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# MEMORANDUM

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Date: October 2, 2007

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

From: C.H. Huckelberry  
County Administrator 

Re: Long-Term Green Valley Water Supply

## Introduction

Green Valley is located in the Upper Santa Cruz Basin near the edge of the Tucson Active Management Area. The primary source of water for Green Valley is from groundwater within the Santa Cruz Valley. Two sources of renewable supply are in the vicinity of Green Valley. One source, reclaimed water, is fully committed to golf course irrigation. The other renewable water source is Central Arizona Project (CAP) water. The CAP delivery system terminates at Pima Mine Road, ten miles north and down-gradient of Green Valley (from the intersection of Continental and Interstate 19). Cooperative and coordinated efforts are needed to deliver CAP water to Green Valley.

Attached are two documents prepared by staff. Attachment A is a report entitled *Evaluation of Sustainable Water Supply Options in Green Valley*, which summarizes the current and projected water use in the Green Valley area and evaluates the costs of water supply options based on an equitable share of capital costs according to water use. Attachment B is a water supply issue paper describing desired outcomes and potential solutions to the groundwater overdraft problem in Green Valley.

## Sustainable Water Supply

The Green Valley area does not have a sustainable water supply given current groundwater pumping rates in the Upper Santa Cruz River Basin. The water table in Green Valley has been declining in past years, and is expected to decline even faster as water demands, through population growth and other factors, continue in the Green Valley area. In addition, large planned urban growth in the Santa Cruz Valley within Santa Cruz County will also cause water levels to decline faster than they have in the past, hence the need for increased awareness and planning associated with long-term water supplies for the water users in the Upper Santa Cruz Basin within Pima County.

Even though certain Green Valley water providers have very limited (5,000 acre-feet) contracts for CAP water, this water is not physically available since the delivery facilities do not exist.

The Honorable Chairman and Members, Pima County Board of Supervisors  
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### **Pima County Not a Water Provider, But a Provider of Reclaimed Water**

Pima County is not a water provider. Therefore, the County has no financial interest or responsibility in securing long-term water sources or providing necessary infrastructure for the treatment and transmission of these water sources.

As the second largest wastewater reclamation entity in the state, we do have a secondary role in water supply, but only as it relates to the treatment of sewage and the conversion of same into reclaimed water. In 2006, the Green Valley Wastewater Treatment Facility treated approximately 2,000 acre-feet of effluent and produced 1,600 acre-feet of Class A+ reclaimed water. Under an effluent reuse agreement approved in 2001, Pima County delivers reclaimed water to Robson Ranch Quail Creek. This water is recharged by Quail Creek to replace groundwater pumped for turf irrigation. The remaining effluent, about 400 acre-feet, is discharged into percolation basins at the County's facility where it ultimately recharges the groundwater. Pima County should address the direct use of reclaimed water at Quail Creek, in lieu of recharge and recovery, in future negotiations for renewal of the effluent agreement in 2013. The County should also implement wastewater treatment modifications so that the entire plant is producing Class A+ reclaimed water that is suitable for turf irrigation.

Pima County's Regional Flood Control District has had a large role in constructing flood detention basins that have, in at least one case, operated as the state's largest urban stormwater harvesting facility (Kino Environmental Restoration Project). The District also has authority to construct and operate groundwater recharge facilities that also have flood control benefits.

Because Pima County is not a water provider, we can only facilitate, offer advice and encourage the various water users and water providers in the Upper Santa Cruz Valley Basin within Pima County to cooperate in their endeavor to secure a more permanent and stable water supply. Because we are a provider of renewable water derived from the treatment of sewage, we are directly interested in the beneficial use of this resource to reduce groundwater overdraft.

### **Rosemont Mine Pipeline Extension a Detractor to the Problem of Water Supply**

Recently a great deal of controversy has arisen over the proposal of Rosemont Mine to pay for a Central Arizona Project pipeline extension from the Pima Mine Road recharge site to a recharge site in the general service area of Community Water of Green Valley. It is unfortunate that this proposal received so much publicity and caused so much controversy within the Green Valley community because it is simply irrelevant to the permanent solution of securing the long-term water future of the Upper Santa Cruz Valley Basin within Pima County.

A new mine, without question, should be prohibited from using groundwater, particularly when other, lower quality water sources are available. In fact, all mine water consumption, whether new or existing, should be from a lower water quality or non-potable water source. The proposal by Rosemont to pay for a 20-inch pipeline extension to convey Central Arizona Project water to a recharge facility within the Community Water service area does more harm than good, particularly when studies sponsored by the Arizona Department of Water Resources indicate that such a pipeline would only serve one small segment of the Upper Santa Cruz Valley water users. Past studies indicate that the size of a pipeline that would convey Central Arizona Project water for direct use or recharge for the entire Upper Basin would need to be at least 72 inches in diameter. Hence, discussion of only a partial solution, a 20-inch pipeline, is counterproductive, and spending money for such a limited solution would be a waste of resources.

#### **Who Uses Green Valley Water**

In the attached report, Evaluation of Sustainable Water Supply Options in Green Valley, Table A indicates that in 2006, nearly 76,000 acre-feet of water was consumed in the area, with the largest single use for metal mining, which consumed approximately 35,000 acre-feet, or 46 percent of the total, followed by agriculture at nearly 30,000 acre-feet, followed by municipal water providers at 6,700 acre-feet and golf course use at 4,500 acre-feet. Of this data, what is surprising is that metal mining is the largest consumer of groundwater in the area, and that metal mining and agriculture combined account for 85 percent of the groundwater used in 2006. Another surprising statistic is that golf course irrigation in the Green Valley area almost equals potable water provided to residential or commercial use in Green Valley. These use allocations do not change dramatically over time. Projected use in the year 2025 increases to approximately 95,000 acre-feet, with metal mining consuming 57 percent of this use at 54,000 acre-feet per year. Combined with agriculture, which drops significantly to 16,257 acre-feet, mines and agriculture account for 74 percent of the projected water use in 2025. During this time period, municipal water use more than doubles to 16,300 acre-feet of water per year and golf course use grows modestly to 6,000 acre-feet per year. Mines and agriculture continue to dominate the water use in the Upper Santa Cruz Basin, even 20 years from now.

#### **The True Cost of Water**

In the attached report, funding the preferred alternative for a CAP water pipeline extension to the Green Valley area costs approximately \$120 million. This cost has been allocated in accordance with actual water use. While such an allocation is instructive from an equity perspective, it does not reflect the state of existing water law in Arizona, which obviously significantly subsidizes mining and agricultural uses when considered in a modern water cost perspective from the reality of scarcity. The long-term true cost of water is substantially higher than the actual cost paid by a user sector, particularly mining or agriculture. If the cost

of extending the Central Arizona Project pipeline could be equitably distributed among each user in proportion to the user's volume of use, the municipal sector could easily pay for the pipeline extension by charging existing residential customers a surcharge of between \$5 and \$8 per month over a five-year period. However, such assumes that metal mining and agriculture pay their full cost associated with water usage. Due to grandfathered water rights and other factors, such is unrealistic, and it is likely the municipal sector will bear the single largest cost of extending the CAP water supply to Green Valley. However, the discussion does underscore how much mining and agriculture are subsidized in the state from the perspective of equitably sharing in the cost of future water supplies.

