

**Grant County Water Commission
P.O. Box 1188
Silver City, New Mexico 88062**

Members:

**Charles Kelly, Mayor, City of Bayard
Edward Encinas, Mayor, Town of Hurley
Richard Bauch, Mayor, Village of Santa Clara
Alex C. Brown, Town of Silver City
Bret Kasten, Commissioner, County of Grant**

July 14, 2011

Craig Roepke, Deputy Director
New Mexico Interstate Stream Commission
P. O. Box 25102
Santa Fe, New Mexico 87504-5102

Re: Tier 1 Application

Dear Mr. Roepke:

On behalf of the Grant County Water Commission and its members, I am submitting a final Tier 1 Application for AWSA funding to support a regional water project. It is attached.

We have done our best to address the review comments made about our preliminary submittal that caused it to fail Criterion #3. Our hydrologist is available for any further explanation that might be needed. We expect that substantially more analysis would have to be performed before a project could actually be implemented, but we believe that we have demonstrated genuine concern at this stage regarding the comments made and have outlined strategies for ensuring that no harm would come to the Gila environment as a result of our proposal.

We have also modestly scaled back the project at the request of the Mayor of Bayard. Projects specific to Bayard are no longer included but Mayor Kelly remains in support of the shared regional elements.

Please call if you have any questions.

Sincerely,

Alex C. Brown
Chair

AWSA APPLICATION

1. Legal Name:

Grant County Water Commission

- City of Bayard
- Town of Hurley
- Village of Santa Clara
- Town of Silver City
- County of Grant

2. Organization:

Joint Powers Agreement

- Municipality
- Municipality
- Municipality
- Municipality
- County

3. Address:

Grant County Water Commission
Attn: Alex C. Brown, Chair
P.O. Box 1188
Silver City, NM 88062

4. Name, e-mail, and phone number of contact person:

Alex C. Brown
tscmgr@qwestoffice.net
(575)534-6450

5. Type of Application:

Tier 1 Application

6. Type of Applicant (Check Box):

Local Governments or
Municipalities

7. Brief Project Description:

This joint application supports the formal development of a Regional Water Supply and Distribution System to meet existing and future demand for drinking water for the municipalities of Grant County and adjacent unincorporated areas.

Purpose

The project will serve approximately 26,000 people by:

- providing reliable access to local public supplies of drinking water by improving existing (and building new) water diversion and distribution infrastructure,
- making new sources of water available to meet local demand for public supplies of drinking water,
- and conserving local public water supplies by re-using municipal effluent water through return flow credits.

Elements

- (PRIORITY) Construct a new well field in the vicinity of the Grant County Airport to make (Mimbres Basin):
 - (PRIORITY) 193.2 AFY of water rights stranded by the critical block administrative system available to Hurley.
 - 750 AFY of return flow credits generated by the Silver City wastewater treatment plant water available to Hurley, Bayard, Santa Clara, Silver City and points in between via a regional waterline. (Model example of conservation through effluent reuse in New Mexico)

- B. (PRIORITY) Develop new supporting infrastructure for community water systems that are supported by the regional distribution system (Mimbres Basin). Currently, this action would be to construct a waterline that links the Santa Clara water system with the Arenas Valley Water Association for water deliveries in emergency situations. (This linkage is a temporary bridging action until the regional waterline can be constructed.)

- C. Improve Frank’s Well Field (Gila Basin):
 - a. Recharge the Frank’s well field, (1,120.24 AFY permitted) with water from the existing pipeline linking Bill Evans Lake to the Tyrone Mine. (One to two cubic feet per second of flow recharges approximately 750 to 1500 AFY, respectively.)
 - b. Construct a new transmission line linking Frank’s Well Field with a regional distribution system.

- D. Construct a regional waterline that links Silver City, Santa Clara, Bayard, and Hurley with ample groundwater supplies in the western part of the project area and the eastern part. (These supplies lie in the geologic feature called the Mangas Trench, which is naturally recharged at rate of 16,000 AFY on average and which has approximately 15,000,000 AF in storage.) The purpose of using the eastern and the western portions of the trench feature is to disperse and minimize overlapping cones of depression, resulting from municipal withdrawals.

8. Areas Affected:

Central Grant County, including the municipalities of Bayard, Hurley, Santa Clara, Silver City, and nearby unincorporated areas, including Tyrone, Pinos Altos, Arenas Valley, Ft. Bayard, Hanover, and North Hurley.

9. Total Funding Requested in 1,000): Year Funding Requested:

	\$30,270	
Element A:	\$7,500	2012
Element B:	\$100	2012
Element Ca:	\$4,340	2014
Element Cb:	\$4,330	2016
Element D:	\$14,000	2018

These costs are full-cost estimates for the various elements of the regional water project. Actual requests from the AWSA funds would be determined by the availability of other funding sources such as grants, state and federal allocations, loans, and bonds that might be available, and by the fiscal capacity of the members of the Grant County Water Commission to contribute towards the development of the elements. The municipalities in the mining district have severely limited capacities. It is reasonable to expect that the

actual application of AWSA funds would not exceed 50% of the listed costs or approximately \$15,000,000. The time line is conjectural.

To the best of my knowledge and belief, all data in this application are true and correct, the document has been duly authorized by the governing body of the applicant, and the applicant will comply with attached requirements and assurances if the proposal is accepted.

10. Typed or printed name of authorized representative:

Alex C. Brown

11. Title:

Chairman, Grant County Water Commission
Town Manager, Town of Silver City

12. Phone Number:

(575)534-6350

13. Signature:

/s/ Alex C. Brown

14. Date:

July 13, 2011

Project Proposal

This project would develop a regional water distribution system and rely on existing water sources to support that system. It is a water utilization alternative that will conserve existing well fields, mitigate the current concentrated effects of water withdrawal, increase public water supplies with aquifer recharge, and improve reliable access to public water.

This regional project has four major elements:

A. A new well field in the vicinity of Grant County Airport to support Hurley and neighboring communities with a new water source. (Mimbres Basin). Element A on the attached map at the end of this document.

