Board of Supervisors Memorandum

December 13, 2016

Cortaro/Marana Irrigation District and Bureau of Reclamation Intergovernmental Agreement for the Construction of Diversion Structures on Pima County Property for Diverting Reclaimed Water to a Groundwater Savings Project

Background

This item was continued by the Board of Supervisors to the December 13, 2016 meeting to provide additional information related to the proposal.

A November 15, 2016 staff report is attached that describes the groundwater savings project, the benefits of same, and the status of effluent discharges and their diversion from the Santa Cruz River. The 2015 Effluent Generation and Utilization Report is also attached to provide more detail regarding effluent generated at the County's wastewater reclamation facilities.

Concern was expressed regarding the continual removal of effluent from the Santa Cruz River and the detrimental effect such may have on the artificially developed riparian environment of the Santa Cruz River downstream of the point of discharge. County staff met with the Community Water Coalition on November 15, 2016. The Coalition expressed interest in hosting a session that would include the City of Tucson to assure the Coalition's concerns about maintaining flow in the Santa Cruz River are addressed.

To provide a better understanding of the utilization of this water resource and its environmental benefits associated with establishing and maintaining riparian vegetation, the table below shows the amount of effluent generated and owned by each ownership entity in 2015, as well as the amount of their own effluent delivered to the Santa Cruz River channel during the same period.

2015 Effluent Entitlements.

Entity	Total Entitlement in Acre Feet	Acre Feet Discharged to the Santa Cruz River	Acre Feet Diverted for Entity's Beneficial Use	Percentage Diverted for Entity's Beneficial Use
Secretary of the Interior (Reclamation)	28,200	24,625	3,575	12.7
City of Tucson	25,234	7,432	17,802	70.5
Pima County	3,316	1,493	1,823	55.0
Metro Water	2,025	1,817	208	10.3
Town of Oro Valley	1,950	0	1,950	100.0

2015 Effluent Entitlements.

Entity	Total Entitlement in Acre Feet	Acre Feet Discharged to the Santa Cruz River	Acre Feet Diverted for Entity's Beneficial Use	Percentage Diverted for Entity's Beneficial Use
Flowing Wells Irrigation District	499	445	54	10.8
Town of Marana	90	81	9	10.0
Spanish Trail Water Company	42	38	4	9.5
Totals	**61,356**	**35,931**	**25,425**	

Subtracting these two columns results in the amount diverted by each entity from the Santa Cruz River for beneficial use.

The diverted effluent is used for beneficial purposes by either distributing the reclaimed water through the City's effluent distribution system to park and/or turf uses at public parks, schools or golf courses.

From the table above, it is clear the largest diverter of effluent is the City of Tucson for their reclaimed water system and reclaimed water facilities at Sweetwater Wetlands.

Diverting approximately 2,000 acre feet for the initial pilot project for the groundwater savings project will result in a small loss of discharged effluent to the Santa Cruz River. Hence, staff continues to recommend Board approval of the Intergovernmental Agreement.

The larger issue relates to long-term viability of the artificially established Santa Cruz River riparian corridor as more of the discharged effluent is removed from the Santa Cruz River channel. Presently, State law incentivizes the removal by allocating only a 50 percent credit to the effluent owners for effluent discharged to the Santa Cruz River and not used in direct reuse or constructed recharge facilities such as Sweetwater Wetlands. Efforts should be made to modify State law to allow for 100 percent recharge credits for discharges to qualifying natural stream systems. Such qualifying of natural stream systems would be defined as meeting the following criteria:

1) Be classified as a Navigable Water of the United States;

2) have effluent and reclaimed water continuously discharged to the navigable waterway for a period of at least 40 years;

3) be limited in length along the qualifying in channel recharge from the point of discharge;

4) be covered by a Federal National Pollutant Discharge Elimination System (NPDES) Permit; and

5) extend for no more than five miles downstream of the point of discharge.

Recommendation

I recommend the Intergovernmental Agreement between the United States Bureau of Reclamation, the Cortaro/Marana Irrigation District and Pima County be approved and the 2017 Pima County Legislative Agenda be amended to include the County's support of 100 percent recharge credits for the discharge of effluent reclaimed water to natural stream systems as described above.

Respectfully submitted,

C.H. Huckelberry
County Administrator

CHH/mjk – December 1, 2016

Attachments

c: John Bernal, Deputy County Administrator for Public Works
Jackson Jenkins, Director, Regional Wastewater Reclamation
Suzanne Shields, Director, Regional Flood Control District
Linda Mayro, Director, Office of Sustainability and Conservation

PIMA COUNTY
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November 15, 2016

TO: C.H. Huckelberry, County Administrator

THRU: John M. Bernal, P.E., Deputy County Administrator - Public Works

FROM: Jackson Jenkins, Director – RWRD

SUBJECT: **Intergovernmental Agreement with Cortaro-Marana Irrigation District (CMID) and the Bureau of Reclamation Construction of Diversion Structures to Divert Effluent Owned by the Metropolitan Domestic Water Improvement District and the Bureau of Reclamation for CMID for a Groundwater Savings Project**

Attached for your review is a report on the above referenced project for distribution to individuals who expressed concerns regarding the proposed project.

I have discussed potential recharge legislation with staff, including the County Attorney's Office. There are on-going efforts to improve beneficial use of effluent discharge, including discussions with ADWR regarding in-channel constructed recharge and a recent proposal from the City of Tucson. As long at these efforts are productive, the Public Works Legislative proposal that calls for the department to monitor and advise on legislative issues related to reuse, recharge, credits ownership rights and groundwater replenishment can address any legislative proposals made in the upcoming session.

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

Attachments

c: Suzanne Shields, RFCD Director
Linda Mayro, OSC Director

Intergovernmental Agreement with Cortaro-Marana Irrigation District (CMID) and the Bureau of Reclamation

Construction of Diversion Structures to Divert Effluent Owned by the Metropolitan Domestic Water Improvement District and the Bureau of Reclamation for CMID for a Groundwater Savings Project

November 18, 2016

Background: Metropolitan Domestic Water Improvement District (Metro Water), Cortaro-Marana Irrigation District (CMID) and the U.S. Bureau of Reclamation (Reclamation) entered into an agreement with each other and proposed to include Pima County to develop and implement a pilot Groundwater Savings Facility (GSF) to deliver effluent for irrigation use in return for groundwater recharge credit.

In order to encourage use of renewable water supplies, the Arizona Department of Water Resources (ADWR) permits Groundwater Savings Facilities (GSFs), which consist of the direct delivery of effluent or CAP water to farms that forgo pumping groundwater. Effluent delivered to a GSF receives 100% credit for the entity storing water.

What is a Groundwater Savings Facility? In our state, there are several types of facilities used to store water underground for future use, a process also known as aquifer recharge. When water is stored underground, ADWR maintains a ledger of entities that have stored water and the amount of water stored. This water is banked and can be withdrawn in the future (recovered) anywhere within the active management area where it was stored in compliance with ADWR recovery requirements. An acre-feet of stored water is also referred to as a long term storage credit. There are three types of underground storage:

- Managed Underground Storage recharges water by allowing water to flow in a streambed where it infiltrates into the aquifer. Effluent stored at a Managed Facility receives credit for only fifty percent of the amount of water reaching the aquifer. The remaining amount is considered a cut-to-the-aquifer and simply becomes groundwater generally available to all users of the aquifer.

- Constructed Underground Storage consists recharges water using a constructed feature to add water to the aquifer, such as a percolation basin, an infiltration trench, levees in a channel, or an injection well. Effluent stored in a Constructed Underground Facility receives credit for one hundred percent of the water reaching the aquifer.

- A Groundwater Savings Facility consists of direct delivery of renewable water, such as effluent or CAP water, to crops on a permitted farm which uses this water instead of (or "*in lieu*" of) pumping groundwater. The saved groundwater is considered stored water since it remains underground, and the facility receives credit for one hundred percent of the in lieu water delivered.

Summary of the proposed CMID/GSF IGA: The Tres Rios WRF Effluent Interconnect Pipeline Project is a collaborative water resource pilot project involving Metropolitan Domestic Water Improvement District, the Bureau of Reclamation, Cortaro-Marana Irrigation District, and Pima County. The pilot project consists

of a temporary pipeline re-establishing the former connection to deliver effluent from the Tres Rios Wastewater Reclamation Facility to CMID's reclaimed water delivery system. The pilot project will deliver up to 2,200 acre-feet of Metro Water's and the Bureau of Reclamation's share of reclaimed water from the Tres Rios WRF to a groundwater savings facility located on CMID's users' land. Metro Water and Reclamation will accrue long-term storage credits for reclaimed water delivered to the CMID groundwater savings facility. The IGA expires on March 25, 2019, unless the parties agree to extend the agreement. The project could be expanded to deliver up to 7,000 acre-feet of reclaimed water, subject to an amendment to the IGA.

Metropolitan Domestic Water Improvement District (Metro Water) Participation Metro Water has an effluent allocation of approximately 2,000 acre-feet annually. Under the present managed recharge project, they accrued 628 acre-feet of long term storage credits last year. Metro Water could accrue up to 2,000 acre-feet of long term storage credits by participating in the CMID groundwater savings facility. The long-term storage credits will be part of Metro Water's portfolio of renewable water resources to demonstrate an assured water supply for their water service areas.

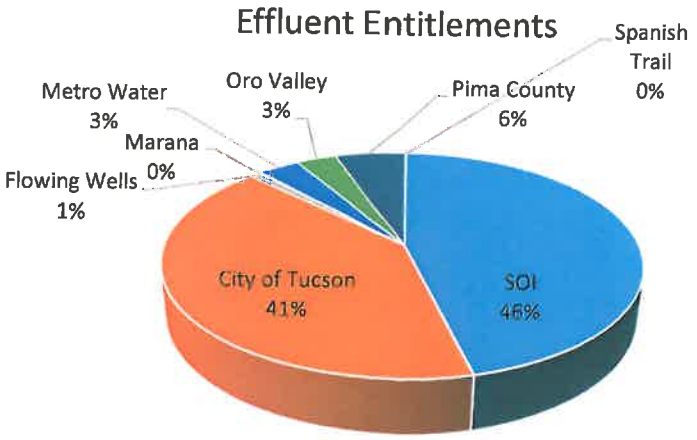
Bureau of Reclamation's Participation The Southern Arizona Water Rights Settlement Act requires the City of Tucson, Pima County and others having a metropolitan wastewater allocation to provide proportionally 28,200 acre-feet of effluent each year to be used to firm CAP water allocated to the Tohono O'odham Nation and to pay for its delivery. The Bureau of Reclamation is responsible for meeting these requirements. Reclamation has been doing so by participating in two managed recharge projects; Upper Santa Cruz Managed Recharge project (from the Agua Nueva discharge to Tres Rios WRF) and Lower Santa Cruz Managed Recharge project (from Tres Rios discharge to Trico Road bridge). Reclamation accrues more than 12,000 acre-feet of long term storage credits, which can be exchanged for CAP water or sold to benefit the cooperative fund. Increasing the amount of long term storage credits through a groundwater savings facility will enable the Secretary to more effectively meet SAWRSA obligations.

Cortaro-Marana Irrigation District's Participation In 1995 the Arizona Department of Water Resources granted CMID a permit to operate a groundwater savings facility to store CAP water. The permit was amended in 2012 to include effluent. The CMID groundwater savings facility is permitted to use up to 20,000 acre-feet per year of *in lieu* water.

Pima County's Participation Pima County owns and operates two regional wastewater reclamation facilities in the metropolitan area; the Agua Nueva WRF and Tres Rios WRF. From the 1980's through 1999, Pima County delivered reclaimed water from Ina Rd WRF to CMID. In order to access their reclaimed water (effluent), Metro Water and Reclamation wish to construct a temporary pipeline on Pima County property at the Tres Rios WRF re-establishing the former connection to CMID's delivery system on Ina Road. Pima County has recently reclassified the reclaimed water at Tres Rios WRF to A+.

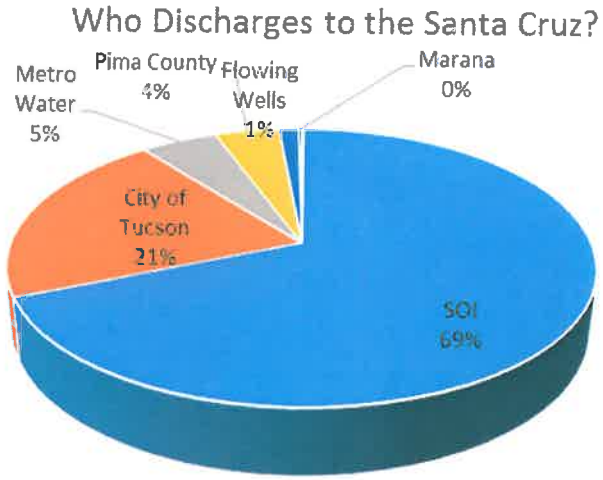
Effluent Entitlements Effluent from Pima County's two metropolitan wastewater treatment facilities has been thoroughly described in numerous studies, reports and documents including the Water & Wastewater Infrastructure Study, Annual Effluent Generation & Utilization Reports and, more recently, the Regional Wastewater Reclamation Department's 2016 Wastewater Facility Plan. Generally, effluent entitlements are specified by a number of intergovernmental agreements including the 1979 Intergovernmental Agreement with the City of Tucson and 2000 Supplemental Intergovernmental Agreement Regarding Effluent. Effluent entitlements are shown below.