### Options Available

To create a sustainable water supply in the Upper Santa Cruz Basin, contained in the attached report are a number of financing options and arrangements, including authorities and districts, that are available to facilitate the capital expense associated with extending a Central Arizona Project water delivery pipeline to the central Green Valley area. In the future, the County will ask the Bureau of Reclamation and the United States Army Corps of Engineers to consider refined studies and to develop implementation and financing options for pipeline extension. In addition, an entity that should be primarily interested in facilitating such an extension would be the Central Arizona Groundwater Replenishment District since, as indicated in Figure 1 of the report, there are a number of residential subdivisions in the Green Valley area that are members of the Groundwater Replenishment District. At present their replenishment obligation and hence recharge does little, if any, to hydrologically benefit the area of groundwater withdrawal. If CAP infrastructure (delivery and recharge facilities) was available in the Green Valley area, the Groundwater Replenishment District could replenish the aquifer in Green Valley.

The County will continue to provide a forum for discussing these important regional issues, including continuing to promote a regional authority to deal with water supply and reclamation issues on a Countywide and active management area-wide basis.

### Conclusion and Recommended County Actions

The Upper Santa Cruz River Basin, centered in the Green Valley area, is in groundwater overdraft. Water supplies will become critical within the next ten years. One key concern for Green Valley is the limited availability of CAP contracts. The total water use is projected to be 88,000 acre-feet in 2015 and, unfortunately, two municipal water providers have only 5,000 acre-feet in CAP allocations. For this area to be sustainable, a mix of all available water resources must be used efficiently and effectively. These include groundwater replenishment, use of effluent, additional CAP supplies, storm water and water conservation. It is essential that the area obtain physical access to renewable supplies and use said supplies to augment groundwater imbalance through recharge or to supplement groundwater use by direct use of Central Arizona Project water. Mines and agriculture consume most of the groundwater and hence cause most of the groundwater overdraft in the Upper Santa Cruz

Basin. They need to financially participate in and become a partner in the long-term solution to sustainable water supply in the Green Valley area. The County can do little except facilitate a long-term solution to this problem, and continue to think outside the box of traditional sources and solutions, including the recommendations outlined below.

### Recommendation

It is recommended the Board of Supervisors authorize the following actions, after holding a public hearing and inviting affected water users in the Green Valley area to offer comment and review on this report and its recommendations. I would recommend the Board of Supervisors hold a public hearing on this matter approximately 30 days after release of this report. At this time the recommended actions of the Board would be as follows:

1. Facilitate and assist Green Valley municipal water providers, as well as existing mine and agricultural water users, to cooperate in the extension and financing of a Central Arizona Project pipeline to provide both direct use of Central Arizona Project renewable water supplies, as well as recharge of same;
2. Ask the Central Arizona Project Groundwater Replenishment District, who has numerous member subdivisions in the Green Valley area, the Bureau of Reclamation and the United States Army Corps of Engineers to assist in the planning and development of the Central Arizona Project pipeline delivery system extension for both direct use and recharge, while promoting multiple benefits, both environmental and recreational, associated with groundwater basin recharge resulting from Central Arizona Project water recharge;
3. Encourage existing groundwater users, both mines and agriculture, to make direct use of renewable Central Arizona Project water supplies in lieu of groundwater pumping;
4. Support new state and federal legislation and regulation requiring any expansion of existing or any new mining activities to use only renewable water supplies in their operation;
5. Authorize the Regional Flood Control District to provide necessary matching funds for any federal agency study to extend the Central Arizona Project transmission system to or through the Green Valley area, provided one use of Central Arizona Project water supply is for the purpose of floodplain recharge with resulting environmental riparian benefits.

CHH/jj

### Attachments

- c: John Bernal, Deputy County Administrator - Public Works  
Suzanne Shields, Regional Flood Control District Director  
Kathy Chavez, Water Policy Manager, Regional Flood Control District  
Frank Postillion, Principal Hydrologist, Regional Flood Control District



## Evaluation of Sustainable Water Supply Options in Green Valley<sup>1</sup>

October 1, 2007

### I. Introduction

The Green Valley area does not have a sustainable water supply given current groundwater pumping rates in the Upper Santa Cruz River Basin. The magnitude of the groundwater overdraft problem is likely to grow worse in the future as water demand in the area increases. A collaborative effort among Green Valley's major water users could change this outlook. One approach to creating a sustainable water supply in Green Valley involves extending the Central Arizona Project (CAP) pipeline at the terminus of Pima Mine Road to the northern portion of Canoa Ranch to allow recharge of the Santa Cruz River at various points along the way and direct use of CAP water by the mines and agriculture as a substitute for groundwater pumping. This paper discusses a preferred route for a CAP water line extension, presents one possible approach to distributing costs of the new line among the various water users (based on an equity model where users pay based on their proportional share of current or projected water use) and identifies various financing mechanisms that could be employed to provide Green Valley with a sustainable and renewable water supply.

### II. Background

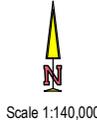
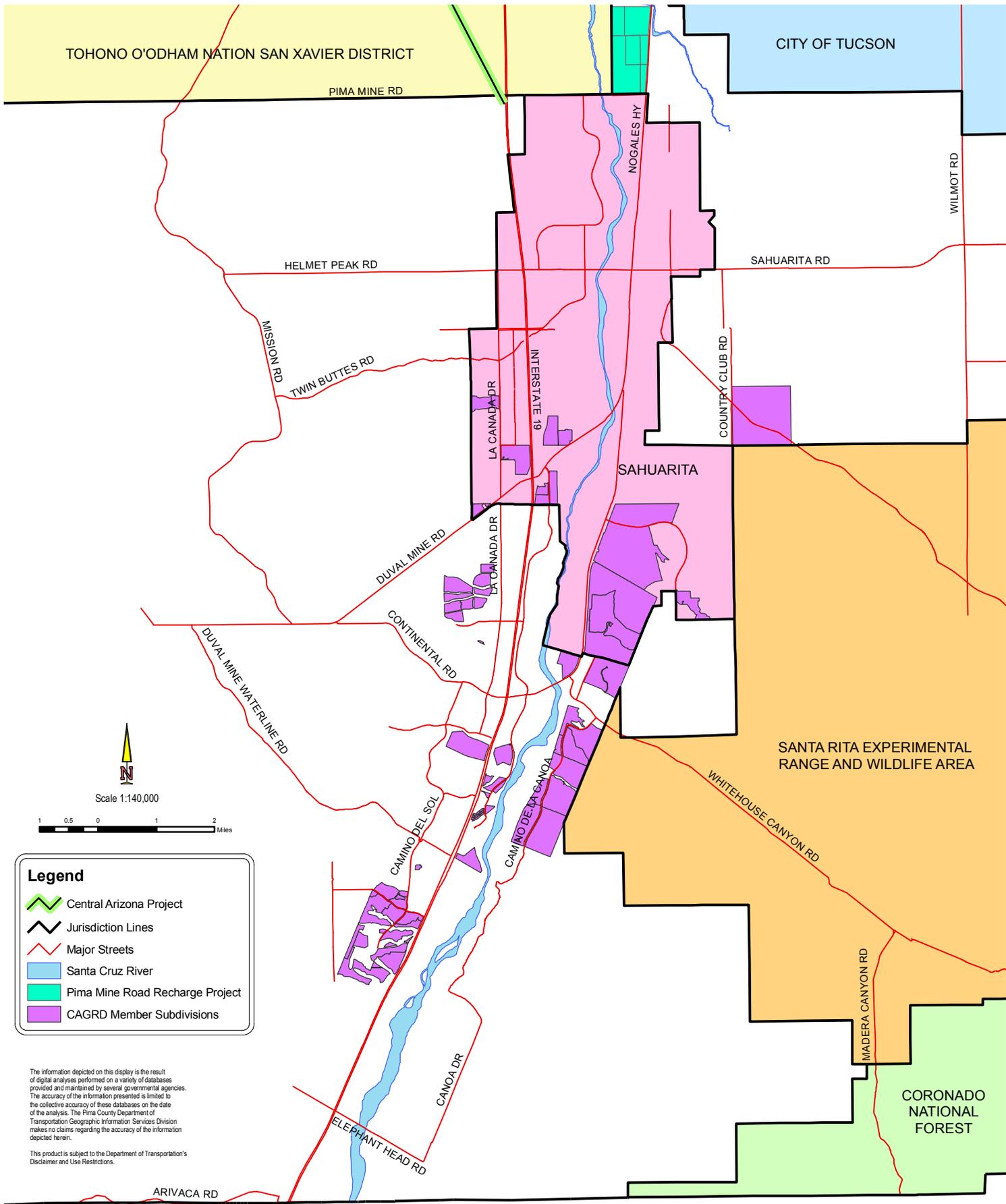
The Green Valley area lies within the upper Santa Cruz River Basin. The area is bisected in a north-south direction by the Santa Cruz River and the Interstate 19 Freeway corridor (see Figure 1). Major water users in this area have relied exclusively on the use of groundwater pumping to meet their water needs.<sup>2</sup>

