Municipal Conservation to Reduce Net Depletions to Groundwater

Tier 2 Application Submitted to NMISC by Gila Conservation Coalition

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1. If the proposal would extend the water supply through conservation, or increase the supply through development of new water,

This project is for a water utilization alternative under the AWSA that proposes to provide funding for the implementation of water conservation measures for municipal and other publicly supplied water systems in southwestern New Mexico to reduce municipal and industrial water use and extend the life of groundwater supplies.

a. Describe the location and verify the ownership of and legal access to lands related to the proposal. [0 to 30 points]

There is no land required to implement this project.

b. Identify the source of the water to be put to use. [0 to10 points]

This proposal would provide funding for implementation of municipal water conservation programs for incorporated and unincorporated public water supply systems in the following groundwater basins: Mimbres Basin, Lordsburg Valley, Animas Basin, San Simon Basin and Gila-San Francisco Basin. The project will provide the necessary funding to extend the life of publically provided water supplies for the incorporated municipalities of Deming, Columbus, Silver City, Santa Clara, Bayard, Hurley, Lordsburg, Virden, Rodeo, Playas and Reserve, as well as unincorporated areas in the four counties as identified by AMEC.[1]

c. Describe and quantify whether and how the proposal would extend the water supply through conservation, or increase the supply through development of new water in the Southwest Planning Region. [4 points for each 10 AF up to 500 points]

Water conservation measures reduce the demand for water and therefore reduce the need to develop new water supplies. Many of these measures also save energy costs, reduce wastewater treatment costs, and reduce the overall environmental impacts associated with water use. According to the NM Office of the State Engineer, "Because the costs of water development and treatment continue to rise, many communities are faced with expensive water and wastewater treatment facility expansions to meet growing water demands. Fortunately, water conservation can delay, and in some cases actually eliminate, the need for these costly infrastructure expansions. The simple fact is this: ***conservation is almost always the least costly water supply alternative."***[2]

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[1] *Regional Water Demand Study for Southwest New Mexico Catron, Grant, Luna and Hidalgo Counties*, AMEC October, 2010 p. 3-48 http://www.awsaplanning.com/Studies_files/FINAL%20report%20SW%20Demand.pdf

[2] NM OSE "A Water Conservation Guide for Public Utilities" http://www.ose.state.nm.us/water-info/conservation/pdf-manuals/nm-water-manual.pdf p. 2.

The NMOSE states that "In New Mexico, many water utilities have proven that reducing water requirements by decreasing demand and increasing operating efficiencies is a cost-effective way to delay capital facilities, reduce operation and maintenance costs, reduce the need for development of costly new water sources, and demonstrate responsible water-use efficiency to regulatory agencies."[3]

Moreover, New Mexico law underscores the importance of water conservation in using efficiently the state's water resources by requiring that any public water supply system with diversions greater than 500 acre-feet/year must adopt a conservation plan to be eligible for funding from the NM Finance Authority and other key state agencies (72-14-3.2 NMSA 1978).

This Tier 2 project proposes to provide funding for implementation of water conservation programs that would extend the water supply by approximately 3,679 - 4,269 acre-feet of water annually throughout the four-county area. The SWNM Regional Water Demand Study conducted by AMEC for the AWSA Stakeholders Group estimates that municipal demand can be reduced by 4,269 acre-feet/year through implementation of water conservation measures throughout the four-county area in 2050.[4]

d. Demonstrate how the proposal would meet AWSA and CUFA requirements

This project is for a **WATER UTILIZATION ALTERNATIVE** as described under the Section 212(i) of the AWSA. Because it does not require an exchange with the Central Arizona Project, this project would not be subject to CUFA requirements.

2. Describe the proposal and its technical viability.

This proposal would provide funding for implementation of water conservation programs for public water supplies in the four-county area. Funding could be administered through the New Mexico Finance Authority/Water Trust Board or similar state agency with the necessary statutory authority. Municipalities and public water supply entities could apply to the board/agency for funding for water conservation programs including planning and implementation through a process similar to Water Project Fund monies disbursement. Given that the Water Trust Board has recommended $228 million in funding through the Water Project Fund to 221 projects statewide, the technical viability of management of such a fund has been demonstrated. Additionally, the Water Trust Board specifically recommends projects for funding in the water conservation and reuse category, and has experience in soliciting, reviewing, and recommending water conservation projects for funding.

Conservation measures fall into two broad categories: those implemented on the consumer side of the water meter such as installing water efficient devices, and those implemented on the utility side, such as rate structures aimed at encouraging conservation. The range of conservation measures that could be funded under the proposal includes the following and would be different for every system depending upon what is already in place and the specific issues related to the public water supply system:

- **Replacing less efficient plumbing fixtures and appliances** with the latest in water efficient devices has great potential to reduce indoor water use.
- By communicating the true cost of water, **increasing block water rate structures** can also be used to promote efficiency. This rate structure charges more per unit of water (e.g., $/1,000

[3] Ibid. p. 6.
[4] AMEC, p. 3-50. http://www.awsaplanning.com/Studies_files/FINAL%20report%20SW%20Demand.pdf

gallons) as consumption increases, protecting lower-volume users and penalizing high volume users.