2015 Effluent Entitlements	(In Acre-Feet)
Secretary of the Interior (Reclamation)	28,200
City of Tucson	25,234
Pima County	3,316
Metro Water	2,025
Town of Oro Valley	1,950
Flowing Wells Irrigation District	499
Town of Marana	90
Spanish Trail Water Company	42
Total	**61,356**



How is Effluent Used? Effluent from the metropolitan wastewater reclamation facilities is used in various ways. Entities that deliver some or all of their effluent entitlement to the City of Tucson reclaimed water system for direct reuse include the City of Tucson, Town of Oro Valley, Pima County and Flowing Wells Irrigation District. Effluent delivered from Agua Nueva WRF into the reclaimed water system is used for landscape irrigation, parks, golf courses, dust control at construction sites, and at environmental restoration sites. The Regional Wastewater Reclamation Department's 2015 Effluent Generation and Utilization Report accounts for effluent/reclaimed water used by the County and by others who have a role in utilizing this resource (See Attachment A).

Who Discharges Effluent? Entities with effluent entitlements from Pima County's metropolitan wastewater reclamation facilities use their effluent shares primarily for direct use on turf and landscaping to offset groundwater use, off-channel recharge and in-channel discharge. Effluent that is not diverted for direct use to the reclaimed system or off-channel is discharged to the Santa Cruz River where it benefits the adjacent riparian habitat and infiltrates to the groundwater. Entities discharging to the Santa Cruz River include the following:



Delivered to In-Channel in 2015	(In Acre-Feet)
Secretary of the Interior (Reclamation)	24,625
City of Tucson	7,432
Metro Water	1,817
Pima County	1,493
Flowing Wells Irrigation District	445
Town of Marana	81
Spanish Trail Water Company	38
Total	**35,931**

Purpose of proposed GSF Project: The goal of ADWR's Recharge Program is to allow for flexibility in the storage and recovery of renewable supply, reduce overdraft by storing water to prevent water level decline, accommodate seasonal demand and augment the water supply. The intent is to meet current and future demand and address aquifer imbalance by storage and replenishment with renewable water supplies and groundwater savings.

Historically, a groundwater savings facility is a partnership between cities or water providers with CAP or reclaimed water allocations who lack infrastructure for direct delivery and agricultural irrigators looking for low-cost water. Water utilities are able to provide renewable water at a cheaper rate than irrigators pay directly, and by subsidizing delivery, the utility can earn storage credits for the groundwater saved that would have been pumped otherwise. This method of recharge is a low-cost alternative for full credit water storage and facilitates indirect delivery of renewable supplies where infrastructure is lacking. Groundwater savings facilities are considered to provide benefits to participating entities while furthering the state's water management objectives and increasing agricultural use of renewable water. However, the potential hydrologic disconnect between storage and recovery remains a concern, as is the case with the entire recharge program.[1]

Options to Transform Managed Recharge: A constructed underground storage facility, or constructed recharge, uses some type of constructed/engineered feature to facilitate infiltration into the aquifer, either by basin spreading, trench infiltration, berm or levee spreading in a channel, or well injection. All constructed facilities in the Tucson AMA use spreading basins as the means of recharge, except the Arroyos Project, which uses check dams in the channel.

While all basin recharge projects require maintenance to reduce clogging layers and vegetative growth, basin spreading is predominant because of the much higher storage unit cost of injection wells. However, managed effluent recharge remains the most inexpensive method, given lack of construction and minimal maintenance of a facility, requiring only a trans-missive wash or streambed in which to discharge. When considering all capital, operating and maintenance costs, a managed effluent recharge project can produce stored water at a unit cost as little as $2.51 per acre-feet of recharged water, compared to unit costs of $140 to $191 for constructed projects within the Tucson AMA.

The cheaper managed alternative comes at the cost, from the water storers' perspective, of losing half of the discharged water to the "cut to the aquifer". Conversely, high capital expenditure to convert from managed to constructed effluent recharge does not make fiscal sense when the unit cost to produce an acre-foot credit of stored water exceeds the cost to purchase the same acre-foot.

In 2011, the Bureau of Reclamation and effluent discharge partners of the Lower Santa Cruz River Managed Recharge Project attempted to test a means of increasing infiltration and credit accrual by diverting water into a trench in an ox-bow channel within the Santa Cruz River. The in-channel recharge project recognized that unless effluent was better utilized, it would be diverted to off-channel uses. However, if more credit could be accrued by constructing some in-channel features, both project partners and the riparian habitat would benefit. Unfortunately, while the Enhanced Recharge Demonstration showed increased infiltration, monsoon flooding washed out the channel and its devices.

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[1] Megdal, Sharon B., and Taylor Shipman. Gains from Trade: Arizona's Groundwater Savings Program. Water Resources Research Center and Montgomery & Associates, June 2010.

Consultations with ADWR may permit a low-cost and easily replaceable constructed recharge solution providing full water storage credit to effluent partners to incentivize in-channel discharge. In what is termed a "low bar" constructed recharge option, small check dams could be installed in-channel to act as "speed bumps" to moderate flow and pond water while not restricting flow. Construction may be simple – anchored polyvinyl chloride (PVC) pipe structures expected to erode away in large storm events but easily replaced later.

There is precedent for this approach to constructed recharge, the Arroyos Recharge Project on the San Xavier District. Preliminary discussion with ADWR suggests similar features could be modeled for the Santa Cruz River. The check dams would not have to be placed throughout the entire length of the project nor would the end of the project need to be dammed. Small, impermanent structures that distributed flow in several reaches of the project could suffice to minimize cost and construction.

If moved forward, County staff, working with effluent partners, would identify constructed features and locations, evaluate costs and permit constraints to arrive at a preferred alternative and develop and refine a conceptual plan through pre-application meetings with ADWR. A cost estimate for permitting, construction and operation and maintenance will determine feasibility. A formal application can be submitted to ADWR after the concept is deemed acceptable and following intergovernmental agreement revision.

Another avenue to transform the area's managed recharge projects into facilities receiving 100% credit is to change ADWR's statutory provisions for managed recharge. Presently, Title 45 only allows 100% credit for a select category of managed recharge projects. Pima County has previously tried to pass legislation to include SAWRSA effluent in the select category defined by statute. Tucson Water and Pima County have discussed the possibilities of mounting an effort to change the statute so that all managed recharge would qualify for 100% credit, in a manner equivalent to constructed facilities. Such a change would provide incentive for multi-benefit recharge projects, and it would secure a significant amount of effluent statewide that would be dedicated to environmental use as well as groundwater recharge. Tucson Water is considering partnering with other water providers in the state to accomplish a legislative change and Pima County can support this effort when it gets underway.

Santa Cruz River Water Quality: Since Pima County's investment of more than $600 million in completion of the Regional Optimization Management Project in 2013, the quality of water released into the river has been a key ingredient for a healthier river. Changes in indicators of river health along a 23-mile stretch of the river have been documented in the *Lower Santa Cruz River – Living River Studies*. The most recent report, 2015 Water Year Living River Report (attached) evaluates six categories of river health: flow extent, water clarity, water quality, aquatic wildlife, riparian vegetation and social impacts. The report shows flow extent has decreased, due to improved infiltration as well as increased constructed basin recharge by Tucson Water. However, there has been improvement for the river in each of the other categories evaluated. Significant findings include:

- Continuing reduction of nutrient (particularly ammonia) levels in the river
- Total suspended solids and turbidity levels have improved considerably
- Although there are still no native fish, several new fish species are present, and fish have expanded their range in the studied reaches

- Aquatic community diversity and abundance of species sensitive to pollution have increased throughout the project area
- Flow extent is shortening because there is profoundly more aquifer recharge occurring in the river channel
- Wetland plant cover has started to recede in some of the drying river sections
- Very little odor escaped the WRF fence line

Information on the Living River Studies is available on line and at the Sonoran Institute website .

Summary Although there are concerns about the impact of reduced stream flow in the Santa Cruz River and its impact to downstream riparian habitat, the established habitat was created by artificial discharge from the metropolitan wastewater treatment facilities. The streamflow length is being reduced as a result of improved infiltration and higher water quality. Discharges are also being reduced as a result of the City of Tucson's increased off-channel reclaimed water recharge from the Agua Nueva WRF to reclaimed water storage basins. A new City of Tucson proposal to divert downstream discharge to a downtown Santa Cruz River segment at 29th Street will further diminish downstream discharge.

The Tres Rios WRF Effluent Interconnect Pipeline Project is a temporary project, and the intergovernmental agreement can be re-evaluated when it expires in 2019. The project represents the only currently available, low-cost opportunity for some effluent owners to receive 100% credit through aquifer recharge. In the interim, a number of options, including in-channel constructed recharge, can be explored longer-term for partners who have an effluent entitlement and with community stakeholders. If a low-cost, in-channel, constructed recharge option can be identified, designed and permitted, all stakeholders would benefit from, and have incentive for maintaining effluent flow in the river.

Attachment A

Effluent Generation and Utilization Report 2015

Pima County Regional Wastewater Reclamation Department

EFFLUENT GENERATION AND UTILIZATION REPORT

2015

Prepared by:
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PIMA COUNTY
WASTEWATER RECLAMATION

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I. Executive Summary

The Pima County Regional Wastewater Reclamation Department (RWRD) is dedicated to the goal of protecting public health and the environment in a manner sustainable and beneficial to current citizens and future generations. RWRD meets this commitment through the significant use of reclaimed water for groundwater recharge, reuse, and environmental restoration. Our activities in this regard aid in mitigating demand on potable water systems, thereby sustaining groundwater levels and preserving green infrastructure throughout our community.

During 2015, RWRD operated eight treatment facilities, and this report provides a narrative description of the different wastewater treatment processes used at each facility along with the quantity of wastewater received and the amount of effluent produced. During calendar year 2015, RWRD facilities treated wastewater to produce a total of 65,219 acre-feet (AF) of effluent. Figure 1 shows the contributions to total effluent generation in 2015 by RWRD facilities. Tres Rios (formerly known as Ina Rd) Wastewater Reclamation Facility (WRF) and Agua Nueva WRF (replacement facility for the closed Roger Road WRF) represent the current metropolitan facilities identified by the 1979 Intergovernmental Agreement (IGA) between the City of Tucson (COT) and Pima County (PC). Metropolitan facilities generated the majority of effluent with total production at 61,356 AF. Non-metropolitan, sub-regional facilities produced the remaining portion, totaling 3,862 AF.

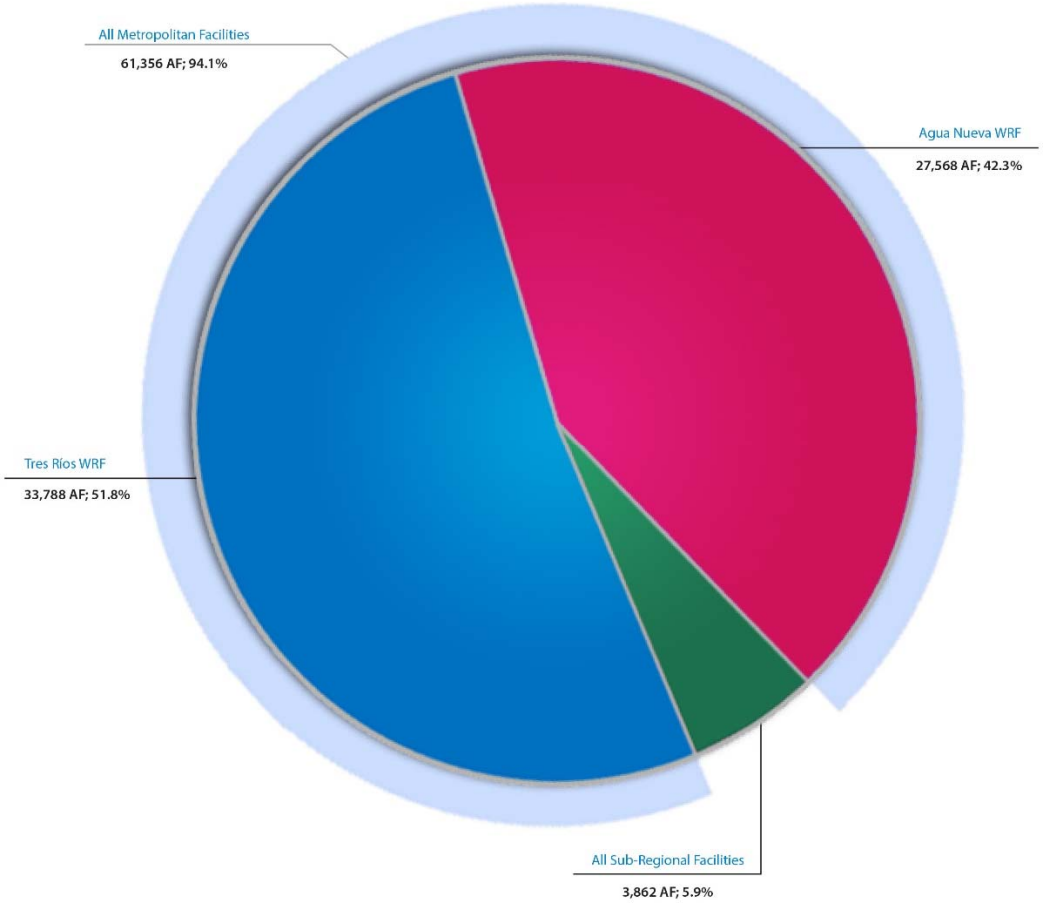


Figure 1: 2015 Effluent Production by Pima County RWRD Facilities – Total Volume Shown is 65,219 Acre Feet.

