RECHARGE AND REUSE INVENTORY REPORT

Prepared for

WESTCAPS, Maricopa County, Arizona

November 2006

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Prepared for

WESTCAPS
our west valley water coalition

Prepared by

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LIST OF ABBREVIATIONS AND ACRONYMS

AAW	Arizona American Water Company
ADEQ	Arizona Department of Environmental Quality
ADWR	Arizona Department of Water Resources
AF	acre-feet
AF/yr	acre-feet per year
AFRP	Agua Fria Recharge Project
AMA	ADWR Active Management Area
APP	Aquifer Protection Permit
AWC	Arizona Water Company
AWS	Assured Water Supply
AZPDES	Arizona Pollutant Discharge Elimination System
CAGRD	Central Arizona Groundwater Replenishment District
CAP	Central Arizona Project
CAWCD	Central Arizona Water Conservation District
CCWRP	Cave Creek Water Reclamation Plant
Code	Groundwater Management Code of 1980
GRUSP	Granite Reef Underground Storage Project
GSF	Groundwater Savings Facility
HMRP	Hieroglyphic Mountain Recharge Project
LTSC	Long-Term Storage Credit
MAG	Maricopa Association of Governments
MGD	Million gallons per day
MWD	Maricopa Water District
NAUSP	New River Agua Fria Underground Storage Project
Recharge	Underground Water Storage, Savings and Replenishment Program
RID	Roosevelt Irrigation District
SAT	Soil Aquifer Treatment
SRP	Salt River Project
SRVWUA	Salt River Valley Water Users Association
TDRP	Tonopah Desert Recharge Project
TMP	Third Management Plan
USF	Underground Storage Facility
WESTCAPS	Coalition of West Valley Central Arizona Project Subcontractors
WMC	West Maricopa Combine Water Company
WRF	Water Reclamation Facility
WSRV	West Salt River Valley
WUGB	Water Utility of Greater Buckeye
WUGT	Water Utility of Greater Tonopah
WWTP	Wastewater Treatment Plant

WESTCAPS

Recharge and Reuse Inventory

November 2006

1. INTRODUCTION

The rapidly urbanizing West Salt River Valley (WSRV), historically dependent on groundwater, is facing significant increases in water demand due to this growth. A 1995 study authorized by the Arizona legislature showed that portions of the WSRV have experienced significant groundwater decline resulting in up to 17 feet of land subsidence. In response to this study, Central Arizona Project (CAP) subcontractors in the WSRV formed the West Valley CAP Subcontractors (WESTCAPS) coalition in 1997 to identify and evaluate options to allow its members to use CAP water to which they are entitled. WESTCAPS membership consists of: Arizona American Water Company, Arizona Water Company, City of Avondale, Town of Buckeye, City of Goodyear, City of Peoria, City of Phoenix, City of Surprise and West Maricopa Combine Water Company. In total these members hold 173,729 acre-feet (AF) of CAP water allocations.

In 2001 WESTCAPS published their strategy for CAP utilization (Figure 1), which estimated approximately 104,000 AF per year (AF/yr) of additional renewable water supply would have to be secured by 2025 to meet growing demands. The strategies to meet this growing demand include using existing water treatment plants and constructing new water treatment plants for the direct delivery of CAP water. Additionally, the recharge of CAP and effluent and reuse of effluent were noted as important water management tools to help water providers to meet growing demands. Recharge is increasingly being used to augment supplies in times when excess water supplies are available. Reuse of effluent decreases the overall potable water demand by allocating effluent to non-potable demands.

In 2005 WESTCAPS members requested an inventory of recharge and reuse facilities in the WESTCAPS study area to gain an understanding of how these facilities are being utilized to meet the renewable supply deficit. The goals of this study are the following:

1. Review regulations governing recharge and reuse projects.
2. Identify existing recharge projects, including those not owned by WESTCAPS members, to quantify recharge capacity of the area.
3. Review wastewater treatment plant (WWTP) projects in the WESTCAPS study area, including those WWTPs not owned by WESTCAPS members, to identify total potential effluent capacity and disposal methods in the WESTCAPS study area.
4. Review available water resources plans to identify recharge and reuse utilization potential and plans for WESTCAPS members.
5. Summarize common issues WESTCAPS members face in fully using recharge and reuse capacity.

This study has identified that since the publication of the WESTCAPS Strategic Plan in 2001, WESTCAPS members have steadily begun to directly use and recharge CAP water. In 2005 WESTCAPS members exceeded their use of CAP water allocations through the purchase of excess CAP water, using approximately 192,600 AF for either direct use or recharge.

This study also identified that although WESTCAPS members are utilizing effluent for recharge or reuse, approximately 107,600 AF is being discharged into the Gila River. Discharge of effluent is a lost opportunity to help meet the goals of the Strategic Plan.

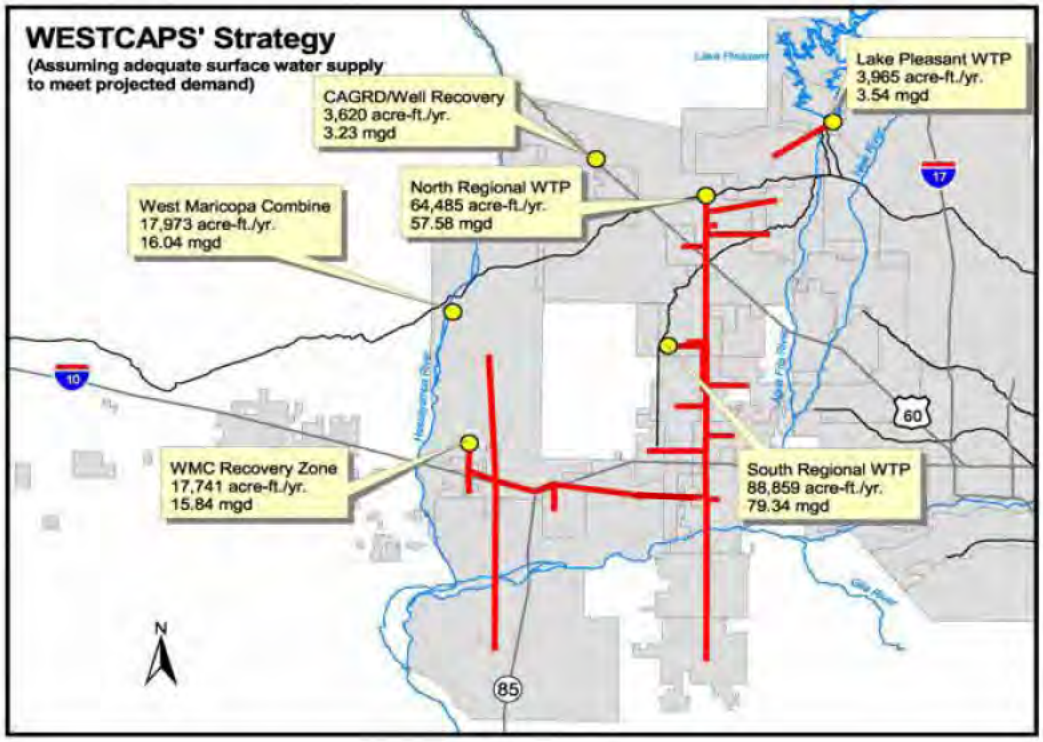


Figure 1. WESTCAPS' Strategy, Developed September 2001

2. REGULATORY ISSUES

2.1 Regulatory Issues Governing Recharge and Reuse

The Arizona Department of Water Resources (ADWR) administers the Underground Water Storage, Savings and Replenishment (Recharge) Program for the recharge of CAP water. For the recharge of effluent, ADWR coordinates with the Arizona Department of Environmental Quality (ADEQ) Aquifer Protection Permit (APP) Program to protect groundwater aquifers. ADEQ also administers the reuse program, which allows water providers to use effluent for non-potable uses and the Arizona Pollutant Discharge Elimination System (AZPDES) program which allows a wastewater treatment plant to discharge effluent into waters of the United States.