- a. This project element would enable Hurley to access 193.2 acre-feet of water rights that Silver City holds in the vicinity of the Grant County Airport. A proposal with description, analysis, and cost estimate was developed by Balleau Groundwater, Inc. It is available upon request. Capital costs are currently estimated to be \$7,500,000 and the annual operating and maintenance costs to be \$460,000. An additional report was prepared by Balleau assessing the “*Hydrologic Effects of Wellfield use in Area of Grant County Airport. March 2011,*” which is also available upon request.
- b. The project element mentioned above would also be located appropriately for the diversion of as much as an additional 750 AFY of water that the Silver City demonstrably returns to the Mimbres aquifer through its wastewater discharge to the San Vicente Arroyo. The reuse of this effluent water as return flow credited to the aquifer would be a model water conservation effort that could be replicated throughout the state. Balleau Groundwater, Inc has prepared a document assessing the magnitude and timing of the return-flow from the Silver City wastewater treatment plant. The document is titled “*Effluent Percolation into the Gila Group Aquifer near Silver City, New Mexico. November 2010*” and is available upon request. Based on this assessment the Town will apply to the Office of the State Engineer for return-flow credits. All of this water could be conveyed from the new well field via a new transmission line to Hurley, where it could enter a regional distribution system.

Improvements to local water diversion and distribution systems supported by the regional system. (Mimbres Basin) Element B on the attached map. This project element would allow improvements to local community water systems that are independently operated but supported by the larger, cooperative system of regional supply and distribution. These activities would include such things as the development in Santa Clara of a system link between the village water system and that of the Arenas Valley Water

for water deliveries in emergency situations. (This linkage is a temporary bridging action until a regional waterline can be constructed.) The estimated cost of this improvement is \$100,000.

B. Groundwater recharge (aquifer storage and recovery) at the Franks Well Field .(Gila Basin). Element Ca on the attached map at the end of the document. This project element would:

- a. provide a link with the existing pipeline that conveys water from Bill Evans Lake to the Tyrone Mine, and a new pumping station would deliver water to the Franks Well Field, where it could be directly injected through wells into the aquifer or allowed to infiltrate into the aquifer along natural channels. A recharge rate of one cubic foot per second over 365 days would yield about 750 AFY, an amount that would roughly offset the existing use at the well field and stop current draw down of groundwater. Two cubic feet per second would offset existing use and make an additional 750 AFY available to replenish draw down stemming from more than 50 years of past use.

Currently the Town is in negotiations with Freeport McMoran Copper and Gold regarding the acquisition through lease or purchase of water rights owned by the mining company as a source of recharge water for the Franks Well Field. The Town does not anticipate any need to use new AWSA water.

In 1984, J.W. Hernandez, W.G. Hines, and F.D. Trauger analyzed a similar project in considerable detail on behalf of the Town of Silver City and the Interstate Stream Commission. Among many issues addressed, the analysis concluded that mixing Gila River water and ground water would not be a problem. The title of this analysis is "*Evaluation of a Municipal Water Supply for the Silver City Area Using Ground Water Recharge of Water from Conner Reservoir on the Gila River. August 1984,*" which is available upon request.

Recently Balleau Groundwater, Inc. developed a Technical Memorandum for the project that includes a feasibility analysis and costs. The title of this memorandum is "*Groundwater Recharge Analysis and Estimate of Recharge Option Costs. July 2010*"; it is available upon request. Capital costs for the infiltration scenario are currently estimated to be \$4,340,000 and annual operation and maintenance costs to be \$378,000. The cost of leasing or purchasing water rights from the Tyrone Mine would be in addition to the costs already identified.

- b. provide a new and larger water transmission line from Franks Well Field to support the regional proposal. Element Cb on the attached map at the end of the document. The project would increase the delivery capacity of the line from 1,000 gpm to 2,000 gpm, an increase in capacity that would complement an aquifer storage and recovery project at the well field.

- C. A new water transmission line linking Hurley, Bayard, Santa Clara, and Silver City. (Mimbres Basin) Element D on the attached map at the end of the document. The system could either draw on supplies from the storage tanks in Silver City and deliver water to the east through a gravity system to community storage tanks or the system could draw on supplies from a new well field in the vicinity of Grant County Airport and deliver water to the west through a series of pumping stations to community storage tanks. A proposal description and cost estimate was developed by Engineers Inc. Capital costs are currently estimated to be approximately \$14,000,000 and the annual operating and maintenance costs to be approximately \$166,500 for the delivery of 816 AFY.

Energy Efficiency

To the extent practical (based on local site physical features, land availability and cost-effectiveness), financing will also be sought to install solar PV systems to reduce water delivery dependence on more costly fossil fuel sources. Funding mechanisms might include Solar Power Purchase Agreements (PPA), bond revenues from Clean Renewable Energy Bonds (CREBs), or USDA, DOE and other federal sources.

FORM 14 A

USE THIS FORM TO COMPLETE ANSWERS TO CRITERIA 1 THROUGH 4. NUMBER EACH ADDITIONAL RESPONSE WITH THE CORRESPONDING CRITERIA NUMBER AND SUB-CRITERIA. USE AS MANY PAGES AS NEEDED.

Criterion 1: State whether the proposal is for the “New Mexico Unit,” a “water utilization alternative,” or both.

The proposal is a water utilization alternative with a focus on conservation through reclamation of effluent discharged to the aquifer as a means of increasing the available supply of water

Criterion 2: Describe how the proposal will meet a “water supply demand” in the Southwest New Mexico Water Planning Region, comprised of Catron, Grant, Hidalgo, and Luna Counties.

This proposal specifically addresses the needs of central Grant County. Identified below are the type of public water supply **needs** for each municipality, the **scale** of total need for additional water, potential **sources** of new water, and a framework of existing local **attributes** that influenced the development of the regional proposal.

Summary: The public water systems of Bayard, Hurley, Santa Clara, and Silver City currently provide water to approximately 26,000 people in central Grant County. A reliable public water supply is essential to the welfare of these communities.

Substantial improvements need to be made to infrastructure, but the total amount of additional water and water rights necessary to meet the current and future needs of the communities is modest.

Return flow credits for effluent returned to the aquifer provide additional water available to public water supplies and constitute a model example of water conservation (reuse).

The proposal for a regional system builds on three attributes of public water systems, water sources, and demand in central Grant County:

1. A modest regional water delivery system already exists. The proposal modestly expands the system (by 20%) and formalizes it.
2. A water mound is building in the Silver City area, raising local water levels, as a result of effluent discharge into the San Vicente Arroyo. This water is eligible for return flow credits.

3. Central Grant County enjoys a very favorable geographic setting that supports an abundant regional aquifer and its ready natural recharge.
4. An existing waterline linking surface water at Bill Evans Lake and the Tyrone Mine passes within five miles of the Franks Well Field.

