally, a Low-Impact Development (LID) Ordinance is being developed to further strengthen local stormwater management policies and regulations. Standardizing policies, methods, and practices, on a regional level will increase the value of implementing stormwater projects. This effort will require collaboration among multiple stakeholders.

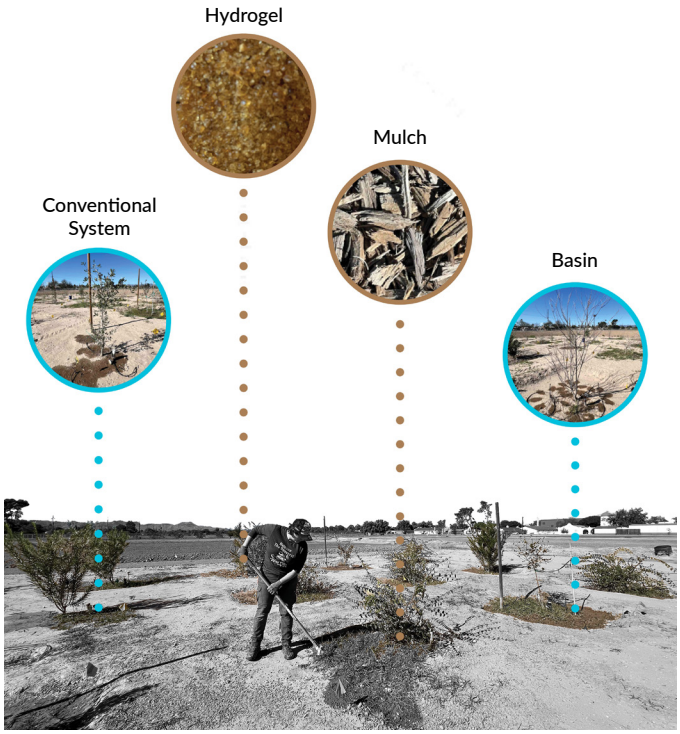
S-2 Action A:
Develop standardized measures of water savings.

High Priority

Near-Term

Actions taken in 2024

- Tucson Water estimates that the total stormwater harvesting capacity in COT-funded GSI assets is 5,068,807 gallons. During summer 2024 Tucson Water improved this estimate by partnering with a student researcher from the University of Arizona who verified basin measurements.
- Tucson Water's Rainwater Harvesting Rebate Program was launched in September 2011 to encourage homeowners to install rainwater harvesting systems for landscape irrigation. The program is funded by a conservation fee for all potable water sales. In 2024, the program funded the installation of 196 rainwater harvesting systems, resulting in approximately 3,696,545 gallons of water savings. Since its inception, the program has achieved cumulative water savings of 181,662,770 gallons (558 acre-feet). This data does not include water savings from customers who built their stormwater harvesting systems outside of the rebate program; however, it serves as a baseline measurement.
- The S2S Program staff collaborated with researchers from the University of Arizona on a project titled "Smart Tree Watering in Arizona's Urban Environment". This study, which included S2S-managed GSI sites, compared conventional drip irrigation to other watering treatments, including a water harvesting basin and a basin with organic mulch. In the study, using these two common GSI practices maintained an average of 44% higher soil moisture than conventional drip irrigation. This research helps build a science-based approach to measuring water savings for GSI.



Examples of different smart watering treatment technologies. Image credit: Annalise Hummel, Christian Aguilar Murrieta, Cordell Lee.

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

High Priority

Near-Term

Actions taken in 2024

- The City participated 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 met every quarter to discuss policy.

