



MEMORANDUM

Date: October 14, 2014

To: The Honorable Chair and Members
Pima County Board of Supervisors

From: C.H. Huckelberry
County Administrator

A handwritten signature in black ink, appearing to be "CHH", is written over the printed name "C.H. Huckelberry".

Re: **Strategic Plan for Pima County Reclaimed Water**

Pima County is committed to optimizing the use of available water resources. A particularly valuable source of available supply is treated wastewater. The attached report, *Strategic Plan for Use of Reclaimed Water for Pima County's Share*, was prepared by the Water Resources Unit of our Regional Wastewater Reclamation Department. This report describes the current state of reclaimed water supplies in the region and quantifies the Pima County share and includes a discussion of the various uses of our allocation of the currently available annual amount of 3,237 acre feet.

Of particular note is the clearly communicated goal of using all of the County's portion that is discharged to the Santa Cruz River rather than allowing it to outflow from Pima County without any beneficial use in our area. The primary public benefits to be derived from Pima County's share of reclaimed water are to:

- Provide recreational public amenities such as parks and sports fields;
- Replace groundwater use where reclaimed water is available and economically feasible to deliver; and
- Enhance riparian habitat and support environmental restoration.

The recommendations listed under the headings Direct Reuse, Aquifer Replenishment, Environmental Restoration, and Eliminate Discharge Leaving Tucson Active Management Area will all be aggressively pursued to avail ourselves of the significant benefits to be derived from this valuable resource.

CHH/mjk

Attachment

c: John Bernal, Deputy County Administrator for Public Works
Jackson Jenkins, Director, Regional Wastewater Reclamation
Kathleen Chavez, Water Policy Manager, Regional Wastewater Reclamation



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October 7, 2014

TO: Jackson Jenkins, Director

FROM: Kathleen M. Chavez, Water Policy Manager

SUBJECT: Strategic Plan for Use of Reclaimed Water for Pima County's Share

The attached report, *Strategic Plan for Use of Reclaimed Water for Pima County's Share*, details uses for Pima County's share of reclaimed water. Pima County strives to manage its water resource assets for the public interest and welfare in three use categories: direct use on irrigated landscape and turf facilities owned by Pima County, environmental restoration and aquifer replenishment.

Although this report provides projected uses of reclaimed water through 2025, these projections should not be viewed as committed uses. Outcomes of several policy decisions could alter how Pima County uses reclaimed water from its metropolitan area facilities. These include the closure of Randolph Park WRF, the extent of our participation in SHARP and other replenishment opportunities.

This report also identifies unrealized opportunities for additional direct use of reclaimed water at some county parks where capacity is limited in the City's reclaimed delivery system; other parks are not close enough to feasibly connect to the existing reclaimed infrastructure. New wastewater flow projections from the upcoming Facility Plan Update will reflect the decreasing trend in wastewater production and projected wastewater flow volumes which will change the projections in this report. However, general use categories in this report can be used to refine strategies for use of Pima County's water.

For our non-metropolitan sub-regional facilities, Pima County will continue to use its reclaimed water for aquifer replenishment and new use opportunities.

Valuable input from Water Rights Team was incorporated into this report. Their multi-disciplinary perspectives reflecting County priorities across several departments were appreciated and indispensable.

Should you have any questions, I am available at your convenience.

Attachment

Copy: Suzanne Shields, RFCD Director
Chris Cawein, NRPR Director
Water Rights Team

2014

Strategic Plan for Use of Reclaimed Water
For Pima County's Share



Regional Wastewater Reclamation
Water Resources Unit
Pima County
October 2014 (R2)

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Pima County
Strategic Plan for Use of Pima County's Reclaimed Water
October 2014

I. Introduction and Purpose

This report is a strategic plan for the use of Pima County's share of reclaimed water. Pima County produces a significant amount of reclaimed water from its wastewater reclamation facilities owned and operated by the Regional Wastewater Reclamation Department (RWRD). Over the last ten years, Pima County has upgraded the quality produced at its wastewater reclamation facilities such that all water produced is considered reclaimed water, as opposed to effluent. Reclaimed water is allocated to several water providers. The reclaimed water allocated to Pima County is used by various Pima County Departments for direct use on irrigated landscape and turf recreational facility, environmental restoration and aquifer replenishment. Pima County seeks to manage its water resource assets for the public interest and welfare and this report describes the County's plans for its use of reclaimed water.

In 2007, the Board of Supervisors approved Water Rights Policy F54.9 to set conditions under which Pima County will manage County owned or acquired water resources including surface water, groundwater, effluent, reclaimed water, recharged water and water storage credits. The Board recognizes that these water resource assets are valuable public properties to be managed for the public's interest and welfare.

Key elements of the Water Rights Policy call for the creation of an inventory and management database of Pima County's water assets and the establishment of a Water Management Committee to prepare a management and use plan for County water resources.

Consistent with the policy, the *Water Resources Asset Management Plan* (WRAMP) was transmitted to the County Administrator in 2012. WRAMP identified a number of recommendations regarding Pima County's water resource assets. Among the recommendations was the need to

"...develop a strategy and reclaimed water management plan for the use of the County's share of reclaimed water that addresses needs for sustainable flows in the Santa Cruz River, replacement of groundwater use with reclaimed water at County facilities, enhancement of riparian areas and replenishment of the aquifer." [WRAMP](#)

Water sustainability was examined in the *City of Tucson/Pima County Water/Wastewater Infrastructure Supply & Planning Study* (WISP). The plan recognized that a sustainable water future must include water for people and the environment. It also concluded that we must learn from the desert to become more drought resistant and drought tolerant and we must look for all water supplies to come from renewable sources, to the extent possible.

II. Pima County Reclaimed Water Share

Pima County's share of reclaimed water is governed by a number of institutional agreements. Reclaimed water use is defined by the amount generated, where it is produced and water quality which regulates the types of uses allowed.

Institutional Framework

The institutional framework governing the allocation of reclaimed water in Pima County is as long as it is complex. Below are the policy documents and agreements relating to the share of reclaimed water available to Pima County and that guide its use.

1979 IGA In 1979, Pima County and the City of Tucson entered into an Intergovernmental Agreement (IGA) to transfer the City sewer system to Pima County. Under that agreement, ninety percent of the effluent produced at the metropolitan area wastewater facilities was allocated to the City of Tucson, with the remaining ten percent share to Pima County. The City divides its share of effluent with Metropolitan Domestic Water Improvement District (MDWID) and the Town of Oro Valley according to the effluent generated from each water provider's service area.

SAWRSA In 1983, the Southern Arizona Water Rights Settlement Act resolved litigation between the Tohono O'Odham Nation, the City of Tucson and others, in part, by making an entitlement of 28,200 acre-feet of effluent per year to the Secretary of the Interior to hold for the benefit of the Nation. The Secretary will use this water to firm non-Indian agricultural priority CAP water and to sustain the cooperative fund used to purchase CAP water for the Nation.

2000 Supplemental In 2000, the City and County approval of a Supplemental IGA set aside up to 10,000 acre-feet of effluent for riparian projects that are part of a habitat conservation plan or are a mutually approved beneficial use by the City and County. It was agreed that this Conservation Effluent Pool (CEP) would be deducted from the total metropolitan area effluent. To date no effluent has been used for designated environmental projects.

Wheeling Agreement In 2003, Pima County entered into a wheeling agreement with the City of Tucson. This agreement allows Pima County to wheel its share of effluent in the City reclaimed water distribution system for delivery to county facilities. The agreement provides for an operating rate limited to the amount of Class A+ reclaimed water produced by Pima County. Currently, this is the amount of reclaimed water produced at the Randolph Water Reclamation Facility (WRF) minus a 1,000 acre-foot allotment to the City. The County may use more than this prescribed amount of wheeled reclaimed water from the City's reclaimed system, but pays an interruptible environmental rate. These rates are calculated annually in accordance with the wheeling agreement. The 2013 operating rate is \$72.69 per acre-foot and the environmental rate is \$291.96 per acre-foot. The county facilities eligible to receive the operating rate are listed in an appendix of the wheeling agreement. This list was updated and approved by the City and County in 2012. See Table 1.

CEP Agreement Under the 2000 Supplemental IGA, the City and County established a conservation effluent pool (CEP) of 10,000 acre-feet per year. The terms and conditions for use of the pool were established in a CEP agreement approved in 2010. CEP water can be used for projects promoting habitat conservation plans or environmental restoration projects approved jointly by the City and County. To date no CEP water has been used pending development of administrative procedures establishing the process for considering CEP requests, allocating and apportioning water, accounting of quantities used, project status reporting and the receipt of a CEP application. Unused CEP water does not accrue from year to year. CEP water is taken from the total amount of reclaimed water produced at the metropolitan area wastewater reclaimed facilities, after the SAWRSA allotment is taken. CEP water delivered through the City reclaimed system will be charged the environmental wheeling rate. When projects using CEP water are

implemented, the amount of reclaimed water available to the City and County will decrease up to a maximum of 10,000 acre-feet per year.