The largest water users are the mines and agriculture, which consumed 85 percent of the groundwater used in 2006, according to Arizona Department of Water Resources (ADWR). Smaller users include municipal providers which together used 9 percent of the groundwater pumped in 2006 and golf courses which used 6 percent.

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<sup>1</sup> Prepared by Kathleen M. Chavez, P.E., Water Policy Manager, Pima County Regional Flood Control District, Tedra E. Fox, Sustainability Manager, Pima County Administrator's Office and Frank Postillion, Chief Hydrologist, Pima County Regional Flood Control District

<sup>2</sup> *Sahuarita-Green Valley Area Central Arizona Project Water Use Feasibility Analysis and Delivery Optimization Study*, prepared by Malcolm Pirnie in association with Errol L. Montgomery & Associates, Inc., for the Arizona Department of Water Resources Tucson Active Management Area (1998), p. ES-1 (hereinafter referred to as the "Malcolm Pirnie" study).



**Legend**

- Central Arizona Project
- Jurisdiction Lines
- Major Streets
- Santa Cruz River
- Pima Mine Road Recharge Project
- CAGR Member Subdivisions

The information depicted on this display is the result of digital analyses performed on a variety of databases provided and maintained by several governmental agencies. The accuracy of the information presented is limited to the collective accuracy of these databases on the date of the analysis. The Pima County Department of Transportation Geographic Information Services Division makes no claims regarding the accuracy of the information depicted herein.

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# Green Valley Area - Location Map - Figure 1



The Malcolm Pirnie study predicts substantial increases in water use in the Green Valley area over the next few decades. Table A shows the existing and projected water use of the major Green Valley water users based on the consumption rates reported to ADWR in 2006 and the water use projections developed in the Malcolm Pirnie study for the years 2015 and 2025.

**TABLE A:  
EXISTING AND PROJECTED WATER USE  
(acre-feet per year)**

Major Water Users	Actual Water Use 2006 <sup>2</sup>	Projected Water Use <sup>3</sup>	
		2015	2025
Municipal Water Providers <sup>4</sup>	6,689	14,099	16,257
Metal Mining <sup>5</sup>	34,583	54,000	54,000
Agriculture	29,800	28,104	18,738
Golf Courses	4,435	5,599	5,599
Sand & Gravel	465	700	700
Total	75,972	102,502	95,294

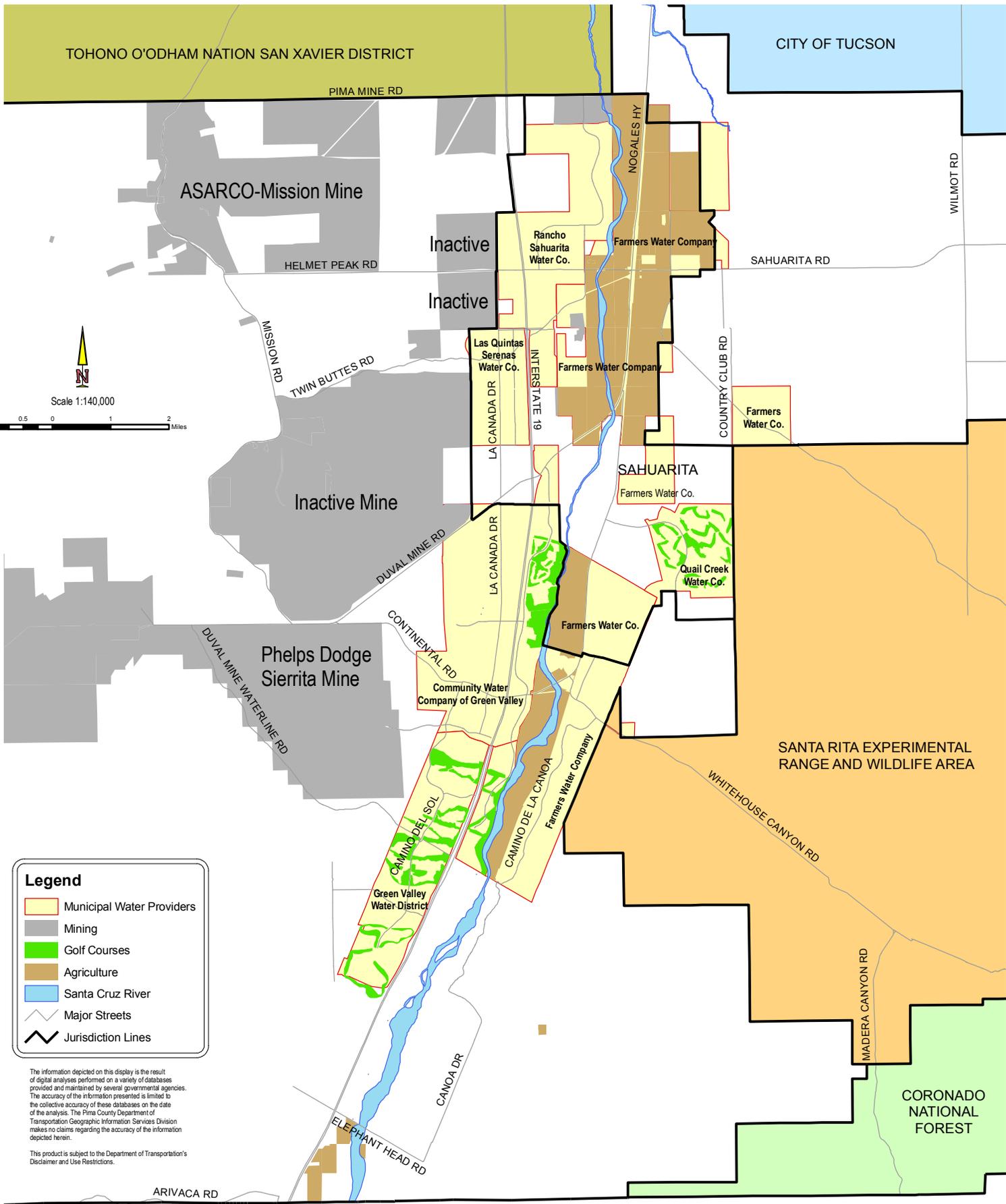
Figure 2 shows the location of the major water users in the Green Valley area as well as jurisdictional boundaries.