- **Outdoor watering requirements** can be implemented to achieve water conservation, such as time of day and day per week limits on turf and landscape irrigation, non-essential water use restrictions related to washing of houses and mobile equipment, and prohibitions on wasting water by letting irrigation, pool or wash water to run off or drain into a street or public right of way.
- **Leak detection and repair programs** can also reduce or eliminate unaccounted for losses from the water distribution system.

a. Include any (or reference publically-available) technical and engineering studies completed and demonstrate how these studies support the proposal. [up to 20 points]

The AMEC Report, *Regional Water Demand Study for Southwest New Mexico Catron, Grant, Luna and Hidalgo Counties*, produced for the AWSA Stakeholders Group and finalized in October, 2010[5] provides an analysis of the potential reduction in water withdrawals resulting from conservation measures. AMEC reports that 4,269 acre-feet per year can be saved by implementing water conservation programs for public water supply systems in both incorporated and unincorporated areas of the four-county area.[6]

ECONorthwest assessed the impacts of water conservation on demand for Silver City and the Mining District and reported that Silver City's regional water supply could be extended by 10 or more years depending upon the demand growth scenario. Under low demand growth, the savings due to conservation is $13M or $164/acre-foot saved. Under the high demand growth scenario, the savings due to conservation is $21 million or $832/acre-foot saved.[7] These estimates represent the delayed or averted costs of procurement/development of new water supplies.

Deming's 40-year water plan outlines a conservation plan that estimates a 10% reduction in demand under both the high and low growth demand scenarios. In order to implement all phases of the plan and achieve this reduction, Deming "will need to obtain and dedicate additional sources of funding. In addition to grant funding…., technical assistance may be available from state or federal agencies."[8] AWSA funding through a project such as this could be a source of funds for implementation of Deming's conservation plan.

Municipal conservation planning efforts are being pursued by Silver City and Columbus. Silver City is in the process of issuing an RFP for development of a conservation plan under a grant from the NM Finance Authority, while the Village of Columbus is modifying its comprehensive plan to include water conservation and is working on a water conservation ordinance. Both these communities would be looking for funding to implement their plans.

Municipal conservation efforts in other communities in the state have been successful and demonstrate the technical viability of this proposal. For example, Santa Fe's per capita water consumption has been

[5] http://www.awsaplanning.com/Studies_files/FINAL%20report%20SW%20Demand.pdf
[6] Ibid. p. 3-50
[7] Rice, Jennie *The Potential Economic Costs of a Gila River Diversion Meeting Future Water Supply Needs in Silver City and the Central Mining District* ECONorthwest June 2005 pp. 3-17 – 3-19 http://www.gilaconservation.org/PDF/EcoNW%20Study/Gila%20River%20Final%20rpt.pdf
[8] DBSA *City of Deming 40-Year Water Plan* July 20, 2009. pp. 95-96

reduced 40 percent between 1995 and 2007 through a comprehensive set of ordinances and financial incentives, including its rate structure.[9] The City of Albuquerque reduced its per capita water use 33% from 216 gpcd in 2000 to 167 gpcd in 2007 through a water conservation program that includes fixture rebate program, outdoor watering program, and penalizing water waste.[10]

b. Include any (or reference publicly-available) hydrologic, ecologic, or geotechnical studies completed and demonstrate how information included in these studies specifically supports or detracts from the proposal.

The Southwest New Mexico Regional Water Plan discusses the hydrologic impacts of a range of municipal conservation measures and its conclusions for municipal conservation support the technical viability of this proposal.[11] "Based on reviews of water use in the region and surrounding communities, and on program examples from around the country (i.e., those with proven track records), some communities in the planning region could achieve significant water savings—as much as 38 percent—through an integrated application of a conservation program. The success of a given conservation program will depend upon (1) the accuracy of the data, (2) the commitment of the local leaders, and (3) the thoroughness of the implementation."[12]

3. Quantify estimated costs.

a. Quantify the proposal's estimated costs, including planning, design, and/or construction, and administration or oversight. [up to 10 points]

The water conservation fund envisioned in this project would be endowed using AWSA NM Unit Funds (~$10M of the $66M) in a similar manner as the Water Trust Fund was endowed with $40 million in 2006. The endowment will allow for an annual stream of resources available to fund planning, administration of the fund, and implementation of water conservation projects. We estimate a present value cost (2009$) of $10.4 million for implementation of water conservation programs throughout the four-county area. Administrative costs are $312,000 with planning costs of $150K. (See below for more detailed description). **Total = $10,862,000**

Planning Costs - $150,000 Year 1
Municipalities and public water supply systems are in various stages of water conservation planning i.e., some have plans in place, others are in progress, and others have nothing at all. Therefore some resources should be set aside for water conservation planning. Additionally, some planning costs will be needed to determine how to set up the water conservation fund, develop grant process, etc.

Administrative costs for NM Finance Authority or appropriate agency to administer fund – 3% of cost of water conservation program = $312,000[13]

[9] http://www.santafenm.gov/DocumentView.aspx?DID=2178

[10] http://www.cabq.gov/progress/environmental-protection-enhancement/dcc-31/indicator-31-2

[11] DBSA, Southwest New Mexico Regional Water Plan 2005 p. 8-26 http://www.gilaconservation.org/PDF/SW%20NM%20Regional%20Water%20Plan/8_Alternatives.pdf

[12] Ibid.