I. Executive Summary (Continued)

Figure 2 illustrates the various modes of delivery or discharge for the total metropolitan and non-metropolitan effluent. RWRD delivered an appreciable portion of the total effluent volume, consisting of 18,595 AF, or more than 28%, to the City of Tucson's Reclaimed Water System. In addition, direct delivery of reclaimed water by RWRD to other parties accounted for 1,640 AF. Reuse for landscape, construction, or dust control at WRF sites utilized 61 AF. Direct discharge to groundwater using various means, such as percolation beds and recharge basins, accounted for 2,223 AF. The balance of effluent, or 42,700 AF, was released through surface water discharge under the authorization of Arizona Pollution Discharge Elimination System (AZPDES) permits.

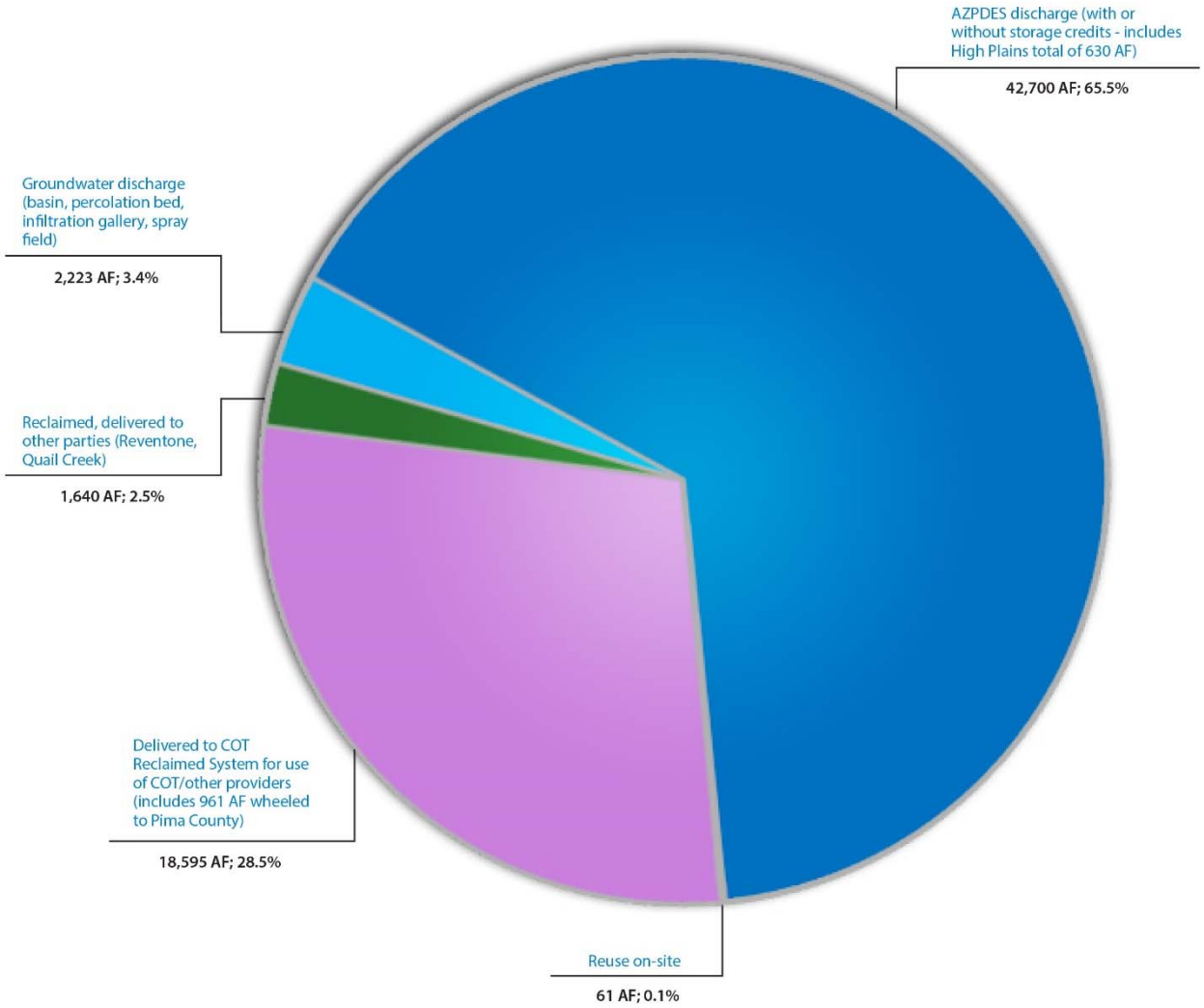


Figure 2: Effluent from All Pima County RWRD Facilities by Type of Discharge, Delivery, or Use for 2015

I. Executive Summary (Continued)

Figure 3 illustrates how the 1979 IGA and subsequent agreements govern effluent entitlement from the metropolitan facilities, and this report describes how Pima County's share of the effluent entitlement was used. In 2015, the effluent allocation formula designated the fixed amount of 28,200 AF for the Bureau of Reclamation to manage under Southern Arizona Water Rights Settlement Act (SAWRSA). No effluent was used for the Conservation Effluent Pool. Of the remaining portion, 29,840 AF were accorded to the City of Tucson and other water providers, while Pima County retained 3,316 AF.

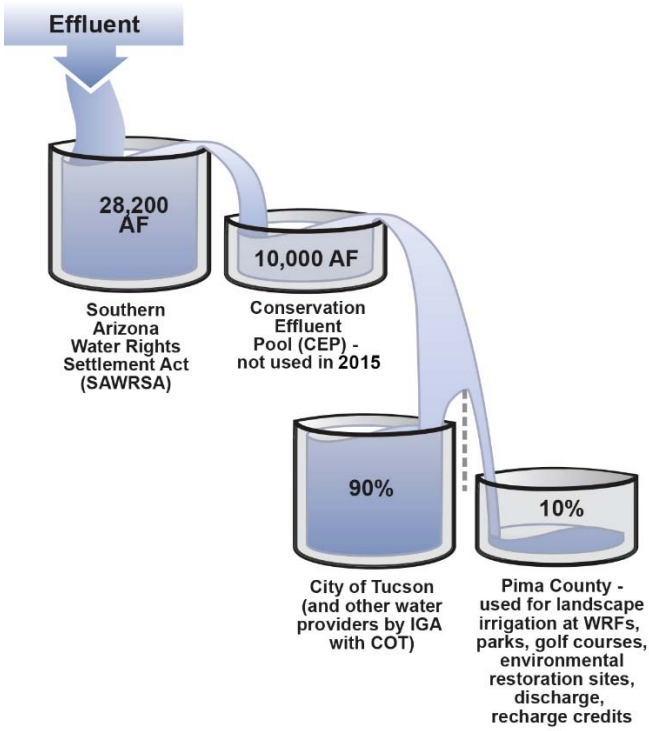


Figure 3: Effluent Entitlement from the Metropolitan Facilities

I. **Executive Summary** (Continued)

Figure 4 shows the manner in which Pima County's share of metropolitan effluent was distributed in 2015. Reuse, either on-site at the WRFs or wheeled through the Reclaimed Water System, accounted for approximately 31% of the total. RWRD used 64% of its metropolitan effluent to serve as water delivery to underground storage facilities recharging the aquifer: the Lower Santa Cruz Managed Recharge Project (LSCMRP) and the High Plains Constructed Recharge Project. Pima County's portion of the outflow from the storage reach on the Santa Cruz River comprised 171 AF, making up 5% of Pima County's total metropolitan effluent allocation.

As a result of groundwater recharge project activities in 2015, Pima County will receive credit to its long-term storage account for 1,892.89 AF of effluent. This volume includes 524.61 AF of underground storage credits for its share of effluent discharged into the Lower Santa Cruz Managed Recharge Project and 600.00 AF for effluent diverted off-channel into the High Plains Effluent Recharge Project. Pima County received an additional 284.26 AF of underground storage credits for its non-metropolitan effluent recharged at the Corona de Tucson WRF, and 484.02 AF of underground storage credits.

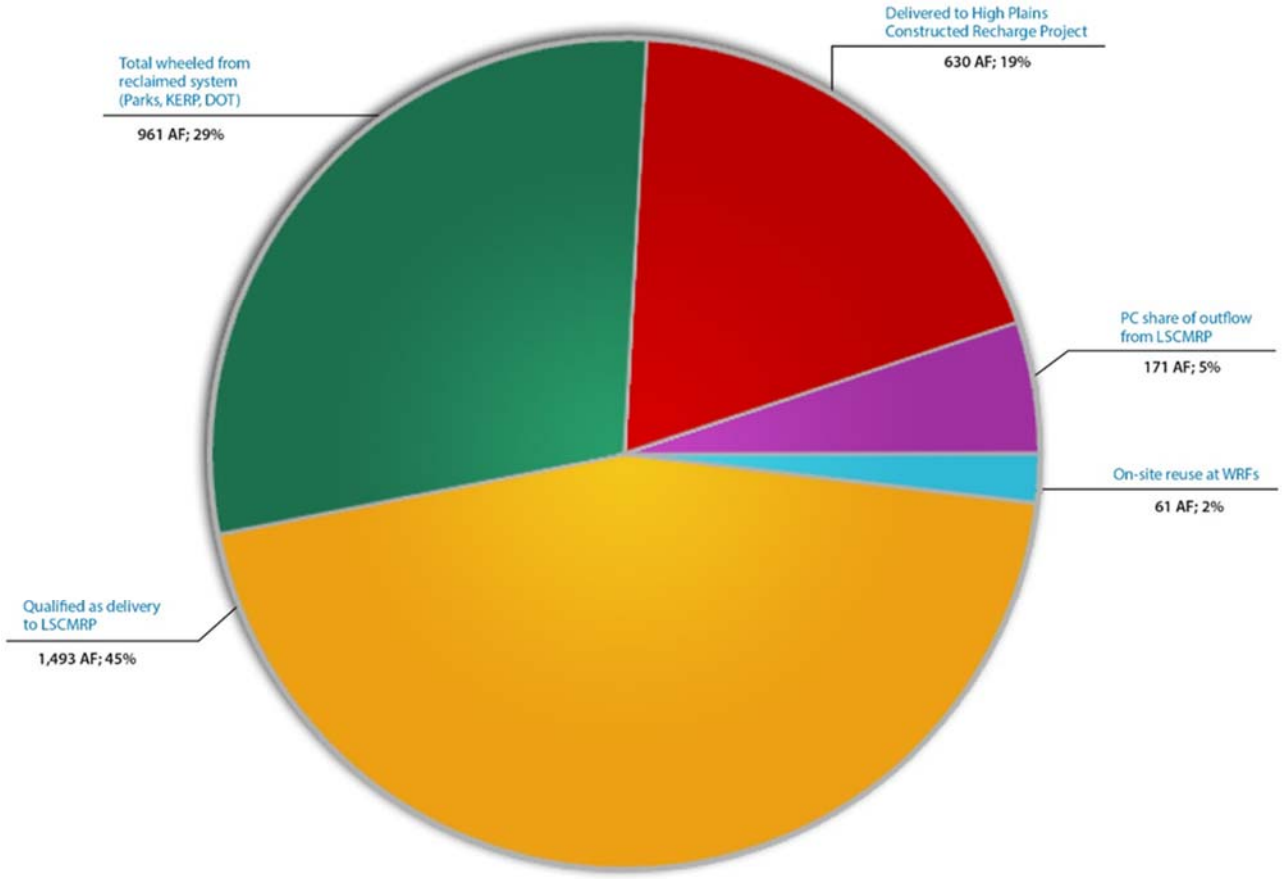


Figure 4: Distribution of Pima County's Share of Metropolitan Effluent in 2015

II. Benefits of Effluent/Reclaimed Water as a Resource

Reclaimed water is a vital, locally generated, renewable resource and a key component in Pima County's available water resources. Reclaimed water, as defined in A.R.S. §49-201(32) is water that has been treated or processed by a wastewater treatment plant. This water resource is regarded by a growing number of people as "recycled water" but is also sometimes referred to simply as "effluent." In 1989, the Arizona Supreme Court refused to characterize effluent as either surface water or groundwater, choosing instead to characterize it as "nothing more than sewerage effluent." This decision kept this part of the water supply from being regulated in the same manner as waters of the state. The Court held that local governments do not "own" the effluent, but have the right to put it to a beneficial use. Wastewater, treated to suitable reuse standards to protect public health as established by the Arizona Department of Environmental Quality (ADEQ), makes up a growing and increasingly important portion of Arizona's water supply.