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

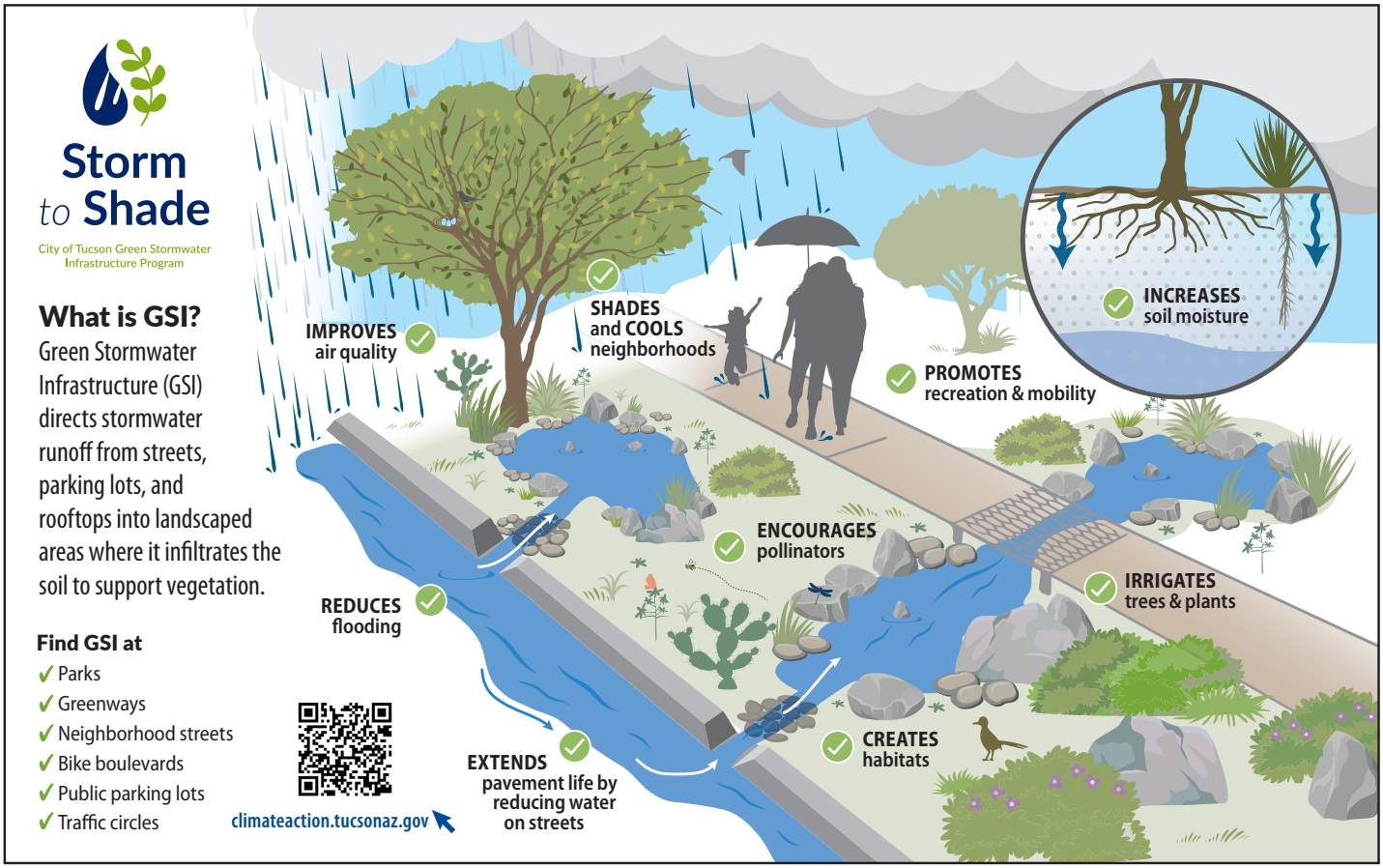
High Priority

Near-Term

Actions taken in 2024

- An inventory and gap analysis of the City's stormwater standards and policies was completed as part of an ongoing initiative to implement a Low Impact Development (LID) Ordinance. This work highlights a number of improvements that the City and Pima County can make to increase clarity and consistency of these standards and support more sustainable stormwater management.
- Tucson Water, Pima County, and other regional stakeholders visited the San Pedro River National Conservation Area to learn and build relationships with other Southern Arizona water professionals who are researching large-scale stormwater capture. Representatives from Cochise County and City of Sierra Vista, part of the Cochise Conservation and Recharge Network, provided tours of existing large-scale stormwater capture projects that utilize basins, infiltration trenches, wetlands, arroyos, and dry wells. Stormwater policies utilized in other regions provide Tucson with guidance on successful approaches.

Figure 10. Green Stormwater Infrastructure Diagram



The diagram illustrates some of the benefits of using GSI and LID practices in the urban environment.

REV 6.13.22

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

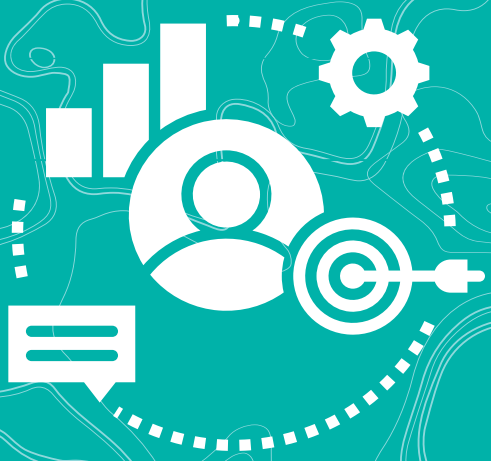
High Priority

Near-Term

Actions taken in 2024

- As a result of the LID ordinance process, progress continued in developing resources that could support a toolkit and guidance document.