The principal source of data cited in this section is the analytical report performed by INTERA, Inc under contract with the Interstate Stream Commission. This report is titled “*Water Resources Assessment of the Silver City Area, Arizona Settlements Act Planning Process 2009.*” Other principal data sources include the 2010 U.S. Census, the comprehensive plans of Bayard, Santa Clara, and Silver City, and the “*Supplement on Water Use and Well field Service—A 40-year water plan for the Town of Silver City, New Mexico. 2006,*” by Balleau Groundwater, Inc.

a) **Water Supply Demand: Statement of Needs**

The public water systems of Bayard, Hurley, Santa Clara, and Silver City currently provide water to approximately 26,000 people in central Grant County. Each system has its own needs, challenges, and problems including—variously--inadequate water diversion and delivery infrastructure, insufficient access to water sources, and limitations associated with the availability and the location of water rights.

The specific community needs and challenges include the following:

- Hurley supplies water to a municipal population of 1,297 (2010 Census). The community has no water rights and no diversion wells, and it depends on Freeport McMoran Inc to provide its water. It is two years into a ten-year water leasing agreement with the mining company, which proposes to end the arrangement at that time. Hurley also provides water to the unincorporated community of North Hurley.
- Bayard supplies water to a municipal population of 2,328 (2010 Census). Overall, the community owns 742 AFY of water rights. It has antiquated water diversion and delivery infrastructure, the water rights for active well fields may be insufficient to meet extra demand generated during extreme dry periods, and additional water rights owned by the community are tied to sources too distant to be accessed economically. Bayard also supplies water to the unincorporated community of Hanover.
- Santa Clara supplies water to a municipal population of 1,686 (2010 Census). The community has approximately 515 AFY of water rights. It has a single well field near Lone Mountain that is the main water source for the community, and an infiltration gallery in Twin Sisters creek, which runs through town--usually as a dry streambed. The diversion and delivery infrastructure is new, but the water rights assigned to the well field (272.9 AFY) may be insufficient to meet extra demand generated during extreme dry periods, and the infiltration gallery yields a little over a third (90 AFY) of the water rights assigned to it (241.9 AFY), and sometimes none at all in the dry months of the year. Santa Clara also supplies water to the new Fort Bayard Medical Center.

- Silver City supplies water to a municipal population of 10,315 (2010 Census), and it supplies another 10,000 people more or less in adjacent areas of the county, including the communities of Tyrone, Pinos Altos, and Arenas Valley. The Town owns 4,566 AFY of water rights that are assigned to its well fields, and it pumps approximately 2,800 AFY. The amount necessary to pump has declined in recent years with improvements to leak detection and rising block rate structures. In their current configuration, these wells can sustainably yield 4,200 AFY, an amount modestly less than the assigned water rights. Like Bayard, the Town also owns some water rights (193.2 AFY) that are stranded or made inaccessible by distance, in this case near the Grant County airport. Some of the existing infrastructure is inadequate to pump and deliver the yield capacity of the wells, especially in the Franks Well Field, and at the Gabby Hayes Well
- Silver City also operates a wastewater treatment plant that over the last 30 years has discharged an average of 750 AFY of water into the San Vicente arroyo. This discharge has created a rising mound in the local groundwater that may influence the operation of the regional landfill.

b) Water Supply Demand: Scale of Needs

A reliable public water supply is essential to the welfare of the communities of central Grant County. Substantial improvements need to be made to infrastructure, but the total amount of additional water and water rights necessary to meet the current and future needs of the communities is modest.

- In 2000, water use in Grant County was measured as 57,319 AFY.
- Public water supplies comprised only 7% of all these withdrawals or approximately 4,012 AFY.
- The current total number of water rights for public water supplies is 6,015 AFY.
- Based on a study performed on behalf of the New Mexico Interstate Stream Commission in 2009, the population of Grant County was estimated to increase at a rate of .75% annually. This study is titled “*A Report on Historical and Future Population Dynamics in NM. 2008. A. Alcantara.*” A 0.75% annual increase would approximate a 35 % increase in local population over the next 40 years. A corresponding 35% increase in water demand might require that an additional 1,404 AFY be withdrawn (4,012 AFY x 35%). The total amount of water withdrawn would then be 5,416 AFY, which is an amount falling well within the total allocated waters rights of the municipalities (6,015 AFY.)
- Should such a 35% population increase occur, an appropriate planning precaution might be to acquire additional water rights in an amount (about 1,400 AFY) adequate to serve the new increment of the forecast and to keep the surplus in reserve as a buffer. In that case the total amount of water rights supporting public water supplies would be 6,015 + 1,400 = 7,445.

- Over the last 30 years, on the other hand, the total combined population of Bayard, Hurley, Santa Clara, and Silver City has actually declined by nine percent.

Community/ Date	Bayard	Hurley	Santa Clara	Silver City
1980	3,036	1,616	1,968	10,315
2010	2,328	1,297	1,686	10,474

Some demographers expect a lower rate of increase and in some cases even continued population declines. Another appropriate planning precaution would be to avoid over-investing in new water acquisitions. In other words, acquisitions should be balanced with reasonable prospects of meeting likely needs and of actually paying for the investment (more new ratepayers or increased rates).

c) Water Supply Demand: Potential New Sources

There exist several options for acquiring additional water rights. Below are some examples. Several are subject to the constraints of the critical block administrative system of the Office of the State Engineer.

- **Mining.** Mining used 38% of the water withdrawn in Grant County in 2000 or approximately 21,781 AFY. Based on documents submitted by the mines to New Mexico regulatory agencies (including testimony regarding proposed closure plans for the Tyrone Mine), mining is expected to decline as an economic activity in Grant County over the next 40 years. The water rights associated with the mining activity will need to find new beneficial uses or revert to the state. Certainly, municipal use, through lease or purchase, is a candidate for a new beneficial use, and the Town of Silver City is negotiating with Freeport McMoRan to that end.
 - Advantages: Proposal already under discussion.
Market cost for acquisition (lease or purchase).
Qualifies for AWSA financial support (\$66,000,000).
 - Constraints: Modest distance (5 miles) between existing Bill Evans waterline and existing well field requires infrastructure costs for water delivery.
Requires approval by the Office of the State Engineer.
- **Agriculture.** Agriculture used 52% of water withdrawn in Grant County in 2000 or approximately 29,805 AFY. Recently, at least two local ranches have offered for sale or lease up to 3,000 AFY for municipal use.
 - Advantages: Proposal already under discussion.
Market cost for acquisition (lease or purchase).