Pima County has legislative authority under ARS §11-264 to construct and operate the regional wastewater system in Pima County. As such, the County is the major producer of effluent/reclaimed water in eastern Pima County.

Effluent/reclaimed water is generally used for three purposes:

- direct reuse
- environmental enhancement
- aquifer replenishment

Pima County uses its highly treated reclaimed water, much of it delivered through Tucson Water's reclaimed distribution system, to irrigate County parks, turf facilities and other landscape vegetation, to provide water for construction and dust control, and to sustain vegetation for environmental restoration projects. Using reclaimed water instead of potable supply for these purposes preserves our groundwater for the future. An additional use of the County's effluent/reclaimed water entitlement is long-term storage in underground storage (recharge) facilities. In this manner, reclaimed water is "banked" for future use and serves to replenish the aquifer until it is recovered.

III. Effluent Generated at Regional and Sub-Regional Wastewater Reclamation Facilities

A. Metropolitan Facilities

1. Tres Rios Wastewater Reclamation Facility

In recognition of the substantial reconfiguration and expansion at the Ina Road facility, it was renamed the Tres Rios WRF in 2013. RWRD's largest facility is located in the northwestern part of the Tucson basin and serves Oro Valley, Marana and the northwest portions of Tucson. The original facility was constructed in 1979 as a 25 Million Gallon per Day (MGD), High-Purity Oxygen (HPO), activated sludge process. Capacity at this facility was increased in 2006 with the addition of a 12.5 MGD, Biological Nutrient Removal Activated Sludge process, thereby increasing the overall combined plant capacity to 37.5 MGD. Completion of RWRD's Regional Optimization Master Plan allowed an increase in capacity to 50 MGD. A new plant interconnect pipeline between Agua Nueva WRF and Tres Rios WRF allows additional sewage flow to be diverted to the Tres Rios Facility. Other modifications include the following components:

- Expansion of preliminary and primary treatment facilities.
- New 25 MGD west train using 5-stage Bardenpho process to replace the HPO process.
- Replacement of Biological Nutrient Removal Activated Sludge process with a Bardenpho process train.
- New aeration tanks and secondary clarifiers for each train.
- New chlorine contact basins with chemical feed and mixing equipment.
- Additional biosolids processing facilities with new sludge thickening, anaerobic digestion, digested sludge thickening/ dewatering, and final product storage and load-out facilities.

The addition of the Bardenpho process achieves compliance with regulatory requirements to reduce total nitrogen concentrations to 8 mg/L or less. This facility uses chlorination to disinfect and is permitted (mid-2016) for producing Class A+ reclaimed water. Effluent undergoes dechlorination prior to discharge.

The Tres Rios facilityy discharges into the Santa Cruz River under authorization of an AZPDES permit. Effluent discharged into the Santa Cruz River flows into the Lower Santa Cruz Managed Recharge Project (LSCMRP) which extends along the river channel from Ina Road to Trico Road. Groundwater storage credits are issued from the Arizona Department of Water Resources (ADWR) for half of the effluent that reaches the water table. Credits are apportioned among participants in the LSCMRP in accordance with IGAs that recognize each party's entitlement.

III. Effluent Generated at Regional and Sub-Regional Wastewater Reclamation Facilities (Continued)

A. Metropolitan Facilities (Continued)

1. Tres Rios Wastewater Reclamation Facility (Continued)

Tres Rios WRF					
Description			AFY	MG/Year	MGD Average
Influent			34,285.79	11,172.06	30.61
Process Water	*Used in industrial process at WRF, not included in effluent total used for allocations*		667.76	217.59	0.60
Effluent Usage	AZPDES discharge	*Outfall to Santa Cruz River, some available for storage credits*	33,760.91	11,001.03	30.14
	Reuse on-site	*Construction and dust control*	26.92	8.77	0.02
Effluent Total	*Used for calculation of effluent allocations*		33,787.83	11,009.80	30.16

2. Agua Nueva Wastewater Reclamation Facility

The Agua Nueva WRF is located west of I-10 just south of El Camino del Cerro. This facility was built to replace the Roger Road WRF and began discharge in December 2013 in start-up mode. It services a population of approximately 500,000 people in the city of Tucson and has a capacity of 32 MGD. Similar to the Tres Rios upgrade, this new treatment facility utilizes a 5-stage Bardenpho treatment process to achieve nutrient removal.

The effluent produced is currently classified as Class B+ reclaimed water utilizing chlorination for disinfection. After dechlorination, it also meets AZPDES permit standards for the Santa Cruz River, as well as numeric Aquifer Water Quality Standards (AWQS). An average of nearly 17 MGD of the total effluent produced was sent to the City of Tucson Reclaimed Water System in 2015. A small percentage of treated effluent is reused for irrigation onsite, at the adjacent Pima County laboratory, and to maintain wildlife ponds at the former Roger Road facility. The remaining portion of the effluent is discharged to the same outfall previously used by the Roger Rd WRF in the Santa Cruz River at an average rate of approximately 8 MGD. Some of the treated wastewater becomes process water used in transporting biosolids pumped by pipeline to the Tres Rios WRF. Biosolids at Tres Rios are treated and transported off-site for use in agricultural land application and mine reclamation.

III. Effluent Generated at Regional and Sub-Regional Wastewater Reclamation Facilities (Continued)

A. Metropolitan Facilities (Continued)

2. Agua Nueva Wastewater Reclamation Facility (Continued)

Agua Nueva WRF					
Description			AFY	MG/Year	MGD Average
Influent			28,641.53	9,332.87	25.57
Process Water	*Used in biosolids flush water and other industrial processes at WRF, not included in effluent total used for allocations*		548.38	178.69	0.49
Effluent Usage	AZPDES discharge	*Outfall to Santa Cruz River, some available for storage credits*	8,939.52	2,912.95	7.98
	Delivered reclaimed water	*Input to COT reclaimed system*	18,595.04	6,059.21	16.60
	Reuse on-site	*Irrigation at WRF*	33.86	11.03	0.03
Effluent Total	*Used for calculation of effluent allocations*		27,568.42	8,983.20	24.61

3. Randolph Park Wastewater Reclamation Facility

The Randolph Park WRF is located in midtown Tucson at the City-owned Randolph Park. This is a 3.5 MGD membrane bioreactor facility and utilizes an ultraviolet light disinfection system. This facility produces Class A effluent that is delivered directly into the COT's Reclaimed Water System.

The Randolph Park WRF did not operate in 2015. In December 2014 the Randolph Park WRF was placed in temporary cessation by Pima County RWRD. This was done to realize some cost savings and to rely on the new metropolitan WRFs. Because reclaimed water was not produced by Randolph Park WRF, Pima County's effluent was wheeled through Tucson Water's Reclaimed Water System from Agua Nueva WRF. The wheeling rate used during FY 2015, as specified in the 2000 Supplemental IGA and 2003 Wheeling Agreement, was the Environmental/ Interruptible rate of $274.65 per acre foot.

III. Effluent Generated at Regional and Sub-Regional Wastewater Reclamation Facilities (Continued)

A. Metropolitan Facilities (Continued)

4. Metropolitan Facilities Summary Table

Metropolitan Facilities - Overall Usage						
Description		Tres Rios WRF	Agua Nueva WRF	All Facilities		
		AFY		AFY	MG/Yr	MGD
Influent Total		34,285.79	28,641.53	62,927.32	20,504.93	56.18
Process Water Total		667.76	548.38	1,216.14	396.28	1.09
Effluent Usage	AZPDES Discharge	33,760.91	8,939.52	42,700.43	13,913.98	38.12
	Delivered to COT Reclaimed Water System	0.00	18,595.04	18,595.04	6,059.21	16.60
	Reuse on-site	26.92	33.86	60.78	19.81	0.05
Effluent Total		33,787.83	27,568.42	61,356.25	19,993.00	54.78

5. Metropolitan Facilities Historic Data

Year	Influent Received AF	Effluent Reused On-site at County WRFs AF	Effluent Discharged or Delivered to Reclaimed AF	Effluent Total AF
Tres Rios				
2003	27,071.50	806.9	26,407.60	27,214.50
2004	28,714.70	605.6	27,925.50	28,531.10
2005	26,149.80	665.7	24,552.10	25,217.80
2006	25,854.40	613.2	24,968.10	25,581.30
2007	28,840.60	8.0	27,856.30	27,864.30
2008	32,192.00	22.2	31,545.70	31,567.90
2009	28,960.41	24.61	28,527.58	28,552.19
2010	28,982.23	48.06	28,821.21	28,869.27
2011	27,746.58	60.91	27,368.49	27,429.40
2012	25,227.94	56.91	24,390.54	24,447.45
2013	28,334.77	26.08	27,954.40	27,980.48
2014	36,292.58	9.71	35,995.70	36,005.41
2015	34,285.79	26.92	33,760.91	33,787.83

III. Effluent Generated at Regional and Sub-Regional Wastewater Reclamation Facilities (Continued)

A. Metropolitan Facilities (Continued)

5. Metropolitan Facilities Historic Data (Continued)

Year	Influent Received AF	Effluent Reused On-site at County WRFs AF	Effluent Discharged or Delivered to Reclaimed AF	Effluent Total AF
Roger Road				
2003	41,991.90	119.7	40,862.20	40,981.90
2004	40,957.00	599	39,025.80	39,624.80
2005	43,239.00	13.6	42,311.50	42,325.10
2006	43,381.20	63	40,864.80	40,927.80
2007	40,730.70	60.1	37,763.20	37,823.30
2008	36,823.60	116.3	34,194.20	34,310.50
2009	37,542.80	107.73	35,339.57	35,447.30
2010	35,279.07	70.31	33,261.83	33,332.14
2011	36,327.65	84.23	34,258.96	34,343.19
2012	37,166.37	106.02	34,391.17	34,497.19
2013	32,700.14	103.35	29,907.98	30,011.33
2014	388.40	2.53	300.30	302.83
2015	0.00	0.00	0.00	0.00
Agua Nueva				
2013	222.60	0.49	215.60	216.09
2014	24,252.07	55.78	23,488.06	23,543.84
2015	28,641.53	33.86	27,534.56	27,568.42
Randolph Park				
2003	1.4	1.4	0	1.4
2004	114.7	0	97.5	97.5
2005	1,579.60	408.4	1,055.90	1,464.30
2006	2,785.40	679.5	1,878.50	2,558.00
2007	2,866.50	0.5	2,610.40	2,610.90
2008	2,973.60	0.3	2,661.60	2,661.90
2009	2,649.11	235.31	2,176.30	2,176.65
2010	2,738.75	0.30	2,337.37	2,337.67
2011	2,521.23	0.21	2,143.83	2,144.04
2012	2,816.99	0.22	2,447.78	2,448.00
2013	2,690.67	0.34	2,364.24	2,364.58
2014	2,618.01	0.20	2,267.63	2,267.83
2015	0.00	0.00	0.00	0.00