V. DEMAND MANAGEMENT

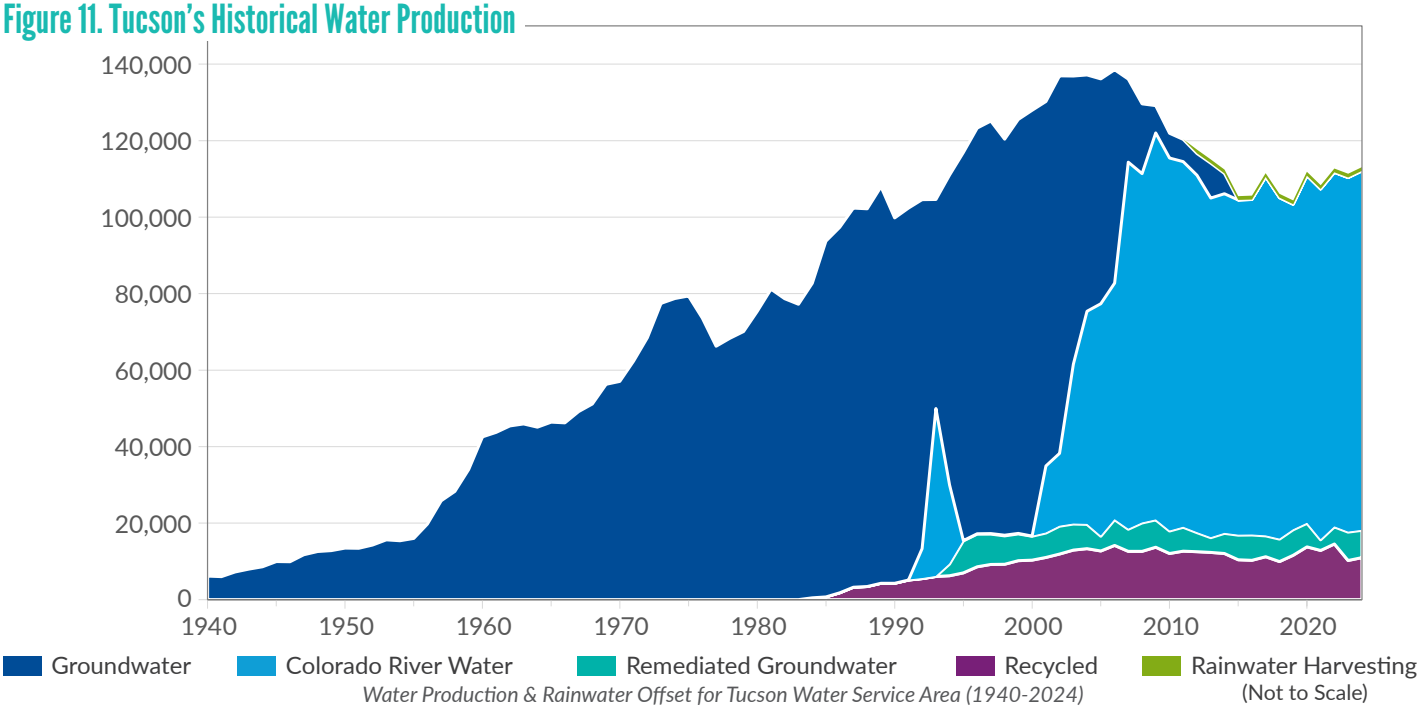


V. DEMAND MANAGEMENT

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 129 GPCD in 2024. 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, and equity for the entire water portfolio, which includes surface water, groundwater, recycled water, and stormwater. To adapt to changing and uncertain conditions while ensuring safe and reliable water delivery to customers, it is essential to manage water demands equitably. Demand management strategies are focused on expanding the success of Tucson Water's conservation program.

Figure 11. Tucson's Historical Water Production



Water Production & Rainwater Offset for Tucson Water Service Area (1940-2024)
(Not to Scale)

Table 6. Demand Management Projects Budget

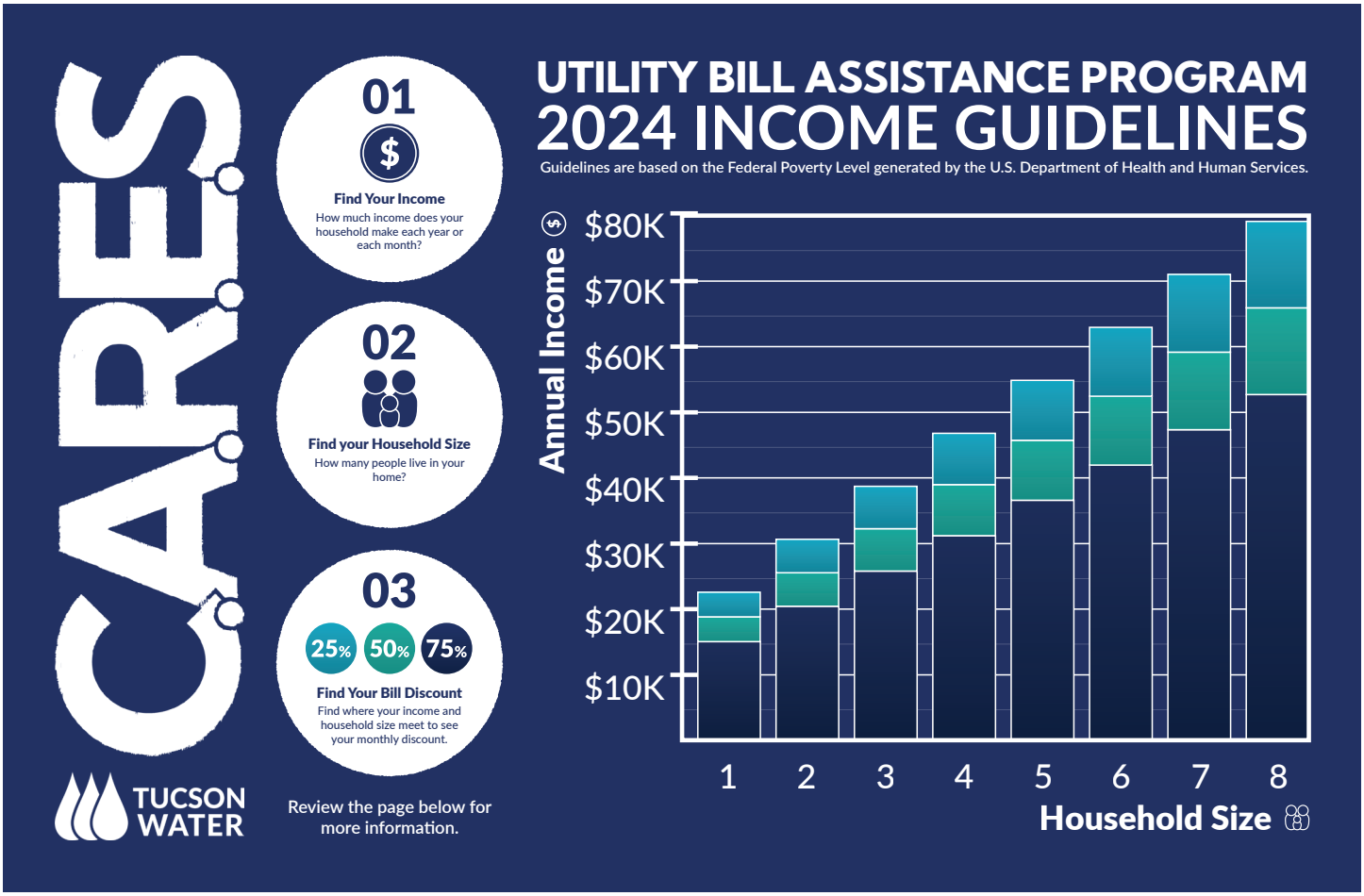
Project	Amount	Project Progress Report	Funding Source			
			Conservation Fund	AZWIFA Grant/ Loans	AZWIFA Conservation Grant	Tucson Water CIP Funds
Advanced Metering Infrastructure (AMI) Implementation Phase I	$4,000,000	In progress			●	●
AMI Implementation Phase II	$4,000,000	Grant awarded in 2024			●	●
Turf Replacement & Non-functional Turf Removal Rebate	$1,500,000	In progress	●		●	
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	In progress		●		●