- Qualifies for AWSA financial support (\$66,000,000).
 - Constraints: Modest distance (10 miles) between current place of diversion and municipal use requires infrastructure costs for water delivery.
Requires approval by the Office of the State Engineer.
- **Conservation: Return Flow Credits via Wastewater Reuse.** Silver City will apply for 750 AFY of return flow credits based the annual discharge from its Waste Water Treatment Plant and the measured and documented contribution this water makes to the aquifer
 - Advantages: No acquisition costs.
No additional infrastructure costs for delivery.
Regional model for conservation through the reuse of effluent water.
Qualifies for AWSA financial support (\$66,000,000).
 - Constraints: Requires approval by Office of the State Engineer.
- **Conservation: Water Leak Detection.** Water leaks in transmission lines account for as much as 20% of water use in some of the local water supplies. Other water savings could be generated by more efficient fixtures and by changes in time of use.
 - Advantages: No water acquisition costs.
No additional costs for diversion or delivery infrastructure.
No approval required by the Office of the State Engineer.
Qualifies for AWSA financial support (\$66,000,000).
 - Constraints: Modest infrastructure improvement costs.
- **New Mexico Unit on the Gila River.** Under the terms of the Arizona Water Settlements Act and the Consumptive Use and Forbearance Agreement, New Mexico is eligible to divert up to 14,000 AFY from the Gila River.
 - Advantages: New water source.
Qualifies for AWSA support and an additional increment (\$66,000,000 + \$34,000,000 or perhaps \$62,000,000 = \$100,000,000 to \$128,000,000).
 - Constraints: Acquisition has contractual limitations, including exchange requirements with water bank in Arizona.
Diversion infrastructure very expensive (\$220,000,000 to \$300,000,000 according to

testimony before Congress by the Interstate Stream Commission).

Substantial distance (25 miles) between point of diversion and place of municipal use requires infrastructure costs for delivery.

Requires approval of the U.S Fish and Wildlife Service.

Requires approval of the N.M. Game and Fish Department.

Diversions always subject to the Endangered Species Act.

Requires approval of the Bureau of Reclamation.

Requires approval of the Office of the State Engineer.

d) Water Supply Demand: Framing Attributes of Local Public Water Supplies

The proposal for a regional system builds on three attributes of public water systems, water sources, and demand in central Grant County:

- A modest regional water delivery system already exists. The proposal modestly expands the system (by 20%) and formalizes it.

Currently, Silver City (pop. 10,315 in 2010) provides water to its own residents and to an additional 10,000 people living outside the municipal limits. These numbers represents a little over two-thirds of the entire Grant County population (pop. 29,514 in 2010). Silver City serves these additional people either directly through its own waterlines or indirectly by supplying water associations that deliver water to Tyrone, Pinos Altos, Arenas Valley, and points in between.

The proposal would link Santa Clara (pop. 1,686 in 2010), Bayard (pop. 2,328 in 2010), and Hurley (pop. 1,297 in 2010) with a formal regional system to provide a reliable source of water to supplement their individual systems. The communities would continue to own and manage their own water rights and their own water delivery systems and could draw on the regional system as a backup in times of need.

The Grant County Water Commission could own the regional waterline. Alternative ownership scenarios can be developed as the project itself develops over time and according to which elements are funded.

In addition to linking Hurley with the regional system to provide supplemental support, the proposal would dedicate 193.2 AFY of

water rights for use by Hurley. Currently, Hurley depends entirely on Freeport McMoRan Inc for all of its water needs. The proposal includes the construction of a well at a new source by the airport and a delivery system from the well to Hurley.

These communities also serve Hanover, North Hurley, and the Fort Bayard Medical Center.

- Central Grant County enjoys a very favorable geographic setting that supports an abundant regional aquifer and its ready natural recharge.

The high mountains just to the north receive significantly more rain and snow than the lower elevations of the communities under discussion. This precipitation runs down the canyons and arroyos to sink into the loose alluvial gravels and deep conglomerates of the flatlands that stretch south to the international border. The Mangas Trench, in particular, where Silver City well fields are located and the airport well is proposed, is an especially rich water feature.

Silver City not only draws water from the Mangas Trench, it contributes water to that geologic feature as well. The Town discharges on average 750 AFY of water from the waste water treatment plant to the San Vicente Arroyo, which is the principal drainage in the Mangas Trench within the Mimbres Basin, and hydrological monitoring has demonstrated that 99% of that water enters the aquifer. Water levels in the vicinity of the treatment plant are rising.

The Town intends to apply for a return flow credit of 750 AFY to supplement its existing 4,566.64 AFY of water rights.

- An existing waterline linking surface water at Bill Evans Lake and the Tyrone Mine passes within five miles of the Franks Well Field.

The proximity of this waterline to a principal well field offers of the possibility of modest conjunctive use of surface water and ground water to support a regional water system that is a little larger than the current informal system.

The surface water could recharge the ground water in the vicinity of the well field (Gila Basin.) A constant flow of one cubic-foot-per-second will yield approximately 750 AFY of water.

Criterion 3: Describe how the proposal considers the Gila Environment and describe how any negative impacts might be mitigated.

The preliminary review of this Tier-1 Application resulted in failure of Criterion 3 with three comments provided by the evaluation panel. In this section of the Application each evaluation comment is listed and followed with clarification of how the Gila environment is affected in the context of the panel's comments.

Evaluation Panel Comment 1: *“Pumping from the Mangas Trench will impact the Gila River flows.”*

Evaluation Panel Comment 2: *“Element D.a (Ca in the revised submittal) should explicitly state if water is existing FMI right or AWSA water.”*

Evaluation Panel Comment 3: *“No discussion of how regional supply system would be organized or funded.”*

These questions will be answered in turn following the summary below.

Summary: The potential for negative impacts to the Gila environment will be avoided or mitigated in the following ways:

- a. All existing and future sources of water proposed for alternative utilization have (or will have) and will maintain environmental permits approved by the New Mexico Environment Department or the U.S. Environmental Protection Agency, as may be required.
- b. The proposed water use will operate under permits administered by the New Mexico Office of the State Engineer. None of the Project Elements (A, B, C, or D) appear to create an associated new negative impact, or new depletion of flow to the Gila environment.
- c. The effects of each proposed Project Element will be modeled, and the effects will be monitored in a manner approved by ISC and OSE and any other authorized state and federal agencies to ensure that there are no negative consequences to the Gila environment.
- d. Any potential negative effects identified through monitoring will be addressed through adaptive management practices.
- e. Project Element Ca provides recharge that increases ground water levels in the vicinity of the continental divide, which creates a buffer between the Gila environment and pumping in the Mangas Trench within the Mimbres Basin. The buffer provides a degree of offset to potential negative effects from pumping in the Mangas Trench within the Gila Basin.