III. Effluent Generated at Regional and Sub-Regional Wastewater Reclamation Facilities (Continued)

A. Metropolitan Facilities (Continued)

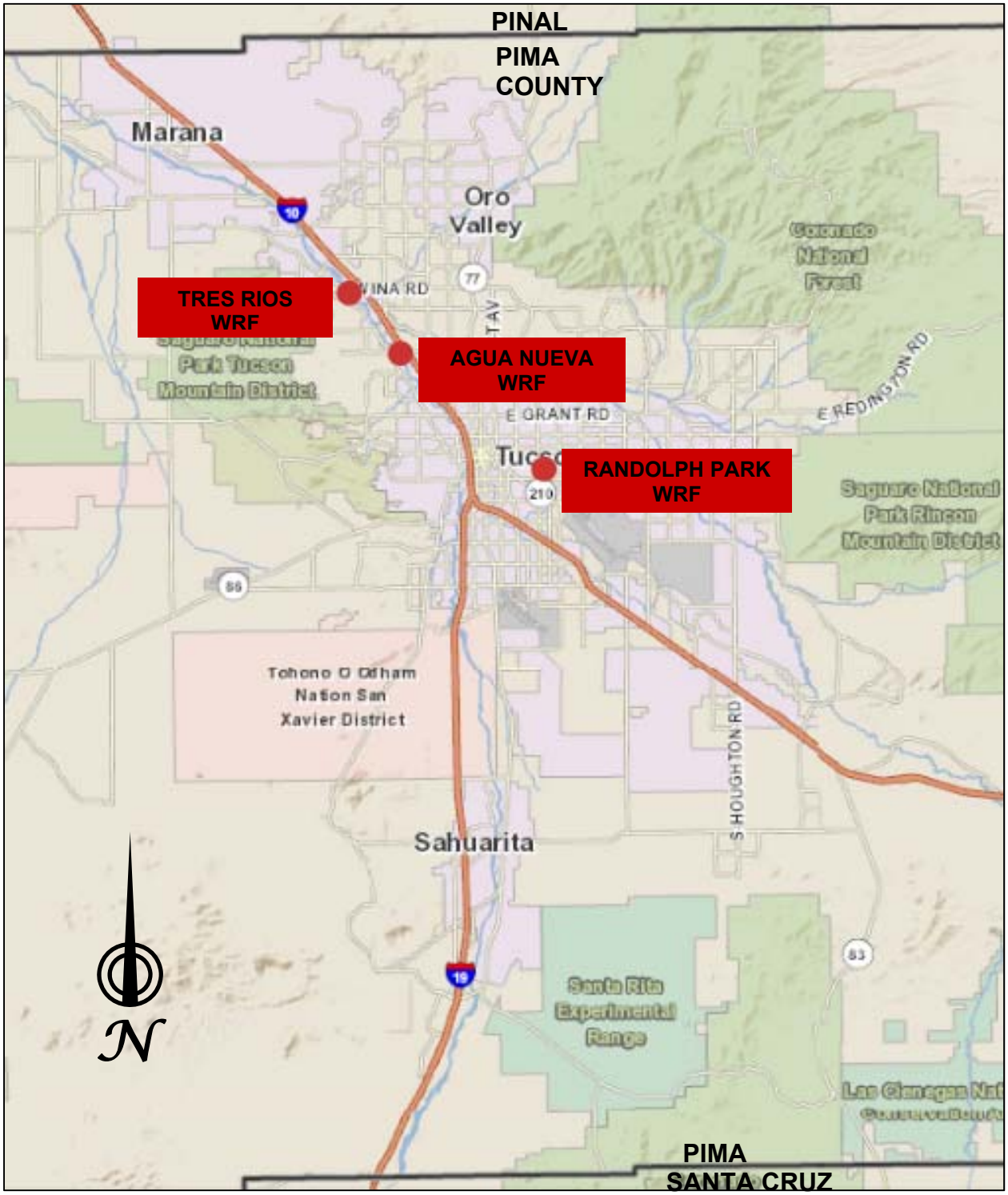
5. Metropolitan Facilities Historic Data (Continued)

Year	Influent Received AF	Effluent Reused On-site at County WRFs AF	Effluent Discharged or Delivered to Reclaimed System AF	Effluent Total AF
Metropolitan Facility Totals				
2003	69,064.80	927.9	67,269.90	68,197.80
2004	69,786.40	1,204.60	67,048.80	68,253.40
2005	70,968.40	1,087.70	67,919.50	69,007.20
2006	72,021.00	1,355.70	67,711.40	69,067.10
2007	72,437.80	68.6	68,229.90	68,298.50
2008	71,989.20	138.8	68,401.50	68,540.30
2009	69,152.32	367.65	66,043.45	66,411.10
2010	67,000.05	118.67	64,420.41	64,539.08
2011	66,595.46	145.35	63,771.28	63,916.63
2012	65,211.30	163.15	61,229.49	61,392.64
2013	63,948.18	130.26	60,442.22	60,572.48
2014	63,551.06	68.22	62,051.69	62,119.91
2015	62,927.32	60.78	61,295.47	61,356.25

III. Effluent Generated at Regional and Sub-Regional Wastewater Reclamation Facilities (Continued)

A. Metropolitan Facilities (Continued)

6. Metropolitan Facilities Map



III. Effluent Generated at Regional and Sub-Regional Wastewater Reclamation Facilities (Continued)

B. Non-Metropolitan Sub-Regional Facilities

1. Arivaca Junction Wastewater Reclamation Facility

The Arivaca Junction WRF is located in the town of Amado, approximately 38 miles south of Tucson. It consists of a single, 3.2-acre, aerated lagoon with a permitted treatment capacity of 100,000 gallons per day (GPD). Chlorination is the method of disinfection. Effluent disposal is via evaporation, percolation through the base of the unlined pond, and reuse. Evaporation ranges from 7,000 to 14,000 GPD, while percolation is approximately 10,000 GPD. RWRD has a reuse agreement with Reventone Ranch to accept delivery of this facility's Class C reclaimed water for restricted agricultural use.

Arivaca Junction WRF					
Description			AFY	MG/Year	MGD Average
Influent			48.40	15.77	0.04
Process Water	*Used in biosolids flush water and other industrial processes at WRF, not included in effluent total used for allocations*		0.00	0.00	0.00
Effluent Usage	Reclaimed, delivered to other parties	*Reventone Ranch*	24.48	7.98	0.02
	Groundwater Discharge	*Percolation through base of impoundment (estimated at 10,000 gallons per day)*	11.23	3.66	0.01
	Reuse on-site	*Irrigation at WRF*	0.01	0.00	0.00
Effluent Total			35.72	11.64	0.03

2. Avra Valley Wastewater Reclamation Facility

The Avra Valley WRF is located on the west side of the Tucson Mountains, approximately 20 miles southwest of Tucson. The treatment facility has a permitted capacity of 4.0 MGD using two oxidation ditches for achieving nitrification and denitrification. It utilizes sand filtration, and UV treatment is the method of disinfection. Effluent produced at this facility can meet Class A+, but is permitted for Class B+ reclaimed quality. Effluent is discharged primarily by percolation through five basins permitted for groundwater recharge. Also, on-site reuse is possible for irrigation and dust control, and limited surface water discharge to Black Wash is covered under an AZDPES permit.

III. Effluent Generated at Regional and Sub-Regional Wastewater Reclamation Facilities (Continued)

B. Non-Metropolitan Sub-Regional Facilities (Continued)

2. Avra Valley Wastewater Reclamation Facility (Continued)

Avra Valley WRF					
Description			AFY	MG/Year	MGD Average
Influent			1,422.77	463.61	1.27
Process Water	*Used in industrial processes at WRF, not included in effluent total used for allocations*		26.41	8.61	0.02
Effluent Usage	AZPDES Discharge	*Black Wash Spray Field*	0.00	0.00	0.00
	Groundwater Discharge	*Percolation beds and ponds - groundwater recharge with storage credit accrual (for a portion of 2015)*	1,420.91	463.00	1.27
	Reuse on-site	*Irrigation at WRF*	0.00	0.00	0.00
Effluent Total[1]			1,420.91	463.00	1.27

[1]Because a recharge permit took effect mid-year, a volume of 484 AF in storage credits was reported to ADWR for this recharge after subtracting evaporative losses.

3. Corona de Tucson Wastewater Reclamation Facility

The Corona de Tucson WRF is located 22 miles southeast of Tucson. The facility consists of a 1.0 MGD closed loop oxidation ditch for achieving both nitrification and denitrification. This facility is not classified for reuse. Effluent is disposed into percolation basins designed and permitted for groundwater recharge. Soil aquifer treatment (SAT) is the method of disinfection.

Corona de Tucson WRF					
Description			AFY	MG/Year	MGD Average
Influent			331.06	107.88	0.30
Process Water	*Used in industrial processes at WRF, not included in effluent total used for*		0.00	0.00	0.00
Effluent Usage	Groundwater Discharge	*Percolation beds and ponds - groundwater recharge with storage credit accrual*	285.66	93.08	0.26
Effluent Total[2]			285.66	93.08	0.26

[2]A volume of 284 AF in storage credits was reported to ADWR for this recharge after subtracting evaporative losses.

III. Effluent Generated at Regional and Sub-Regional Wastewater Reclamation Facilities (Continued)

B. Non-Metropolitan Sub-Regional Facilities (Continued)

4. Green Valley Wastewater Reclamation Facility

The Green Valley WRF is located approximately 29 miles south of Tucson and serves the town of Green Valley. This facility is comprised of two distinct treatment sequences. The first consists of a 2.0 MGD oxidation ditch achieving nitrification and denitrification. Sand filtration followed by chlorination of this effluent produces Class A+ reclaimed water. The reclaimed water is delivered to Robson/ Quail Creek for groundwater recharge. The other option for treatment at the facility can handle up to 2.1 MGD. It consists of two separate secondary aerated lagoons, two separate polishing ponds, and four percolation ponds. It produces the equivalent of Class B reclaimed water, but this stream is not classified for reuse in the Aquifer Protection Permit. Effluent from this portion of the facility is disposed of only through percolation.

Green Valley WRF					
Description			AFY	MG/Year	MGD Average
Influent			2,054.60	669.49	1.83
Process Water	*Used in industrial processes at WRF, not included in effluent total used for allocations*		0.00	0.00	0.00
Effluent Usage	Reclaimed, delivered to other parties	*Effluent from BNROD to Robson/ Quail Creek for groundwater recharge*	1,615.45	526.40	1.44
	Groundwater Discharge	*Percolation ponds (Lagoon Facility) - groundwater recharge without storage credit accrual*	487.12	158.73	0.43
Effluent Total			2,102.57	685.12	1.88

5. Mt. Lemmon Wastewater Reclamation Facility

The Mt. Lemmon WRF is located in the Village of Summerhaven in the Catalina Mountains. This facility operates under a special use permit issued by the United States Forest Service (USFS), which authorizes a treatment capacity of 17,000 gallons per day. The facility consists of a closed loop oxidation ditch for achieving both nitrification and denitrification. Effluent is disposed of through an off-site sprayfield, through a French drain, and through a surface water discharge to an unnamed tributary to the San Pedro River under an AZPDES permit. The facility currently is regulated by an APP general permit, so a reclaimed water classification is not possible. The spray application is to a restricted area of forest and is not regarded as reuse by ADEQ.

III. Effluent Generated at Regional and Sub-Regional Wastewater Reclamation Facilities (Continued)

B. Non-Metropolitan Sub-Regional Facilities (Continued)

5. Mt. Lemmon Wastewater Reclamation Facility (Continued)

Mt. Lemmon WRF					
Description			AFY	MG/Year	MGD Average
Influent			3.00	0.98	0.0027
Process Water	*Used in industrial processes at WRF, not included in effluent total used for*		0.00	0.00	0.0000
Effluent Usage	Groundwater Discharge	*Discharge to spray field, drain, or AZPDES release to unnamed tributary to San Pedro River*	2.79	0.91	0.0025
Effluent Total			2.79	0.91	0.0025

6. Pima County Fairgrounds Wastewater Reclamation Facility

The PC Fairgrounds WRF is located approximately 18 miles southeast of Tucson and serves the fairgrounds complex. This facility has a permitted capacity of 20,000 GPD. It uses stabilization lagoons and the effluent is disposed of through evaporation and percolation. The facility currently is regulated by an APP general permit, so a reclaimed water classification is not possible.