SHARP Agreement Another IGA governing the use of reclaimed water is the South Houghton Area Recharge Project (SHARP). Although this project does not define the County's share of reclaimed water, it provides for infrastructure to store County reclaimed water in a constructed recharge facility. In this 2011 agreement, the City and County agreed to jointly establish a recharge project in the southeast area of the County to store reclaimed water underground for future use and to replenish the aquifer. The minimum recharge capacity is 4,000 acre-feet with the City and County each contributing up to 2,000 acre-feet of reclaimed water. Reclaimed water will be delivered to the project through the City's reclaimed water delivery system. This project is anticipated to be completed in 2016.

Robson Agreement The agreements above address reclaimed water produced at the metropolitan area wastewater reclamation facilities. The Robson Ranch Quail Creek agreement applies to reclaimed water produced at the Green Valley Wastewater Reclamation Facility, a non-metropolitan facility. The Robson agreement, approved in 2001, provides for the sale of a minimum of 1,121 acre-feet annually of reclaimed water from the Green Valley WRF to Robson Ranch Quail Creek for recharge and reuse. The agreement provided for an in-kind contribution from Robson toward the construction of filtration facilities at the Green Valley WRF. It established a reclaimed water charge of \$40 per acre-foot that increased to \$80 per acre-foot in November 2013. Robson recharges reclaimed water and recovers it for its golf course irrigation. Water that Robson does not recover accrues recharge credits to Robson's long term storage credit account.

Arizona Department of Water Resources (ADWR) State legislation and the administrative code provide the framework for storing and recovering water for future use. Artificial recharge is considered an important tool in the management of Arizona's water supplies. ADWR encourages use of renewable water supplies, including reclaimed water, through a regulatory program for underground storage, savings and replenishment of water. Reclaimed water owners storing underground for future use must apply to ADWR for the appropriate permits and the volume of water stored and/or recovered must be reported to ADWR annually.

Board Water Policy Reclaimed water and associated recharge is considered a County asset to be managed for the public interest and welfare. In 2007 the Board of Supervisors adopted Board Policy F54.9 relating to water rights acquisition, protection and management. This policy document requires that water assets, including groundwater, surface water, wastewater, reclaimed water, stormwater and recovered water and associated rights and credits be monitored and inventoried. The policy also requires that the manner in which water resource assets are procured, managed, maintained, shared, delivered, apportioned, sold or exchanged will be conducted according to procedures established by the County Administrator.

Sustainability Pima County's *Sustainable Action Plan for County Operations*, adopted in 2008 and updated in 2014, acknowledges that an adequate, safe water supply for ecosystems and current and future generations is essential to ensuring the sustainability of Pima County. As such, the Water Conservation and Management component of the plan includes the following goals:

- Ensure that public projects are multi-benefit, including restoration, stormwater management, recharge and public amenity

- Maximize County water resource assets, including groundwater rights, surface water rights and the production and use of reclaimed water to sustain and protect the natural environment
- Optimize water use efficiency in County operations

Pima County Production of Reclaimed Water

The amount of reclaimed water generated at each of Pima County's wastewater reclamation facilities is documented in the Pima County's *Effluent Generation and Utilization Report* published annually. The report details the amount of reclaimed water produced, the amount used for process water and effluent usage.

It includes a summary of the effluent received, effluent reused, effluent discharged or delivered to the reclaimed system and effluent total for each of the metropolitan area wastewater reclamation facilities from 2003 through the present. Total effluent as well as effluent usage by each of the non-metropolitan sub-regional facilities is also included.

Monthly reclaimed water used by the Natural Resources Parks and Recreation Department (NRPR) and the Kino Sports Park and Kino Environmental Restoration Project (KERP) is documented along with historical water use from 2003 to the present.

A recent addition to the report is a list of environmental restoration projects that use reclaimed water. The report includes a description of underground storage projects involving county reclaimed water and a summary of long term storage credits accrued by Pima County as well as a description of how Pima County's share of reclaimed water is determined. In 2011, the report included a summary of the effluent used in the Tucson Active Management Area to demonstrate the region's use of reclaimed water.

Determination of Pima County's Reclaimed Water Share

Reclaimed water produced at Pima County's wastewater reclamation facilities is established by the intergovernmental agreements described above. Since most of the reclaimed water is generated by the three metropolitan area facilities it is addressed separately from the non-metropolitan area facilities.

Metropolitan Area Reclaimed Water The three metropolitan area facilities include the Tres Rios Wastewater Reclamation Facility (WRF), Agua Nueva WRF and Randolph Park WRF. The Tres Rios WRF, previously known as Ina Road WRF, was recently upgraded to a treatment capacity of 50 million gallons per day (mgd) and water quality to Class A+ reuse standards.

The Agua Nueva WRF, which recently replaced the Roger Road WRF, has a treatment capacity of 32 mgd and produces Class A+ reclaimed water suitable for direct reuse. Approximately 13 mgd are diverted to the City of Tucson for use in their reclaimed water system and for underground storage and recovery.

The Randolph Park WRF, located midtown, is a 3.5 mgd reclamation plant that produces Class A+ water. Its water is delivered directly into the City's reclaimed system. Reclaimed water delivered to the County's turf and landscape facilities is generated at the Randolph Park WRF. Together, these three facilities produced 60,572 acre-feet of reclaimed water in 2013.

Wastewater Flow Trends The amount of reclaimed water available for reuse is dependent on suitable water quality and population. Since 2003, the wastewater flow trends have reflected an increase in population as well as the impacts of water conservation efforts and the economic down turn. Overall, wastewater flows to the metropolitan area facilities have decreased as reflected in the effluent

production starting in 2006. Water demand from local water providers have also been observed to be declining in recent years. An ongoing municipal water demand study¹ will investigate trends in water use that have led to recent declines in water demand. RWRD is updating its facility plan which will include updated flow projections. Wastewater flow projections are expected to reflect the increasing use of indoor low flow water use fixtures, especially in new construction. Figure 1 illustrates the historical effluent production from the metropolitan area facilities.

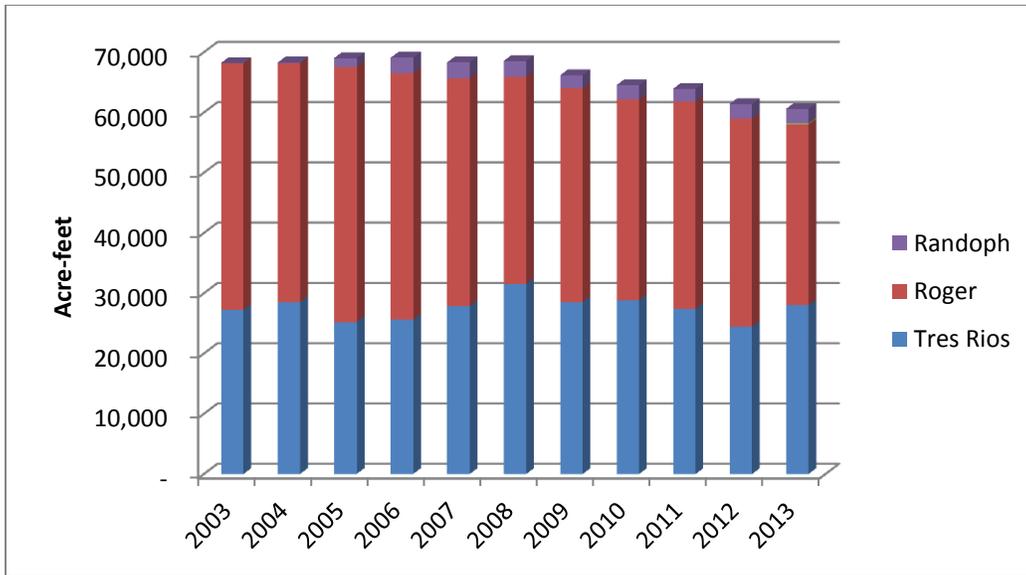


Figure 1 - Wastewater Flow Trends 2003-2013

Reclaimed Water Allocation Intergovernmental agreements described above between the City of Tucson and Pima County govern the entitlements from the metropolitan area facilities and the allocation of effluent between the City and County. Although Pima County produces a large amount of reclaimed water, very little is available for Pima County to use.

Based on the effluent produced at the metropolitan area facilities in 2013, Pima County’s entitlement to reclaimed water was 3.237 acre-feet as described in Table 1.

¹ *Development of Dynamic Planning Tools for Improved Understanding of Trends in Residential Water Demand*, Gary C. Woodard, Montgomery & Associates, in progress.

Entitlement Calculations	Effluent Total (Acre-Feet)
Metropolitan Effluent	60,572
Less SAWRSA	28,200
Subtotal	32,372
Water Providers Share	0.90
Pima County Share	0.10
Entities Share	
-Water Providers (90%)	29,135
-Pima County (10%)	3,237

Table 1-Entitlement Calculations for 2013

Conservation Effluent Pool (CEP) As described earlier, a conservation effluent pool of 10,000 acre-feet of reclaimed water can be used for conservation projects subject to approval by the City and County. To date, no projects have been approved and no CEP water has been used. When CEP projects are approved, the impact to the availability of effluent to the City and County will be less effluent available. Unused CEP water does not accrue from one year to the next. CEP water delivered through the City reclaimed water system will be charged the environmental wheeling rate.