Evaluation Panel Comment 1: *“Pumping from the Mangas Trench will impact the Gila River flows.”*

The Mangas Trench includes both the Gila basin and the Mimbres Basin; the Project Elements are located in both basins. Project Elements A, B and D are located in the

Mimbres Basin. Results of a 100-year quantitative analysis indicate Mimbres basin elements do not affect the flow of the Gila River. Groundwater operation in the Gila basin is the only element that causes effects on flow of the Gila River system. Project Element Ca is development of a groundwater recharge project at a municipal wellfield in the Gila River basin. The effect of the groundwater recharge is to provide a volume of water to the aquifer that reduces the net quantity of Gila basin groundwater diversions. The hydrologic effect of reduced groundwater diversions or of Project Element Ca is that it mitigates the depletion to the Gila River system that occurs from baseline groundwater pumping conditions. Water will be diverted from the Gila River to provide the recharge water; however, that water for recharge will be leased or purchased from existing uses that are part of the water allocated to New Mexico prior to the 2004 AWSA, so no additional water is developed.

In a setting where Project Elements Aa, Ab, B, Cb, and D do not affect flow of the Gila River system, and Project Element Ca is a recharge component that mitigates depletion to Gila River flow, the overall effect of the proposal is to enhance the flow of the Gila River system. In the paragraphs that follow, a quantitative model analysis provides the basis for the statements above regarding Project Element effects to the Gila River. The model is calibrated to historical trends of key wellfields in the Mangas Trench and it provides a tool suitable for assessing hydrologic effects associated with Project Elements. As part of ongoing and future water planning, the Grant County Water Commission in cooperation with ISC, OSE, and other authorized state and federal agencies will monitor hydrologic conditions in the area of Project Elements with wells to confirm that the model reasonably captures field conditions and that negative impacts to the Gila River are not incurred. The Grant County Water Commission does not intend to impose negative impacts to the Gila environment. The management of the Project Elements will be adaptively adjusted to offset any potential negative impacts to the Gila environment that are identified through the established monitoring program.

Assessment of Hydrologic Effects to Gila River from Project Elements

The technical approach of response to Criterion 3 comments involves first describing the area of the Mangas Trench with a description of how groundwater pumping affects flow in rivers. Where groundwater pumping occurs or changes to groundwater levels are caused by a Project Element, the corresponding effect on flow of the Gila River is reported. The assessment is based on a quantitative analysis of the groundwater flow system and its interaction with surface water. Results are reported as the difference that each project element causes to the hydrologic system. Reporting the difference resulting from each project element is compatible with the technique of implementing a “no-build” alternative that is typically included as a benchmark against which the impacts of other alternatives can be compared. This is comparable to a “no-action” alternative to assess environmental impacts resulting from changes in an aquifer system.¹

¹ Implementation of a “no-action” alternative is a required approach in Environmental Impact Statements conducted under the National Environmental Policy Act.

The valleys containing Mangas Creek and San Vicente Arroyo form a major feature of the regional geology known as the Mangas Trench, named by F.D. Trauger (1965).² As depicted in Figure 1, the Mangas Trench is controlled by the structure of other geologic features known as the Burro Uplift and the Silver City Prong. The orange color delineating the Mangas Trench is adapted from Hawley and others (2000).³ Figure 1 also shows the location of the Project Elements relative to the Mangas Trench and the Gila River. Mangas Creek becomes perennial at Mangas Spring before it flows into the Gila River.

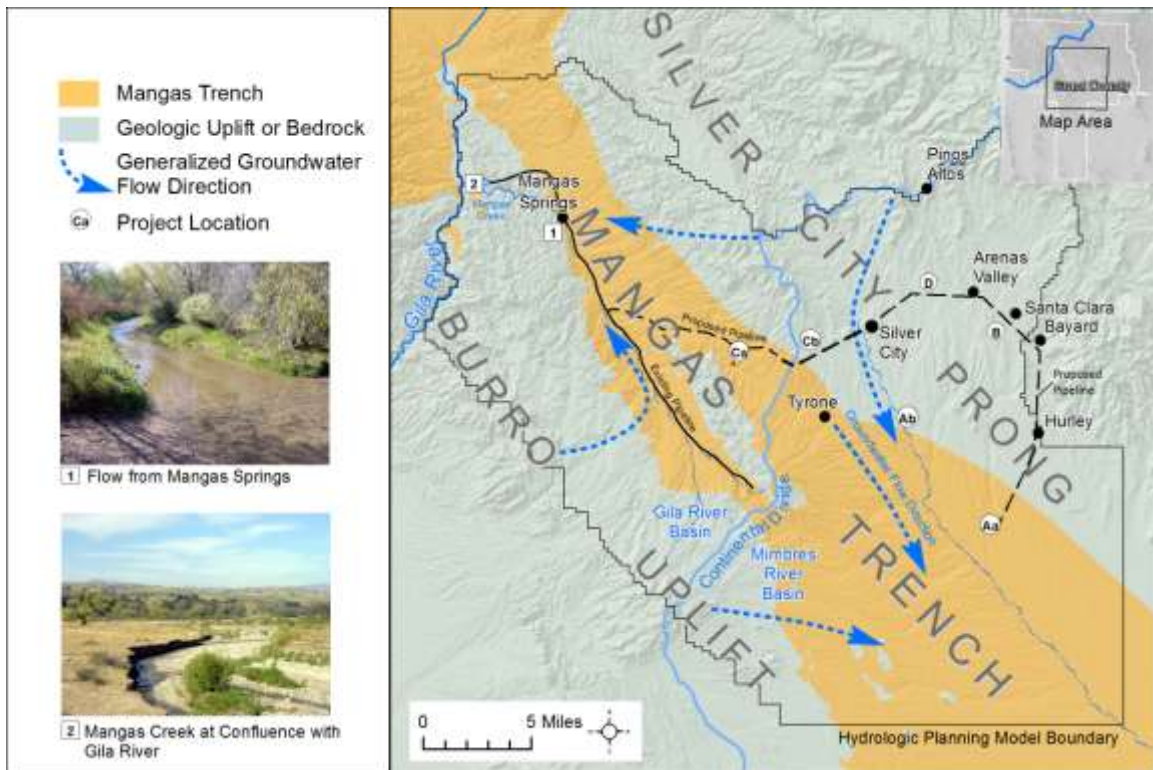


Figure 1. Locality of Mangas Trench, Project Elements and Gila River.