Pima County Fairgrounds WRF					
Description			AFY	MG/Year	MGD Average
Influent			14.84	4.84	0.0132
Effluent Usage	Groundwater Discharge	*Percolation*	14.84	4.84	0.0132

III. Effluent Generated at Regional and Sub-Regional Wastewater Reclamation Facilities (Continued)

B. Non-Metropolitan Sub-Regional Facilities (Continued)

7. Sub-Regional Facilities Summary

Sub-Regional Facilities - Effluent Usage										
		Arivaca	Avra Valley	Corona	Green Valley	Mt. Lemmon	Fair-grounds	All Facilities		
Description		AFY						AFY	MG/Yr	MGD
Influent Total		**48.40**	**1,422.77**	**331.06**	**2,054.60**	**3.00**	**14.84**	**3,874.67**	**1,262.57**	**3.46**
Process Water Total		**0.00**	**26.41**	**0.00**	**0.00**	**0.00**	**0.00**	**26.41**	**8.61**	**0.02**
Effluent Usage	AZPDES Discharge		0.00					0.00	0.00	0.00
	Reclaimed, delivered to other parties	24.48			1,615.45			1,639.93	534.37	1.46
	Groundwater Discharge (basin, percolation bed, infiltration gallery, spray field)	11.23	1,420.91	285.66	487.12	2.79	14.84	2,222.55	724.22	1.98
	Reuse on-site	0.01	0.00					0.01	0.00	0.00
Effluent Total		**35.72**	**1,420.91**	**285.66**	**2,102.57**	**2.79**	**14.84**	**3,862.49**	**1,258.60**	**3.45**

III. Effluent Generated at Regional and Sub-Regional Wastewater Reclamation Facilities (Continued)

B. Non-Metropolitan Sub-Regional Facilities (Continued)

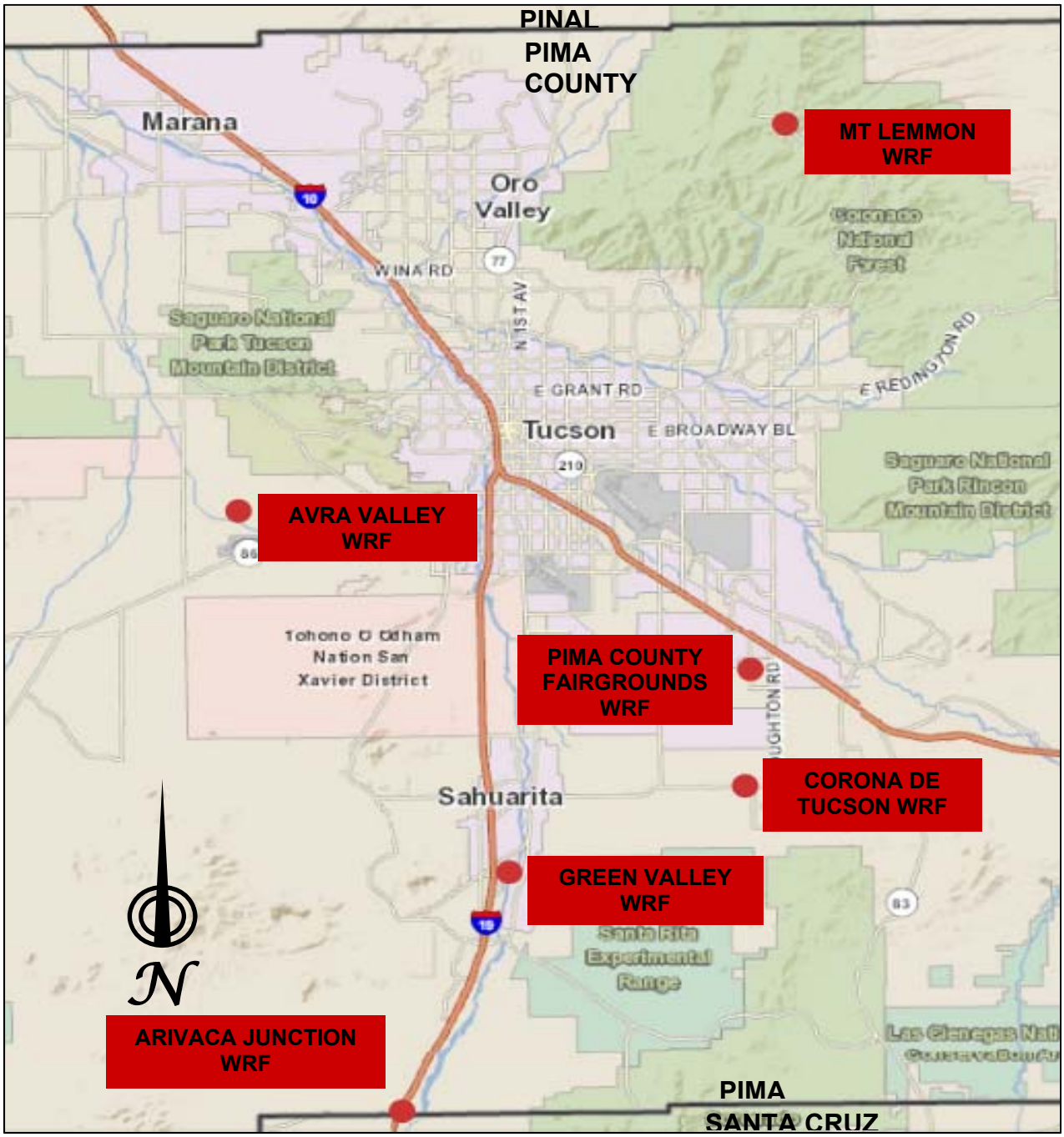
8. Summary Table of All Facilities

All Facilities - Effluent Usage					
	Metropolitan	Sub-Regional	All Facilities		
Description	AFY		AFY	MG/Yr	MGD
Influent Total	**62,927.32**	**3,874.67**	**66,801.99**	**21,767.50**	**59.64**
Process Water Total	**1,216.14**	**26.41**	**1,242.55**	**404.89**	**1.11**
AZPDES Discharge	42,700.43	0.00	42,700.43	13,913.98	38.12
Delivered to COT Reclaimed System	18,595.04		18,595.04	6,059.21	16.60
Reclaimed, delivered to other parties		1,639.93	1,639.93	534.37	1.46
Groundwater Discharge		2,222.55	2,222.55	724.22	1.98
Reuse on-site	60.78	0.01	60.79	19.81	0.05
Effluent Total	**61,356.25**	**3,862.49**	**65,218.74**	**21,251.59**	**58.22**

III. Effluent Generated at Regional and Sub-Regional Wastewater Reclamation Facilities (Continued)

B. Non-Metropolitan Sub-Regional Facilities (Continued)

9. Non-Metropolitan Facilities Map



IV. Reclaimed Water for Reuse, Environmental Restoration and Underground Storage (Groundwater Recharge)

A. Reclaimed Water Wheeled Through Tucson Water Reclaimed System

To take advantage of effluent as a renewable water supply, Pima County reuses a substantial volume of its wastewater for irrigation, construction, environmental restoration and other purposes. Most of this reuse is conducted by the Natural Resources, Parks and Recreation Department and the Kino Sports Complex/Kino Environmental Restoration Project. Pima County Regional Flood Control District and Pima County Department of Transportation also use reclaimed water for certain projects. RWRD periodically draws on the reclaimed supply for sewer line flushing and construction use. The supply of reclaimed water for various County sites is Class A reclaimed water wheeled through the City of Tucson Reclaimed Water System and delivered in the amounts shown in the following tables.

Natural Resources, Parks and Recreation			
2015 Monthly Reclaimed Water Use			
Month	**Gallons**	**Ccf**	**AF**
January	5,307,429	7,095.0	16.29
February	7,659,304	10,239.0	23.51
March	13,747,699	18,378.0	42.19
April	20,730,764	27,713.0	63.62
May	31,226,681	41,744.0	95.83
June	31,062,109	41,524.0	95.33
July	38,328,686	51,238.0	117.63
August	32,199,148	43,044.0	98.82
September	32,468,447	43,404.0	99.64
October	20,320,083	27,164.0	62.36
November	18,473,143	24,695.0	56.69
December	13,964,634	18,668.0	42.86
Total	**265,488,125**	**354,906.0**	**814.75**

Regional Flood Control District			
2015 Monthly Reclaimed Water Use			
Month	**Gallons**	**Ccf**	**AF**
January	224,416	300.0	0.69
February	285,008	381.0	0.87
March	322,410	431.0	0.99
April	891,678	1,192.0	2.74
May	1,244,758	1,664.0	3.82
June	360,561	482.0	1.11
July	423,397	566.0	1.30
August	382,255	511.0	1.17
September	382,255	511.0	1.17
October	312,686	418.0	0.96
November	167,564	224.0	0.51
December	145,870	195.0	0.45
Total	**5,142,857**	**6,875.0**	**15.78**

IV. Reclaimed Water for Reuse, Environmental Restoration and Underground Storage (Groundwater Recharge) (Continued)

A. Reclaimed Water Wheeled Through Tucson Water Reclaimed System (Continued)

Department of Transportation			
2015 Monthly Reclaimed Water Use			
Month	**Gallons**	**Ccf**	**AF**
January	53,112	71.0	0.16
February	64,332	86.0	0.20
March	53,860	72.0	0.17
April	145,122	194.0	0.45
May	140,634	188.0	0.43
June	47,127	63.0	0.14
July	31,418	42.0	0.10
August	31,418	42.0	0.10
September	17,953	24.0	0.06
October	44,883	60.0	0.14
November	32,914	44.0	0.10
December	10,473	14.0	0.03
Total	**673,247**	**900.0**	**2.07**

Regional Wastewater Reclamation Department			
2015 Monthly Reclaimed Water Use *			
Month	**Gallons**	**Ccf**	**AF**
January	0	0.0	0.00
February	0	0.0	0.00
March	11,221	15.0	0.03
April	0	0.0	0.00
May	0	0.0	0.00
June	0	0.0	0.00
July	0	0.0	0.00
August	10,473	14.0	0.03
September	0	0.0	0.00
October	1,496	2.0	0.00
November	0	0.0	0.00
December	0	0.0	0.00
Total	**23,190**	**31.0**	**0.07**

*Water used for sewer line flushing.

IV. Reclaimed Water for Reuse, Environmental Restoration and Underground Storage (Groundwater Recharge) (Continued)

A. Reclaimed Water Wheeled Through Tucson Water Reclaimed System (Continued)

Kino Sports Park & KERP			
2015 Monthly Reclaimed Water Use			
Month	**Gallons**	**Ccf**	**AF**
January	751,792	1,005.0	2.31
February	734,587	982.0	2.25
March	0	0.0	0.00
April	647,065	865.0	1.99
May	2,719,169	3,635.0	8.34
June	6,675,616	8,924.0	20.49
July	13,036,301	17,427.0	40.01
August	5,155,574	6,892.0	15.82
September	0	0.0	0.00
October	0	0.0	0.00
November	100,987	135.0	0.31
December	0	0.0	0.00
Total	**29,821,091**	**39,865.0**	**91.52**

Historical Water Use at Kino Sports Park & KERP			
	Reclaimed		Harvested Stormwater*
Year	**Ccf**	**AF**	**AF**
2003	156,042.8	358.2	87.00
2004	143,723.0	329.9	30.70
2005	78,493.0	180.2	64.90
2006	171,955.0	394.8	0.00
2007	69,389.0	159.3	65.95
2008	81,916.0	188.1	95.85
2009	163,725.0	375.9	0.00
2010	56,140.0	128.9	88.53
2011	74,907.7	172.0	50.22
2012	94,651.0	217.3	36.79
2013	80,297.0	184.3	126.81
2014	76,132.0	174.8	149.39
2015	39,865.0	91.5	187.77
Total	**1,287,236.5**	**2,955.1**	**983.91**

*2015 was a record high volume for stormwater harvested.

IV. Reclaimed Water for Reuse, Environmental Restoration and Underground Storage (Groundwater Recharge) (Continued)

A. Reclaimed Water Wheeled Through Tucson Water Reclaimed System (Continued)

Yearly Reclaimed Water Use by Pima County from Tucson Water's Reclaimed System			
Year	**Gallons**	**Ccf**	**AF**
2003	69,573,993	93,006.9	213.51
2004	86,118,658	115,123.9	264.29
2005	74,349,631	99,391.0	228.17
2006	92,822,026	124,085.0	284.86
2007	295,588,987	395,145.0	907.13
2008	302,590,005	404,504.0	928.61
2009	418,643,532	559,645.0	1,284.77
2010	317,788,925	424,822.0	975.26
2011	366,899,807	490,473.7	1,125.97
2012	330,454,192	441,753.0	1,014.13
2013	360,033,662	481,295.0	1,104.90
2014	360,110,712	481,398.0	1,105.14
2015	**301,148,509**	**402,577.0**	**924.19**

B. Environmental Restoration with Reclaimed Water

As part of Pima County's Sustainable Action Plan begun in FY `09, RWRD began tabulating the volume of effluent used for environmental restoration or riparian enhancement at various projects and sites. For some of the listed projects, riparian vegetation is one of the multiple benefits derived from operating a groundwater recharge project.

Environmental Restoration with Reclaimed Water			
Project Name	**Volume in Acre Feet**	**Multibenefit Recharge Project?**	**Comments**
Kino Environmental Restoration Project (KERP)*	0.0		Reclaimed water was not needed for riparian vegetation at the site during the year. KERP's vegetation is usually supported with harvested stormwater, except in particularly dry years.
Lower Santa Cruz Managed Recharge Project	162.2	Yes	This volume represents Pima County's share of the total evapotranspiration (ET) from the managed recharge project. The total ET was 1040.42 AF, and this volume is split among the participants by an agreed upon allocation formula.
Marana High Plains Effluent Recharge Project	4.8	Yes	Delivery of 629.9 AF was diverted from Santa Cruz River. Calculated evapotranspiration of 4.8 AF is the portion of the delivery volume that supports riparian vegetation.
Rillito Riparian/Swan Wetlands*	5.2		Reclaimed water is being used for the establishment of plants that were installed as part of this ecosystem restoration project.
Roger Rd WRF Pond	30.4		This volume is used to support a riparian and wildlife viewing pond adjacent to the Santa Cruz River on-site at the Roger Rd WRF.
Santa Cruz River- West Branch Bosques*	2.6		Small wetland area managed by PCRFCD. Reclaimed water used for vegetation establishment in water harvesting basins adjacent to existing mesquite bosque along West Branch of Santa Cruz River. Previously (2005-2011) provided drought relief for mature bosque vegetation.
Paseo de las Iglesias*	22.6		Project involves bank protection, paved pathway River Park with new vegetation, water harvesting basins and preservation of in-place areas of vegetation/habitat on the Santa Cruz River near Silverlake Road, managed by PCRFCD.
Arroyo Chico*	10.6		Construction of a series of detention basins in Arroyo Chico near Cherry Avenue including athletic fields and environmental restoration of habitat and revegetation within the basins. Managed by PCRFCD.
Annual Total	**238.5**		

*Reclaimed water delivered through COT reclaimed water

IV. Reclaimed Water for Reuse, Environmental Restoration and Underground Storage (Groundwater Recharge) (Continued)

C. Underground Storage (Groundwater Recharge) of Effluent

Pima County operates, or participates in operation of four facilities designed to replenish groundwater supply by recharging the aquifer. The source water for this recharge is wastewater effluent that has been treated to a high quality. Each recharge project operates under an Aquifer Protection Permit issued by ADEQ and an Underground Storage Facility Permit issued by ADWR. The tables below reflect the groundwater recharge credits earned and the most recent balance of Pima County's Long-term Storage Account with ADWR.