<sup>2</sup> *The Malcolm Pirnie Study*, p. ES-1

<sup>3</sup> Projections are from Tables ES-10 and ES-11 in the Malcolm Pirnie study.

<sup>4</sup> Rancho Sahuarita, FICO, Quail Creek, Las Quintas, Community Water of Green Valley, Green Valley Domestic Water Improvement District

<sup>5</sup> Includes ASARCO and Phelps Dodge



**Legend**

- Municipal Water Providers
- Mining
- Golf Courses
- Agriculture
- Santa Cruz River
- Major Streets
- Jurisdiction Lines

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## Green Valley Area - Major Water Users - Figure 2



Very little groundwater recharge in the Upper Santa Cruz River watershed occurs and the rate of replenishment is not enough to compensate for the continuous amount of overdraft. Recharge that does occur is the result of effluent discharge, some natural recharge, incidental recharge (from irrigation and mining activities) and CAP water recharge by the Central Arizona Groundwater Replenishment District (CAGRDR) at their Pima Mine Road recharge facility, north of Green Valley. Even the CAGRDR replenishment that occurs at the Pima Mine Road recharge facility is not optimal because it is hydrologically down gradient of the areas of groundwater withdrawal, which lie upstream from Pima Mine Road (see Figure 1).

Groundwater levels in the Upper Santa Cruz River Watershed are now declining at an estimated average rate of two feet per year. If groundwater pumping continues at the present rate, it is highly likely that well owners and water purveyors will have to expend more resources to drill new or deeper wells and portions of the Canoa Ranch area's riparian ecosystem may be adversely impacted, particularly during times of drought.

Over the years, studies have examined ways to bring a renewable water supply to the Green Valley Area and Sierra Vista by extending the CAP pipeline terminus at Pima Mine Road.<sup>6</sup> In 1996, the Upper Santa Cruz Water Users Group was formed, consisting of representatives from agricultural, industrial and municipal uses; public agencies and other stakeholders. This group approached ADWR about conducting a feasibility study for the construction of a CAP water delivery system that would extend south of Pima Mine Road and deliver the most water at the least cost to Green Valley water users.<sup>7</sup> The resulting Malcolm Pirnie study examined three possible alignment corridors for a CAP pipeline extension. A preferred alignment, referred to as the "Nogales Highway/Old Nogales Highway–Canoa (N-3/S-3)" alignment, was selected based on both cost and non-cost criteria.<sup>8</sup> The preferred alignment is shown as Phases 1 and 2 on the Figure ES-3 ("Recommended Pipeline Alignment") of the Malcolm Pirnie report (see Attachment 2). The pipeline would extend from the CAP terminus at Pima Mine Road in an easterly direction to Nogales Highway and then south along the Old Nogales Highway and the Southern Pacific railroad alignment to the north end of Canoa Ranch. Several turn-outs are designed to provide Phelps Dodge and FICO's Sahuarita Farms and Continental Farms with direct use of CAP water for agricultural irrigation. Three additional turnouts would provide groundwater recharge into the Santa Cruz River.

The issue of a renewable and sustainable water supply for Green Valley is moving to the forefront again. A representative of the Groundwater Awareness League in Green Valley has requested that the County determine a method for resolving the groundwater deficit issue in Green Valley (see Attachment 1: letter from Nancy Freeman). In addition, the Community Water Company of Green Valley recently entered into a Letter of Intent with Augusta Resource Corporation (developers of the proposed Rosemont Mine) that would allow

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<sup>6</sup> The Bureau of Reclamation studied the possibility of extending the CAP water pipeline from Pima Mine Road to Sierra Vista in order to offset groundwater pumping and to provide for future water use in that community. However, the proposed alignment did not extend south of Sahuarita Road and thus, it could not effectively serve most of Green Valley's major water users. See *Augmentation Alternatives for the Sierra Vista Sub-watershed*, U.S. Department of the Interior, Bureau of Reclamation (June 2007).

<sup>7</sup> Malcolm Pirnie study, pages ES-1 and ES-2.

<sup>8</sup> Non-cost criteria included utility conflicts, right-of-way acquisition, traffic impacts, commercial and industrial impacts, residential impacts, institutional impacts, ecological impacts, archaeological impacts, environmental impacts and floodplain/floodway impacts. Malcolm Pirnie, ES-14.

Augusta to fund a seven-mile extension of the CAP pipeline from Pima Mine Road to Community Water Company's well near Duval Mine Road.

### **III. Finding a regional solution to Green Valley's overdraft problem**

The Green Valley area is situated in the southern portion of the ADWR Tucson Active Management Area. ADWR views the use of CAP water as a key component in achieving long-term water balance in the Tucson AMA.<sup>9</sup>

In addition, the Central Arizona Groundwater Replenishment District (CAGR), which has several member subdivisions in the Green Valley area, has an obligation to replenish the groundwater pumped for these subdivisions with renewable water. (CAGR subdivisions are shown in Figure 1.) Currently, the CAGR is meeting its replenishment obligation by recharging CAP water at the Pima Mine Road and Lower Santa Cruz River recharge facilities. Clearly, it is more desirable that the replenishment take place closer to the areas where groundwater withdrawals are occurring.

The CAP pipeline extension preferred alignment ("Old Nogales Highway-Canoa") identified in the Malcolm Pirnie study would help secure Green Valley's water future. The pipeline would import a renewable water supply in the Upper Santa Cruz River watershed for the area's major water users for at least the next 20 years. This pipeline extension could potentially deliver 88,500 af per year of renewable water, which is sufficient to meet the projected water needs of all major water users except ASARCO, during the projected peak use year of 2015. Because ASARCO's Mission Complex mine is located near the CAP water line terminus, ASARCO could theoretically be able to meet their water needs by constructing a mini-pipeline for direct service of CAP water.

The construction of the Old Nogales Highway-Canoa CAP pipeline extension offers several advantages, in addition to those described above: it recharges water in the area where it is being withdrawn so that localized groundwater balance occurs; it provides a renewable water supply for direct use by the two largest water users (mines and agriculture); and it provides sufficient excess capacity to allow for recharge directly into the Santa Cruz River at three locations.

The Old Nogales Highway-Canoa pipeline extension scenario could be further enhanced if additional recharge areas were created using tributaries to the Santa Cruz River. Consequently, it is recommended that the feasibility of providing additional recharge locations along the Santa Cruz River be studied and that the environmental consequences of an expanded recharge area also be evaluated. It is also recommended that the Malcolm Pirnie study be updated, as necessary, to reflect any changed conditions.