Demand Management – Incentive (I) Implementation Actions

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

Tucson Water offers financial assistance aligned with national guidelines to ensure customers have access to affordable, safe, and reliable drinking water. Tucson Water strives to improve outreach with bilingual customer service representatives and create outreach and educational materials in Spanish and English. In 2024, the Tucson Water Community Assistance Resources for Economic Stability (CARES) campaign was launched. At the center of Tucson Water CARES is the Utility Bill Assistance Program (previously called the Low-Income Assistance Program), through which customers can apply for monthly utility discounts based on financial eligibility to meet their needs. Tucson Water CARES also offers customers other assistance programs, regardless of income. The Emergency Hardship Relief Adjustment is offered in the event of an emergency hardship in the household such as job loss, serious illness or injury, or the loss of an income-earner in the household, and the Courtesy Adjustment is available for situations where leaks and accidents lead to high water bills.

https://www.tucsonaz.gov/Departments/Water/Your-Water-Bill/Financial-Assistance



Income guidelines

Tucson Water has been actively removing older service lines on the public side and mapping this progress before the EPA 2021 Revised Lead and Copper Rule Revisions (LCRR) was established. A key element of the LCRR is public education and outreach, which includes updating the Consumer Confidence Report (CCR) to reflect progress with LCRR implementation. This also involves providing public access to the service line inventory and replacement plan, as well as issuing direct notifications to customers in the event of exceedances, followed by investigations into the distribution system. Tucson Water received AZWIFA funding to develop inventories of lead service lines. These inventories will serve as a guide for creating a plan to replace lead service lines on private properties, ultimately improving drinking water quality for residents. This initiative will also help Tucson Water better serve customers in low-income and disadvantaged communities.

https://www.tucsonaz.gov/Departments/Water/Water-Quality/lead-free

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

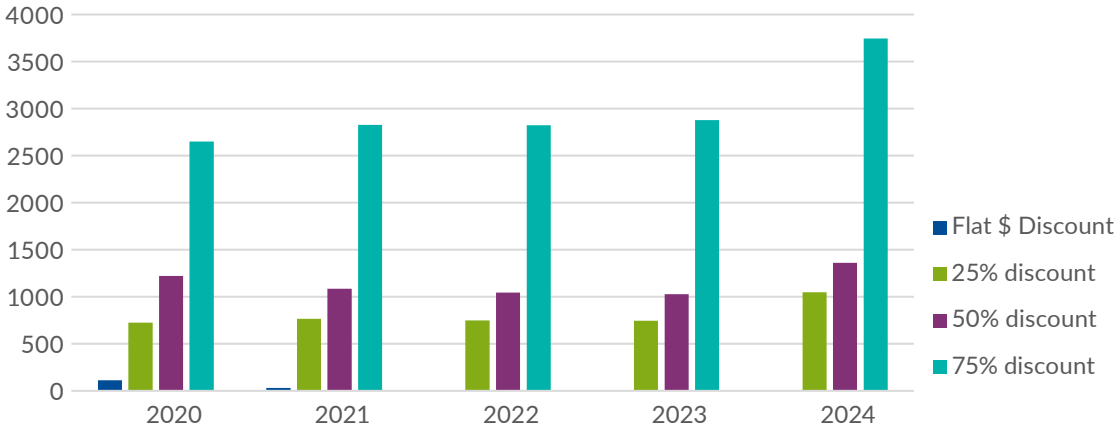
High Priority

Ongoing

Actions taken in 2024

- Tucson Water continued to monitor participation in the Utility Bill Assistance Program and distributed $49,719 in federal low-income funds to nearly 149 low-income customer accounts. The remaining funds were supported by utility revenue.

Figure 12. Low Income Program Participation



- The low-income program expanded in 2024, and Tucson Water partnered with Sonoran Environmental Research, Inc. to provide rainwater and graywater harvesting grants and loans to families based on income. Tucson Water also partnered with the Community Home Repair Projects of Arizona, which offers free emergency plumbing repairs on behalf of Tucson Water. Tucson Water's conservation fund sponsors low-income programs. The 2024 low-income rebates are reported in Figure 12.