[13] Personal communication with Greg Campbell, Director of Accounting, NM Finance Authority in reference to administrative costs for Water Trust Board which are approximately 3% of the grant amount or "endowment."

Cost Estimates for Water Conservation Project/Program Implementation

In order to estimate project costs, we conducted an analysis of the more likely water conservation program elements that could be considered by municipalities and public water supply systems. This gives us a ball park estimate of the potential water conservation program costs for this proposal. The following discussion outlines each water conservation measure along with calculation of cost/acre-foot of water saved. Note that more recent AMEC demand growth projections have been utilized so estimates in the Tier 2 application differ slightly from the Tier 1 application.

Water Efficient Technologies

Replacing less efficient plumbing fixtures and appliances with the latest in water efficient devices has great potential to reduce indoor water use. In a non-conserving household, toilets are the largest contributor to water use on a per capita basis, consuming on average about 18.5 gallons per capita per day (gpcd), followed by washers at 15.0 gpcd, and showerheads at 11.6.[14] The following discussion estimates the potential costs of and water savings from utility-sponsored programs to replace these fixtures and appliances with the most efficient models and thereby determine the cost-effectiveness in $/ac-ft. For each of these programs, utility administrative costs are assumed to add 10 percent to the utility's direct costs. In addition, the standard industry assumption of an average of 2.6 persons per household is used throughout.[15]

High Efficiency Toilets

Older toilets consume anywhere from 3.5 to 6 gallons per flush (gpf), as compared to the high efficiency toilets on the market today that use 1.28 gpf. Since 1994, the US Energy Policy Act has required that all residential-use toilets sold in the U.S. must not exceed 1.6 gpf. The effect of this law is that toilet water efficiency has been increasing over time as older toilets are replaced with newer models. Even so, the average flush volume of a residential toilet is still 3.48 gpf.[16] A high efficiency toilet replacement program will therefore save 3.48 - 1.28 = 2.2 gpf on average. Using the standard estimate for the number of flushes per day per person (5) produces a savings of 4,015 gallons per person per year (2.2 gpf x 5 flushes/day x 365 days/yr).

To estimate the cost-effectiveness of a utility-sponsored toilet replacement program, the following assumptions are made:

- The utility provides a 50% rebate for each high efficiency toilet purchased.
- The average customer cost per high efficiency toilet is $125.00.[17]
- The toilet lifetime is 15 years.
- An average of 2 toilets per household must be replaced in order to achieve the 4,105 gallons per person per year savings.[18]

Using these assumptions, the cost-effectiveness of the program is **$360/ac-ft**, calculated as follows:

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[14] Vickers, Amy. Handbook of Water Use and Conservation, WaterPlow Press, Amherst, MA, 2001, p. 15.

[15] Vickers, p. 50.

[16] Vickers, p. 26.

[17] September 2009 price, homedepot.com

[18] This is a more conservative approach than is typically taken in comparable analyses, as it reduces the cost-effectiveness by half.

$125/toilet x 2 toilets/household x 0.0838/yr (amortization) x 50% rebate x 1.1 (admin costs)
÷
4015 g/person/yr x 2.6 persons/household x 1/325,851 g/ac-ft

The total water savings from the program will depend on the number of households in each county and the estimate of participation in the program.

High Efficiency Washers

Older clothes washers are also water hogs, consuming 40-50 gallons per load (gpl), while high efficiency models are closer to 27 gpl, and some use as little as 16 gpl.[19] Depending on the washer being replaced, a high efficiency washer replacement program is estimated to save between 1,621 and 3,241 gallons per person per year (2,161 is the intermediate estimate).[20]

To estimate the cost-effectiveness of a utility-sponsored washer replacement program, the following assumptions are made:

- The utility provides a 25% rebate for each high efficiency washer purchased.
- The average customer cost per high efficiency washer is $850.00.[21]
- The washer lifetime is 15 years.
- One washer per household.

Using these assumptions, the cost-effectiveness of the program is **$1,136/ac-ft**, calculated as follows:

$850/household x 0.0838/yr (amortization) x 25% rebate x 1.1 (admin costs)
÷
2161 g/person/yr x 2.6 persons/household x 1/325,851 g/ac-ft

The total water savings from the program will depend on the number of households in each county and the estimate of participation in the program.

Low-Flow Showerheads

Older, higher-flow showerheads will consume between 2.5 and 5 gallons per minute (gpm). The newest fixtures have a flow rate of 2.0 gpm, while maintaining sufficient pressure (80 psi). The Environmental Protection Agency's WaterSense program estimates the savings from replacing older showerheads with 2.0 gpm showerheads at 885 gallons per year per person.[22] To estimate the cost-effectiveness of a utility-sponsored showerhead replacement program, the following assumptions are made:

- The utility provides the showerheads for free.
- The utility bulk cost per showerhead is $10.[23]
- The showerhead lifetime is 15 years.

[19] Vickers, p. 116.