2.1.1 Arizona Department of Water Resources

The ADWR regulates the volume of groundwater pumped through the Groundwater Management Code of 1980 (Code). The Code was established to eliminate groundwater overdraft (groundwater mining) in areas where groundwater pumping has led to severe declines in water levels and to provide means for allocating groundwater resources for Arizona's water demand needs. The Code established five Active Management Areas within the state where groundwater level decline was most severe. The Code provided ADWR with more regulatory power within an Active Management Area (AMA). The AMAs are: Phoenix, Tucson, Prescott, Pinal and Santa Cruz.

The Code also created a system of groundwater rights that limits groundwater withdrawals; prohibits development of new irrigated farmland; requires new developments to prove that a long term water supply is available and dependable; and requires the measuring and reporting of groundwater uses for these rights. Management goals were developed for each AMA and these goals were to be met with the implementation of a series of five management plans, each one more stringent than the prior one. The management plans consist of conservation requirements for industrial, municipal and agricultural groundwater users. Currently the Code is operating in its Third Management Plan (TMP), which expires on December 31, 2009.

Other programs developed by ADWR include the Assured Water Supply (AWS) program and the Recharge Program. The AWS Program evolved from the 1973 Water Adequacy Statute to ensure that new developments would have water on a legal, physical and continual basis for 100 years. This program also encourages the use of renewable water resources, such as surface water from the Colorado and Salt/Verde Rivers in lieu of mining groundwater. Another source of water deemed as a renewable resource is effluent that can be used for non-potable uses. Recharge assists the AWS program by replenishing groundwater withdrawn with excess surface water such as CAP water or effluent.

The 1989 Arizona Supreme Court case of John F. Long versus City of Phoenix provided municipalities with the legal basis for putting effluent to reasonable use, including recharge and reuse. The basis of this court case determined that municipalities that treat and discharge wastewater into surface waters do not have to continue to discharge effluent to meet downstream users' needs. Thus, municipalities secured a renewable water resource to use for non-potable purposes.

2.1.1.1 Recharge Program

The Recharge Program was developed as a means of storing excess water supplies when they are available so that participants can recover and use water in the future when excess supplies are not available. Recharge is also important for the Central Arizona Groundwater Replenishment District (CAGRD), who is responsible for replenishing groundwater pumped by water providers under the AWS rules.

Recharge can occur through two primary methods: Groundwater Savings Facility (GSF) or Underground Storage Facility (USF). A GSF works by having an irrigation district work with a CAP contractor to develop a plan of operation to reduce groundwater pumping and utilize surface water "in-lieu" of pumping. The supplier of the surface water thereby earns credits on the "saved" groundwater. The same concept can be applied using effluent.

A USF works by physically adding water to the aquifer. There are two types of USFs: Constructed and Managed. A "constructed" facility may utilize spreading basins or injection wells to artificially recharge water. A "managed" facility is a recharge project located within a stream bed where water is allowed to infiltrate into the aquifer at its own rate. A USF storing CAP water is exempt from the APP program, but a USF recharging effluent must acquire an APP through ADEQ.

Considerations for permitting a USF are:

- The applicant has technical and financial capability to construct and operate a facility
- The proposed recharge is hydrologically feasible. Recharge is not limited because of geologic and hydrogeologic features (i.e. hard rock, clay and water mounding)
- Storage at the proposed facility will not cause unreasonable harm to surrounding land and water users.

A Water Storage permit is required to store at any permitted facility and allows for the accrual of recharge credits. Water can be stored to earn long term storage credits (LTSC) or can be stored and recovered within the same calendar year (annual credits), depending on the legal character of the stored water and other requirements including whether or not the water could have been reasonably used directly. Waters eligible for LTSC are CAP water and effluent. Surface water from the Salt River Project (SRP), composed of water from the Salt and Verde Rivers, is not eligible for LTSC but may be stored and recovered annually. Groundwater and storm water cannot be recharged for credits. Figure 2 shows how CAP water LTSC are calculated.

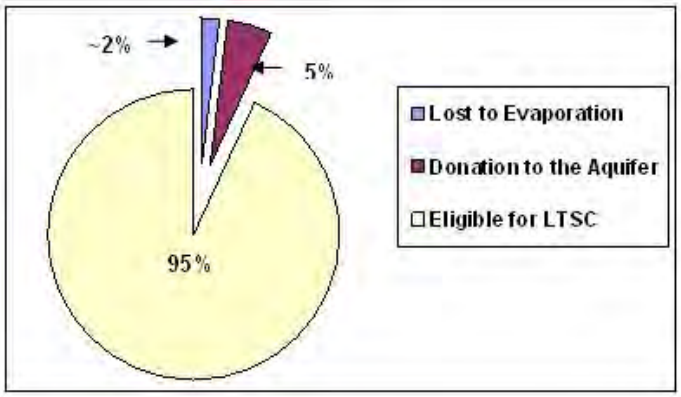


Figure 2. LTSC Calculations

Storers of effluent at a managed USF may only recover 50 percent of the water delivered to the managed facility.

Recovery is the last component of the Recharge Program. Recovery Well permits are required to recover LTSC or annual storage credits. Recovery can occur anywhere within the same AMA, as long as recovery does not harm existing land and water users and recovery is consistent with the AMA management plan. Therefore, recharge can occur outside of the WESTCAPS study area but water can be recovered within the WESTCAPS study area.

2.1.2 Arizona Department of Environmental Quality

The ADEQ is mandated to protect and enhance public health and the environment in Arizona and administers programs developed to protect air, land and water. With jurisdiction over safe drinking water and wastewater programs, ADEQ works together with ADWR to ensure that safe quality water is available for the future.

2.1.2.1 Aquifer Protection Permit

The APP Program was developed for protecting groundwater quality. Any facility that discharges directly into an aquifer or land surface that has the potential to pollute an aquifer must operate in accordance with the APP program. Facilities required to attain APPs include most septic tank and leach field systems, mines, industrial facilities and most WWTPs. Effluent recharge facilities also require an APP. Only Class A+, A, B+ or B effluent can be recharged.

WWTP plants can be designed and permitted to treat wastewater to one of the five different classes as illustrated in Table 1.

Table 1. Classes of Effluent

Class	Chemical Characteristics
A+	▪ Secondary treatment to remove or deuce volume of organic material in sewage through bacterial digestion ▪ Nitrogen removal treatment to total nitrogen: <10 mg / L ▪ Chemical feed facilities ▪ Filtration ▪ Disinfection
A	▪ Secondary treatment ▪ Chemical feed facilities ▪ Filtration ▪ Disinfection
B+	▪ Secondary treatment ▪ Nitrogen removal treatment to total nitrogen: <10 mg / L ▪ Disinfection
B	▪ Secondary treatment ▪ Disinfection
C	▪ Secondary treatment

2.1.2.2 Reuse Permits

Reuse is the direct use of effluent for non-potable purposes such as irrigation of golf courses, agricultural lands or construction water purposes. Direct reuse of effluent recycles non-potable water for beneficial uses, thereby conserving potable water resources for potable uses. The reuse program regulates the sites where effluent is reused and the quantities that are reused according to the class of effluent. Table 2 shows the different classes of effluent and their permitted usage.

To use effluent for non-potable irrigation a new distribution system must be constructed. New infrastructure can be costly to construct and should be a significant consideration when water providers are considering implementing a reuse plan.

Table 2. Allowed Non-Potable Usage per Effluent Class

Effluent Class	Food Crop/Crop Irrigation	Landscape/Turf Irrigation	Restricted Irrigation Uses*	Recharge	Livestock Watering (non-dairy animals)	Construction Water
A+	√	√	√	√	√	√
A	√	√	√	√	√	√
B+			√	√	√	√
B				√	√	√
C					√	√

**Restricted Irrigation Uses is defined as not irrigating while people are on turf.*

2.1.2.3 Arizona Pollutant Discharge Elimination Systems

In 2002 Arizona was authorized primacy by the U.S. Environmental Protection Agency to operate the National Pollutant Discharge Elimination System program. The AZPDES Permit Program regulates facilities discharging into waters of the United States. For WWTPs that discharge into surface waters AZPDES permits require effluent to be monitored for the protection of aquatic life. This program requires that sensitive invertebrates, fish and algae be subjected to varying effluent concentrations, to confirm the presence or absence of toxicity. This is then used as an indicator of potential in-stream impacts on aquatic life.