  Link to Low-Income Conservation Programs:
  https://www.tucsonaz.gov/Departments/Water/Conservation/Low-Income-Conservation-Programs

- Tucson Water continued to investigate and identify the pipe material used for drinking water service to comply with the EPA 2021 Revised Lead and Copper Rule Revisions (LCRR). In October 2024, the LCRR team completed nine preliminary inventories of service line materials for nine water systems in our service area to meet the LCCR deadline. A map showing the materials of service lines in the Main Distribution System was created and is available online for customers and the public: https://pws-ptd.120wateraudit.com/CityofTucson-AZ. Annual notices were mailed to over 142,000 addresses to inform residents that the material of their service line is unknown or that they have galvanized pipes that require replacement. The LCRR team is working with customers to explain the changes to the monitoring requirements for lead in drinking water as outlined by the LCRR program. They are also providing health-related information and helping identify the service line materials at individual residences. More information on our Lead and Copper program can be found at Lead and Copper Rule City of Tucson website.


EPA

Understanding the Risk

https://bit.ly/47wjWSo

There is no safe level of lead in drinking water. Exposure to lead in drinking water can cause serious health effects in all age groups, especially pregnant people, infants (both formula-fed and breastfed), and young children.

Some of the health effects to infants and children include decreases in IQ and attention span. Lead exposure can also result in new or worsened learning and behavior problems. The children of persons who are exposed to lead before or during pregnancy may be at increased risk of these harmful health effects.

Adults have increased risks of heart disease, high blood pressure, kidney, or nervous system problems.

Contact your health care provider for more information about your risks.

Take the *Lead* on Lead

Tucson Water is enhancing its lead service line replacement program. Water service lines confirmed as lead or galvanized steel will be replaced with copper service line materials. For information about potential financing solutions to assist with replacement of your lead service lines, please contact Tucson Water at *QualityandPressure@tucsonaz.gov* or *520-791-5945*.
If you are planning on replacing your portion of the water service line, please contact Tucson Water at *QualityandPressure@tucsonaz.gov* or *520-791-5945*.

Here are steps you can take to reduce your risk of lead exposure in drinking water:

Use water filters certified to remove lead.

Flush your taps by running the water for 15-30 seconds.

Use cold water. Boiling water does not remove lead.

Clean your faucet's screen.

Have your water tested by a certified lab.

Tucson Water customers were notified via mail in November 2024 of their service line material status. The pamphlet seeks to educate the public on ways to lessen the risks of lead exposure.

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

High Priority

Near-Term

Actions taken in 2024

- Tucson Water is enhancing its outreach efforts by employing bilingual customer service representatives and developing outreach and educational materials in both Spanish and English. The utility has engaged with local media platforms in both languages to inform customers about the ongoing availability of low-income and emergency hardship bill-reduction programs.
- In 2024, the City was awarded two AZWIFA grants to complement the Utility Bill Assistance 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 provide the necessary matching funds for these grants. Targeted outreach for this water conservation program aims to implement indoor water efficiency retrofits at 600 units in low-income multifamily properties across the Tucson service area over two years.

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 2024

- Tucson Water continued to maintain an easy-to-use website page that informs potential low-income and emergency-hardship customers. Timely and accurate information was maintained on the website, and applications require only the minimum information that is necessary for customers to screen their eligibility to participate in these programs.

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

In 2024, the Tucson community reached a notable milestone and has saved over 6 billion gallons of water through conservation efforts over the last 15 years through rebate programs and incentives. And, we are not stopping there. We continue to improve, seek funding for, and grow these programs. Lowering a water bill can also be achieved by reducing how much water a household consumes and oftentimes, high water bills indicate inefficient or leaky appliances. Tucson Water offers low-income conservation programs to qualified customers, including free high-efficiency toilet replacements and discounted high-efficiency clothes washers. While resilience is accomplished through both individual and collective actions that help Tucson conserve its water supplies, 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.