When a well is pumped to divert groundwater, the volume of water displaced from the aquifer forms a cone of depression⁴ that expands radially away from the well or from multiple wells that form a wellfield. The cone of depression expands through time and depletes, or captures water stored in the aquifer system until the edge of the cone intersects another source of water, besides aquifer storage, that can be captured. If

² Trauger, F.D., 1965, Geologic Structure Pattern of Grant County, New Mexico: NM Geological Society Guidebook, 16th Field Conference, Southwestern New Mexico II, p. 215 – 227, 2 figures.

³ Hawley, J.W., Hibbs, B.J., Kennedy, J.F., Creel, B.J., Remmenga, M.D., Johnson, M., Lee, M.M. and Dinterman, Phil, 2000, Trans-International Boundary Aquifers in Southwestern New Mexico.

⁴ Driscoll, F.G., 1986, Groundwater and Wells – Second Edition: Copyright 1986 by Johnson Screens, St. Paul Minnesota 55112, sixth printing, ISBN 0-9616456-0-1, see pg. 211.

groundwater pumping in the area of the Mangas Trench affects Gila River flow, it is because the cone of depression intersects the Gila River or the perennial reach of Mangas Creek, thereby depleting flow from the Gila River stream system. The time over which the stream depletion occurs depends on river and aquifer geometry, location of the pumping, and aquifer properties that control the rate over which the cone of depression expands (Leake and others, 2008, p. 2).⁵ An assessment of whether groundwater pumping at a specific location in the Mangas Trench impacts flow of the Gila River over a specific time frame requires an analysis that takes these factors into account.

Hydrologic studies conducted by the Town of Silver City have facilitated an effort to develop a hydrologic planning model that is suitable for assessing hydrologic effects from groundwater pumping in the area of the Mangas Trench. The model is based on MODFLOW-2000 (Harbaugh and others, 2000)⁶ and it is generally described in Balleau Groundwater, Inc. (2010).⁷ The hydrologic planning model boundary is shown on Figure 1. The model is calibrated and it builds on previous work conducted by the New Mexico Office of the State Engineer; it is intended for use to address questions regarding hydrologic effects resulting from groundwater pumping or recharge operations in the area of the Mangas Trench. The model is used as a tool herein to illustrate and quantify the effect to the Gila River caused by pumping groundwater in two general areas within the Mangas Trench, the Mimbres River Basin and the Gila River Basin. The two basins are separated by the continental divide as shown on Figure 1. Southeast of the continental divide is the Mimbres basin; northwest is the Gila basin. Whether there is an effect on flow of the Gila River is illustrated by inspecting whether the cone of depression that results from Project Elements reaches the perennial reach of Mangas Creek or the Gila River. The model analysis reasonably represents an extensive time frame by simulating the Project Elements over a 100-year period. (If the ISC considers the 100-year time horizon too limited, the applicant will expand the horizon to a standard in common use that is suggested by the ISC or the OSE.) The horizontal distance from a well to the limit of the cone of depression is termed the radius of influence⁸; in this case the practical radius of influence is illustrated as the distance where one tenth of one foot of water-level change is caused by a Project Element. Each Project Element is described below with a description of its effect to flow of the Gila River.

Project Element A

⁵ Leake, S.A., Greer, W., Watt, D. and Weghorst, P., 2008, Use of Superposition Models to Simulate Possible Depletion of Colorado River Water by Ground-Water Withdrawal: U.S. Geological Survey Scientific Investigations Report 2008-5189.

⁶ Harbaugh, A.W., Banta, E.R., Hill, M.C. and McDonald, M.G., 2000, MODFLOW-2000, The U.S. Geological Survey Modular Ground-Water Model—User Guide to Modularization Concepts and the Ground-Water Flow Process: U.S. Geological Survey Open-File Report 00-92.

⁷ Balleau Groundwater, Inc., 2010, Groundwater Recharge Analysis and Estimate of Recharge Option Costs: Technical Memorandum to Town of Silver City, dated July 16, 2010.

⁸ As Footnote 3, see pg. 209.

Project Element Aa is development of a new wellfield in the vicinity of Grant County airport. The wellfield is in the Mimbres Basin. The wellfield pumping is not more than what has been allocated to New Mexico prior to the 2004 AWSA; however, it does constitute groundwater pumping that would be facilitated by drilling wells with applied-for funds. For clarification of hydrologic effects, pumping groundwater from the new wells is analyzed. Model simulation of pumping groundwater from the airport wells quantifies the extent of the radius of influence. The radius of influence over a 100-year period of pumping is illustrated on Figure 2.