[20] Vickers, p. 118.

[21] Vickers, p. 122, midpoint of $600-$1100 price range

[22] epa.gov/watersense

[23] Vickers, p. 94.

- An average of two showerheads per household must be replaced to achieve the water savings.[24]

Using these assumptions, the **cost-effectiveness of the program is $261/ac-ft**, calculated as follows:

$10/shwrhd x 2 shwrhds/household x 0.0838/yr (amortization) x 1.1 (admin costs)
÷
885 g/person/yr x 2.6 persons/household x 1/325,851 g/ac-ft

The total water savings from the program will depend on the number of households in each county and the estimate of participation in the program.

The Table below summarizes the data and cost-effectiveness calculations for each of the three water efficient technology programs.

Water Savings and Cost-Effectiveness of Water Efficient Technologies

	Total Cost ($/household)	% Covered by Utility Program	Annualized Program Cost, including Admin Costs ($/yr/household)	Water Savings (gallons/yr/person)	Program Cost-Effectiveness ($/ac-ft)
Toilet Rebate	250	50%	11.52	4015	360
Showerhead Replacement	20	100%	1.84	885	261
Washer Rebate	850	25%	19.58	2161	1136

Increasing Block Water Rate Structures

According to a recent study on water rate structures in New Mexico: "To promote efficiency, water rate structures must communicate the true cost of water. Only if the price of water reflects the economic value of water will customers know whether it is "worth it" to conserve water. The true economic value of water includes: (1) the utility's operation and maintenance costs; (2) the costs to procure and develop additional water supplies to meet growing demands; and (3) the social and environmental "opportunity costs" of losing other benefits of the water in order to develop and consume the water (e.g., ecological and recreation values of river basins, local/community economies, values of river flows for diluting pollutants, etc.). Failing to integrate all of these social and environmental costs into a water rate structure

[24] This is a more conservative approach than is typically taken in comparable analyses, as it reduces the cost-effectiveness by half.

is equivalent to subsidizing the cost of water. Furthermore, if the retail price of water is lower than its value, customers have an incentive to use too much of it."[25]

Water rate structures typically take one of three forms: uniform, decreasing block (unit costs decline as consumption increases), and increasing block (unit costs increase as consumption increases). While all rate structures result in higher water bills as consumption increases (i.e., the water isn't being given away), uniform and decreasing block rate structures do not encourage conservation because the unit price remains constant or decreases. Moreover, since utilities set their first block rates so as not to over-burden low-income customers, the total water bill for large volume users under a uniform or decreasing block rate structure is very unlikely to send the proper price signal.

Increasing block rate water structures, on the other hand, charge more per unit of water (e.g., $/1,000 gallons) as consumption increases, protecting lower-volume users and penalizing high volume users. The goal is to reward low-volume users with lower unit costs and charge high-volume users more per unit because their consumption puts pressure on the water system to expand supplies. To be effective, however, the increase in unit cost must be significant enough to send the right economic signal to consumers in terms of their total water bill and/or their disposable income. For example, if the block rate increases only 10 cents per 1,000 gallons from the first 10,000 gallons consumed to the second 10,000 gallons, then the incremental cost of that second 10,000 gallons is only $1.00 more than the first 10,000 gallons. Such price increases are highly unlikely to encourage conservation. Properly implemented, however, with economically-meaningful increases in unit rates by block, increasing block rate water structures are the most effective way to promote water conservation because they reward customers who conserve.[26] Ideally, the price of water in the last block of the rate structure would reflect the marginal cost to the utility of acquiring new water supplies.

The table below shows the effect of each city's rate structure in terms of the unit rate per 1,000 gallons for the first versus the second 12,000 gallons consumed. Santa Fe has the highest unit rate increase, $3.33, followed by Silver City with $1.52, and Lordsburg with $0.32. Again, since Deming has a uniform rate structure, the increase in the unit rate is $0.00.

Unit Rate per 1,000 Gallons

	Silver City	Deming	Lordsburg	Santa Fe
First 12,000 gallons	$2.51	$1.98	$2.02	$4.09
Second 12,000 gallons	$4.03	$1.98	$2.33	$7.42
Increase in Unit Rate ($/1,000 gallons)	$1.52	$0	$0.32	$3.33

Santa Fe is sending very strong price signals for conservation compared to most cities in southwestern New Mexico. Its block rates are roughly twice those of Silver City, three to four times those of Lordsburg, and almost five times those of Deming for the largest volumes. Within the region, only Silver

25 Western Resource Advocates, Water Rate Structures in New Mexico: How New Mexico Cities Compare Using This Important Water Use Efficiency Tool, February 2006, p. 5

26 Western Resource Advocates, p. 5.

City has an increasing rate block structure that provides an incentive for conservation. Lordsburg's unit rates do not increase significantly enough by block ($0.32 in our example for a 12,000-24,000 gallon increase), and Deming does not have an increasing block rate structure at all. Improving water rate structures could lead to significant reductions in water demand in the region. Santa Fe's per capita consumption has been reduced 40 percent between 1995 and 2007 through a comprehensive set of ordinances and financial incentives, including its rate structure.[27] The Environmental Protection Agency reports almost a one-to-one correspondence between the percentage increase in rates and the percentage reduction in consumption in Tucson, Arizona.[28]

The utility costs to design and implement a new or improved increasing block rate structure are estimated at $**40,000 in one-time design costs and $15,000 per year in staff time**. These costs are estimated based on data reported in a wide-ranging study of water utility conservation programs.[29] Over 20 years, the present value of the program costs would be $263,162, or $17,689 per year annualized. The cost-effectiveness in $/ac-ft of improving water rate structures will be based on the acre-feet saved and will vary for each city depending on the assumption for the percent reduction in consumption.