The Malcolm Pirnie study presents four separate water delivery and cost scenarios for the Old Nogales Highway-Canoa preferred alignment. The first three scenarios are shown in Table B below.

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<sup>9</sup> *Regional Recharge Plan*, Arizona Department of Water Resources, Tucson Active Management Area (August 1998), page ES-1.

Scenario 1 would deliver water to Sahuarita Road and the FICO Sahuarita Farm only, with volumes from 13,000 to 24,000 acre-feet per year, depending on the year delivered.

Scenario 2 would deliver water farther south but have only one recharge turnout location and a total delivery of 59,000 to 65,950 acre-feet per year.

Scenario 3 would deliver the highest projected water supply to the major water users at a total estimated cost of \$120 million (in 2008 dollars), or \$167 per acre-feet of water delivered.

**TABLE B  
PREFERRED OLD NOGALES HIGHWAY – CANOA ALIGNMENT (N-3/S-3)**

<b>Malcolm Pirnie Preferred Alignment Scenario<sup>1</sup></b>	<b>1998 Capital Cost Estimate<sup>2</sup></b>	<b>Projected Cost in 2008 Dollars Based on 3% Annual Inflation</b>	<b>Estimated Water Delivery in 2015<sup>3</sup> (acre-feet)</b>	<b>Estimated Unit Conveyance System Costs in 1998<sup>4</sup> (\$/AF)</b>	<b>Estimated Unit Conveyance System Costs (\$/AF) in 2008 Dollars Based on 3% Annual Inflation</b>
Scenario 1	\$23.0 M	\$30.9 M	19,700	\$59	\$79
Scenario 2	\$72.1 M	\$96.9 M	65,950	\$139	\$187
Scenario 3	\$88.9 M	\$119.5 M	88,500	\$124	\$167

<sup>1</sup> Scenario 4 is excluded from the table because it includes a regional treatment facility at Elephant Head Road for municipal use and does not provide the same level of groundwater recharge as Scenario 3.

<sup>2</sup> Based on estimates from Malcolm Pirnie study, Table ES-12

<sup>3</sup> Based on projected water demand estimates from Malcolm Pirnie study, Table ES-11

<sup>4</sup> Based on capital, O&M and replacement costs over a 30-year pay off at 3% interest. 2015 is the highest water use year projected by the Malcolm Pirnie study, Table ES-13.

Scenario 4, which would extend the pipeline to Elephant Head Road and include the construction of a treatment facility, is not included in Table B because it is not considered as optimal as Scenario 3 for the following reasons: (1) it does not deliver any more water than Scenario 3; (2) it costs \$18 million more (in 1998 dollars) because it involves five more miles of pipe and the construction of a treatment facility; and (3) any groundwater recharge that occurs south of the Scenario 3 pipeline extension (near the north end of Canoa Ranch) would not be as beneficial because the water table in that area is already fairly high (ground water levels are 30-90 feet below surface there compared to 200-400 feet below surface in the central portion of the study area); and (4) direct use of CAP by Phelps Dodge would significantly reduce groundwater pumping at their Canoa Ranch Well Field, thereby allowing groundwater levels to recover.

To implement Scenario 3, substantial additional CAP water allocations would have to be secured because current and pending allocations in the Green Valley area only total about 5,000 acre feet.<sup>10</sup> However, options do exist for securing additional CAP water, including allocations held by the State Land Department, using non-Indian agriculture priority water allocations, or entering into agreements with Indian Nations who are not currently using their

<sup>10</sup> *Water Resource Availability for the Tucson Metropolitan Area*, Sharon B. Megdal, Water Resources Research Center, July 2006.

CAP allocations.<sup>11</sup> Additionally, the CAGR D has replenishment obligations for its member subdivisions. The CAGR D is responsible for acquiring renewable water (currently CAP) for its member subdivisions.

#### IV. Funding the CAP water line

Tables C and D are examples of how an equitable cost-sharing formula might be applied to fund the Scenario 3 version of the Old Nogales Highway-Canoa CAP water line extension. Costs are distributed among all current groundwater users in Green Valley based on their proportional share of groundwater use. Under the equitable cost-sharing model, a water user that pumps one acre foot of groundwater must pay to recharge one acre foot of groundwater or, alternatively, use one acre foot of CAP water as a substitute for groundwater. Two model scenarios were created to show the minimum and maximum costs each user might expect to pay under the lowest volume and highest volume water delivery scenarios (the cost per acre foot decreases as water delivery volumes increase).

Table C shows how much each water user would pay based on their actual 2006 water use, which is the lowest volume of water use expected to occur over the next 20 years. Under this scenario, agriculture would pay the highest amount of capital costs (about \$53 million) and Phelps Dodge would pay the next highest amount (about \$47 million). Municipal water providers would collectively pay about \$12 million. When municipal costs are spread out among an estimated 27,600 residential customers, each household would pay a one-time cost of \$434 or \$36.17 per month *for one year*.

**TABLE C:  
COST DISTRIBUTION BASED ON EQUITY MODEL  
FOR LOWEST WATER DELIVERY**

<b>Green Valley Area Ground-Water Users</b>	<b>Lowest Projected Water Use in AF (see Table A)</b>	<b>Percentage of Total Groundwater Use in 2006</b>	<b>Projected Phase 3 Capital Costs in 2008 (see Table B)</b>	<b>User's Equitable Share of Capital Costs For Phase 3 Alignment</b>
Municipal Water Providers	6,689	10%	\$120 M	\$12.0 M <sup>2</sup>
Metal Mining <sup>1</sup>	26,690	39%	\$120 M	\$46.8 M
Agriculture	29,800	44%	\$120 M	\$52.8 M
Golf Courses	4,435	7%	\$120 M	\$8.4 M
<b>Total</b>	<b>68,079</b>	<b>100%</b>	<b>\$120 M</b>	<b>\$120.0 M</b>

<sup>1</sup> Includes Phelps Dodge only. ASARCO is excluded from the calculation because they have access to CAP at the terminus and could construct a mini-pipeline for direct service.

<sup>2</sup> The cost is \$36.17 per month per customer for one year, based 27,600 residential customers at 1.8 people per unit and 120 gallons per capita a day.

<sup>11</sup> See <http://www.cap-az.com/static/index.cfm?contentID=22>

Table D shows how much each water user would pay under the highest water delivery scenario, which is projected to occur in 2015 in the Malcolm Pirnie study. Under this scenario, Phelps Dodge would pay the highest amount of capital costs (about \$55 million) and agriculture would pay the next highest amount (about \$38 million). Municipal water providers would collectively pay about \$19.2 million. When municipal costs are spread out among a 2015 estimated 67,200 residential customers, each household would pay a one-time cost of \$286 or \$23.81 per month *for one year*. Note that in the year 2015 scenario, agriculture is no longer the largest groundwater user. That is because over time, agricultural land is expected to be converted to residential and commercial developments and other municipal uses.