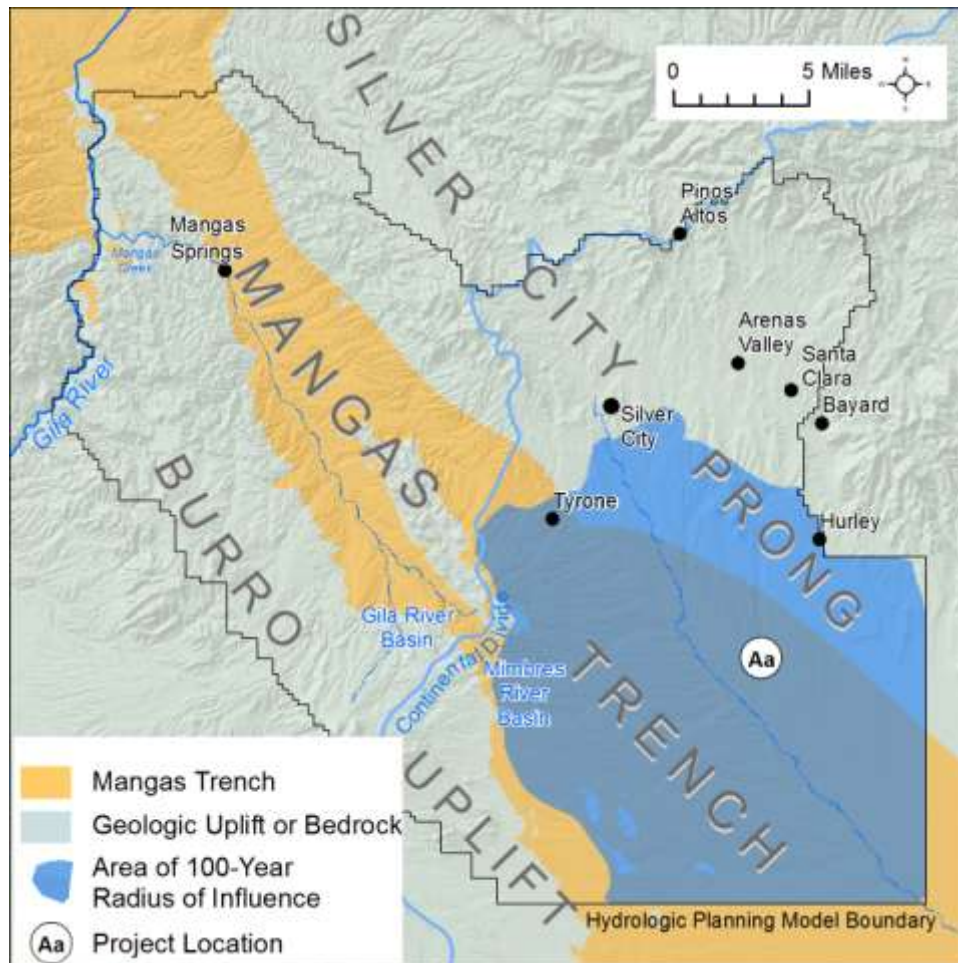


Figure 2. 100-year radius of influence from pumping groundwater (Project Element Aa).

The blue shading in the southeast area of Figure 2 is the model-calculated area over which the cone of depression expands from pumping the new airport area wells for 100 years. On Figure 2 it is apparent that the radius of influence does not reach to Mangas Creek or the Gila River. Inspection of internal model calculations confirms that depletion to Mangas Creek and the Gila River does not occur in the model simulation. Figure 1 shows the direction of groundwater flow in the Mimbres Basin is toward the southeast. Rather than depleting flow from the Gila River system, the long-term effect of pumping

the airport wells is to capture groundwater that otherwise would flow southeast to known discharge regions in the Mimbres Basin (alluvial flats and playas).

Project Element Ab is to increase groundwater pumping at the new wellfield in the area of the Grant County airport (Site Aa), but the increased pumping is contingent upon return flow that occurs at the site of Ab on Figure 1. The return flow balances the groundwater pumping with an equal amount of recharge to the Gila Group aquifer so that the net diversion from the aquifer system is zero. The return flow location (Ab) is between the wellfield pumping location (Aa) and the Gila River so there is no new diversion of groundwater that could potentially deplete flow from the surface-water system of the Gila River.

Project Element B

Project Element B is a system link between the Santa Clara water system and the water line that serves the Arenas Valley for water deliveries in emergency situations. The proposed quantity of water use is not more than New Mexico's allocation prior to the 2004 AWSA allocation. There is no new planned diversion of groundwater for the project that would potentially deplete flow from the Gila River.

Project Element C

Project Element Ca is development of a groundwater recharge operation at the Town of Silver City municipal wells known as Frank's wellfield. The operational plan is to make use of an existing pipeline that draws water from an impoundment (Bill Evans Lake), which is in turn supplied by an existing diversion on the Gila River. The constructed features have all received regulatory approvals, and no new burden or impact is proposed. The water diverted for recharge will be leased or purchased from an existing, permitted use (allocated prior to the 2004 AWSA) and converted into a groundwater recharge use, so no new water diversion from the Gila River is proposed. An additional five miles of new pipeline would have to be constructed from the Bill Evans pipeline to reach the actual well field, and all regulatory standards and best management practices would be instituted.

Leasing or purchasing an existing commercial use of water diverted from the Gila River and converting the purpose of use into a recharge operation in the Gila Basin constitutes a groundwater recharge program that would be facilitated by applied-for funds. For clarification of hydrologic effects, groundwater recharge with the hydrologic planning model is analyzed. The 100-year radius of influence from recharging groundwater is shown on Figure 3 as green shading. There are two notable differences from the other analyses conducted herein, the groundwater recharge causes water-level rise (opposed to drawdown from well diversions) and the radius of influence extends to the perennial reach of Mangas Creek. Water level rises in the Mangas Trench in the Mimbres Basin, as well. Also apparent on Figure 3 is the influence that the structure of the Mangas Trench

has on the cone of depression; it causes the greatest degree of expansion to occur in a northwest trend consistent with the narrow structure of the trench in the Gila basin.



Figure 3. 100-year radius of influence from recharging groundwater (Project Element Ca).

The radius of influence from the water-level rise causes an accretion of flow to Mangas Creek thereby increasing the flow of the Gila River system. Inspection of internal model calculations confirms that accretion to Mangas Creek and to the Gila River does occur in the model simulation. The quantity of flow accretion is shown on Figure 4.

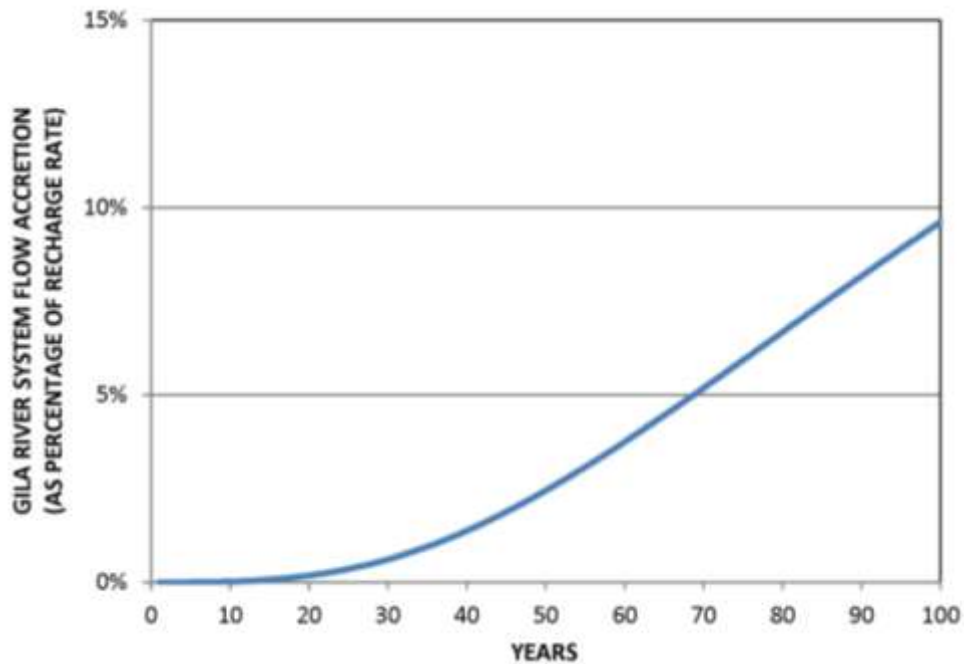


Figure 4. Flow accretion to Gila River system (Project Element Ca).