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

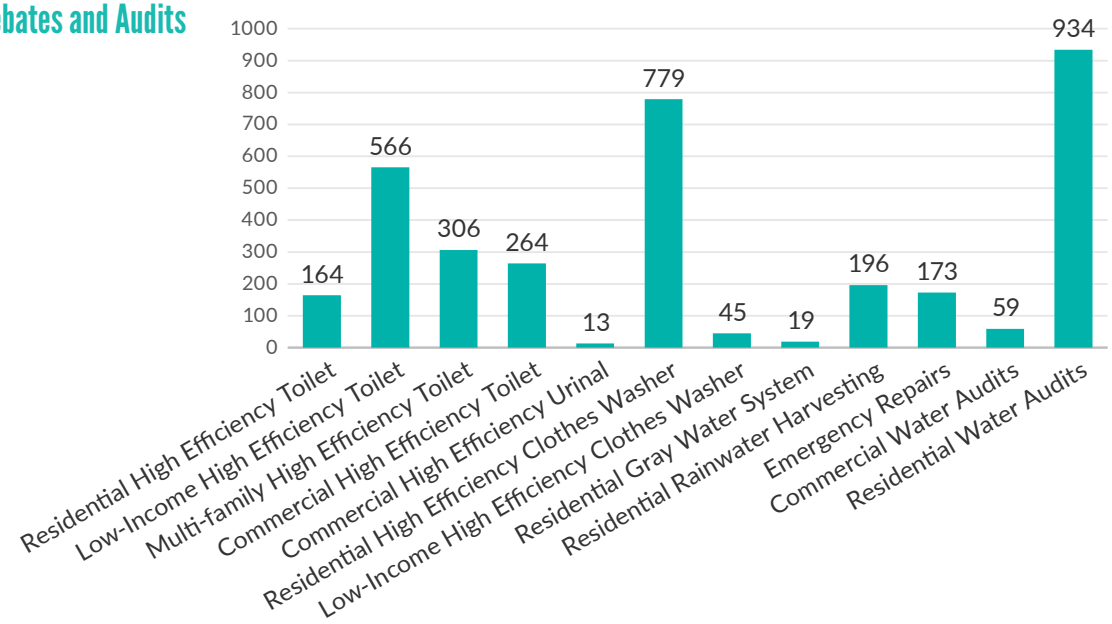
High Priority

Ongoing

Actions taken in 2024

- Tucson Water Conservation staff compiled the 2023 Annual Conservation Report in mid-2024. The reporting schedule changed from a calendar year to a fiscal year basis. As a result of the change, the report covers water savings and related metrics for the 18-month period that ends in June 2024. The report will be available in early 2025.
- Tucson Water accounting of annual rebates and audits is starting to be automated in Microsoft Power-BI, a visual interactive software platform. Power BI will improve data management and visualization of incentive programs.

Figure 13. 2024 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 2024

- The Conservation team launched the new commercial and multi-family turf removal rebate program funded through recent AZWIFA grant awards.
- The "high-use letter" campaign successfully continued in compliance with the Drought Preparedness and Response Plan. In 2024, 6,566 single-family customers, 70 multi-family customers, and 15 duplex/triplex 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 a free water audit, free devices, and appliance rebates. Conservation staff also did door-knocking outreach for low-income, high-use customers to provide information and offer in-person services. Approximately 200 audits were scheduled because of the combined outreach efforts. https://www.tucsonaz.gov/Departments/Water/Conservation/Zanjero-Program-Free-Water-Efficiency-Audit

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 2024

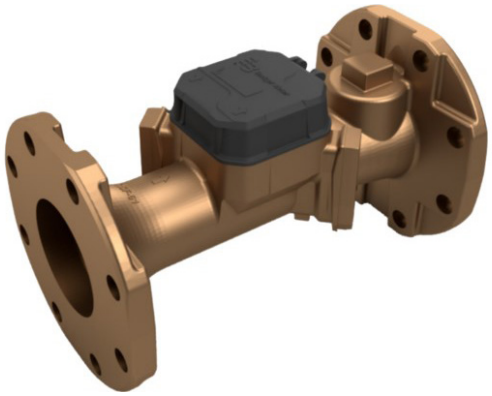
- Following the launch of the new commercial and multi-family turf rebate program in July 2024, direct outreach was initiated via letters and newsletters to specific customers who were identified as likely having ornamental turf based on outdoor water use meter data. The turf removal rebate is offered at $5 per square foot for a maximum of $100,000 for turfgrass removed that meets the City of Tucson ordinance definition of ornamental turf. Recruitment also began in 2024 for a Commercial Conservation Manager, whose major responsibilities will include the implementation of Tucson Water's grant-funded turf rebate plan.
- Turf removal rebate information is available online: https://www.tucsonaz.gov/Departments/Water/Conservation/Commercial-Multi-family-Customer-Rebates

Demand Management – Monitoring and Mandates (MM) Strategies

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

Advanced metering infrastructure (AMI) and smart meters have successfully demonstrated their technological benefits in managing water resources for both customers and the utility. This technology allows for early detection of leaks in real time, resulting in quicker repair responses and reducing water loss. AMI provides customers with knowledge into their daily water usage, which can incentivize customers to manage their water bills effectively by identifying conservation opportunities. In Tucson, AMI was advanced through pilot projects designed to assess customer satisfaction and the potential for water savings through conservation tracking methods. Although AMI is seen as a significant step toward enhancing conservation measures, its large-scale implementation is expensive. Therefore, securing funding through grants was prioritized to help keep costs manageable for customers.

Another notable benefit of AMI is the reduction of greenhouse gas emissions, as it eliminates the need to drive around to monitor 250,737 meters each month. Reductions like these will help us reach Tucson's carbon-neutral goal by 2030.



Ultrasonic meter

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

High Priority

Near-Term

Actions taken in 2024

- Pilot testing was performed at several Tucson Water facilities using smart meters and AMI technology. A leak was identified in a building swamp cooler pump through an alert that was successfully communicated to our customer information system portal. The testing demonstrated that all key components were effectively integrated providing confidence in the technology and confirming the hard work of countless hours upgrading the customer information system.
- Evaluation planning was initiated to assess water savings potential.
- In 2024, Tucson Water was awarded two $3 million grants ($3 million in grant funds and $1 million in Tucson Water matching funds) through the AZWIFA Water Conservation Grant Fund, totaling $6 million. The grants will help fund the first two phases of the project and the implementation of the new AMI software.
- Project Managers reviewed proposals submitted for the AMI project implementation and negotiated a contract with the selected vendor. The vendor is on track to begin smart meter installations by March 2025. It is estimated that 105,000 customer meters need to be replaced with smart meters.

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 2024

- Tucson Water has identified business processes that will help leverage smart meters data and has completed initial planning efforts towards system integration of AMI technology and the utility's Customer Information System platform using Microsoft PowerBI software.
- Planning efforts began to develop a website platform for city-wide access in 2024, and City-wide implementation will be performed over five Phases. Phase I will include approximately 20,000 meters starting in March 2025, and Phase II will follow with an additional 6,000 meters. Deployment of AMI in residential phases will be considered a priority for those customers with financial hardship. Public outreach will be developed to inform customers and will include door hangers, fliers, and social media. These campaigns will provide guidance on logging into accounts, tracking usage, and offer background information about the AMI program. Once AMI is fully implemented, the data generated will provide valuable information on the effectiveness of the AMI program.