3. RECHARGE AND WASTEWATER TREATMENT PLANT CAPACITY

3.1 Recharge and Wastewater Treatment Plant Capacity in the WESTCAPS Study Area

To assist in identifying total capacity of recharge for WESTCAPS members, recharge projects and capacities were identified. Recharge sites include projects outside of the WESTCAPS study area but are sites where WESTCAPS members are permitted for water storage. Recharge projects owned by WESTCAPS members are discussed in Section 4.0.

Effluent availability for the entire WESTCAPS study area, including water providers who are not members of WESTCAPS, were also identified. This was done because several WESTCAPS members share WWTP capacity with other municipalities.

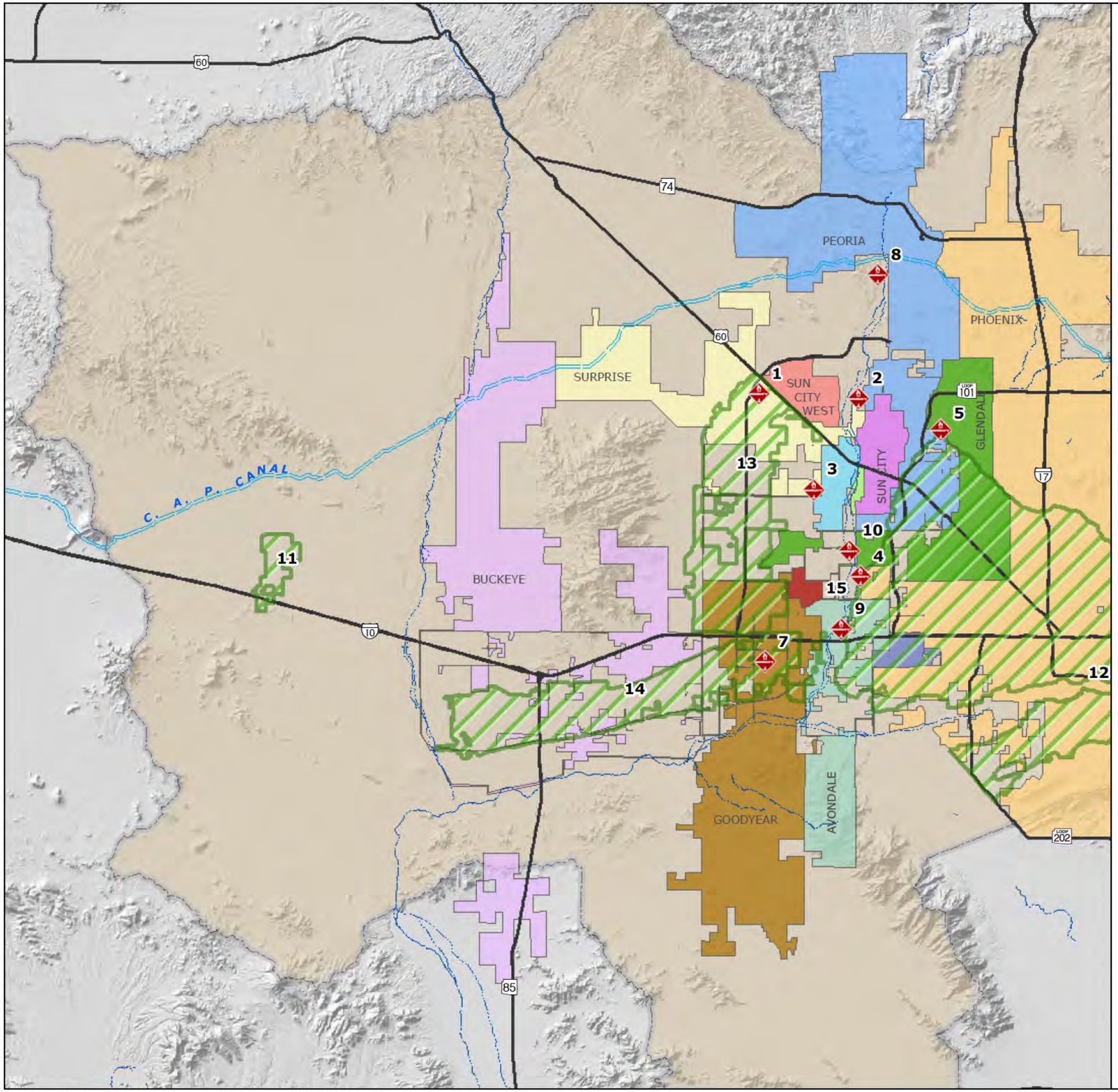
3.1.1 Recharge Project Capacity

Figure 3 shows that in 1996 fifteen recharge facilities were proposed or existing in the WESTCAPS study area. By 2006 32 facilities in the WESTCAPS study area have been permitted or are proposed (Figure 4). This significant increase in the number of proposed facilities illustrates the importance of recharge to WSRV water supplies.

Current total recharge capacity available to WESTCAPS members is approximately 932,500 AF. Table 3 identifies several recharge projects where WESTCAPS members have water storage permits. Please note that the Granite Reef Underground Storage Project is not within the WESTCAPS study area but several members of WESTCAPS have obtained water storage permits at this facility.

Table 3. Large Scale Regional Recharge Projects

Permit Holder	Facility	Permit Number	Permitted Capacity (AF)
CAWCD	Agua Fria Recharge Project	71-569775 and 71-569776	100,000
	Hieroglyphic Mountains Recharge Projects	71-584466	35,000
	Tonopah Desert Recharge Project	71-593305	150,000
SRP	Granite Reef Underground Storage Project	71-516371	200,000
	New River Agua Fria Recharge Project	71-588558	75,000
	Salt River Project GSF	72-553133	200,000



RECHARGE SITES

1	USF	Del Webb Sun City Grand
2	USF	Del Webb Sun City West
3	USF	Surprise WWTP
4	USF	SRP NAUSP
5	USF	Skunk Creek
6	USF	Pima Utilities
7	USF	Goodyear WWTP
8	USF	Agua Fria
9	USF	City of Avondale/Wetlands
10	USF	Glendale Aquifer
11	GSF	Tonopah ID
12	GSF	SRP
13	GSF	MWD
14	GSF	Roosevelt ID
15	GSF	LPSCO