If the full amount of CEP water is used, the County’s share of effluent would decrease from 3,237 acre-feet to 2,237 acre-feet based on 2013 flows. Figure 2 shows the change in effluent availability with and without CEP water.

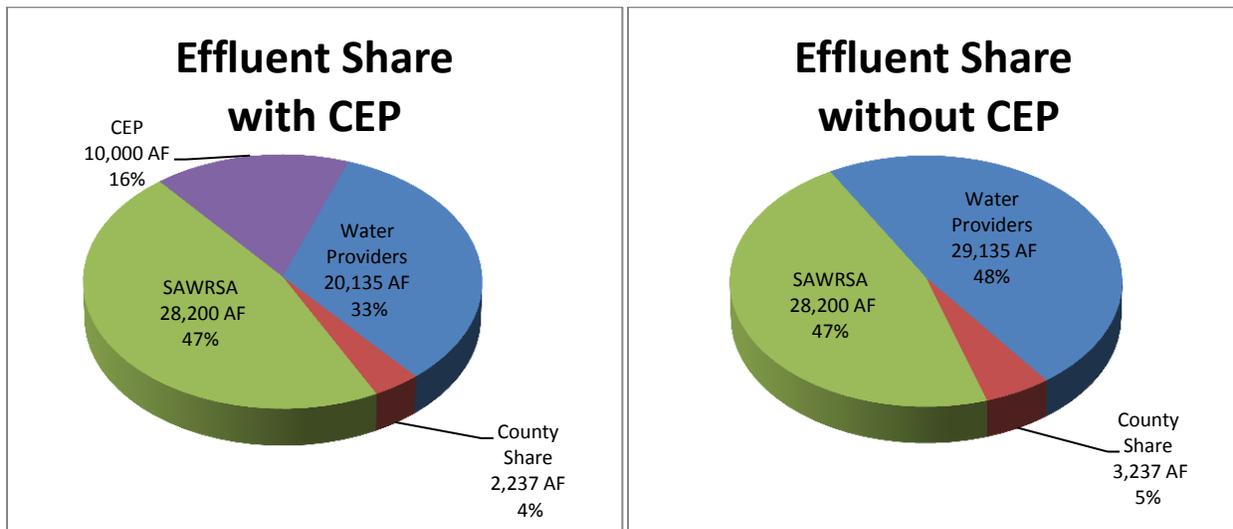


Figure 2 - 2013 Effluent Shares with and without CEP Water

A task force, coordinated by the Tucson Water Coalition, was established 2013 to develop a list of project candidate sites. Project guidelines include water resource availability, governmental support, social equity, economic feasibility and environmental restoration/preservation. The task force report, submitted to the Board of Supervisors August 7, 2014 recommends 13 projects, four of which have immediate potential for implementation.

- Santa Cruz River Adjacent to Continental Ranch
- Tucson Origins Oasis
- Santa Cruz River, 29th Street to Ajo; Paso de Las Iglesias Phase 1
- Isabella Lee Natural Preserve

Non-Metropolitan Area Reclaimed Water Six wastewater reclamation facilities treat wastewater from outlying, non-metropolitan areas in Pima County (see Figure 3). In 2013 these facilities produced 3,782 acre-feet of reclaimed water. Wastewater flow trends vary for each of the facilities, based on the population served. The Green Valley and Avra Valley WRFs have experienced the most growth over the last several years.

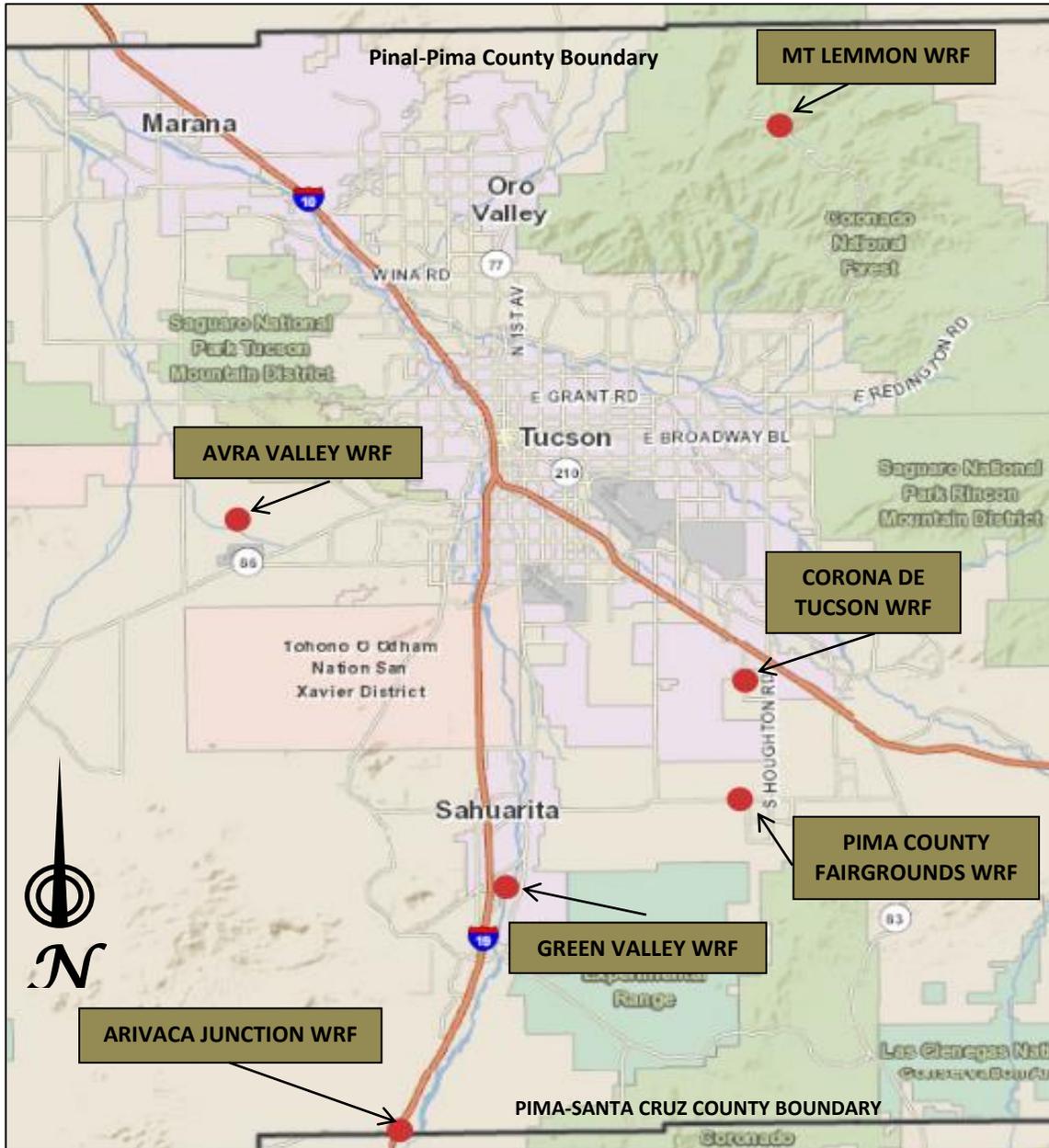


Figure 3 - Location of Non Metropolitan Area Wastewater Reclamation Facilities

Wastewater reuse of each of the non-metropolitan facilities, from largest to smallest is shown in Table 2 below.

Facility Name	Reclaimed Water in 2013 (acre-feet)	Disposal and Reuse
Green Valley WRF	2,076	Pima County recharges with no storage credit accrual. Robson Quail Creek recharges to accrue credit
Avra Valley WRF	1,376	Groundwater recharge with no storage credit accrual, on-site use
Corona de Tucson WRF	284	Groundwater recharge with storage accrual
Arivaca Junction WRF	35	Restricted agricultural use
Fairgrounds	4	Groundwater discharge with no storage accrual
Mt. Lemmon	3	Spray field on Forest Service land
Rillito Vista²	3	Groundwater recharge with no storage credit accrual
Total Non-Metro WRF	3,782	

Table 2 – Reclaimed Water from Non-Metropolitan Facilities

Non-Metropolitan Reclaimed Water Allocation The 1979 IGA and 2000 Supplemental govern effluent entitlements from the metropolitan area wastewater reclamation facilities. The 2000 Supplemental IGA exempts non-metropolitan facilities from City of Tucson control. Recent direction from the County Administrator clarifies county ownership of reclaimed water produced from non-metropolitan facilities³

III. Pima County Use of Reclaimed Water

Pima County uses its share of reclaimed water in a variety of ways to the benefit of Pima County residents. County reclaimed water is delivered to County facilities through the City of Tucson Reclaimed Water Delivery System through a wheeling agreement approved in 2003. Reclaimed water is also stored underground where it can be recovered in the future. Pima County also uses its reclaimed water to sustain environmental restoration projects.