Outdoor Watering Ordinances

Outdoor water use also has the potential for conservation. The City of Deming has implemented a strict set of mandatory outdoor watering requirements for all users of the water supply system, including time of day and day per week limits on turf and landscape irrigation, nonessential water use restrictions related to washing of houses and mobile equipment, and prohibitions on wasting water by letting irrigation, pool or wash water to run off or drain into a street or public right of way. Serving drinking water in restaurants is prohibited except upon request of the customer. In the City of Deming outdoor water use has averaged about 30 gallons per capita per day (gpcd) since 2000 and has been as low as 23 gpcd.[30] These amounts are well below the typical outdoor use of 40 gpcd,[31] and it appears that the City has achieved excellent results with its ordinances.

For this analysis, the potential for outdoor water conservation will be analyzed for the town of Silver City only. The costs to develop and implement an outdoor water conservation ordinance are assumed to be one-quarter the design costs and one-half the annual cost used for new rate structures. (The design costs are likely overestimated, since Silver City could simply adopt the same ordinance as Deming.) So, with upfront design costs of $10,000 and annual staff costs of $7,500, the present value of the total program costs over 20 years would be $121,578, or $8,170 per year amortized.

Leak Detection and Repair

All public water systems have unaccounted-for losses to some degree. Typically, the majority of these unaccounted-for losses are to un-metered customers, while the remainder is due to system leaks. Most water utilities invest in leak detection and repair programs to reduce system losses. Leak detection costs are estimated at $200/ac-ft and leak detection is recommended for systems where losses exceed 10-20%.[32]

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[27] http://www.santafenm.gov/DocumentView.aspx?DID=2178

[28] http://www.epa.gov/owow/nps/chap3.html

[29] Western Resource Advocates, Smart Savings, Water Conservation Measures that Make ¢ents, 2008.

[30] Daniel B. Stephens and Associates, City of Deming 40-Year Water Plan, July 20, 2009, p. 93.

[31] DBSA, SWNM Regional Water Plan p. 8-27.

[32] http://www.water.ca.gov/wateruseefficiency/leak/

Estimate of Costs for Implementation of Potential Water Conservation Projects in SWNM

Conservation Measures Analyzed for SWNM Counties

Water Conservation Measure	Grant Co.	Luna Co.	Hidalgo Co.	Catron Co.
Water efficient technologies	X	X	X	X
Outdoor watering	X			
Increasing block rate structure		X	X	
Leak detection and repair	X		X	

Grant County Municipal Conservation Programs

Grant County	% Participation	Number of Households Participating	Annualized Program Cost ($/yr/hhold)	Annualized Program Cost ($/yr)	Water Savings (g/yr/person)	Program Water Savings (ac-ft/yr)	Program Cost ($, PV)
Toilet Rebate	50%	7,663	11.52	88,260	4015	245	$1,053,647
Showerhead Replacement	75%	11,494	1.84	21,182	885	81	$252,875
Washer Rebate	50%	7,663	19.58	150,043	2161	132	$1,791,199
Total						**459**	**$3,097,721**

Outdoor Watering Ordinances

In contrast to Deming, which has a strict outdoor watering ordinance (see Section 2), there is great potential in Grant County to reduce outdoor water use. Incentive programs have been estimated to reduce outdoor use by up to 50 percent.[33] The regional water plan estimates per capita demand in Grant County in 2000 at 160 gallons per day. Outdoor water use is typically about 40 percent of overall water use. If an outdoor watering ordinance similar to Deming's could reduce outdoor use by just 30 percent, then overall water use would be reduced by 12 percent. Using AMEC's estimate for Grant county's 2050 total public water supply withdrawals of 5468 ac-ft/yr,[34]12 percent corresponds to a water savings of **656 ac-ft/yr.** Using the program cost estimate discussed above, $8,170 per year, an outdoor water ordinance in Grant County would have a cost-effectiveness of $11/ac-ft ($8,170/yr ÷ 739 ac-ft/yr) and a **total cost of $121,578.**

[33] DBSA, SWNM Regional Water Plan. p. 8-27.

[34] AMEC p. 3-50

Leak Detection and Repair for Grant County

The Town of Silver City's unaccounted-for losses have ranged from 13-16 percent.[35] Since this is above the ideal threshold of 10 percent, this analysis will estimate the potential water savings from leak detection. Since system losses are only 5 percent in Deming, it seems reasonable to assume that Silver City could reduce its losses to a similar level. The AMEC report projects withdrawals in 2050 by the Silver City public water system of 3,488 ac-ft/yr.[36] A reduction in losses from 15 to 5 percent would correspond to a savings of **349 ac-ft/yr.** Using the cost-effectiveness estimate of $200/ac-ft and assuming a 20-year time horizon and a 3 percent discount rate, the **total cost of the leak detection program would be $1.3 million** (449 ac-ft/yr × $200/ac-ft ÷ 0.067/yr (amortization)).