EXPLANATION

- Recharge Point
- GSF Site
- River
- Canal
- Phoenix AMA

0 2.5 5 10
Miles

LOCATOR MAP

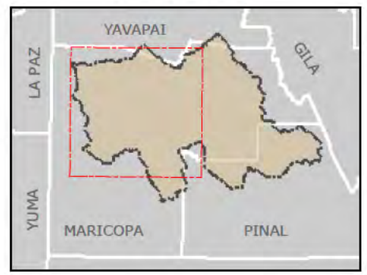
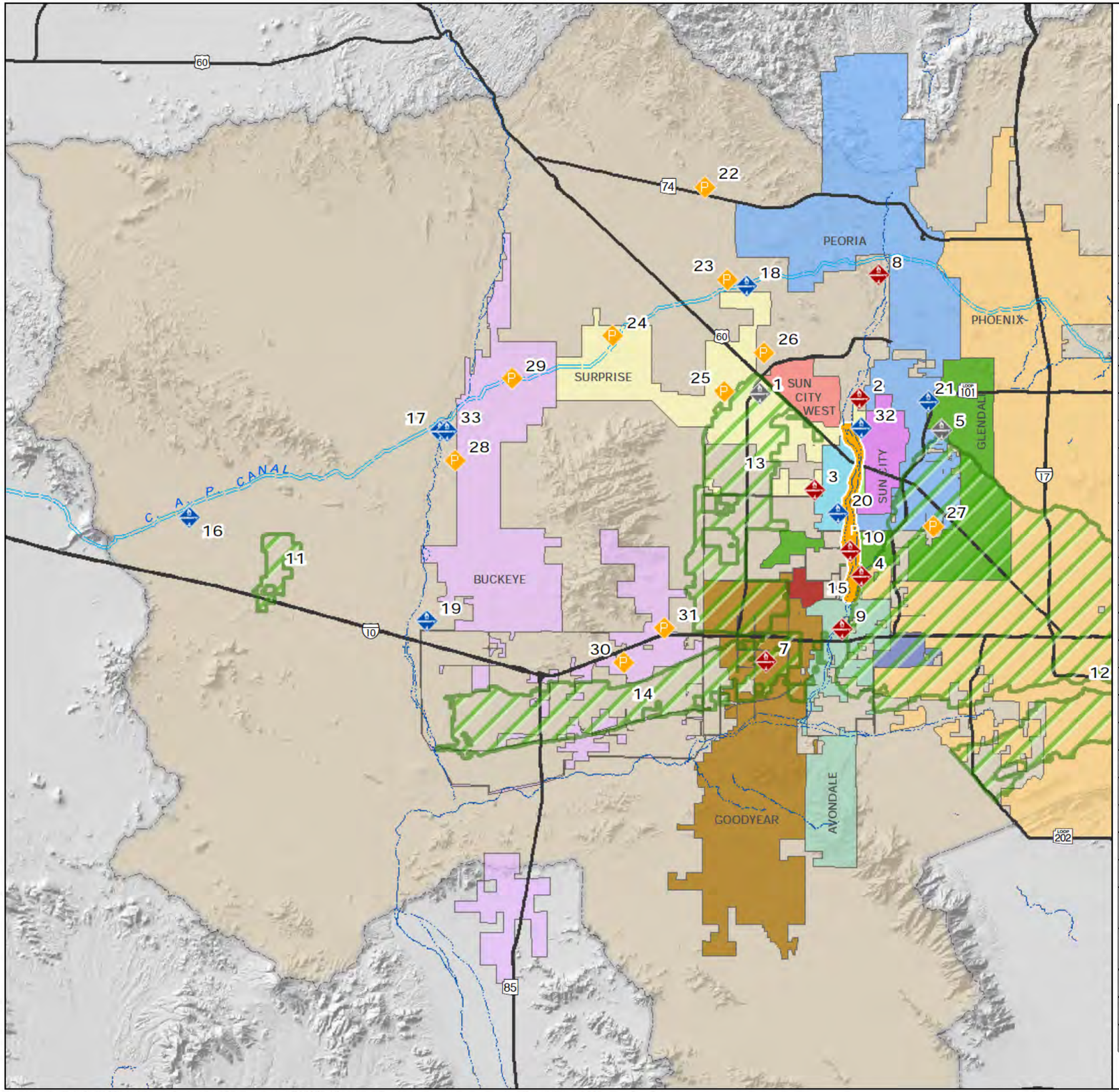


FIGURE 3

1996
PROPOSED AND EXISTING RECHARGE SITES IN WESTCAPS PLANNING AREA

BROWN AND CALDWELL



RECHARGE SITES

1	USF	Del Webb Sun City Grand (Expired)
2	USF	Del Webb Sun City West
3	USF	Surprise WWTP
4	USF	SRP NAUSP
5	USF	Skunk Creek (Expired)
6	USF	Pima Utilities
7	USF	Goodyear WWTP
8	USF	Agua Fria
9	USF	City of Avondale/Wetlands
10	USF	Glendale Aquifer
11	GSF	Tonopah ID
12	GSF	SRP
13	GSF	MWD
14	GSF	Roosevelt ID
15	GSF	LPSCO
16	USF	CAWCD Tonopah
17	USF	West Maricopa Combine (W)
18	USF	CAWCD Hieroglyphic Mts.
19	USF	Buckeye Tartesso
20	USF	El Mirage
21	USF	Glendale Arrowhead
22	USF	Proposed SPA6 (Surprise)
23	USF	Proposed SPA4 (Surprise)
24	USF	Proposed SPA5 (Surprise)
25	USF	Proposed SPA3 (Surprise)
26	USF	Proposed SPA2 (Surprise)
27	USF	Proposed Butler WRF (Peoria)
28	USF	Proposed Trillium (Buckeye)
29	USF	Proposed Festival Ranch (Buckeye)
30	USF	Proposed Sundance (Buckeye)
31	USF	Proposed Verado (AAW)
32	USF	Peoria Beardsley
33	USF	West Maricopa Combine (E)

EXPLANATION

- Recharge Point
- 2006 Recharge Point
- Proposed Recharge Point
- Expired Recharge Point
- P — Proposed Recharge Area
- GSF Site
- River
- Canal
- Phoenix AMA

0 2.5 5 10
Miles

LOCATOR MAP

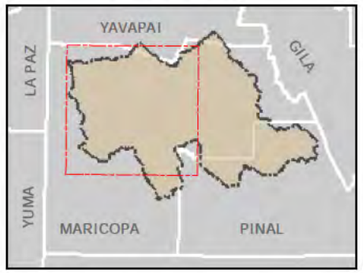


FIGURE 4
2006
PROPOSED AND EXISTING RECHARGE SITES IN WESTCAPS PLANNING AREA

BROWN AND CALDWELL

Table 3. Large Scale Regional Recharge Projects			
Permit Holder	**Facility**	**Permit Number**	**Permitted Capacity (AF)**
MWD	Maricopa Water District GSF	72-8558246	40,000
RID	Roosevelt Irrigation District GSF	72-572386	30,000
Tonopah	Tonopah Irrigation District GSF	72-534439	15,000
Total			**830,000**

Source: Semi Annual Status Report, December, 2005 by Arizona Department of Water Resources

The location and other pertinent information pertaining to these sites are summarized below:

- Agua Fria Recharge Project (AFRP). The AFRP is located near the City of Peoria approximately four miles downstream of Lake Pleasant. The site is owned by the Central Arizona Water Conservation District (CAWCD). The facility consists of a "managed" facility (4 mile stretch of the Agua Fria River) with a "constructed" facility consisting of a conveyance canal to route water to 100 acres of spreading basins. The total permitted recharge capacity is 100,000 AF/yr. Planning for the AFRP began in 1996, with operation beginning in 2001.
- Hieroglyphics Recharge Project (HMRP). The HMRP is owned by CAWCD and is located west of the intersection of 163rd Avenue and the CAP canal. The project has an annual permitted recharge capacity of 35,000 AF/yr. The HMRP project consists of three basins covering approximately 38 acres along the CAP canal. This project was permitted in 2003.
- Tonopah Desert Recharge Project (TDRP). The TDRP is also owned by CAWCD and is located approximately 40 miles west of the City of Phoenix. The TDRP consists of approximately 541.8 acres, divided into nineteen basins adjacent to the CAP canal and is permitted for a maximum storage of 2,000,000 AF after 20 years. This project was permitted in 2005.
- Granite Reef Underground Storage Project (GRUSP) is located in the East Salt River Valley and is permitted for 200,000 AF of CAP and Salt/Verde River Waters. The cities of Peoria and Phoenix have water storage permits at this facility.
- New River Agua Fria Underground Storage Project (NAUSP). The NAUSP is expected to be completed in 2006 and will be permitted to store 75,000 AF/yr of Salt, Verde and CAP water along with effluent from the cities of Glendale and Peoria. NAUSP is located within the Glendale city limits and consists of 7 basins covering 125 acres.
- Salt River Valley Water Users Association (SRVWUA) GSF. The SRVWUA GSF is located within the boundaries of the SRVWUA irrigation district. This facility is permitted for recharge of 200,000 AF/yr of CAP water.
- Maricopa Water District (MWD) GSF. The MWD GSF is located within the boundaries of the MWD irrigation district is permitted for recharge of 40,000 AF/yr of CAP water.
- Tonopah Irrigation District GSF is permitted for recharge of 15,000 AF/yr of CAP water.
- Roosevelt Irrigation District (RID) GSF is permitted for 30,000 AF/yr of effluent from the City of Phoenix.