Direct use in the City of Tucson reclaimed water delivery system

Pima County’s annual use of reclaimed water is documented in the *Effluent Generation and Utilization Report*. Pima County has used reclaimed water since at least 1979, but began to increase its use after the 2003 wheeling agreement. Table 3 shows the amount of reclaimed water delivered to Pima County facilities via the Tucson Water reclaimed system⁴.

Reclaimed water is delivered through this system to numerous County facilities. The County facilities using the most reclaimed water are:

² Operational responsibility transferred to the Town of Marana effective July 1, 2013

³ Memorandum from C.H. Huckelberry to J. Bernal and J. Jenkins Re: Ownership of Nonmetropolitan Effluent, July 29, 2013.

⁴ 2013 *Effluent Generation and Utilization Report*, Pima County Regional Wastewater Reclamation Department

- Crooked Tree Golf Course (Arthur Pack) – 601 acre-feet in 2013⁵
- Kino Environmental Restoration Project and Kino Sports Fields – 184 acre-feet in 2013
- Various sports parks and linear parks – 332 acre-feet in 2013

Pima County Annual Reclaimed Water Delivery From Tucson Water Reclaimed System			
Year	Gallons	Hundred Cubic Feet⁶	Acre-Feet
2003	69,573,993	93,0067	213
2004	89,118,658	115,1234	264
2005	74,349,631	99,391	228
2006	92,822,026	124,085	285
2007	295,588,987	395,145	907
2008	302,590,005	404,504	929
2009	418,643,532	559,645	1,285
2010	347,788,925	424,822	975
2011	366,899,807	490,474	1,126
2012	330,454,192	441,753	1,014
2013	360,033,662	481,295	1,105

Table 3 – Annual Pima County Reclaimed Water Delivery from Tucson Water’s Reclaimed System

Pima County’s reclaimed water demand varies based on precipitation (or lack of) and temperature. As one can expect, high peak use is in May, June and July when temperatures are at their highest and there is minimal precipitation. Once the summer monsoon season arrives, reclaimed water demand decreases. Increased water also occurs in late fall when winter turf is planted. Newly constructed parks require more reclaimed water until vegetation and turf are established, then irrigation is reduced sufficiently to maintain vegetation and turf health. The lowest water use is in late winter when vegetation and turf require less water and winter rains can meet irrigation needs. Pima County’s monthly reclaimed water demand is shown in Figure 4.

Annual variation occurs based on annual rainfall. During wet years, reclaimed water demand can be expected to be lower. However, with ongoing drought conditions expected to persist or worsen, it can be anticipated that reclaimed water demand will increase.

⁵ As a county-owned facility, Crooked Tree Golf Course receives County reclaimed water via the Tucson Water delivery system. The golf course operator pays Pima County for reclaimed water

⁶ Hundred Cubic Feet is approximately 748 gallons

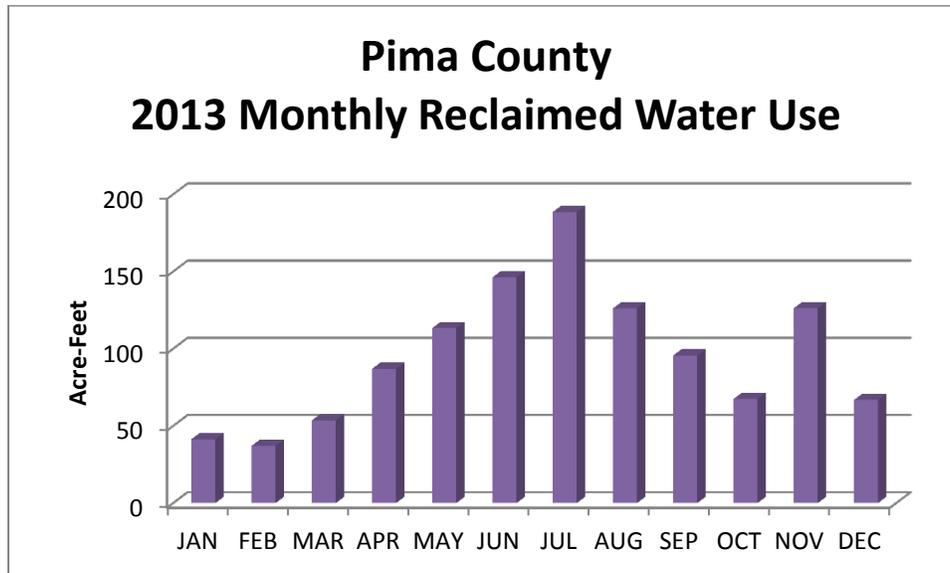


Figure 4 - Pima County 2013 Monthly Reclaimed water Use via Tucson Water Delivery System

Aside from Crooked Tree Golf Course and Kino Environmental Restoration Project, Pima County parks use most of the reclaimed water delivered from the City reclaimed system. Pima County’s largest parks using reclaimed water are listed in Table 4 below.

Reclaimed Water Delivered to Major Pima County Parks in 2013	Acre-Feet
Rillito River Park including Children’s Memorial Park	117
Rillito Regional Park	77
Brandi Fenton Memorial Park	62
George Mehl Family Foothills Park	40

Table 4 – Major Pima County Parks Using Reclaimed Water

Pima County’s use of reclaimed water to support county projects has been successful and sustainable. However, delivery of reclaimed water is limited to sites where the City reclaimed water infrastructure delivers water. A number of Pima County parks are using potable water because the reclaimed system does not reach these areas. In some cases, the cost to extend the reclaimed system is not feasible for facilities that only require a small amount of reclaimed water.

Capacity in certain segments of the City reclaimed system has also been a constraint. Reclaimed water mains, such as the one on Thornydale Road, deliver large amounts of reclaimed water to high water use golf courses in the Northwest during peak periods, leaving limited capacity to provide reclaimed water to county parks such as the Arthur Pack Regional Park and YMCA Soccer fields.

Aquifer Replenishment

Pima County is currently recharging reclaimed water at three recharge sites:

- The Lower Santa Cruz River Managed Recharge Project, operated by the Cortaro-Marana Irrigation District, is a collaborative project including the City of Tucson, Pima County, the US Bureau of Reclamation, the Metropolitan Domestic Water Improvement District, Flowing Wells Irrigation District, Spanish Trail Water Company and the Town of Oro Valley. The project has an ADWR permit to store up to 43,000 acre-feet per year. Pima County's annual contribution of effluent to this project has ranged from a low of 58 acre-feet at its inception to a high of 1,036 acre-feet in 2010. Managed recharge facilities consist of effluent or CAP water discharged to a natural stream channel that allows water to percolate to the aquifer without the assistance of a designed and constructed facility. There is a fifty percent cut to the aquifer for effluent stored at managed facilities. In other words, for every 100 acre-feet of effluent stored at a managed facility, 50 acre-feet of long term storage credits can accrue to the storer's account
- Marana High Plains Effluent Recharge Project, constructed in 2000, can recharge up to 600 acre-feet of effluent per year. This multi-purpose facility is designed to recharge treated effluent from the Santa Cruz River into the groundwater aquifer, while investigating wildlife habitat associated with recharge. The basin side slopes are vegetated with emergent plants and riparian trees. Marana High Plains was constructed by the Pima County Regional Flood Control District in cooperation with the Bureau of Reclamation, Arizona Water Protection Fund, Cortaro-Marana Irrigation District and the Town of Marana.
- Corona de Tucson WRF can recharge up to 1,120 acre-feet of effluent per year. Treated effluent from this reclamation facility is recharged in percolation basins at the treatment site.

Marana High Plains and Corona de Tucson are constructed recharge facilities which accrue long term storage credits at a rate of 100 percent, meaning for every acre-foot of effluent stored, Pima County accrues one acre-foot of long term storage credits

An analysis of the costs associated with managed recharge and constructed recharge, as well as recharge other considerations indicate that the unit costs of managed recharge are more favorable than the unit cost of constructed recharge even taking into consideration the 50 percent cut to the aquifer.⁷ Other factors to consider include location of the recharge, use of long term storage credits and the impacts associated with recovery of the credits.

In 2014 ADWR updated a groundwater model to predict groundwater levels through 2025 based on expected groundwater pumping. Figure 5 shows areas in the TAMA where groundwater is expected to increase (blue areas) as well as where it is expected to decline (orange and yellow areas). New or increased groundwater pumping should be avoided in areas prone to subsidence, areas near shallow groundwater-dependent ecosystems and areas where groundwater levels are declining.

⁷ Memorandum from K Chavez to J Jenkins, PC RWRD, April 3, 2014.