Tucson Water technician installing an ultrasonic smart meter

MM-1 Action C:
Implement utility-wide smart meter communication technology.

High Priority

Near-Term

Actions taken in 2024

- Tucson Water's progress in implementing smart meter technology remains a high priority. Staff are continuing to build an online customer portal that will provide private access to customers' daily water usage, which is transmitted from state-of-the-art ultrasonic meters. Through the customer portal, customers will have the ability to view their usage throughout the day. Additional grant funding was sought in 2024 through the Bureau of Reclamation's WaterSMART Drought Response Program; however, Tucson was not awarded funding for smart meter technology through this program.

Demand Management – Education (E) Strategies

E-1 Conduct research on new technologies and approaches

Tucson's conservation programs are constantly evolving to ensure resilience in long-term water resource planning in the face of climate change. An overall broader perspective on what is possible is inspired by researching other desert-adaptive municipalities' conservation success stories. Often, this research process leads our program to find new ideas and tools to make better-informed decisions about demand management. Tucson Water partners with research institutions and industry organizations to test new technologies via pilot programs, develop new programs, and improve current programs. Staff have been working to modernize and standardize its conservation program procedures, so they are Tucson-specific, readily available to the public, and easy for industry professionals and the community to follow. Educational engagement on conservation continues to help with water-use reduction in Tucson, as reflected by the continued low GPCD.

Tucson Water staff partners with the Arizona Project WET annually to educate youth water stewards on Arizona specific water sustainabily practices at the 4th Grade Water Festivals.

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 2024

- Tucson Water and the Planning and Development Services Department developed a preliminary draft Low Impact Development ordinance to strengthen local stormwater regulations. LID offers the Tucson community multiple social, environmental, and economic benefits, such as preserving natural landscapes, which improves habitat, air quality, and water conservation. A series of stakeholder workshops were held to gather feedback on LID practices and proposed ordinance considerations. The new ordinance went under review in 2024 but is not yet finalized.
- Tucson Water staff made significant progress with the non-functional turf replacement program in 2024, and the commercial and multi-family turf removal rebate program launched in July 2024 with the goal of replacing 200,000 square feet of non-functional turf with low water use landscaping in the next two years. At the end of 2024, 22 properties entered the first phase of the rebate program, and 13 properties were approved to proceed with design, permitting, removal, and installation. The program funding also includes replacing approximately 55,000 square feet of non-functional turf at four city parks (Fort Lowell Park, James Thomas Park, Mirasol Park, and Sunset Park at City Hall). In 2024, turf was removed at Fort Lowell and Sunset Parks, and design work is underway for James Thomas and Mirasol Parks and will continue into 2025.

Public notice of work in progress at City Hall.

Removal of turf along the road at Fort Lowell Park.

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

High Priority

Near-Term

Actions taken in 2024

- Tucson Water partnered with the Water Research Foundation on a project to collect data about indoor and outdoor end uses of water for Tucson customers. Tucson Water contributed five years of data to the study, and a customer survey is planned for 2025.
- Tucson Water continued working with outside expertise to explore how Net Zero Water approaches could be implemented in Tucson. Net Zero or water-neutral development is the idea that new developments are "neutral" to the water supply system by not increasing demand. Staff initiated local work with partners at the Pima County Regional Flood Control District and the University of Arizona to tie parcel data to meter data for continued analysis of water-neutral policy options.

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

High Priority

Near-Term

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.

High Priority

Near-Term

Actions taken in 2024 (To support Actions C and D)

- Tucson Water is exploring technological solutions to support the rainwater harvesting rebate program by improving rainwater harvesting plans for customers using satellite imagery to design systems based on parcel features and elevations. The technology platform is being reviewed by staff as a proof of concept to be tested in 2025.
- Staff researched technology that can be used more efficiently and accurately to collect field data, including area, slope, elevation, and volume. Devices have been identified that connect directly to a cell phone to complete the measurements and store the data; staff are piloting a device for the turf removal rebate program and with the Tucson Water Zanjeros to improve site visits for the rainwater harvesting rebate.
- Tucson Water's Conservation Program continued to develop a business plan that will review existing conservation activities, identify program priorities, and create a process for new future conservation solutions and 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 non-residential sites that use native or desert-adaptive landscapes 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 designed for homeowners to enhance the community's conservation ethic. However, shortly after its inception, a need for training specifically tailored to landscape professionals was recognized, leading to the creation of the Smartscape Program. 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 residential homeowners through Zanjero water audits, workshops, public events, and the desert dweller guide. Visit https://www.tucsonwaterrunsdeep.org/conservation for more tips.

A Guide to Responsible Desert Dwelling is available online as a resource to residents and provides conservation tips through mindful lifestyle choices, like using native and drought tolerant plants in your landscaping (shown above).

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 2024

- Tucson Water co-sponsored an in-person outreach event, the 2024 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 monthly customer outreach newsletter, "Water Matters," offers monthly conservation messages and periodic feature articles 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: https://www.tucsonaz.gov/Departments/Water
- Tucson Water began updating and simplifying the educational resources on irrigation and landscape watering for customers. During customer water audits, Zanjeros have found that irrigation controllers are often not programmed for seasonal irrigation and that overall irrigation system programming knowledge can be improved. The updated information is expected to be published in 2025.
- Tucson Water began developing rainwater harvesting maintenance materials to support the original rainwater harvesting guide, which was published in September 2013. The updated information is expected to be published in 2025, in conjunction with updated irrigation and landscape watering resources.