Table 4 identifies current recharge projects owned and operated by WESTCAPS members. These facilities are discussed in further detail in Section 4.0.

Table 4. Recharge Projects Owned by WESTCAPS Members		
Permit Holder	**Facility**	**Permitted Capacity (AF)**
Arizona American Water	Sun City West	5,600
Avondale	Avondale Recharge	15,000
Buckeye	Tartesso Recharge Project	20,163
Goodyear	Goodyear/SAT Facility	3,360
Peoria*	Beardsley Road Wastewater Treatment Plant	10,529
City of Phoenix	Phoenix	3,871
	Tramonto Recharge Facility**	1,935
	Cave Creek Wastewater Reclamation Plant Recharge Facility**	8,961
Surprise	City of Surprise South WWTP	8,066
West Maricopa Combine	WMC Managed USF (West)	25,000
	WMC Managed USF (East)	25,000
Total		**127,485**

**Averaged annual permitted volume over 20 years.*
***Outside of WESTCAPS Study Area.*

Table 5 identifies WESTCAPS members water storage capacity at the existing recharge projects and how much was recharged in 2005.

3.1.2 Effluent Production in WESTCAPS Study Area

The Maricopa Association of Governments (MAG) is responsible for developing the regional water quality management planning for pollution control in accordance with Section 208 of the Clean Water Act. The MAG 208 Plan was written for the following:

- Identify 20-year wastewater treatment needs
- Establish a regulatory program to implement treatment needs
- Identify the agencies which will implement the plan
- Identify sources and methods to control non-point source pollution from agriculture, mining, construction and residual wastes.

The MAG 208 Plan was updated in 2002 and assembles data from cities and towns on the current and proposed wastewater collection and treatment system for Maricopa County through the year 2020. Table 6 identifies the current and planned facilities, capacities and the effluent disposal option for WWTPs in the WESTCAPS study area.

Total WWTP capacity identified through the 208 Plan for the WESTCAPS Study area in 2005 is approximately 379,000 AF. MAG WWTP capacity projections for 2020 are estimated to be about 696,000 AF.

ADWR requires municipal water providers to report effluent produced, received, delivered, reused, recharged or discharged within their service areas. Table 7 lists effluent treated by WESTCAPS members in 2005. Note that this volume includes effluent created outside of the WESTCAPS study area and effluent that cannot be accounted for because of regional WWTPs.

Table 5. WESTCAPS Water Storage Permits

Permit Holder	CAP Allocation	Facility	Type of Water	Permit Type	Permitted Capacity (AF)	Recharged 2005 (AF)
Arizona American Water		Sun City West	Effluent	USF	5,600	2,590
Sun City	4,189	Maricopa Water District-Sun City	CAP	GSF	4,189	4,189
Sun City West	2,372	Maricopa Water District-Sun City West	CAP	GSF	2,372	2,372
Agua Fria	11,093	Maricopa Water District-Agua Fria	CAP	GSF	11,093	7,600
Subtotal						**16,751**
Arizona Water Company	6,000	N/A	N/A	N/A		
Subtotal						**0**
Avondale	5,416	Wetlands of Avondale	CAP & SRP	USF	15,000	7,003
		Agua Fria Recharge Project Managed Facility	CAP	USF	100,000	5,500
		Agua Fria Recharge Project Constructed Facility	CAP	USF		
		Hieroglyphic Mountains Recharge Projects	CAP	USF	35,000	6,601
Subtotal						**19,104**
Buckeye	25	Tartesso Recharge Project	CAP	USF	20,163	0
Subtotal						**0**
Goodyear	3,531	Goodyear/SAT Facility	Effluent	USF	3,360	2,325
		Agua Fria Recharge Project Managed Facility	CAP	USF	100,000	500
		Hieroglyphic Mountains Recharge Projects	CAP	USF	35,000	500
		Tonopah Irrigation District	CAP	GSF	15,000	9,324
		Maricopa Water District	CAP	GSF	40,000	3,000
		LPSCO	Effluent	GSF	840	0
Subtotal						**15,649**
Peoria	19,709	Beardsley Road Wastewater Treatment Plant	Effluent	USF	210,580	2,218
		Agua Fria Recharge Project Managed Facility	CAP	USF	100,000	7,120
		Agua Fria Recharge Project Constructed Facility	CAP	USF		
		Hieroglyphic Mountains Recharge Projects	CAP	USF	35,000	7,375
		Granite Reef Underground Storage Project	SRP	USF	200,000	0
		New River Agua Fria	Effluent	USF	75,000	0
		SRP	SRP	GSF	200,000	0
Subtotal						**16,713**
Phoenix	113,914	SRP	SRP	GSF	200,000	0
		Granite Reef Underground Storage Project	CAP	USF	200,000	0
		Roosevelt Irrigation District	Effluent	GSF	30,000	33,788
Subtotal						**33,788**
Surprise	7,373	City of Surprise South WWTP	Effluent	USF	8,066	636
Subtotal						**636**
West Maricopa Combine	107	WMC Managed USF (West)	CAP	USF	25,000	0
		WMC Managed USF (East)	CAP	USF	25,000	
Subtotal	**173,729**					**0**
Total						**102,641**

Source: Semi Annual Status Report, December 30, 2005 by Arizona Department of Water Resources

Table 6. Planned and Existing West Valley Wastewater Facilities

Permit Holder	Facility	Capacity 2005 (mgd)	Capacity 2020 (mgd)	Capacity 2005 (AF)	Capacity 2020 (AF)	Current or Planned Effluent Disposal
Arizona American Water Co.	Sun City West	5	6.44	5,601	7,214	Groundwater recharge
	Verrado WRF	0.5	3.4	504	3,752	Landscape irrigation and recharge
Arizona Water Company	N/A			0	0	
Avondale	Avondale WWTP	6	20	6,721	22,403	Discharge to the Agua Fria River
	Northside Reclamation Plant		6	0	6,721	Landscape irrigation, aquifer storage/recovery
	Package WWTP Plant south of the Gila River		1.0	0	1,120	Landscape irrigation, aquifer storage/recovery
Buckeye	Central Buckeye WWTP	1.5	16.6	1,680	18,594	Discharge to Arlington Canal, eventual reuse of 40 mgd
	Trillium	0.32	11	358	12,322	Next upgrade is 3.2 mgd to final of capacity of 11. Reuse/ Recharge
	Tartesso	4	4	4,481	4,481	Landscape reuse/recharge for excess
	Palo Verde Road WWTP	0.25	10.2	280	11,425	Irrigation/recharge
	Sundance WWTP	2.3	8.2	2,576	9,185	Landscape irrigation, recharge, discharge to Roosevelt Irrigation District Canal
	Festival Ranch WRF	1.0	4.0	1,120	4,481	Landscape irrigation/Recharge
El Mirage	El Mirage WWTP	3.6	3.6	4,033	4,033	Reuse or discharge into Agua Fria
Glendale	Arrowhead Ranch	4.5	4.5	5,041	5,041	Landscaping irrigation; Recharge up to 2.3 mgd of excess effluent during winter
	West Area WRF	4.3	15	4,817	16,802	Recharge to West Area Recharge Facility
	Russell Ranch WWTP	0.06	0.4	67	448	Recharge/reuse for landscaping irrigation, merge to West Area WRF in future
Goodyear	Corgett Basin WRF	0.8	2.8	896	3,136	Landscape irrigation, groundwater recharge
	City of Goodyear WWTP	3	12	3,360	13,442	Landscape irrigation, groundwater recharge
	Rainbow Valley WRF	0.75	16	840	17,922	Landscape irrigation, groundwater recharge
LPSCO	Palm Valley WRF	4.1	8.2	4,593	9,185	Landscape irrigation, groundwater recharge
	Sarival WRF	4.1	8.2	4,593	9,185	Landscape irrigation, groundwater recharge
Peoria	Beardsley Road WRF	3.0	16	3,360	17,922	Groundwater recharge
	Butler WRF	0.0	13	0	14,562	Recharge at NAUSP and on-site vadose zone wells
	Jomax WRF	0.75	9.0	840	10,081	Groundwater recharge/surface discharge
Phoenix	Cashman Park			0	0	
	Cave Creek WRP	18.0	32	20,163	35,845	Deliver to golf courses and parks, or discharge to a tributary wash of Cave Creek Wash
	North Gateway WRP	4.0	32	4,481	35,845	Discharge to Skunk Creek aquifer recharge and/or reused for turf irrigation
	23rd Avenue WWTP	63	78	70,569	87,371	Discharge to a Roosevelt Irrigation District GSF canal or to the Salt River
	91st Avenue WWTP	179.25	179.25	200,786	200,786	Deliver to Palo Verde Nuclear Generating Station as cooling water and discharge to the Salt River for delivery to Buck Irrigation Company for reuse
	Desert Willow Park			0	0	Landscaping irrigation
Surprise	South Water Reclamation Facility	3.2	36	3,584	40,325	Groundwater recharge
	Desert Oasis WWTP	0.35		392	0	Reuse for on site disposal, decommissioned with SPA2 on-line
	SPA 2 Regional WRF	1.2	10.5	1,344	11,762	Groundwater recharge, landscaping irrigation
	SPA 3 Regional WRF	1.8	30	2,016	33,604	Groundwater recharge and/or discharge or Agua Fria River
Tolleson	Tolleson WWTP	17.9	24	20,051	26,883	Effluent sent to Palo Verde Nuclear Generating Station, 10% of effluent reused at WWTP
Source: 208 Water Quality Management Plan, Oct. 2002		338.48	621.24	379,146	695,878	