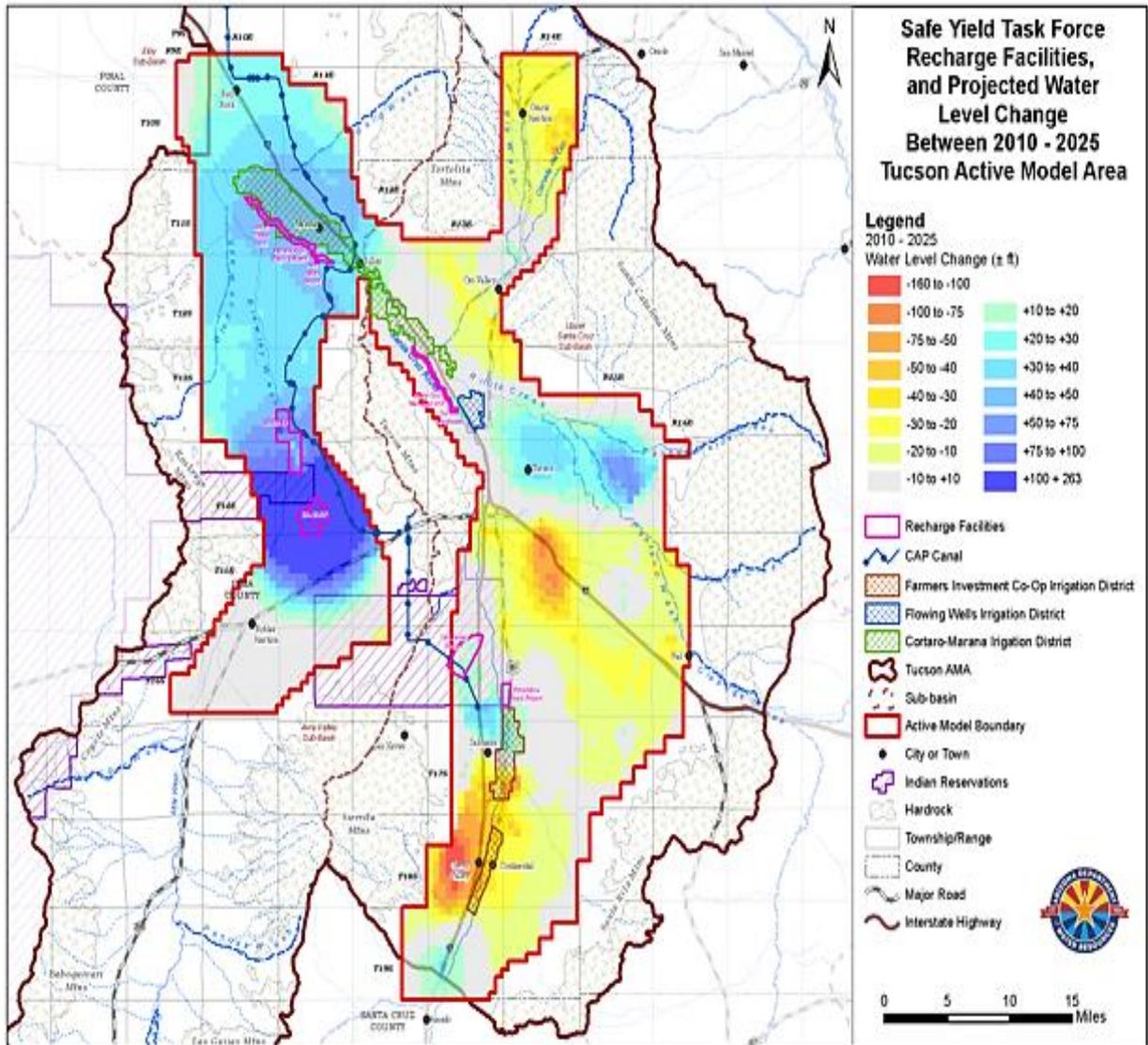


Figure 5 - ADWR Projected Water Level Changes between 2010-2025 TAMA Model Area

Environmental Restoration

Reclaimed water is used for a number of environmental restoration projects. Reclaimed water offers a reliable drought-proof source of water for restoration where reclaimed water is readily available. Reclaimed water discharge to the Santa Cruz River sustains riparian resources and aquatic systems in the river channel. Evapotranspiration (ET) represents the environmental water demand from plant transpiration and evaporation along this important riparian corridor. Table 5 lists environmental restoration projects using reclaimed water.⁸ For most of these projects, restoration, aquifer replenishment and recreation are integrated to provide multi-purpose benefits to the public.

⁸ Pima County RWRD 2013 Effluent Generation and Utilization Report

Environmental Restoration with Reclaimed Water			
Project Name	Volume (acre-feet)	Multi-Benefit Recharge Project	Comments
Kino Environmental Restoration Project (KERP)	0.0		No reclaimed water was needed in 2013 for riparian vegetation. KERP's vegetation is supported with harvested stormwater, except in particularly dry years
Lower Santa Cruz River Managed Recharge Project	89.4	Yes	This volume represents Pima County's share of total evapotranspiration (ET) from the managed recharge project. The total ET was 1,563.5 af and this volume is split among the participants by an agreed upon allocation formula
Marana High Plains Effluent Recharge Project	13.2	Yes	Delivery of 559.6 af was diverted from the Santa Cruz River. Calculated evapotranspiration of 17.4 af is the portion of the delivery volume that supports riparian vegetation
Rillito River Riparian/Swan Wetlands*	3.7		Reclaimed water is being used for the establishment of plants that were installed as part of this ecosystem restoration project.
Roger Road WRF Pond	22.9		This volume is used to support a riparian and wildlife viewing pond adjacent to the Santa Cruz River on-site at the Roger Road WRF
Santa Cruz River-West Branch Bosques*	Minimal		Small wetland area managed by Pima County Regional Flood Control District. Reclaimed water used for vegetation establishment in water harvesting basins adjacent to existing mesquite bosque along the West Branch of the Santa Cruz River. Previously (2005-2011) provided drought relief for mature bosque vegetation
Annual Total	129.2		
*Reclaimed water delivered from Tucson Water Reclaimed System			

Table 5 – Environmental Restoration Projects Using Reclaimed Water

IV. Pima County Reclaimed Water

As discussed previously, Pima County's goals are to use its share of reclaimed water for multiple benefit public projects. These include:

- Provide recreational public amenities such as parks and sports fields
- Replacement of groundwater uses where reclaimed water is available and appropriate
- Enhancement of riparian habitat and environmental restoration

Discharges from the metropolitan wastewater reclamation facilities since mid-1950 have created a valued habitat along the Santa Cruz River. This year-round water source supports wetland habitats. The Bureau of Reclamation has estimated that up to 19,500 acre-feet per year of reclaimed water flows past

Trico Road at the northern end of Pima County⁹; eventually leaving the Tucson Active Management Area. However, reclaimed water flows during late spring and summer 2014 have not been reaching the Trico Road gage. Higher infiltration rates may result from recent treatment plant upgrades and scouring of the river channel from summer monsoon storms in 2014. The “Living River” project is monitoring the rapidly changing conditions along the river. As uses of reclaimed water increase, it is important to ensure the future of riparian and aquatic habitat along the effluent-dependent reach of the Santa Cruz River as reflected in the City/County Water & Wastewater Study *Action Plan for Water Sustainability*.¹⁰

Reclaimed Water Opportunities

Reclaimed water is an increasingly important renewable water source for the community as it decreases its reliance on groundwater, and prepares for potential shortages of Colorado River (CAP) water in the future while maintaining the goal of achieving aquifer safe yield. Increased use of the community’s renewable water within this area is a regional goal.

This section discusses the use of County reclaimed water including its share delivered in the Tucson’s reclaimed water delivery system. The City’s system (see Figure 6) consists of 160 miles of pipes and 15 million gallons of surface storage in enclosed reservoirs.¹¹ Although many County parks are in close proximity to the City’s reclaimed system, others are not. Extending the reclaimed system infrastructure can be costly, especially for parks that have a relatively small reclaimed water demand. In some areas, the City reclaimed system has capacity constraints and cannot provide reclaimed water at peak usage periods when large volumes of reclaimed water are delivered to other higher priority reclaimed water customers. This is the case for Arthur Pack Regional Park on Thornydale Road. This park is using potable water from Tucson Water as well as county-owned non-exempt groundwater wells for turf irrigation.

⁹ Effluent Utilization and the Santa Cruz River, U.S. Bureau of Reclamation, April 16, 2014.

¹⁰ City-County Water & Wastewater Infrastructure, Supply and Planning Study, 2011-2015 Action Plan for Water Sustainability, Adopted by the Board of Supervisors, January 12, 2010 Resolution 2010-16.