**TABLE D:  
COST DISTRIBUTION BASED ON EQUITY MODEL  
FOR HIGHEST WATER DELIVERY**

<b>Green Valley Area Groundwater Users</b>	<b>Highest Projected Water Use in AF (see Table A)</b>	<b>Percentage of Total Groundwater Use in 2015</b>	<b>Projected Phase 3 Capital Costs in 2008 (see Table B)</b>	<b>User's Equitable Share of Capital Costs for Phase 3 Alignment</b>
Municipal Water Providers	14,099	16%	\$120 M	\$19.2 M <sup>2</sup>
Metal Mining <sup>1</sup>	40,000	46%	\$120 M	\$55.2 M
Agriculture	28,104	32%	\$120 M	\$38.4 M
Golf Courses	5,599	6%	\$120 M	\$7.2 M
<b>Total</b>	<b>88,502</b>	<b>100%</b>	<b>\$120 M</b>	<b>\$120.0 M</b>

<sup>1</sup> Includes Phelps Dodge only. ASARCO is excluded from the calculation because they have access to CAP at the terminus and could construct a mini-pipeline for direct service.

<sup>2</sup> The cost is \$23.81 per month per customer for one year, based on 67,200 residential customers at 1.8 people per unit and 120 gallons per capita a day.

The equity model shown in Tables C and D does not recognize the state of existing water law or grandfathered rights to groundwater use. However, it is instructive in identifying the costs that water users would incur if their share of groundwater over drafting was the only factor considered in developing a financing mechanism. Hopefully, this information can serve as a baseline for initiating a community dialogue about each water user's appropriate, fair-share contribution to finding a regional solution to Green Valley's overdraft problem.

## **V. Additional Financing Options & Arrangements**

Under state law, a variety of development authorities and special districts can be used to help fund the cost of a CAP water line extension to Green Valley. Two separate authorities, the Water Infrastructure Authority (WIFA) and the Greater Arizona Development Authority

(GADA), provide financial assistance to public agencies and special districts to construct water infrastructure projects. In addition, various water districts could potentially be formed to build, operate and maintain a CAP water line extension for Green Valley water users. The water districts would assess fees and charges to the water users within the district to pay for the CAP water system. A summary of statutory financing options and water district arrangements is described below.

#### Water Infrastructure Authority (WIFA)

Established under ARS 49, Chapter 8, the Water Infrastructure Authority is an independent State agency that can finance construction, rehabilitation and/or improvement of drinking water, wastewater, wastewater reclamation and other water quality facilities. WIFA offers a borrower below market interest on loans for one hundred percent of eligible project costs. WIFA operates as a revolving loan program. Funds are capitalized by contributions from the state and U.S. Congress. The Drinking Water Revolving Fund is available for eligible publicly and privately-held drinking water systems. Publicly-held community drinking water systems includes cities, towns, special districts, domestic water improvement districts, co-ops and nonprofit associations. The borrower must demonstrate legal, financial, technical, managerial and institutional capability and must obtain the legal approval of its constituents to undertake a loan agreement with WIFA.

#### Greater Arizona Development Authority (GADA)

GADA was created by the State Legislature under ARS 41, Chapter 10, Article 8, to assist local and tribal governments and special districts with development of public infrastructure. GADA leverages its funds to lower the costs of financing and help accelerate project development for public facilities owned, operated and maintained by political subdivisions, special district or tribal governments. GADA offers low interest loans and grants to help accelerate projects. GADA also provides competitive grants for project development such as engineering planning, design review and feasibility studies.

#### Domestic Water Improvement Districts (DWID)

ARS 48, Chapter 6, enables formation of a domestic water improvement district to provide water services. A DWID can assess user fees for the operation, maintenance and replacement of the water system and can impose connection fees. The district may issue revenue bonds or enter into loan agreements or accept financial assistance to construct, acquire or improve drinking water facilities. The district may file a property lien for nonpayment of user fees. The district is formed when a petition, signed by a majority of the persons owning real property or by the owners of fifty-one percent or more of the real property is filed with the clerk of the county board of supervisors and the board of supervisors holds a hearing and approves the formation of the district.

#### Irrigation and Water Conservation Districts

Under ARS 48, Chapter 19, Irrigation and Water Conservation Districts can construct, acquire or improve a drinking water facility. It can establish tolls or charges for service of irrigation, domestic water electricity and other commodities. A district is formed when a petition signed by a majority of the resident owners and filed with the board of supervisors of the county in which the greater portion of the proposed district is located and a majority of the votes cast are "yes" votes. The district can issue general obligation bonds or revenue bonds or enter into a loan agreement with WIFA and can levy taxes or fees to meet its debt obligations.

### Community Facility District

ARS 48, Chapter 4, Article 6, defines Community Facility Districts which may enter into contracts and expend monies for any public infrastructure purpose with respect to the district. It may enter into agreements with landowners and the municipality or county for collection of fees and charges from landowners for public infrastructure purposes and can enter into contracts and agreements to obtain credit enhancement or liquidity support for its bonds. Each owner has the number of votes or portions of votes equal to the number of acres or portions of acres rounded upward to the nearest one-fifth of an acre. Formation of the district must be approved by a majority of the votes cast at an election. The governing body appoints the initial directors. The District is a tax levying public improvement district.

### Multi Jurisdictional Water Facilities Districts

ARS 48, Chapter 34, defines Multi Jurisdictional Water Facilities Districts that may enter into contracts and expend money for any water related facility consistent with the district's general plan. It may construct, operate, maintain and repair water related facilities, except for facilities that are customarily used to serve individual customers of municipal water providers. The District can establish and charge and collect user fees, rates or charges for the use of water related facilities or services. It may enter into grants and loans with any federal, state or local entity. The district may not engage in retail sale of water, exercise the power of eminent domain nor use district monies to acquire water rights. The requirements for forming a water facilities district are 1) the governing body of each municipal water provider approves holding an election on the issue of formation of the district, 2) if a municipal water provider is a private water company, the governing body of each city, town or county in which any participating portion of the service area of the private water company is located approves holding an election on the issue of formation of the district, 3) an election is held, and 4) a majority of those persons voting approves the formation of the district.

## **VI. Conclusion**

Pima County supports the development of a sustainable and renewable water supply in the Green Valley area in order to ensure an adequate and safe water supply for residents and as part of its commitment to preserve the County's significant riparian habitats. With the collaboration and cooperation of all major water users in the Green Valley area, a renewable water supply for Green Valley can be realized and the replenishment of the Upper Santa Cruz River Basin can begin.