Table 7. WESTCAPS Members Effluent Production Reported to ADWR in 2005

WESTCAPS WWTP	Effluent Produced (AF)	Effluent Recharged (AF)	Effluent Reused (AF)
Arizona American Water	2,590	2,590	0
Avondale	4,462	4,462	0
Buckeye	621	0	0
Goodyear	3,150	2,324	116
Peoria	2,307	2,189	81
Phoenix*	218,926	33,788	78,921**
Surprise	5,673	683	4,990
Total	**237,729**	**46,037**	**84,108**

**Includes effluent quantities from Cities of Glendale, Mesa, Scottsdale, Tempe and Phoenix. Also includes effluent from Cave Creek Water Reclamation Facility located outside of WESTCAPS study area.*

***Majority of effluent is used at the Palo Verde Nuclear Generating Station.*

Effluent created outside of the WESTCAPS study area is treated at the 91st Avenue WWTP, operated by the City of Phoenix. This plant treats Phoenix effluent along with effluent from the cities of Glendale, Mesa, Scottsdale and Tempe. The City of Phoenix also treats effluent at the Cave Creek Water Reclamation Facility, which is located outside of the WESTCAPS study area.

Effluent not accounted for in Table 7 includes:

- Effluent created from Arizona Water Company and West Maricopa Combine water service areas (located within Buckeye municipal boundaries) are treated by Buckeye.
- Arizona American Water owns and operates three service areas in the WESTCAPS study area, the Sun City, Sun City West and Agua Fria service areas. Arizona American Water operates the Sun City West WWTP and recharges this effluent. Wastewater from the Sun City service area is treated at the Tolleson WWTP along with a portion of wastewater from the City of Peoria. A portion of wastewater created in the Agua Fria service area is treated at the Verrado WWTP but the remaining effluent is treated by the City of Surprise.

4. WESTCAPS MEMBERS CURRENT UTILIZATION

4.1 WESTCAPS Members Current Utilization of Recharge and Reuse, and Future Plans

WESTCAPS members are currently using recharge and reuse of effluent to meet the goals of WESTCAPS strategic plan. This section identifies how each member is currently using recharge and reuse and their future plans for recharge and reuse.

4.1.1 Arizona American Water

Arizona American Water (AAW) operates Sun City, Sun City West and Agua Fria service areas in the WESTCAPS study area. All of these service areas have CAP water allocations which are recharged at the MWD GSF.

Effluent for the Sun City service area is treated at the Tolleson WWTP. The current contract is for 8 million gallons per day (MGD) and will expire in 2016. AAW operates the Northwest Valley Water Reclamation Facility which treats effluent for the Sun City West service area. Effluent from this facility is recharged through 110 acres of recharge basins. Effluent from the portions of the Agua Fria service area located north of Peoria Avenue goes to the City of Surprise WWTP. Effluent south of Peoria Avenue goes to either the Litchfield Park Service Company WWTP or the Verrado WWTP.

Future plans for AAW's CAP allocations are to continue to recharging CAP water at MWD until MWD is urbanized. Once MWD is urbanized, AAW will contract with CAWCD to recharge at one of their WSRV facilities. Timing of this change depends on how quickly MWD is urbanized. Future plans for AAW effluent are to renew the contract with Tolleson WWTP after 2016 for Sun City service area effluent. Recharge of effluent will continue within the Sun City West service area. At this time AAW only plans on using effluent for reuse in the Verrado master planned community and plans to recharge in the winter months when effluent is not being reused.

4.1.2 Arizona Water Company

Arizona Water Company (AWC) operates two potable water service areas in the Phoenix AMA. The AWC White Tanks service area is located in the WESTCAPS study area and the Apache Junction service area is located in the eastern part of the Phoenix AMA (outside of WESTCAPS study area). AWC has a 6,000 AF CAP allocation which it uses for direct delivery in the Apache Junction service area. No current CAP allocation is in place in the west valley. The White Tanks service area currently pumps groundwater.

AWC is strictly a water provider and does not recharge water or reuse effluent.

4.1.3 Avondale

Avondale has a CAP allocation of 5,416 AF and purchases an additional 5,000 AF in excess CAP water that is recharged at CAWCD facilities (AFRP and HRP). Avondale also purchases excess CAP water for recharge at the CAWCD facilities.

Avondale operates a 4 MGD WWTP that treats effluent to Class B+ standards. Avondale must discharge 1 MGD of its effluent into the Agua Fria River due to permitting issues with the Army Corp of Engineers in order to maintain stream flow for vegetation. Remaining effluent and SRP water are recharged at the Avondale Recharge facility. The facility is permitted for 15,000 AF and is composed of the Crystal Gardens Wetlands facility that is used to treat high nitrate SRP water and 28 acres of recharge basins. Avondale is located north of the area known as the "waterlogged area" per Section 2.3.10 of the ADWR TMP and Arizona Revised Statute (A.R.S.) § 45-411.01. Depth to groundwater in this waterlogged area is as shallow as 10 feet below land surface and the TMP acknowledges that this area is has high concentrations of salinity which can be over 2,500 mg/L. With its location adjacent to the waterlogged area, Avondale occasionally has water levels mounding at the recharge facility with water levels reaching the alert level of fifteen feet below land surface. The mounding issues prevent Avondale from expanding this facility or utilizing vadose zone injection wells.

Avondale is planning to move its current recharge of SRP water storage from the Avondale Recharge facility to the NAUSP. Avondale has tentatively discussed an additional recharge facility at the Agua Fria River and Interstate (I) 10, but existing sand and gravel facilities located in the Agua Fria likely prevent further development of the site.

Future expansion plans include upgrading the treatment plant to produce effluent to Class A+ standards with a build out capacity of 14 MGD. Avondale is considering effluent reuse strategies for some regional parks, one golf course within its service area and irrigation of common areas at a new master planned community (pending WWTP producing Class A+ effluent). Providing effluent for reuse within existing communities' common areas is not being considered due to the high cost of infrastructure to deliver relatively small volumes of effluent.

4.1.4 Buckeye

Buckeye has a CAP allocation of 25 AF/yr and is not currently using or recharging this allocation. Recharge within Buckeye town limits is currently limited because the majority of development exists south of I-10 which is in the "waterlogged area."