¹¹ City of Tucson website “Reclaimed Water Facts”, <http://www.tucsonaz.gov/water/reclaim-facts>

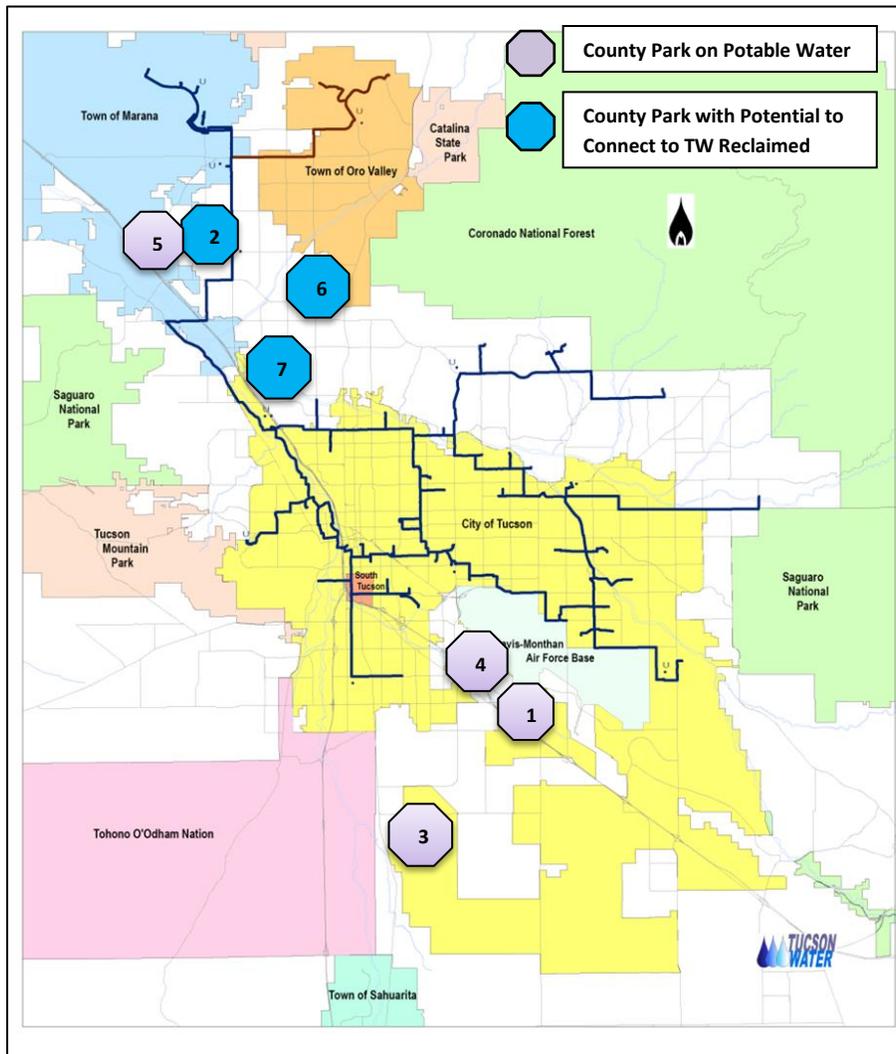


Figure 6 - Tucson Water Reclaimed Delivery System and Large County Parks on Potable Water

Where feasible, Pima County wishes to irrigate existing parks with its share of reclaimed water instead of potable water. A list of Pima County’s largest parks irrigated with potable water is listed in Table 6. Numbered park locations in relation to the reclaimed system are indicated in Figure 6 above. Arthur Pack is in close proximity to the existing reclaimed system. The remaining parks would require lengthy extensions to connect to the existing reclaimed system.

Map No.	Pima County Park	Size (acres)	Potable Water Use (acre-feet per year)
1	Thomas Jay Community Center	45	78
2	Arthur Pack Regional Park	30	52
3	Summit Old Nogales	9	22
4	Los Niños Park Alvernon/Drexel	8	23
5	Denny Dunn Park	5	14
6	Northwest YMCA	20	18
7	Wildwood Park	5	12

Table 6 – Major County Parks on Potable Water in 2013

Tucson Water’s Reclaimed Water Master Plan notes the reclaimed water system has grown to serve irrigation water to many turf facilities in the metropolitan Tucson area and is not expected to add significant additional demand in the future.¹² The reclaimed water master plan recommends improvements to address existing system deficiencies and provide better service. These include North Loop Improvements to the northwest, improvements in the Dove Mountain area and Northeast Loop Improvements for increased reliability to La Paloma golf courses. These projects could provide capacity to connect Arthur Pack Regional Park, Wildwood Park and the Northwest YMCA fields to the reclaimed water system. At this time, the remaining parks listed in Table 6 are too far from the reclaimed water distribution system to make connection financial feasible.

Wheeled Rates

Under the 2003 wheeling agreement, Pima County pays the City of Tucson a wheeled rate per acre-foot to deliver County reclaimed water through the City’s reclaimed delivery system. The Operating Rate is charged for County reclaimed water treated by Pima County and delivered by the City of Tucson. This water is delivered on an uninterruptible basis. The Environmental Rate is charged for County reclaimed water treated and delivered by the City of Tucson. Water delivery under this rate can be interrupted, based on the City’s higher priority customer needs. The City recalculates the rates annually leaving some uncertainty on the rate to be paid each year. Rates have varied from a low of \$58.02 per acre-foot in 2011 to a high of \$96.20 per acre-foot in 2007. The Operating rates charged by the City of Tucson for Pima County reclaimed water produced at the Randolph WRF and delivered to County sites are listed below in Table 7 along with the Environmental Rate.

Year	2002	2003	2004	2005	2006	2007
Operating Rate	\$72.25	\$76.05	\$63.69	\$60.38	\$70.84	\$96.20
Environmental Rate	\$276.22	\$274.58	\$260.92	\$252.41	\$306.33	\$314.62
Standard TW Reclaimed Rate	\$610.00	\$610.00	\$610.00	\$675.00	\$675.00	\$700.00

Year	2008	2009	2010	2011	2012	2013
Operating Rate	\$84.58	\$71.33	\$62.01	\$58.02	\$72.69	\$72.69
Environmental Rate	\$317.67	\$270.25	\$286.22	\$261.79	\$291.96	\$291.96
Standard TW Reclaimed Rate	\$700.00	\$700.00	\$797.20	\$797.20	\$797.20	\$797.20

Table 7 – Pima County Wheeled Rates Charged by the City of Tucson in \$ per Acre-Foot

Pima County recently completed implementation of the Regional Optimization Master Plan (ROMP) which will improve water quality generated at the metropolitan area WRFs. The new Agua Nueva WRF and upgraded Tres Rios WRF will have a capacity to treat 32 million gallons per day and 50 million gallons per day, respectively, and produce reclaimed water that allows for many more reuse applications. Reclaimed water delivered directly from either facility to nearby County reuse sites will be

¹² Recycled Water Master Plan Executive Summary, Tucson Water, December 2013.

possible as long as there is adequate delivery infrastructure. This could include the City reclaimed water delivery system or a separate Pima County transmission system to deliver County reclaimed water directly to nearby county facilities. Another opportunity exists to collaborate with other entities to deliver reclaimed water to groundwater savings facilities and accrue long term storage credits.

When the 2000 Supplement Agreement was negotiated Pima County agreed to reactivate the Randolph Park WRF and to provide the City of Tucson 1,000 acre-feet of reclaimed water annually until 2027 and 750 acre-feet annually thereafter. Because of certain high costs associated with operating Randolph WRF, Pima County is considering providing this reclaimed water and its share of reclaimed water from the ROMP metropolitan facilities in lieu of operating Randolph WRF. If the City agrees to the closure, there will be increased wheeling costs to the County which will need to be taken into consideration.

Long Term Storage Credits

As described in Section III of this report, Pima County is replenishing the groundwater aquifer at three sites: Marana High Plains, Corona de Tucson and Lower Santa Cruz River Managed Recharge Project. Each of these replenishment sites generates long term storage credits for reclaimed water stored underground. Long term storage credits are a valuable public asset to be managed for the public’s interest and welfare, consistent with the Board’s Water Rights Policy F54.9 and the Board’s Sustainability resolution. As of 2013 Pima County had accrued 8,542 acre-feet of long term storage credits. An analysis of constructed and managed recharge evaluated recharge costs in comparison with long term storage credits generated by various projects.¹³ Additional information on future recharge costs may result in recalculated costs. The analysis also addressed potential uses of long term storage credits. Table 8 lists the potential uses of long term storage credits, value they might have and considerations in using them. To date, no long term storage credits earned by Pima County have been sold, exchanged or otherwise disposed. Before they are relinquished, a number of considerations should be taken into account and criteria established for their use. A pilot project involving a small number of credits could be tested.

Options	Value	Considerations
Recover at County facilities in lieu of pumping groundwater using groundwater rights	Multi-Use Benefits for Riparian Restoration, Recreation, Wildlife, Public Viewing	Consistent with existing County policy
Recovery for County use in a location where the County does not have a groundwater right	Monetary value equivalent to the value of a groundwater right	Positive or negative impacts to the local aquifer
Recovery for a use that might not be allowed with groundwater (for example to fill a public recreational lake)	Monetary value equivalent to an similar water source	Prohibit recovery near groundwater dependent ecosystems
Sale, trade or exchange as approved by the Board of Supervisors	Market Value based on other local transactions for long term storage credits	No adverse impacts to water quality (such as mobilizing contaminant plumes) Where will the credits be used? Will there be adverse county

¹³ Analysis of Constructed Recharge versus Managed Recharge, Memorandum K Chavez to J Jenkins, Pima County, April 3, 2014.