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 2024

- The Smartscape Program, in partnership with the University of Arizona's Cooperative Extension, facilitated a workforce development program. In 2024, a total of 255 landscape professionals including City personnel completed the training. The course covers the fundamentals of design, installation, and maintenance of sustainable, desert-adapted landscapes and irrigation systems and is geared to meet current workforce needs.

Smartscape training in indoor & outdoor classrooms. Photos courtesy of University of Arizona Smartscape staff.

- In 2024, Tucson Water worked with the Watershed Management Group to expand residential rainwater harvesting customer classes and begin outreach to train contractors who install rainwater harvesting systems. Classes will be launched in 2025.

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

Medium Priority

Ongoing

Actions taken in 2024

- Tucson Water continued collaboration with the University of Arizona's Smartscape Program, by initiating Phase 2 of the Homeowners Association Landscape Transformation Pilot Program. This includes establishing a cohort of Homeowners Associations that receive guidance and limited funding on transitioning to water-efficient landscapes. Participating in Homeowner Associations may receive up to $10,000 in grants to complete new landscape designs.

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

Medium Priority

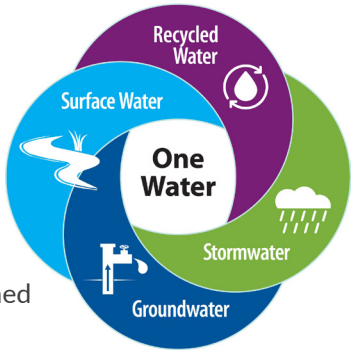
Near-Term

Actions taken in 2024

- Tucson Water continues to partner with Watershed Management Group and Sonora Environmental Research Institute to facilitate rebate workshops, which are offered for free to any interested resident, online and in person, in English and Spanish.
- Residential rainwater harvesting and greywater workshops, both of which are prerequisites for their respective rebates, underwent review and update to improve the content and the participant experience.

  Link to workshops: https://www.tucsonaz.gov/Departments/Water/Conservation/Residential-Customer-Rebates

VI. 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 evaluated in the demand management section. This included annual tracking of groundwater production, surface water, recycled 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 or developed.

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

Community engagement is the cornerstone of successful implementation of Tucson's One Water program. Understanding how and why communication efforts are most effective, in a constantly evolving technological environment, is valuable for providing information exchange throughout the community.

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 improved 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).*

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 well sites, three reservoirs, as well as at CAVSARP, and SAVSARP to offset electricity demands. Since 2020, the City has installed solar panels providing a total capacity of 6,679.68 kilowatts of direct current (kWdc). The third phase of the solar installation project at CAVSARP is currently under construction, with a final system size of 8,602.20 kWdc. Additionally, five more projects are under contract, contributing an additional 2,887.62 kWdc. 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.

The solar plant at CAVSARP.

Uncertain climate conditions significantly impact water supply management. Tucson Resilient Together is addressing climate change through various initiatives aimed at mitigating excessive heat. In 2020, Tucson launched the "Plant a Million Trees by 2030" campaign, which continued through 2024. This campaign specifically targets areas where investments to reduce the heat island effect have not been made, focusing primarily on underserved communities. The Mayor's Office, Urban Forestry Program, and community partners are driving progress on the Tucson Million Trees initiative. Since 2020, approximately 120,000 trees have been planted or distributed throughout Tucson neighborhoods to promote Tree Equity. This number is expected to grow significantly with the launch of the City's TREECenter and the USDA-funded Grow Tucson urban forestry project. In 2024, the City of Tucson and its partners planted 14,900 trees.

The S2S Program's stormwater harvesting projects provide supplemental water to help sustain healthy tree growth, demonstrating how different City of Tucson departments collaborate for the benefit of the community. Tucson is investing in solar installations, electric vehicle charging stations, and has 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 second implementation report provides documentation on the progress of incorporating the 1W2100 Plan approach to value and responsibly manage all water resources. 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

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-3	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

Action	Surface Water Strategy	Time Frame	Priority	Relative Expense	Level of Effort
SW-1	**Maximize the benefits of our current Colorado River water**		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 Colorado River allocation	Ongoing			
D	Utilize groundwater storage credits as short-term transitional supplies during Colorado River 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 Colorado River allocation shortages.	Near & Mid-Term			
SW-2	**Work with the State of Arizona to explore additional water supplies for the Central Arizona Project.**		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.**		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			

Action	Groundwater Strategy	Time Frame	Priority	Relative Expense	Level of Effort
GW-1	**Partner with regional water organizations to protect the aquifer.**		**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.**		**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.**		**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			

Action	Recycled Water Strategy	Time Frame	Priority	Relative Expense	Level of Effort
RW-1	**Adopt new policies for water reuse in buildings.**		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.**		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			
E	Implement advanced water treatment to address high priority emerging water quality issues.	Mid & Long-Term			

Action	Recycled Water Strategy	Time Frame	Priority	Relative Expense	Level of Effort
RW-6	**Implement treatment technologies to address unregulated, emerging water quality issues.**		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			

Action	Stormwater Strategy	Time Frame	Priority	Relative Expense	Level of Effort
S-1	**Explore opportunities for large scale stormwater projects with multiple benefits.**		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.**		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			

Action	Demand Management Strategy	Time Frame	Priority	Relative Expense	Level of Effort
I-1	**Improve outreach for low-income assistance programs for homeowners and renters.**		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.**		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.**		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			

Action	Demand Management Strategy	Time Frame	Priority	Relative Expense	Level of Effort
E-1	**Conduct research on new technologies and approaches.**		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.**		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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