Luna County Municipal Conservation Programs

Luna County	% Participation	Number of Households Participating	Annualized Program Cost ($/yr/household)	Annualized Program Cost ($/yr)	Water Savings (gallons/yr/person)	Program Water Savings (AF/yr)	Program Cost ($, PV)
Toilet Rebate	50%	10,110	11.52	116,446	4015	324	$1,390,125
Showerhead Replacement	75%	15,165	1.84	27,947	885	107	$333,630
Washer Rebate	50%	10,110	19.58	197,958	2161	174	$2,363,213
Total						**605**	**$4,086,968**

Increasing Block Rate Structure for Luna County

There is significant potential to reduce public water supply demand in Luna County through an improved water rate structure. As demonstrated above, the City of Deming--the largest public water supply system in the county--has a uniform rate structure as opposed to an increasing block rate structure--the most desirable structure to encourage conservation. Since the total potential for municipal conservation through incentive pricing is estimated to range from 15 to 50 percent,[37] and since the City of Deming 40-year water plan indicates that its outdoor water use already reflects conservation efforts,[38] this analysis makes the conservative assumption that only an additional 15 percent in demand reduction by 2050 could be achieved from an increasing block rate structure.

[35] DBSA, SWNM Regional Water Plan. p. 8-13.

[36] AMEC p.3-50

[37] DBSA, SWNM Regional Water Plan p. 8-27.

[38] DBSA, City of Deming, p. 94.

Since public water supply in Luna County in 2050 is projected at 6,784 ac-ft/yr in AMEC Study,[39] a 15 percent reduction would correspond to a savings of **1,018 acre-feet in 2050. The costs to design and implement an improved rate structure are estimated at $263,162 (present value).**

Hidalgo County Municipal Conservation Programs

Hidalgo County	% Participation	Number of Households Participating	Annualized Program Cost ($/yr/h-hold)	Annualized Program Cost ($/yr)	Water Savings (g/yr/person)	Program Water Savings (ac-ft/yr)	Program Cost ($, PV)
Toilet Rebate	50%	1,371	11.52	15,786	4015	44	$188,454
Showerhead Replacement	75%	2,056	1.84	3,789	885	15	$45,229
Washer Rebate	50%	1,371	19.58	26,836	2161	24	$320,372
Total						82	$554,056

Increasing Block Rate Structure for Hidalgo County

While the city of Lordsburg's water rates do have an increasing block rate structure, the magnitude of the increases is too small to encourage conservation. As described earlier, the conservation potential of incentive pricing ranges from 15 to 50 percent. Unlike Luna County, however, there is no indication of an existing ordinance in Hidalgo County addressing outdoor water use that would limit the potential for new conservation. So, for Hidalgo County a conservative assumption for the savings from an increasing block rate structure is 30 percent.

Since public water supply demand in Hidalgo County in 2050 is projected at 1,071 ac-ft/yr in the AMEC report[40] a 30 percent reduction would correspond to a savings of 321ac-ft/yr in 2050. **The costs to design and implement an improved rate structure are estimated at $263,162 (present value).**

Leak Detection and Repair for Hidalgo County

Lordsburg's unaccounted for losses are 22% of total withdrawals. Assuming a reduction in unaccounted for losses to 5% of annual withdrawals of 816 ac-ft/year in 2050,[41] Lordsburg can save **139 acre-feet/year** for a total cost of $358,000 (amortized over 20 years).

[39] AMEC, 3-50.

[40] AMEC, 3-50

[41] AMEC, 3-50

Catron County Municipal Conservation Programs

Catron County	% Participation	Number of Households Participating	Annualized Program Cost ($/yr/hhold)	Annualized Program Cost ($/yr)	Water Savings (g/yr/person)	Program Water Savings (ac-ft/yr)	Program Cost ($, PV)
Toilet Rebate	50%	834	11.52	9,604	4015	27	$114,654
Showerhead Replacement	75%	1,251	1.84	2,305	885	9	$27,517
Washer Rebate	50%	834	19.58	16,327	2161	14	$194,912
Total						**50**	**$337,082**

In our analysis we identified municipal conservation measures to achieve water savings of 3679 ac-ft/year. The AMEC report has identified a potential savings of 4,269 ac-ft/year.[42] We therefore assume for this proposal the range of potential water savings as 3,679 – 4269 ac-ft/year at a present value cost of approximately $10.4 million. The table below summarizes project implementation costs by county.