Options	Value	Considerations
Retire credits as a contribution to benefit the aquifer	Value will increase over time	impacts if recovered near sensitive lands?
Banking for future to-be-determined uses and allowing the value to increase		Are there other higher, multi-purposes uses Consistent with other county recovery obligations (e.g., recovery plans for joint recharge projects) Use of asset deferred

Table 8 – Potential Uses of Long Term Storage Credits

The following are proposed criteria that should be considered regarding their use:

- ❖ Is the use consistent with County Policy?
- ❖ Will recovery have adverse impacts to the groundwater aquifer?
- ❖ Will recovery have adverse impacts to county owned lands or county facilities?
- ❖ Will recovery contribute to declining groundwater levels?
- ❖ Will recovery degrade or negatively impact groundwater quality (such as mobilizing contaminated groundwater?)
- ❖ Will credits be recovered adjacent to groundwater dependent ecosystems?
- ❖ Is the value equal to or greater than the cost to develop the long term storage credit?
- ❖ Will the entity acquiring the County’s credits agree to recovery conditions?
- ❖ Credit transfer agreement entered into by Pima County must benefit the region’s water management objectives
- ❖ Agreements ultimately must benefit Pima County residents, not private parties
- ❖ Agreements must be “win-win” for all parties involved
- ❖ Only water providers with a designation of assured water supply may participate in credit transfers with the County
- ❖ Credits cannot be transferred to third parties

Reclaimed water is an increasingly important supply source for water providers. Some entities are considering taking their share of reclaimed water from the Santa Cruz River channel as there is little incentive to recharge in the river when water providers can only accrue long term storage credit for 50 percent of reclaimed water recharged. Water providers decide the most efficient use of their reclaimed water in managing their water supply and demand.

The WISP Phase 2 report recommended the riparian and aquatic habitat along the effluent-dependent reach of the Santa Cruz River be sustained. Toward this goal, Pima County is preparing a Lower Santa Cruz River Plan that will include multi-benefit features. Pima County is also pursuing elimination of the 50% cut to the aquifer for the Bureau of Reclamation’s share of reclaimed water. Finally, the Conservation Effluent Pool agreement between the City of Tucson and Pima County could be used to sustain the river’s riparian habitat. A task force is developing candidate projects for the use of the 10,000 acre-feet set aside for the conservation effluent pool.

RWRD's Regional Optimization Master Plan is expected to increase infiltration rates and it is possible no effluent will flow beyond Trico Road. Improved infiltration will increase the long term storage credits accruing to the cooperators of the Lower Santa Cruz Managed Recharge Project, including Pima County.

V. Reclaimed Water Utilization

Most reclaimed water generated in Pima County is produced at the metropolitan area wastewater reclamation facilities. However, because reclaimed water allotments are defined through various intergovernmental agreements, Pima County's share is approximately five percent. Non-metropolitan area wastewater reclamation facilities generate less reclaimed water at this time, but Pima County maintains sole control of reclaimed water produced at these facilities.

Metropolitan Area Wastewater Reclamation Facilities

Pima County's current and projected use is described in Table 9 below. The availability of reclaimed water is based on wastewater flow projections developed in the 2006 Facility Plan Update. RWRD is updating its Facility Plan and will be providing updated flow projections by 2015.

Table 9 shows that Pima County can continue to provide reclaimed water for its facilities using its share. A five percent increase in reclaimed water for new park expansion and new park facilities along the Rillito River, Santa Cruz River and Pantano Wash can also be irrigated with county reclaimed water. Pima County is taking on maintenance of river parks along the Santa Cruz River from the City of Tucson. Discussions are being held regarding whether reclaimed water for these parks will be from the City share or County share.

Table 9 provides estimates to balance the projected uses and the projected supply. The single biggest new use is the South Houghton Area Recharge Project (SHARP), a collaborative recharge project with the City of Tucson. When complete the project will provide underground storage for up to 2,000 acre-feet of reclaimed water for Pima County and an equal amount for Tucson Water. Cost considerations to transport reclaimed water as well as recharge operational costs are being evaluated to determine if it is in the County's best interest to use SHARP to replenish its reclaimed water. If Pima County does not fully use SHARP, other cost effective replenishment projects can be considered including in-channel recharge or off-channel recharge in the Corazón de los Tres Rios project.

Future environmental restoration projects, Paso de las Iglesias and Corazón are included in Table 9. Projections for Corazón may need to be adjusted, based on the project scope. Additional reclaimed water for environmental restoration projects can be made available under the category of undesignated uses in later years starting in 2025.

Recent observations of flow in the Santa Cruz River at Avra Valley Road and Trico Road indicate increased infiltration rates, possibly attributed to improved water quality from reclaimed water discharges at the metropolitan facilities. If this trend continues, there may be less than optimal flows available to the Marana High Plains Effluent Recharge Project. This new observation of reduced flow availability at the High Plains diversion would be compounded in the future, as shown in the final row of Table 9 titled "outflow from Trico Road". The combination of full utilization at SHARP and the increased use of directly delivered water at Corazón and Tres Rios would eliminate outflows of County effluent at Trico Road. The projected uses may also reduce or eliminate Pima County's contribution of reclaimed water to the Lower Santa Cruz River Managed Recharge Project.

Reclaimed Supply (in acre-feet unless otherwise noted)	Actual	Projected ¹⁴			
	2013 ¹⁵	2015	2020	2025	2030
Metro Effluent (million gallons per day)	54.08	69.1	72.9	76.7	85.05
Metro Effluent (acre-feet per year)	60,572	77,402	81,658	85,915	95,268
Minus SAWRSA	28,200	28,200	28,200	28,200	28,200
Minus CEP	-	10,000	10,000	10,000	10,000
Subtotal	32,372	39,202	43,458	47,715	57,068
Available Pima County Share	3,237	3,920	4,346	4,772	5,707
Reclaimed Uses					
Direct Reuse TW Reclaimed System					
a. to NRPR, RFCD, DOT, RWRD ¹⁶	921	967	1,015	1,066	1,119
b. to KERP	184	200	200	200	200
c. System Loss (4%)	44	115	131	142	144
d. to SHARP		1,343	1,704	2,000	2,000
e. Rillito Park ¹⁷		75	75	75	75
f. Santa Cruz River Park ¹⁸		50	50	50	50
g. Pantano River Park ¹⁹		50	50	50	50
h. Paseo de las Iglesias ²⁰		180	180	110	110
Delivered via TW	1,149	2,980	3,405	3,693	3,749
Pima County Direct Delivery					
a. On-Site Reuse ²¹	130	115	115	115	115
b. Marana High Plains	514	600	600	600	600
c. Corazon de los Tres Rios		150	150	150	150
d. Ted Walker Park		75	75	75	75
e. Undesignated ²²				138	1018
f. Managed Recharge	609				
Delivered via PCWRF Direct	1,253	940	940	1,078	1,958
Pima County Reclaimed Uses	2,402	3,920	4,345	4,771	5,707
Outflow from Trico Rd	835	0	0	0	0

Table 9 – Use Plan for Reclaimed Water from Metropolitan Area Reclamation Facilities

Table 9 detailed the projected amount of Pima County reclaimed water that could be delivered through the City of Tucson Reclaimed Delivery System or delivered directly from County facilities. Based on goals established in the WISP—direct use, aquifer replenishment and environmental restoration—Pima County’s projected reclaimed water use in each of these three categories is shown in Table 10. Projects meeting more than one goal are listed as multi-benefit projects.

¹⁴ Based on 2006 RWRD Facility Plan Update. New update expected in 2015 will include revised projections

¹⁵ Based on 2013 Effluent Generation Report

¹⁶ Estimated to increase 5% annually, subject to capacity availability in TW Reclaimed System

¹⁷ Future fields constructed in two phases

¹⁸ Managed by the City of Tucson; to be transferred to Pima County in the future

¹⁹ Managed by the City of Tucson; to be transferred to Pima County in the future

²⁰ After 10-year establishment period, irrigation reduced to 110 af/y per S Shields, 8/24/14 email

²¹ Will decrease to 115 af/y with completion of ROMP

²² Used to achieve the goal of zero outflow from Trico Road

Reclaimed Supply (in acre-feet)	Actual	Projected			
	2013	2015	2020	2025	2030
Available PC Share	3,237	3,920	4,346	4,772	5,707
Reclaimed Uses					
Reuse to Offset Groundwater					
a. to NRPR, RFCD, DOT, RWRD	921	967	1,015	1,066	1,119
b. Ted Walker Park		75	75	75	75
c. Rillito Park		75	75	75	75
d. Santa Cruz River Park		50	50	50	50
e. Pantano River Park		50	50	50	50
f. System loss (4%)	44	115	131	142	144
g. On-Site Reuse	130	115	115	115	115
Total Reuse to Offset Groundwater	1,095	1,447	1,511	1,573	1,629
Replenishment and Recharge					
a. SHARP		1,343	1,704	2,000	2,000
b. Managed Recharge	609	0	0	0	0
Total Replenishment and Recharge	609	1,343	1,704	2,000	2,000
Future Environmental Restoration					
a. Paseo de las Iglesias	0	180	180	110	110
b. Corazon de los Tres Rios	0	150	150	150	150
c. Undesignated Restoration	0	0	0	138	1,018
Total Environmental Restoration	0	330	330	398	1,278
Multi-Use Projects					
a. KERP (Restoration and Offset Groundwater)	184	200	200	200	200
b. Marana High Plains (Restoration and Replenishment)	514	600	600	600	600
Total Multi-Use Projects	698	800	800	800	800
Outflow from Trico Rd	835	0	0	0	0

Table 10 – Use Plan for Reclaimed Water Based on Category of Use

Non-Metropolitan Areas

Pima County owns and operates six wastewater reclamation facilities serving outlying areas. The largest serves the Green Valley area, while the smallest serves the village of Summerhaven on Mount Lemmon. The facilities and their permitted treatment capacity are listed in Table 11. RWRD’s planned reclaimed water use is also indicated.