Recharge Volumes - Calendar Year 2015 in Acre Feet (AF)

PROJECT	Delivery Volume	Evapo-transpiration	Contribution to Stream Diversions	Outflow	Cut to Aquifer	Recharge Credit
Lower Santa Cruz Managed Recharge Project (LSCMRP)	1,492.84	162.21	281.41	170.94	524.61	524.61
Marana High Plains Effluent Recharge Project (MHPERP)	629.90	4.80				600.00
Corona de Tucson	285.66	1.4				284.26
Avra Valley	493.02	9.0				484.02
Credit Transfer for CMID Pilot GSF						18.00
Total	2,901.42	177.41	281.41	170.94	524.61	1,910.89

Long-term Storage Credit Summary

Year	County Share of Metro Effluent (AF)	County Storage Credits (AF)	Cumulative Credits (AF)
2003	3,999.80	58.10	58.10
2004	4,005.30	449.30	507.40
2005	4,080.70	535.10	1,042.50
2006	4,086.70	532.30	1,574.80
2007	4,009.90	788.38	2,363.18
2008	4,034.00	1,025.89	3,389.07
2009	3,821.10	977.41	4,366.48
2010	3,633.91	1,085.37	5,451.85
2011	3,571.66	990.06	6,441.91
2012	3,319.26	1,131.71	7,573.62
2013	3,237.25	962.69	8,536.31
2014	3,391.99	1,339.37	9,875.68
2015	3,315.63	1,910.89	11,786.57

IV. Reclaimed Water for Reuse, Environmental Restoration and Underground Storage (Groundwater Recharge) (Continued)

D. Summary of Use or Distribution of Pima County's Metropolitan Effluent Allotment

Description			AFY	MG/Yr	MGD
Reuse	Reclaimed System	Natural Resources, Parks and Recreation	814.75	265.49	0.73
		Kino Sports Park & KERP	91.52	29.82	0.08
		Department of Transportation	2.07	0.67	0.00
		Regional Flood Control District	15.78	5.14	0.01
		Regional Wastewater Reclamation	0.07	0.02	0.00
		System Loss (4% in 2014)	36.97	12.05	0.03
		Total from Reclaimed System	961.16	313.19	0.86
	Delivery to CMID pilot GSF		17.96	5.85	0.02
	Reuse on Metropolitan WRF sites		42.82	13.95	0.04
Santa Cruz Releases	Delivered to High Plains Constructed Recharge Project		629.90	205.25	0.56
	Qualified as Delivery to Lower Santa Cruz River Managed Recharge Project (LSCMRP)		1,492.84	486.44	1.33
	PC Share of Outflow from LSCMRP		170.94	55.70	0.15
Effluent Total			**3,315.62**	**1,080.40**	**2.96**

V. Effluent Entitlements

The 1979 IGA and subsequent agreements govern effluent entitlement from the metropolitan facilities. In 2014 the total metropolitan effluent produced was 61,356.3 AF. The effluent allocation formula designated the fixed amount of 28,200 AF for the Bureau of Reclamation to manage under Southern Arizona Water Rights Settlement Act (SAWRSA). Of the remaining portion, the City of Tucson and other water providers received 29,840.6 AF, while Pima County retained 3,315.6 AF.

Entitlement Calculations	Effluent Total (AF)
Total Effluent	61,356.3
SAWRSA	28,200.0
Total Less SAWRSA*	33,156.3
Water Providers Share	0.9
Pima County Share	0.1
Entities Share 2015	
- Water Providers (90%)	29,840.6
- Pima County (10%)	3,315.6

*SAWRSA = Southern Arizona Water Rights Settlement Act.

Allocation and use of effluent in Pima County are governed by a series of agreements and legal constraints. The key agreements are listed and described below:

A. 1979 Intergovernmental Agreement, Resolution No. 1979 - 78

The 1979 Intergovernmental Agreement, signed on June 26, 1979, was the original agreement between Pima County and the City of Tucson. This agreement assigned control of wastewater conveyance and treatment activities to PC RWRD. In exchange, the COT would receive 90% of all effluent produced at the RWRD metropolitan sites, which were limited to Ina Road WRF and Roger Road WRF at the time.

B. Southern Arizona Water Rights Settlement Act (SAWRSA)

SAWRSA stands for the Southern Arizona Water Rights Settlement Act of 1982 (P.L. 97-293) and the subsequent Arizona Water Settlements Act (P.L. 108-451--12/10/2004). The U.S. Department of Interior Bureau of Reclamation receives, on behalf of the Tohono O'Odham Nation, 28,200 acre-feet per year of secondary treated effluent from Tucson area wastewater treatment plants to assist in implementation of the settlement. Reclamation currently recharges this treated effluent in the Santa Cruz River and receives credit for 50% of the water recharged.

C. City of Tucson - Pima County Supplemental Intergovernmental Agreement Relating to Effluent, Resolution No. 2000-28

The 2000 Supplemental Intergovernmental Agreement signed on February 8, 2000, placed restrictions on how PC could use effluent. This agreement also exempted Sub-Regional treatment facilities from the City control, identified the need for reopening the Randolph Park

V. **Effluent Entitlements** (Continued)

C. City of Tucson - Pima County Supplemental Intergovernmental Agreement Relating to Effluent, Resolution No. 2000-28 (Continued)

WRF, and provided an avenue for the County to deliver County effluent to County facilities. This supplemental agreement also established a Conservation Effluent Pool for use with riparian habitat projects and identified how the Southern Arizona Water Rights Settlement Act (SAWRSA) volumes are to be treated in determining effluent allocations.

D. Conservation Effluent Pool Agreement

The Conservation Effluent Pool (CEP), which is a specific quantity of effluent that can be used for conservation projects, was identified in the 2000 Supplemental Intergovernmental Agreement. The CEP agreement was approved by the Board of Supervisors in December 2010 and was approved by the City of Tucson's Mayor and Council in January 2011. The CEP administrative procedures will establish the process for considering CEP requests, address how allocations and apportionments will be made, require an accounting of quantities used, address how CEP water will be delivered and scheduled, and require project status reporting. No CEP water has been used through the reporting year, 2015. However, Pima County has appointed a Conservation Effluent Pool Administrator and a CEP Taskforce has identified 13 prospective sites.

E. Intergovernmental Agreement between the COT and PC for Treating Effluent and Wheeling Reclaimed Water (Wheeling Agreement), Resolution No. 2003-286

The Wheeling Agreement, signed December 16, 2003, governs reclaimed water transactions between RWRD (the effluent provider), COT (the distributor and a reclaimed water user) and other County facilities (reclaimed water users). Effluent enters the reclaimed water system at the COT Sweetwater Plant and formerly through direct delivery from the Randolph Park WRF, where it is piped to various locations. The agreement governs the costs per acre-foot that will be charged to PC by COT for distribution of PC effluent to County sites.

F. Intergovernmental Agreement - Permitting and Operating Managed In-Channel Recharge of Effluent in the Santa Cruz River Channel (Managed Recharge IGA 2003)

The Managed Recharge IGA 2003 governs the recharge of effluent and the associated groundwater storage credits made available from recharging effluent into LSCMRP (Lower Santa Cruz Managed Recharge Project) between the Tres Rios (at that time, Ina Road) WRF and Trico Road in Marana. Participants include the Town of Marana, Cortaro-Marana Irrigation District, Avra Valley Irrigation District, Metropolitan Domestic Water Improvement District, Flowing Wells Irrigation District, Oro Valley, Spanish Trail Water Co, Pima County, and the City of Tucson.

VI. Effluent Generation and Use in the Tucson Active Management Area (TAMA)

ADWR and local water managers often examine the water budget from the perspective of the entire Tucson Active Management Area (TAMA). In order to show the overall picture of effluent production and use for this region, a table is included here that depicts the amount of effluent each entity controlled and how that effluent was utilized. Pima County's wastewater production constitutes the primary source of effluent in the region, but there are a number of other entities that operate treatment facilities. This data is somewhat incomplete in that information is not available for all of the smaller wastewater treatment facilities. However, future reports may be able to capture additional data in this regard, and the majority of effluent generated in the TAMA is represented below.

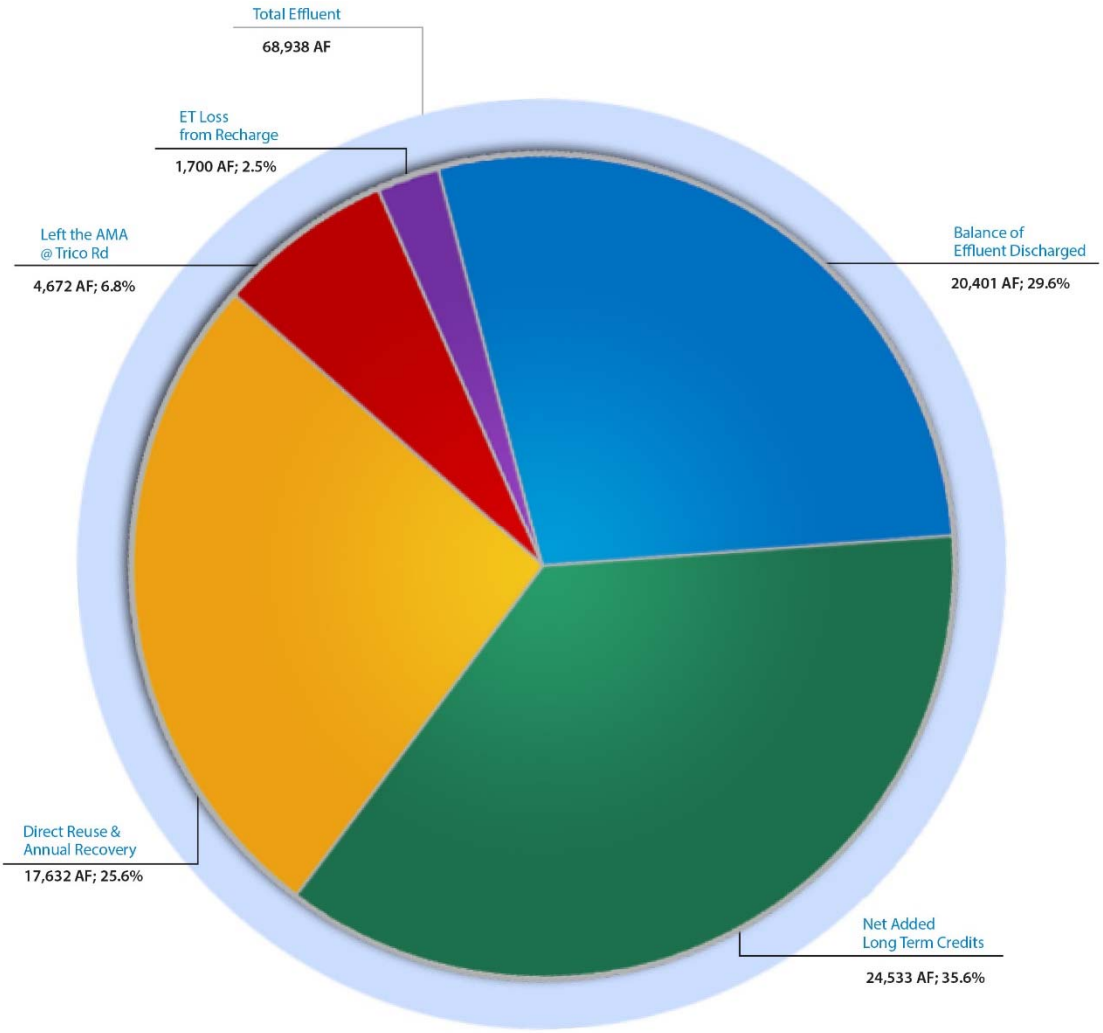


Figure 5: 2015 Tucson AMA Effluent Use and Dispensation

In 2015, the total amount of effluent produced in the TAMA was 68,938 AF. Of this total, a volume of 17,632 AF or 26% was either directly reused or recharged with subsequent recovery for use during the year. Aquifer recharge activity resulted in net accrual of 24,533 AF in long-term storage credit, over 5,000 AF more than what was stored in 2014. Only 7% of the effluent produced, or 4,672 AF, flowed out of the AMA according to measurement at the Trico Road gage on the Santa Cruz River. This volume of outflow was

VI. Effluent Generation and Use in the Tucson Active Management Area (TAMA) (Continued)

lower than in 2014 by more than 5,000 AF. Increased infiltration and dramatically reduced outflow are likely due to improved water quality from upgraded treatment plants and concurrent clearing of organic matter that was plugging sediment in the channel bottom. Additionally, in 2015 Tucson Water diverted more effluent to their Sweetwater recharge basins. Finally, in 2015 a total volume of 20,401 AF or 30% of the effluent was either "cut to the aquifer" from recharge accounting or simply discharged in a manner that it was not accounted for as either reuse or recharge credit.