Summary of Water Savings and Cost for Water Conservation Measures by County

County/Conservation Measure	Water Savings (ac-ft/yr)	Present Value Cost ($1,000)
GRANT		
Water efficient technologies	459	3,100
Outdoor watering ordinance	656	0.122
Leak Detection	349	1,300
LUNA		
Water efficient technologies	605	4,100
Increasing block rate structure	1018	0.263
HIDALGO		
Water efficient technologies	82	.554
Increasing block rate structure	321	.263
Leak detection and repair	139	.358
CATRON		
Water efficient technologies	50	.337
TOTAL	**3679**	**10,400**

[42] AMEC, p. 3-50.

b. If applicable, quantify the proposed project's on-going administrative, operational, and maintenance costs. [up to 10 points]

The project would have on-going administrative costs to oversee the fund endowment; solicit, review, recommend projects for implementation; manage grants; and provide overall administration of the program. Administrative costs are estimated at 3% of the program costs which is $312,000.[43]

c. Describe environmental compliance activities, and quantify the costs for environmental mitigation and restoration related to the proposal. [up to 10 points]

It is expected that there will be no need for environmental mitigation and restoration related to this proposal. The WTB/NMFA or administering agency would review each project on a case-by-case basis to ensure that the proposals comply with all environmental regulations and that there are no negative environmental impacts.

d. Quantify the AWSA funding sought for the proposal and for the pendency of the proposed activity's or project's duration. [up to 10 points]

We estimate a present value cost (2009$) of $10.4 million for implementation of water conservation programs throughout the four-county area. Administrative costs are $312,000 with planning costs of $150K .

Given cost share of 30% of the implementation costs ($3.12 million), **AWSA funding requested is $7,742,000**

4. If proposal impacts, beneficially or adversely, the environment of the Southwest Planning Region, the Gila River, its tributaries or associated riparian corridors, use the best available science to:

a. Describe and quantify how the proposal might impact the project site and environment, particularly state and federally-listed species. [up to 10 points]

Water conservation provides an environmentally beneficial alternative to meeting the region's future water needs in comparison to a Gila River diversion which could cause significant harm to the Gila River, its tributaries and associated riparian corridors.[44]

The Gila Conservation Coalition is very concerned about preservation of the Gila environment and thus proposes that this water conservation program implement procedures to avoid impact to the environment in accordance with applicable laws.

There are no anticipated negative impacts to the environment of the Southwest Water Planning Region, the Gila River or its tributaries expected from this project. To the extent that water

[43] Personal communication with Greg Campbell, Director of Accounting, NM Finance Authority in reference to administrative costs for Water Trust Board which are approximately 3% of the grant amount or "endowment."
[44] Rice, Jennie p. 5-1.

conservation measures are implemented in areas in which groundwater is connected to surface water, there could be a benefit to surface water flows from reduced groundwater withdrawals.

b. Describe and quantify the proposal's efforts to mitigate possible adverse impacts on the environment, particularly riparian areas and state and federally-listed species in the Gila Basin and at the specific location of the proposal. [up to 10 points]

Water conservation provides an environmentally beneficial alternative to meeting the region's future water needs in comparison to a Gila River diversion which could cause significant harm to the Gila River.

There are no anticipated negative impacts to the environment, riparian areas and state and federally listed species in the Southwest Water Planning Region, the Gila River or its tributaries expected from this project.

The Gila Conservation Coalition is very concerned about preservation of the Gila environment, riparian areas, and impacts to state and federally listed species and thus proposes that this water conservation program implement procedures to avoid impacts to the environment, riparian areas and state and federally listed species in accordance with applicable laws. Although highly unlikely, mitigation measures would be implemented if deemed necessary.

c. Describe and quantify how the proposal may benefit the environment, particularly riparian areas and state and federally-listed species in the Gila Basin and at the specific location of the proposal. [up to 10 points]

Water conservation provides an environmentally beneficial alternative to meeting the region's future water needs in comparison to a Gila River diversion which could cause significant harm to the Gila River.

It is unknown at this time the specific details of water conservation projects that could be funded through this project and it is therefore impossible to quantify potential benefits to the environment as a result of this project. According to EPA, water conservation "helps to maintain aquatic habitats; restore wetlands and fisheries; protect groundwater from depletion and contamination; and reduce the amount of energy used to pump, heat, and treat drinking water and to pump and treat wastewater."[45]

To the extent that water conservation measures are implemented in areas in which groundwater is connected to surface water, there could be a benefit to surface water flows from reduced groundwater withdrawals, benefiting riparian areas and the multitude of species, some of which are listed, that depend on these areas for survival.

d. List any environmental statutes, rules, or regulations that may apply to the proposal, and demonstrate how the proposal implementation will comply with such laws, rules or regulations. [up to 10 points]

[45] www.epa.gov

The administering agency for this water conservation fund would need to set up policies and procedures to comply with all state and federal environmental and other laws as applicable covering impacts to land use, floodplains, wetlands, cultural resources, biological resources, water quality, environmental justice, air quality, noise and hazardous materials as necessary.