Facility Name	Permitted Treatment Capacity	Planned Reuse
Green Valley	4,480 acre-feet per year (4 mgd) consisting of 2 mgd oxidation ditch and 2 mgd aerated lagoons and percolation	1,120 acre-feet per year to Robson Quail Creek. Remaining water to aquifer replenishment to accrue long term storage credits.
Avra Valley	4,480 acre-feet per year (4 mgd) oxidation ditch	Aquifer replenishment to accrue long term storage credits. Will be exploring direct use with Pascua Yaqui
Corona de Tucson	1,456 acre-feet per year (1.3 mgd) Closed loop reactors and evaporation ponds	Aquifer Replenishment to accrue long term storage credits
Arivaca Junction	112 acre-feet per year (100,000 gpd) aerated facultative stabilization pond	Restricted agricultural use and eventual connection to Green Valley System
Fairgrounds	22 acre-feet per year (20,000 gpd) percolation ponds	Groundwater discharge with no storage accrual
Mt. Lemmon	20 acre-feet per year (17,000 gpd) aerated oxidation ditch	Spray field on Forest Service land

Table 11- Non-Metropolitan WRF Capacity and Planned Reuse

VI. Conclusions and Recommendations

Pima County is maximizing utilization of its share of metropolitan reclaimed water each year. New demands for the County's share of reclaimed water will be added by the potential transfer of City-maintained river parks to Pima County, the SHARP recharge project, the replacement of potable uses at County parks, and planned environmental restoration projects. At the same time, wastewater flows to the metropolitan facilities are declining, the allocation of the CEP will likely decrease the County's share, and infiltration rates on the Santa Cruz River will likely increase. The projections in this report show that new uses will displace the County's ability to participate in managed recharge unless provisions are made specifically to continue that practice through managing the amount of reclaimed water the County devotes to other recharge projects that also use reclaimed water.

Outside the metropolitan system, the situation is quite different. The County has an increasing capacity to gain long-term storage credits and accommodate new uses, but no projected new demands. Even more so than in the metropolitan area, new uses are constrained by lack of infrastructure. Water delivery infrastructure developments in the Green Valley area, for example could provide new opportunities in the long term.

Pima County's goals, as established in the WISP Phase 2 Report are to increase direct use of reclaimed water, replenish the aquifer and support environmental restoration.

a. Direct Reuse

Pima County is currently directly using reclaimed water wheeled through the City of Tucson Reclaimed system at numerous County Parks and ball fields wherever reclaimed infrastructure extends to those sites. A total of 1,054 acre-feet per year is being used. Direct reuse should be implemented by Pima County wherever possible at the lowest possible cost.

Recommendation: Interchange improvements at Ina Road and Interstate 10 may provide Pima County an opportunity to facilitate delivery of reclaimed water directly to Crooked Tree Golf Course, Arthur Pack Regional Park and other nearby County sites. Pima County will be evaluating the feasibility of direct delivery from Tres Rios WRF. Additional opportunities for direct delivery from Agua Nueva to restoration projects along the Santa Cruz River will also be evaluated.

Recommendation: Explore opportunities to use reclaimed water directly on the existing riparian vegetation in the Santa Cruz River with the CEP water.

Recommendation: Evaluate direct delivery opportunities from non-metropolitan reclamation facilities, such as Avra Valley WRF.

b. Aquifer Replenishment: SHARP has become a reality and is projected to help water levels recover in the upstream portions of the Tucson Basin. Replenishment costs need to be evaluated thoroughly before the County decides how much of its reclaimed water to replenish at this location. Outlying Facilities at Avra Valley and Green Valley afford additional opportunities for aquifer replenishment in those regional areas.

Recommendation: Obtain Underground Storage Facility permits and Water Storage Permits from ADWR for the Avra Valley and the Green Valley Wastewater Reclamation Facilities. Evaluate the full replenishment costs at SHARP

c. Environmental Restoration

In 2013 Pima County used 698 acre-feet of reclaimed water at two projects associated with environmental restoration; KERP and Marana High Plains Effluent Recharge Project. The amount of reclaimed water dedicated to environmental restoration will increase with completion of Paseo de las Iglesias and future projects such as the Tres Rios del Norte project and the Corazón de los Tres Rios del Norte project. These projects may be evaluated for potential use of CEP water through direct delivery, although at this time it is more cost effective to use the County's share of water. Sufficient reclaimed water will need to be allocated for projects along the Santa Cruz River corridor.

Recommendation: Continue implementation of the WISP Phase 2 recommendations that include: sustain the riparian and aquatic habitat along the effluent-dependent reach of the Santa Cruz River, continue preparation of a Santa Cruz River Plan to be developed by the Pima County Regional Flood Control District that will include multi-benefit features, pursue elimination of the 50% cut to the aquifer for the Bureau of Reclamation's share of reclaimed water and pursue using the Conservation Effluent Pool water to sustain the river's riparian habitat

d. Eliminate discharge leaving Tucson Active Management Area

Beginning in 2014 ROMP is providing high quality water that is low in nutrients and turbidity. Starting in April 2014 minimal wastewater discharges have been observed at the Pima-Pinal County boundary due to increased infiltration rates, riparian evapotranspiration and a higher seasonal

demand for treated reclaimed water. Of interest will be fall and winter observations of the extent of flow in the Santa Cruz River as reclaimed water demand and riparian evapotranspiration diminishes.

Recommendation: Actively monitor the extent of Santa Cruz River flow on a seasonal basis to measure the effectiveness of water discharged from the ROMP projects and increased infiltration rates in the Santa Cruz River

Recommendation: Continue to explore potential in-channel constructed recharge options to obtain 100% storage credits for users and to enhance riparian habitat along the river using multi-purpose objective to drive the project plans.

A number of factors could affect the recommendations listed above. Additional information could affect outcomes:

- ❖ Re-evaluation of the cost effectiveness of recharge. Pima County will be developing additional data as it expands its recharge capabilities, including operation and maintenance costs and permitting regulatory costs. These factors may change the cost effectiveness of in channel recharge versus off channel recharge taking into account the regulatory cut to the aquifer.
- ❖ Improved reclaimed water quality is anticipated to improve infiltration rates for reclaimed water discharged to the Santa Cruz River. New data on measured flows along the river channel will quantify actual infiltration rates. Recent rain events and high stream flows this summer likely scoured the river channel bed which will contribute to increased infiltration
- ❖ Measurement of the infiltration rate in the Santa Cruz River as well as observed infiltration will contribute to an understanding of the impacts to delivery of reclaimed water to the Marana High Plains Effluent Recharge Project
- ❖ Resolution of the wheeled rates to be charged by Tucson Water will determine the cost effectiveness of storing County reclaimed water in the SHARP project
- ❖ Off-channel recharge projects or increased direct delivery of reclaimed water involving other entities with reclaimed water entitlements could reduce the amount of reclaimed water in the Santa Cruz River
- ❖ Use of the Conservation Effluent Pool in approved off-channel riparian restoration projects could decrease reclaimed water flowing in the Santa Cruz

There are several key issues that require resolution and additional evaluation:

- How does the county want to use its reclaimed water? This could include Pima County's priorities for use of its share of reclaimed water
- Are there locations near the County's wastewater reclamation facilities where it is more cost effective to deliver reclaimed water directly versus the City reclaimed system? A feasibility analysis is needed to determine the capital, operation and maintenance costs of transmission, storage, pumping and permitting requirements

- The costs to store reclaimed water at SHARP need to be ascertained. These include capital, operation and maintenance and wheeling costs
- What will be the future of the Marana High Plains Effluent Recharge Project if reclaimed water flows in the Santa Cruz River fail reach the project due to increased infiltration and increased direct reuse?
- What is the best use of the County's long term storage credits? With the potential for increased infiltration in the Santa Cruz River, increase aquifer replenishment and recharge, more long term storage credits will accrue to Pima County in the future.

Reclaimed water is a valuable renewable water resource and a key component to achieving safe yield in the Tucson Active Management Area. Pima County is in a unique position in that it can also use its share of reclaimed water for multi-benefit purposes replacing groundwater use, replenishing the aquifer and restoring riparian ecosystems to maximize the use of reclaimed water in the broader context of sustainability. Thoughtful planning, in-depth cost-benefit analyses and creativity will shape how Pima County maximizes its use of this important water resource.

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