Attachment 1-Letter from Nancy Freeman, Groundwater Awareness League

Nancy Freeman

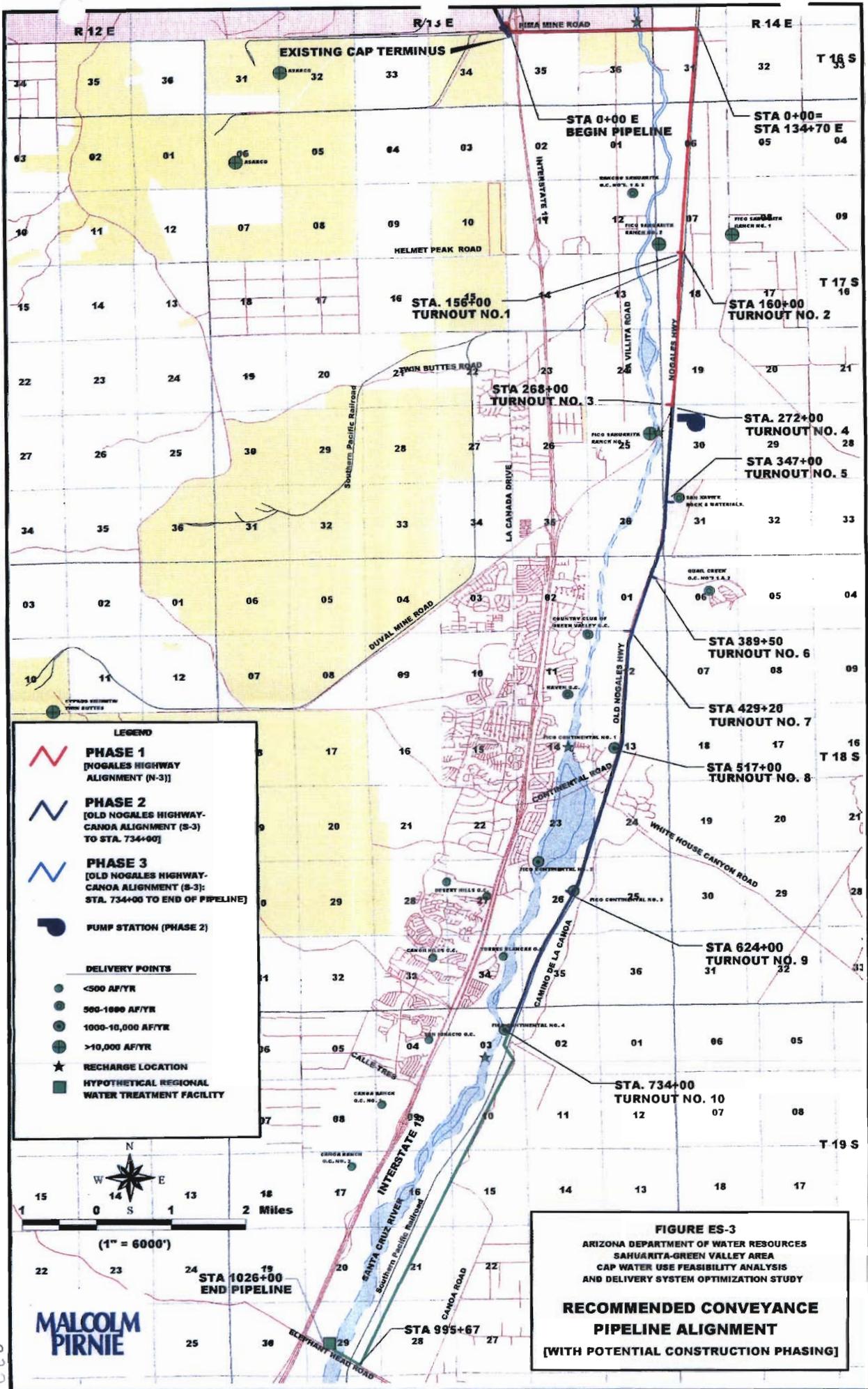
Groundwater Awareness League, 188 Calle del Ano, Green Valley, AZ 520/207-6506

The message from the County has been you people in Green Valley are responsible for your water problems—you deal with it. I beg to differ. The fact is Green Valley residents were not informed that with the 1980 Groundwater Code that 50,000 a.f. of groundwater were grandfathered—this is against a natural recharge of some 25,000 a.f. which means that water mining was going on since Sierrita/Duval mine started pumping for operations in 1970. The County has continued to permit development, in spite of the fact that no one has ever done a study to determine the subsidence risk. Since I gave the Board a presentation in March, 2006, I have been asking for such a hearing on the issue. When nothing had been done this March, I started another campaign and was joined by many Green Valley residents, to ask that the County do a study or request the Bureau of Reclamation to do a study. Then the final word came from Chuck Huckleberry—the County was not going to give us a hearing or to do anything about studying the subsidence factor or determining some methods of relief from the continued 31,000 a.f. of groundwater deficit. The deficit in Sierra Vista is only 4,000 a.f. and we know the assistance they are getting at every level of government.

The current misrepresentation of the CAP pipeline is simply a neglect of looking at the facts and figures and facing in the reality. Because of the law suit in the early 1970's by FICO against water depletion by the mines, in 1983, PAG completed a study done by PAG and Army Corp of Engineers. They published an excellent report—with comprehensive data on mining waste pollution and water depletion. In the report, recommendations were specifically listed, including water balance study for all mines. That was in 1983, in 2002, when the follow-up report came out, none of these recommendations were even mentioned. As a matter of fact, The Sierrita/Duval mine numbers were left out—they were not easy to obtain—and the total dissolved solids and hardness levels of Community Water Wells were also “mysteriously omitted [page C-4 & C-5]. It was clear that the Feds and county had paid for another expensive report that was put on the shelf and ignored.

At this time, there is a potential additional water user that is exempt from needing to have water rights by state law (showing us how invalid a 100-year certificate is). They propose to pump 5,000 to 7,000 a.f. [I believe it will be more] of groundwater near Sahuarita Road and I-19. Although it is not mandated that they do so, they are recharging that amount of water in Marana now, and hopefully in the future near where they are pumping groundwater. There is a logical reason for this: FICO grandfathered rights. If you have forgotten about their 1970's law suits, a copy of the final disposition of the case is on the Groundwater Awareness League website. Statements such as “we don't want that pipeline to Green Valley” are downright misleading and uninformed. Did you talk to the CAP Board, did you talk to ADWR, or did you talk to the Bureau of Reclamation to get the easily available facts? Did you talk to the Forest Department to find out if having a recharge facility to replace the groundwater pumping would effect their decision on the permitting of the mine? I am sorry that some of the board members have preferred to divert the public's attention from the real issue of focusing on the stopping the mine. False accusations causing divisions among us are not going to do it. Let's get on task.

Attachment 2-Figure ES-3: Recommended Pipeline Alignment

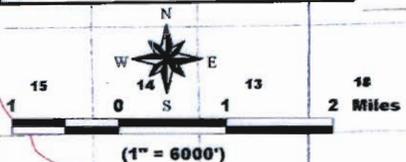


**LEGEND**

- PHASE 1**  
[NOGALES HIGHWAY ALIGNMENT (N-3)]
- PHASE 2**  
[OLD NOGALES HIGHWAY-CANOA ALIGNMENT (S-3) TO STA. 734+00]
- PHASE 3**  
[OLD NOGALES HIGHWAY-CANOA ALIGNMENT (S-3): STA. 734+00 TO END OF PIPELINE]
- PUMP STATION (PHASE 2)**

**DELIVERY POINTS**

- <300 AF/YR
- 500-1000 AF/YR
- 1000-10,000 AF/YR
- >10,000 AF/YR
- RECHARGE LOCATION
- HYPOTHETICAL REGIONAL WATER TREATMENT FACILITY



**FIGURE ES-3**  
 ARIZONA DEPARTMENT OF WATER RESOURCES  
 SAHUARITA-GREEN VALLEY AREA  
 CAP WATER USE FEASIBILITY ANALYSIS  
 AND DELIVERY SYSTEM OPTIMIZATION STUDY

**RECOMMENDED CONVEYANCE PIPELINE ALIGNMENT**  
 [WITH POTENTIAL CONSTRUCTION PHASING]

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Water Supply Issues for the Southern Tucson Basin<sup>1</sup>  
(Sahuarita-Green Valley-Canoa)  
Pima County Regional Flood Control District

August 24, 2007

Problem Statement

- In the Green Valley area more groundwater is withdrawn than replenished. Major water users are agriculture, mining and municipal.<sup>2</sup>
- There is currently no sustainable water supply for the population and the environment. This is complicated by water and air quality problems from past mining activities. Green Valley needs to remain a livable, sustainable community.
- Local water providers' CAP allotment of 5,000 acre-feet is not sufficient to eliminate groundwater depletion

Desired Outcomes:

- Share water resources among municipal, agriculture, mining and environmental interests
- Balance the groundwater aquifer with the addition of new renewable water supplies
- Agricultural and mining land uses will eventually transition to residential development. The area should plan for changes in land uses and the related water demand changes
- Achieve community consensus based on a common set of facts.