VI. Effluent Generation and Use in the Tucson Active Management Area (TAMA) (Continued)

Tucson AMA
Annual Effluent Utilization

Entities with Effluent	2015 Effluent Generation & Use in the Tucson AMA (values in acre-feet)												2015 Effluent Recharge Balance Activity			
			Off Channel Recharge (Constructed USF or GSF)				In Channel Recharge						Off Channel Recharge (Constructed USF or GSF)		In Channel Recharge	
	Net Effluent	Off Channel Recharge and Direct Reuse	Delivered to Off-Channel Recharge	Calculated Evapora-tion (ET loss)	Cut to the Aquifer	Annual Recovery	Delivered to In-Channel Recharge	Share of Down-stream Diversions[2]	Calculated Evaporation (ET loss)	Cut to the Aquifer	Outflow at Trico Rd Gage	Annual Recovery	Long-Term Credits Earned/ Reported	Long-term Credits Recovered	Long-Term Credits Earned/ Reported	Long-term Credits Recovered
PC Metropolitan WRFs																
Secretary of the Interior[1]	28,200.0						24,624.7			12,312.3	3,575.4				12,312.3	
Conservation Effluent Pool																
Pima County[3]	3,315.6	1,651.8	629.9	4.8			1,492.8	281.4	162.2	524.6	170.9		600.0		524.6	
City of Tucson[1,4]	25,234.4	15,680.7	10,962.2	83.6	0.0	6,154.1	7,432.4	1,074.8	1,139.2	3,343.4	652.9	0.0	4,724.6	0.0	3,343.4	0.0
Marana	90.0						80.7	15.2	8.8	28.4	9.2	28.4				
Oro Valley	1,949.9	1,949.9														
Metro Water	2,025.0						1,816.9	342.5	197.4	638.5	208.1				638.5	
Flowing Wells	499.1	3.2	360.9	11.7	160.9	1,795.8	445.0	83.9	48.4	156.4	51.0					
Spanish Trail	42.3						38.0	7.2	4.1	13.3	4.4				13.3	
Subtotal	61,356.2	19,285.7	11,953.0	100.1		7,949.9	35,930.4	1,805.0	1,560.0	17,016.9	4,671.8	28.4	5,324.6		16,832.2	0.0
PC Non-Metro WRFs	3,862.5	803.2	778.7	10.4									768.3			
Other Facilities																
Marana WRF	329.1															
Milagro	1.9	1.9														
Marana - Rillito Vista	4.7															
Marana High School	9.5	9.5														
Robson Ranch Quail Creek[5]	1,615.5	1,615.5	1,615.5	7.2									1,608.2			
Saddlebrooke/Saddlebrooke Ranch[6]	504.7	343.4														
Sahaurita	1,116.9	617.3	617.3	22.2												
U of A Tech Park	136.5	136.5														
Effluent Total	68,937.5	22,812.9	14,964.4	139.9		7,949.9	35,930.4	1,805.0	1,560.0	17,016.9	4,671.8	28.4	7,701.1	-	16,832.2	-

Data from Entities with Effluent Entitlements, ADWR, ADEQ, or Corporation Commission records.

[1] In-channel recharge data include credits from both SCRMUSF + LSCRMRP.

[2] Diversion of effluent off-channel is for agricultural use, which also counts as reuse.

[3] Off channel recharge and direct reuse data for Pima County include direct reuse of 1,021.9 af plus 629.9 af directed to constructed recharge.

[4] Off channel recharge and direct reuse data for City of Tucson include direct reuse of 4,718.5 af plus 10,962.2 af directed to constructed recharge.

[5] Robbson recharges effluent from Green Valley WRF. Delivery is the volume reported to ADWR for 2015, but ET and credits earned are estimated.

Summary Table

	AF	% of Total
Effluent Available	**68,937.5**	**100**
Direct Reuse & Annual Recovery	**17,631.7**	**25.6**
Net Added Long Term Credits	**24,533.3**	**35.6**
ET Losses from Recharge	**1,700.0**	**2.5**
Left Tucson AMA (@ Trico Rd)	**4,671.8**	**6.8**
Effluent Balance	**20,400.7**	**29.6**

VII. Glossary of Terms & Acronyms

Acre-foot (AF): A measure of water volume. One acre-foot of water will cover one acre to a depth of one foot and equals 43,560 cubic feet or 325,851 gallons. An acre-foot of water meets the needs of three average Tucson families for one year.
AFY: Acre-feet per year.
AMA or **Active Management Area:** Areas with heavy reliance on mined groundwater were identified and designated as Active Management Areas (AMAs) by the 1980 Arizona Groundwater Management Act. There are five AMAs: Prescott, Phoenix, Pinal, Tucson, and Santa Cruz, where groundwater is subject to state regulation.
Aquifer Protection Permit (APP): ADEQ's permit program to protect groundwater quality from discharging facilities.
Arizona Department of Environmental Quality (ADEQ): State agency responsible for groundwater quality protection, water quality standards, and wastewater reclamation and reuse permits.
Arizona Department of Water Resources (ADWR): State agency responsible for water management and administration of water-related programs within the State.
Arizona Pollutant Discharge Elimination System (AZPDES): Arizona's permit program to protect surface water quality. ADEQ holds NPDES primacy from EPA.
BADCT - Best Available Demonstrated Control Technology – the technical design standard applied by ADEQ in their APP program.
CCF: A water billing unit that equals 100 cubic feet or 748 gallons – this is the typical measure of metering for water delivery volumes for residential and commercial customers.
BNR - Biological Nutrient Removal.
BNRAS - Biological Nutrient Removal Activated Sludge.
BNROD - Biological Nutrient Removal Oxidation Ditch.
Class A Reclaimed Water: Treated wastewater that has undergone secondary treatment, filtration and disinfection to a level that is essentially pathogen-free. The "A" designation established by ADEQ is suitable for outdoor irrigation with unrestricted access and certain industrial uses.
Class A+ Reclaimed Water: Means wastewater that has undergone secondary treatment with nutrient reduction so that total nitrogen is less than 10 mg/l, followed by filtration and disinfection to a level that is essentially pathogen-free. The "A+" designation by ADEQ is suitable for "A" category uses without the need for liners, volume restrictions, and certain reporting requirements.
Class B Reclaimed Water: Treated wastewater that has undergone secondary treatment, and disinfection to meet the Partial Body Contact criteria. The "B" designation by ADEQ is suitable for outdoor irrigation with restricted access, construction, dust control, and livestock watering.
Class B+ Reclaimed Water: Treated wastewater that has undergone secondary treatment with nutrient reduction so that total nitrogen is less than 10 mg/l, followed by disinfection to be meet the Partial Body Contact criteria. The "B+" designation by ADEQ is suitable for "B" category uses without the need for liners, volume restrictions, and certain reporting requirements.
Class C Reclaimed Water: Treated wastewater that has undergone secondary treatment in a stabilization lagoon with aeration. This reclaimed water is suitable for livestock watering of non-dairy animals and irrigation of non-food crops.
Conservation Effluent Pool (CEP): Effluent set aside each year pursuant to an intergovernmental agreement between the City of Tucson and Pima County for use in riparian restoration projects.
Constructed Recharge: Replenishing the aquifer using a facility that is designed and constructed, in-channel, or off-channel, to store water underground pursuant to permits issued by ADWR.
COT: City of Tucson.
Disinfection: The treatment of water to inactivate, destroy, and/or remove disease-producing bacteria, viruses, and other microorganisms.
Effluent: Treated municipal wastewater.

VIII. Glossary of Terms & Acronyms (Continued)

Environmental Restoration: (also referred to as Riparian Restoration, Riparian Enhancement, or Habitat Restoration) Environmental restoration means enhancing existing ecosystems or creating new habitat. The goal of restoration is recovery of some functional characteristics of the ecosystem including plant communities and habitat structure. In most instances replication of historical ecosystems isn't possible, but enhancing vegetation can result in sustainable habitat that helps restore ecosystem function and its support for wildlife and increased biodiversity. Enhancements may also include erosion control, improved water quality and achieving a self-sustaining, functional flow regime.
ET: Evapotranspiration, which accounts for water that is both evaporated and absorbed by plants and transpired into the atmosphere.
GPD: Gallons per day.
Intergovernmental Agreement (IGA): An agreement authorized by state statute between two or more governmental entities that provides for joint action or joint exercise of governmental powers.
KERP: Kino Environmental Restoration Project. The KERP basin is approximately 27 acres of watercourse and riparian habitat within the 120-acre Ajo Detention Basin. This project harvests stormwater and uses reclaimed water for both environmental restoration and irrigation of sports fields and landscape.
LSCMRP: Lower Santa Cruz River Managed Recharge Project.
Managed Recharge: A facility that uses the unmodified natural channel of a stream to artificially recharge and store water underground in an aquifer pursuant to permits issued by ADWR.
Metropolitan (or Metro) Wastewater Reclamation Facility: This term refers to any of the three metropolitan wastewater reclamation facilities operated by RWRD: Ina Rd, Roger Rd, and Randolph Park.
MG: Million gallons.
MGD: Million gallons per day – one means of measuring discharge or flow volume.
MHPERP: Marana High Plains Effluent Recharge Project.
Milligrams per Liter (mg/l): A unit of measure of dissolved or suspended concentration within a fluid that equates to parts per million.
Oxidation Ditch: The oxidation ditch is a component of the wastewater treatment process that provides long-term aeration. It consists of a long channel laid out in an elliptical or circular configuration. The channel is equipped with mechanical aeration equipment, such as brush rotors, disc aerators, draft tube aerators, or fine bubble diffusers. The design generates wastewater flow through the ditch, stirring water in the channel and supplying oxygen. A certain amount of settled solids (sludge) is added into the incoming wastewater in order to activate the bacterial treatment.
PC: Pima County.
Recharge: Water that replenishes an aquifer by surface infiltration or by other natural or induced means.
Reclaimed Water: Means water that has been treated or processed by a wastewater treatment plant (A.R.S. §49-201.31).
Regional Wastewater Reclamation Facility: This term refers to any of the three metropolitan wastewater reclamation facilities operated by RWRD: Ina Rd, Roger Rd, and Randolph Park.
RFCD (or PCRFCD): Pima County Regional Flood Control District.
RWRD (or PCRWRD): Pima County Regional Wastewater Reclamation Department.
Riparian: Pertaining to or situated on the bank of a body of water, especially a river.
Soil-Aquifer Treatment: Use of the physical, chemical, and/or microbiological properties of the soil and the aquifer to provide treatment of water introduced into the groundwater system.
Southern Arizona Water Rights Settlement Act (SAWRSA): 1982 federal legislation to settle water-rights claims of the Tohono O'odham Nation against City of Tucson and several other parties.
Stabilization Lagoons: This type of treatment facility consists of shallow man-made basins comprising a single or several series of anaerobic, facultative or maturation ponds that are operated without aeration. Such ponds allow suspended solids to settle and the soluble element of organic matter (BOD) is reduced through the coordinated activity of algae and heterotrophic bacteria.

VIII. Glossary of Terms & Acronyms (Continued)

Sub-regional: A term used to describe the non-metropolitan wastewater reclamation facilities in Pima County. This group includes Arivaca Junction, Avra Valley, Corona de Tucson, Green Valley, Marana, Mount Lemmon, Pima County Fairgrounds, and Rillito Vista.
Surface Water: Water on the Earth's surface, such as in a stream, river, lake, or reservoir.
Underground Storage: Recharge of the groundwater in a manner that anticipates eventual recovery from the aquifer. In Arizona this usually involves establishing an account with ADWR for tracking short- or long-term storage credits.
USBR: United States Bureau of Reclamation.
UV: Ultra-Violet, which is a band of wavelengths of light that is useful in disinfecting wastewater.
Water Harvesting: The process of intercepting stormwater from a surface, such as a roof, parking area, or land surface, and putting it to beneficial use.
Wheeled Water or Water Wheeling: Water transferred between two agencies whereby one agency uses its system infrastructure to treat and/or convey water that is owned by the receiving agency.
WRF: Wastewater Reclamation Facility.