Flow accretion on Figure 4 is depicted as a percentage of the groundwater recharge rate (i.e. after 70 years of recharge, an amount equivalent to approximately five percent of the annual recharge rate, accretes as flow to the Gila River system). Recharge operations are initially planned at rates of one to two cubic feet per second, which translates to about 750 to 1,500 AFY, respectively.

Project Element Cb is for a new and larger water transmission line from Frank’s wellfield to the regional water system. The larger transmission line will increase the delivery capacity from 1,000 gpm to 2,000 gpm, which will enhance the water supply during peak times of demand. Frank’s wellfield is permitted for groundwater diversions up to 1,120.14 AFY. Since the late 1970s, the annual diversion from Frank’s wellfield has varied from about 500 to 1,100 AFY, so the wellfield is operating at rates near its permitted diversion. For clarification, increasing the capacity of peak demand water deliveries does not translate to an increase in the amount of water that Frank’s wellfield is permitted to divert on an annual basis. Wellfield diversions will continue to operate in the same general range of diversions that have occurred historically. There is no new allocation of permitted pumping or diversion of groundwater associated with Project Element Cb that would deplete flow from the Gila River.

Project Element D

Project Element D is a new water transmission line linking Hurley, Bayard, Santa Clara and Silver City to operate as a regional water system. New groundwater pumping

facilitated with applied-for funds is planned at the wellfield near the Grant County Airport; however, the results presented in the “Project Element A” section above illustrate that the pumping does not affect flow of the Gila River system.

Evaluation Panel Comment 2: *“Element D.a (Ca in the revised submittal) should explicitly state if water is existing FMI right or AWSA water.”*

Project Element Ca would use existing water rights and not AWSA water.

Evaluation Panel Comment 3: *“No discussion of how regional supply system would be organized or funded.”*

The proposal for a regional supply system is a concept to guide and coordinate efforts to adequately and reliably supply water to the residents in municipalities of Grant County and in nearby unincorporated areas. Other than the bylaws of the Grant County Water Commission, formal contractual instruments to support these coordinated efforts have not yet been established. Undoubtedly, they will be shaped by the nature of the opportunities and the constraints made available to these communities through their own evolving efforts to cooperate and by the requirements of private and market lending institutions as well as the requirements of funding resources made available by state and federal agencies. The regulatory requirements of the supporting and authorizing agencies that oversee water management will also influence the specifics of the contractual instruments.

In concept, however, the management of the regional system could be structured in the following way as described below. (The Grant County Regional Landfill provides a successful model showing successful cooperative ownership and management.)

- a. Each municipality would own its own system, including municipal wells, transmission lines, storage tanks etc. Each municipality would set its own water rates to consumers and maintain its own water system.
- b. The Grant County Water Commission or a successor that is mutually agreed to by the members of the Commission would own the pipeline that links the different communities together. It might be that staff is hired by the Commission to operate and maintain the regional part of the linked systems. Or perhaps the operational responsibilities could be contracted by mutual agreement to one of the members in the Commission.
- c. The regional entity would also manage any water made available by the return flow credits that are generated from the Silver City effluent discharge into the San Vicente Arroyo. This water would be available to all members of the Grant County Water Commission or its successor at rates set by members—just as rates are mutually set at the regional landfill.

- d. Construction costs would be paid for through a combination of grant, loans, and AWSA funding. In some instances, the costs of the Project Elements in this application exceed the amounts typically available through regular sources of grants and loans. In such cases, the AWSA funds are essential for municipalities in the mining district that have very limited financial resources. In other cases, the AWSA funds are important as a source for grant matches, supplemental funding, and gap funding. Finally, the AWSA funds are able to support projects that are collectively owned, such as the regional pipeline (Project Element D). It is very difficult for an individual municipality to bond for projects that it would not completely own.
- e. Operation and maintenance costs would be paid for by revenues derived from the sale of water. Individual municipalities would set their own rates for water users that they directly serve. Water received by the municipalities would be paid for at rates set by the Grant County Water Commission or its successor.

Criterion 4: Describe how the proposal considers the historic uses of and future demands for water in the Southwest New Mexico Water Planning Region and the traditions, cultures, and customs affecting those uses.

- a) **Historic Uses, traditions, cultures, and customs:** The proposal recognizes that living in towns and in aggregated but unincorporated clusters of housing is a use established early in Grant County history. Pinos Altos was established in 1860 and became Grant County's first county seat. In 1867, the county seat was moved to Santa Clara (formerly Central City), and it was moved again finally to Silver City in the 1870s. These communities were generally founded to support miners and mining interests, although Santa Clara began as a sutlers service area supporting the military post of Fort Bayard. Local farming and ranching activities were largely initiated after the establishment of those communities (and others such as Georgetown, etc.), in order to supply the new residents with essential agricultural products. The communities of Bayard and Hurley were established later as centers for mine administration and residential locations for miners working in the nearby large open pit mine. In short, it is reasonable to say that municipal living, mining, as well as farming and ranching were and still are contemporaneous traditional activities that all present equally valid claims for water needs.

There is also an established history and culture of water transfers between those economic sectors. In the 1950s, the Phelps Dodge mining company acquired numerous water rights in the Cliff-Gila valley, which it (and its successors) used (and still use) to support mining activities. By retaining the original farms that were the source of those water rights, the mining companies can and do transfer water rights back and forth between mining uses and agricultural uses. In fact, a mining company is by far the largest owner of irrigated land in that valley. Phelps

Dodge and Exxon, which invested in mines locally, have in the past also conveyed water rights and even wells to Silver City in order to ensure adequate public water supplies that support housing for miners. Local ranches have also sold or conveyed water rights to municipalities for public water supply use, and some ranches have subdivided their land, and relied on these public water supplies to serve the new developments. In short, water and water rights in Grant County have moved across economic sector lines to the mutual benefit of all parties based on market demand and willing sellers.

Finally, it should be noted that public water supplies constituted only 7% of all water withdrawals in Grant County in 2000, while irrigated agriculture constituted 52% and mining 38%. The effects of modestly increasing public water supply withdrawals on the other economic sectors would likely be very modest indeed: a 35% increase of a 7% share is only a 2% increase in overall usage. Given the declining mining activities that are forecast, increasing public water supplies may in fact have no negative impact in actual use allocations.

- b) **Future Demands:** The future public water supply needs are tied to modest growth projections that have been discussed at more length above in Criteria 2. There are substantial infrastructure needs to provide reliable access to people currently using public water supplies, but the amount of additional supplies suitable to accommodate future growth is modest—approximately 1,400 AFY.

PROJECT ELEMENTS