Buckeye has plans on recharging and/or reusing all effluent generated within its town limits but to date has not set this as Town of Buckeye code. It is anticipated that new WWTPs constructed in the rapidly developing northern section of Buckeye will reuse effluent for the irrigation of golf courses or other common areas. Recharge is planned for storage of effluent when demand for reuse is low (see Figure 4 for proposed recharge locations).

4.1.5 Goodyear

Goodyear has a 3,531 AF allocation of CAP water that can be recharged at the MWD GSF, the Agua Fria Recharge Project (AFRP), Hieroglyphic Mountain Recharge Project (HMRP) or Tonopah GSF. Additionally, Goodyear purchases excess CAP water that is recharged at AFRP, HMRP or Tonopah GSF.

Goodyear's 3 MGD Water Reclamation Facility (WRF) produces Class A+ effluent and is being expanded to 5 MGD. The majority of effluent produced at this WRF is recharged at the Goodyear Soil Aquifer

Treatment (SAT) recharge project. This facility is located north of the waterlogged area but does not currently experience mounding issues, although brackish groundwater is encountered in the area.

A small portion of Goodyear effluent is reused at the Palo Verde Nuclear Generating Station and for landscape irrigation at the WRF. Goodyear is planning expansion of reuse strategies within its service area.

4.1.6 Peoria

Peoria has a 19,709 AF allocation of CAP water of which some is directly treated and delivered for potable purposes. CAP water that is not directly delivered is recharged at CAWCD's AFRP or HMRP. Peoria has about 9,000 AF per year of capacity at the AFRP and about 4,000 AF/yr at HMRP.

Wastewater from Peoria is treated at three WWTPs: the City of Tolleson WWTP, which serves the areas south of Beardsley Road; the Beardsley Road WRF, which serves areas north of Beardsley Road and east of the Agua Fria River; and the Jomax WRF, which serves areas west of the Agua Fria River.

Peoria owns 9.4 MGD of capacity in the Tolleson WWTP, but does not receive any benefits from water reclaimed at the Tolleson facility either in revenues or from stored water credits. Consequently, Peoria is planning to develop the Butler Drive WRF with a maximum capacity of 14,600 AF/yr. The initial capacity of this project is 11,200 AF and is scheduled for completion in 2009. The Butler Drive WRF is being designed to produce Class A+ effluent for reuse. Peoria's excess water will be recharged at the NAUSP or onsite at the Butler Drive WRF.

The Beardsley Road WRF also produces Class A+ effluent and has a current treatment capacity of 4,500 AF per year. Build out capacity for this plant is 17,900 AF per year. Peoria currently recharges this water at the Beardsley Road Recharge Facility and it is being expanded incrementally for the full capacity of the WRF.

The Jomax WRF has an initial capacity of 800 AF per year, with an ultimate capacity of 10,100 AF per year. The amount of reclaimed water demand for direct reuse is projected to exceed the actual amount of reclaimed water produced. Therefore, developing recharge facilities at Jomax is a lower priority than at the Beardsley Road and Butler Drive WRFs

In the 2005 Water Resources Master Plan Peoria has listed several other potential options for maximizing CAP and effluent in their service area, which include:

- Opportunities to exchange reclaimed water with the CAGRD for CAP water
- Develop infrastructure to distribute effluent to its places of use
- Limit discharges to waters of the United States
- Recharge or exchange all CAP water not treated and directly delivered as LTSCs to meet long term demands
- Build and participate in recharge facilities outside the Peoria boundaries (within the Phoenix AMA).

4.1.7 Phoenix

Phoenix has an allocation of 113,914 AF of CAP water, plus access to approximately 71,000 AF of CAP through exchanges and Indian leases. Phoenix utilizes most of this water directly and recharges the remainder of this water at the SRP GSF or the Granite Reef Underground Storage Project (located outside of the WESTCAPS study area). Phoenix's Water Resources Plan 2005 Update states that approximately 50,000 AF of CAP LTSC are in storage at various recharge projects.

Phoenix operates the 91st Avenue WWTP, 23rd Avenue WWTP and the Cave Creek Water Reclamation Plant (CCWRP). Phoenix estimates that 30- to 40-percent of potable water from residential and non-

residential sources returns to one of these WWTPs and is available as effluent for reuse or recharge. A City of Phoenix ordinance requires use of non-potable water by large turf facilities where practical but a direct dedicated distribution system from WWTPs to turf facilities does not exist.

The 91st Avenue WWTP is the largest in the Phoenix metropolitan area and treats effluent from the cities of Glendale, Mesa, Phoenix, Scottsdale and Tempe. The current capacity is 179 MGD and by 2020 the capacity is expected to be 205 MGD. Ultimate buildout capacity is planned for 230 MGD in 2030. Effluent commitments from this plant are approximately 173,000 AF/yr.

1. Use at the Tres Rios Demonstration Project (28,000 AF/yr)
2. Reuse within the Buckeye Irrigation District (35,000 to 40,000 AF/yr)
3. Reuse at Palo Verde (contracted for 105,000 AF/yr but currently only 75,000 AF/yr is used).
4. The remaining 30,000 AF of the effluent is discharged into the Salt River because there is not the ability to reuse this water.

The 23rd Avenue WWTP has a current capacity of 63 MGD and a planned capacity of 75 MGD by 2020. Effluent is recharged through the RID GSF.

The CCWRP, located outside of the WESTCAPS study area, produces Class A+ effluent and has a current treatment capacity of 4 MGD. Buildout capacity for this plant in 2020 is 32 MGD. Effluent from this facility is reused at nearby golf courses or is recharged.

The City of Phoenix is developing a plan for recharge of effluent in the proposed Agua Fria Linear Recharge project. This project is anticipated to recharge between 60,000 and 100,000 AF of effluent in the Agua Fria. It is unknown when this project will begin construction.

4.1.8 Surprise

Surprise has a CAP allocation of 7,373 AF/yr and does not currently directly use or recharge this water. Surprise currently operates the South WWTP which has a capacity of 7 MGD. It is anticipated that the maximum capacity of this plant will be 22 MGD at buildout. A portion of Surprise's effluent (less than 1,000 AF/yr) is recharged via recharge basins located adjacent to the South WWTP and the remainder of the effluent is reused by agricultural operations within Surprise.

Surprise is planning five additional WWTPs for the City as it continues to grow. The Surprise Water Resources Master Plan indicates that recharge and reuse are very important components of Surprise's water resources portfolio. Both of these methods will be used at each plant.

The Surprise water department has indicated that reuse is preferred over recharge because clays in the soil limit the volume of recharge in some areas of Surprise. In addition, reuse is preferable over recharge because it reduces net demand of potable water that is used. Currently Surprise uses groundwater, which is high in arsenic and therefore requires treatment prior to distribution. Staff identified that an impediment to direct reuse is the cost of constructing infrastructure.

4.1.9 West Maricopa Combine

West Maricopa Combine Water Company (WMC) operates four potable water service areas in the Phoenix AMA. The Water Utility of Greater Buckeye (WUGB), Water Utility of Greater Tonopah (WUGT) and the Valencia Water Company service areas are located in the WESTCAPS study area and the Water Utility of Northern Scottsdale service area is located in the eastern part of the Phoenix AMA. WUGB has a 43 AF CAP allotment and WUGT has an allotment of 64 AF. These allotments are currently not used. WMC is a water provider and does not recharge or reuse effluent.

WMC owns the WMC Pipeline to the Future, a managed USF project located in the Hassayampa River. The project consists of two recharge permits with a total permitted capacity of 50,000 AF of CAP water. The first permitted project is located on the west side of the Hassayampa River and is permitted for 25,000 AF. The western facility is currently under construction and will be operational by January 2007. The eastern facility is also permitted for 25,000 AF and the anticipated date for completion is January 2008.

5. SUMMARY OF COMMON ISSUES

5.1 Summary of Common Issues in Fully Utilizing Recharge and Reuse

In general WESTCAPS members are directly using or recharging CAP water in accordance with the overall plan developed in the 2001 WESTCAPS Strategic Plan. Table 8 shows WESTCAPS members are allocated 173,729 AF of CAP water but are using and/or recharging 192,000 AF of CAP water by purchasing excess CAP water.