Potential Solutions:

In general there should be minimal new development located in Conservation Lands System. Planning for post-mining redevelopment of Sierrita mine complex and Park Development Corporation lands should be considered. Other potential solutions are:

1. Groundwater Replenishment
  - Over the next 20 years progressively eliminate mining demand on groundwater beginning with PD wells in upper Canoa Ranch area
  - Install interceptor wells and increase the pumping volume at Sierrita wells. Balance groundwater recoveries of sulfate plume at existing ASARCO wells, and install interceptor wells at base of tailings at ASARCO ponds, and recycle.
  - Implement proposed water resources regional plan policies, so the Planning & Zoning Commission and the Board of Supervisors have water resources information on Comprehensive Plan amendments and rezoning requests that will result in increased groundwater pumping before increased land use intensity decisions are made.
  - Include zoning conditions in new development requiring water conservation, rainwater harvesting and graywater systems.

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<sup>1</sup> Prepared by Kathleen Chavez, P.E., Water Policy Manager, Pima County Regional Flood Control District

<sup>2</sup> Nancy Freeman, Green Valley Awareness League-6/19/07.

## 2. Effluent

- Build a wastewater scalping plant and recharge effluent at Canoa Ranch
- Terminate any City of Tucson claims on Green Valley and Arivica Junction effluent
- Research the effluent IGA with Quail Creek to determine the amount of effluent that can be delivered to local golf courses to replace groundwater pumping
- Locate turf facilities in close proximity to wastewater treatment facilities to minimize infrastructure costs
- Require Quail Creek to convert effluent recharge ponds to a multi-purpose recharge facility with vegetation on side slopes and access to public as a condition of effluent IGA renewal
- Commit excess effluent produced at the Green Valley WWTF to future uses by County.
- Build a small reclaimed delivery system for excess Green Valley effluent to facilitate direct use. As a reclamation delivery system from the Green Valley WWTF is built, golf courses would convert to reclaimed water.
- Convert GVWWTF percolation ponds to multi-purpose recharge facility with access to public.
- Consistent with the Golf Course Zone Ordinance, no new golf courses permitted unless they directly irrigate with reclaimed water

## 3. CAP

- Expand the CAP recharge capacity of Pima Mine Road by buying or condemning ASARCO gravel pit
- CAGR D pays for new recharge capacity and buys and recharges CAP at the new gravel pit and helps finance a CAP delivery system to the mines.
- Direct CAP use by mines with groundwater savings mechanism
- Green Valley municipal water providers would acquire a portion of CAP water from the San Xavier District and recharge and recover it imposing water fees to finance a portion of the cost.
- Pecan groves in the floodplain would be irrigated with CAP, not groundwater. Any remaining pecan groves outside floodplain would be converted to urban development with density no greater than 4 RAC, unless there is a renewable and potable water supply
- Develop replenishment projects upstream near Canoa—(Very costly to do this with CAP, but adds water resources at the upstream end of the TAMA basin)
- Abandoned ASARCO tailings would be rehabilitated for dust and erosion control using native plants, initially irrigated with high sulfate groundwater. A portion of the area would be redeveloped for intensive municipal/commercial use initially using groundwater, but transitioning to CAP with time. This area might include a CAP water treatment plant to produce potable quality water.
- Infrastructure built from the existing CAP would supply redeveloped areas with potable water, along with Sahuarita, a portion of TW service area and northern Green Valley.

4. Stormwater
  - Build check dams to increase storm run off recharge and cease scouring washes. This may not be feasible unless there is a pristine watershed that could be directed into a recharge a pit in the mines without increasing the contamination problems.
  - Minimal floodplain encroachments on Santa Cruz River to allow for stormwater from tributaries to continue to infiltrate.

#### Bureau of Reclamation Participation<sup>3</sup>

- Funding for general planning studies is obtained in one of two ways; internal request or external request.
- An external request is done through a congressional authorization under Title XVI, in which a member of the Arizona delegation would request general planning studies monies be included, much as was recently done recently for H.R.1503 the Avra/Black Wash Reclamation and Riparian Restoration Project. Any constituent, water provider, local governmental entity can make the request. Funding is currently for the FY09 budget cycle.
- An internal request is done through BOR staff which consists of funding for a general planning study in the agency budget. This type of request would be accompanied by support letters, so the BOR can show there is local support. The BOR is working on the FY10 budget cycle.
- The general planning study could define the problem, collect data, screen alternatives and recommend solutions. Funding to implement the recommended project would require additional Congressional authorization and appropriation. Funding includes a federal share and a local share.
- The Bureau may have limited funding for the Water Resources Research Center to assist.

#### ADWR Study

In 1998 an ADWR study<sup>4</sup> investigated alternatives to deliver CAP water to major water users in the Sahuarita-Green Valley area. Findings included:

- Four scenarios range in cost from \$23 to \$116 million to deliver from between 13,000 and 81,000 acre-feet per year of CAP water to the area.
- Implementation will require a long-term commitment by water users, CAP water allocation holder and other sponsors to be successful
- Most of the major water users exhibit seasonal demand variations and the conveyance system must have sufficient peaking capacity to serve season demands.
- The four scenarios provide a versatile range of conveyance parameters. As delivery quantities and locations are better defined, the preliminary design can be refined to match the anticipated CAP deliveries
- Artificial recharge could reduce conveyance system costs and system-wide delivery costs.
- Approval to tie in to the CAP Reach 6 Pipeline should be pursued.
- Conditions affecting the use of CAP water should be updated periodically.

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<sup>3</sup> Personal telecon with Eric Holler, Bureau of Reclamation-6/20/07.

<sup>4</sup> *ADWR Sahuarita-Green Valley Area Central Arizona Project Water Use Feasibility Analysis and Delivery System Optimization Study*, Malcolm Pirnie, Inc. September 1998

Recommendations:

- Form a stakeholders group to evaluate options, identify study needs and recommend actions. The group should consist of water providers (including Community Water of Green Valley), the mines, Farmers' Investment Corp., the development industry and citizens.
- The charge to form the group should come from the Board of Supervisors; staff could recommend strategies to improve water sustainability and mitigate water problems. Additional information needs should be identified. Financing opportunities for infrastructure also should be identified
- Since the ADWR study was conducted many factors have changed; the study did not consider land use, water quality, other water supplies or financing options.
- A well defined scope is needed. It would include a broad survey of water supply, water use, and water quality and how land use relates to these.