Table 8 also reveals the details of how WESTCAPS members are recharging and/or reusing effluent. From the table and the totals provided, around 45 percent of the effluent being created is being discharged and is not being recycled. As the demand for water increases over time the expectation is that the price for water will rise accordingly. The expectation is that at some higher price the cost of reusing water begins to make more economic sense than discharging it. Naturally the laws of supply and demand to some extent will dictate the implementation of water recycling. To this end, WESTCAPS members may want to study further the need for a regional reuse plan to fully utilize effluent and the cost savings associated with a regional strategy.

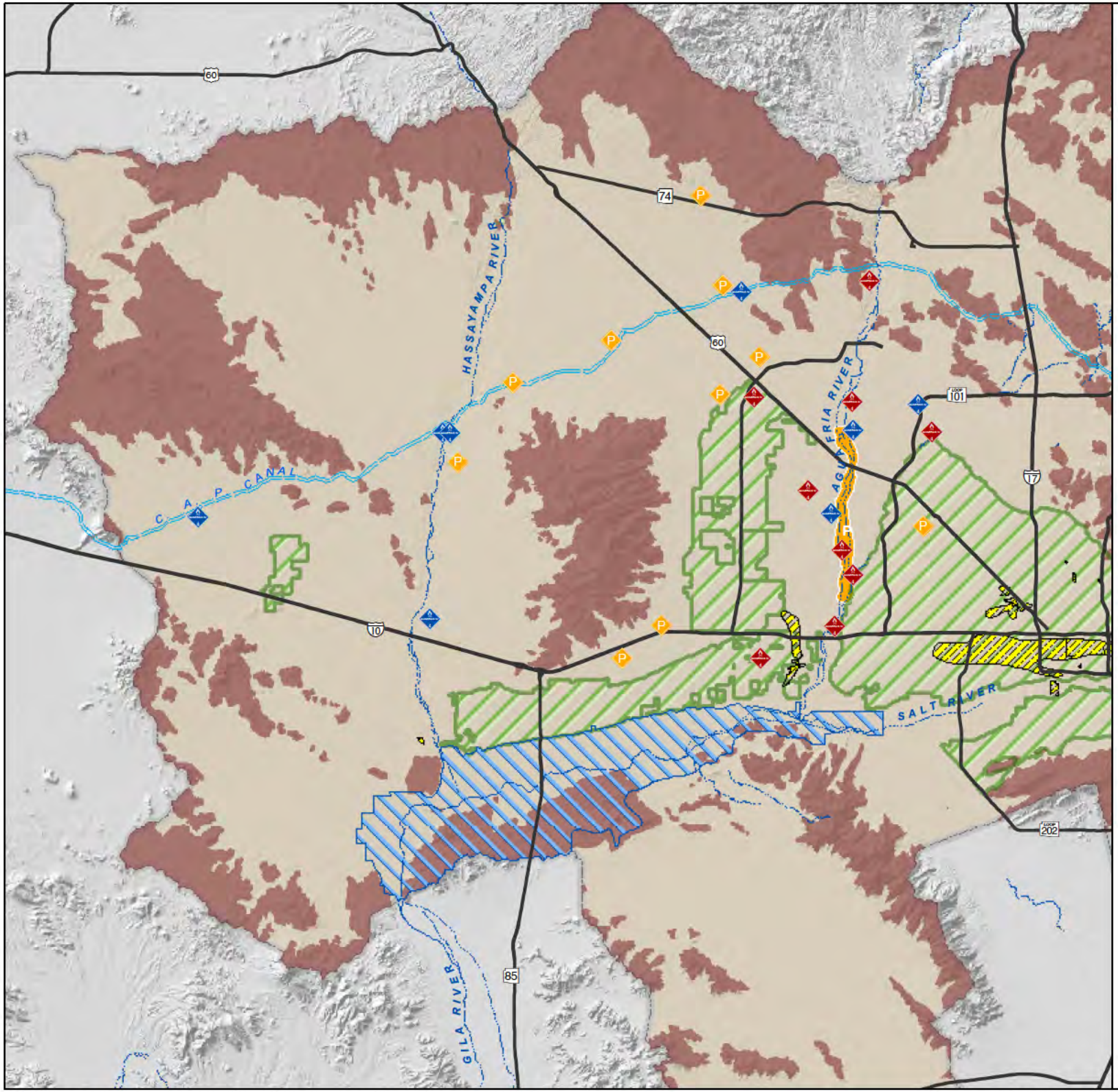
To date approximately half of the WESTCAPS water providers have adopted a plan and are implementing a strategy for recharging or reusing effluent. Another one-quarter of the water providers are planning a strategy though the strategy has not yet been implemented.

The following is a common theme among WESTCAPS members with regard to recharging effluent:

- Physical limitations to recharging due to geologic or hydrogeologic features (see Figure 5). (i.e., hard rock or clay conditions or waterlogged areas such as the southwest portion of the West Salt River Valley.)
- The cost associated with implementing a project due to further limitations on available land and the increasing cost associated with land purchase. Other factors exacerbating the issue are surrounding land uses, such as sand and gravel operations, which often limit the amount of recharge which can occur.
- The cost of implementing new technologies is initially cost prohibitive. As an example, drilling vadose zone wells is more expensive than using basins (assuming land is available).
- The time associated for an employee to apply for and purchase permits is an expense also often overlooked.

The expectation through previously completed WESTCAPS studies is that the use of effluent, either through recharge or direct reuse, should increase substantially over the next 25 years. New technologies, improvements and efficiencies in wastewater treatment and subsequent legislation allowing more flexibility in reuse, will propel the use of effluent during the coming decades.

Although WESTCAPS has never formally adopted a reuse/recharge plan of operation, the data over time provided in this report is proof that the general concept is well on its way as a strategy for decreasing demand on potable supplies in the West Salt River Valley.



EXPLANATION

- Recharge Point
- 2006 Recharge Point
- Proposed Recharge Point
- Proposed Recharge Area
- River
- Canal
- Irrigation District
- Waterlog Area
- Superfund Site
- Phoenix AMA
- AMA Hardrock

0 2.5 5 10
Miles

LOCATOR MAP

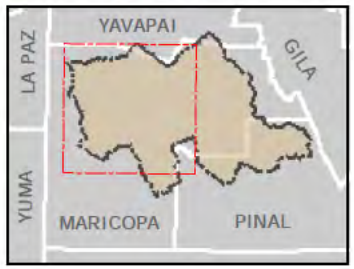


FIGURE 5
GEOLOGIC AND WATER FEATURES IN WESTCAPS STUDY AREA

BROWN AND CALDWELL

Table 8. Summary of Water Available for Reuse and Recharge

Water and Sewer Provider	CAP					Effluent Produced			
	Allocation	Actual Delivery to WESTCAPS Members	Direct Use	Recharged	Available for Direct Use or Recharge	Effluent Produced	Effluent Reused	Effluent Recharged	Available for Reuse or Recharge
Arizona American	17,654	17,654	0	14,161	3,493	2,590	0	2,590	0
Arizona Water Company*	6,000	4,962	0	0	1,038	0	0	0	0
Avondale	5,416	12,101	0	12,101	0	4,462	0	4,462	0
Buckeye	25	0	0	0	25	621	0	0	621
Goodyear	3,531	13,324	0	13,324	0	3,150	116	2,325	709
Peoria	19,709	22,406	7,911	14,495	0	2,308	81	2,189	38
Phoenix**	113,914	122,100	122,100	0	0	218,926	78,921	33,788	106,217
Surprise	7,373	0	0	0	7,373	5,673	4,990	683	0
West Maricopa Combine	107	0	0	0	107	0	0	0	0
	173,729	192,547	130,011	54,081	12,036	237,730	84,108	46,037	107,585

**Allocation used outside of the WESTCAPS study area.*

***Includes WWTPs outside of WESTCAPS study area.*

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