5. Describe any economic or cost analysis information and data for the proposal:

a. Quantify estimated economic benefits including environmental, recreation, value of water itself, value of the water to the regional economy, increased economic growth, protection against loss of jobs, agriculture, ranching, local economic sustainability or growth, or other. [up to 10 points]

According to a recent study on water rate structures in New Mexico: "To promote efficiency, water rate structures must communicate the true cost of water. Only if the price of water reflects the economic value of water will customers know whether it is "worth it" to conserve water. The true economic value of water includes: (1) the utility's operation and maintenance costs; (2) the costs to procure and develop additional water supplies to meet growing demands; and (3) the social and environmental "opportunity costs" of losing other benefits of the water in order to develop and consume the water (e.g., ecological and recreation values of river basins, local/community economies, values of river flows for diluting pollutants, etc.). Failing to integrate all of these social and environmental costs into a water rate structure is equivalent to subsidizing the cost of water. Furthermore, if the retail price of water is lower than its value, customers have an incentive to use too much of it."[46]

Assuming that municipalities price water to reflect the operation and maintenance costs of providing water, one can get a lower bound estimate of the economic value of water conservation achieved by this project by multiplying the price of municipally supplied water by the amount of water saved by conservation.

- 3679 – 4269 ac-ft/year annual water savings (lower bound = this analysis; upper bound = AMEC estimate[47]
- Average price of municipally supplied water across 4-county area of SWNM – $24.78/6000 gallons[48] = $1345.92/ac-ft
- Lower bound estimate of economic value of water conservation = water savings X average price of municipally supplied water = **$4.95 million – $5.75 million**

The costs of procurement and development of additional water supplies that would be delayed or averted as a result of water conservation is also part of the total economic value of the water saved through water conservation. As a ball park estimate, it is assumed that implementation of water conservation would preclude development of a Gila River diversion project. Since that project could supply 8000 ac-ft/year[49] at a cost of $250 million - $300 million and the amount of water saved

46 Western Resource Advocates, Water Rate Structures in New Mexico: How New Mexico Cities Compare Using This Important Water Use Efficiency Tool, February 2006, p. 5

47 AMEC, p. 3-50.

48 SWNM Council of Governments 2011 Statistical Abstract p. 18 http://www.swnmcog.org/images/2011_ABSTRACT.pdf

49 DBSA SWNM Regional Water Plan p. 8-115.

through water conservation is approximately half of the yield of a diversion project, it is assumed **the averted costs of development of a diversion project from water conservation is $125 million - $150 million** (half of the estimated cost range for a Gila River diversion).

Opportunity costs of the water if developed – if water were developed through a Gila River diversion project, the potential economic losses range from **$12.4 million in lost tourism dollars to $218 million in the loss of free-flowing river values.**[50] Another way to phrase this is that through water conservation, we maintain economic benefits of a healthy Gila River ecosystem that can be valued at $12.4 million to $218 million. It should be noted that this is an incomplete accounting of the opportunity costs of the water if it were developed through a diversion. These numbers are the most readily accessible for economic costs due to potential ecological impacts from a diversion and do not include other cost categories such as water quality impacts, quality of life impacts, aesthetics, property values, and impacts to domestic wells and agriculture.

Summary: Estimate of Total Economic Value of Water Saved through Water Conservation

Averted operation and maintenance costs of supplying water = $4.95 million – $5.75 million
Averted costs of procuring/developing water through diversion = $125 - $150 million
Opportunity costs if water is developed through diversion (partial estimate) = $12.4 million – $214 million
TOTAL = $142.4 million – $369.8 million

Apart from total economic value of the water saved through this project, water conservation provides benefits to the regional economy that are difficult to quantify, including a secure (less risky), sustainable water supply that is not dependent upon a high risk, high cost diversion project subject to federal management through the Central Arizona Project.

Assuming a diversion were constructed rather than water conservation and other non-diversion alternatives to meet future water needs and that the region's environmental amenities would be negatively affected by a diversion, economic growth in the region could be negatively affected due to fewer new households and businesses locating in the area to take advantage of quality of life amenities.

According to the Southwest New Mexico Regional Water Plan, "growth of the residential, municipal and commercial sectors in Grant County will most likely be driven by increased tourism and in-migration of residents seeking quality of life, including retirees." The plan goes on to observe that increased tourism is currently shifting and will continue to shift commercial development toward services for visitors to the area, and that businesses that serve county residents will continue to locate in the Silver City area.[51]

Implementation of water conservation and non-diversion alternatives would allow the ecological values of the Gila River to be maintained providing recreation, tourism and quality of life benefits. A recent Economic Research Service study finds that tourism and recreational development in rural areas leads to increases in local employment, income, and wage levels, and improvements in social

[50] Rice, Jennie & Ernie Nemie *The Potential Economic Costs of a Gila River Diversion Meeting Future Water Supply Needs in Silver City and the Central Mining District* ECONorthwest June 2005 pp. 5-1- 5-12 http://www.gilaconservation.org/PDF/EcoNW%20Study/Gila%20River%20Final%20rpt.pdf
[51] DBSA, Appendix E4, pp. 9, 12

conditions, such as poverty, education and health.[52] **Thus pursuing water conservation programs to meet future water needs rather than a diversion project can contribute to economic growth, recreation and tourism[53], job growth and quality of life benefits in addition to the economic values presented above**.

Finally, the NM Office of the State Engineer states that "water conservation can delay, and in some cases actually eliminate, the need for costly infrastructure expansions. The simple fact is this: ***conservation is almost always the least costly water supply alternative."***[54] If a high cost project like a diversion project is unnecessarily implemented to meet future water needs rather than cost-effective water conservation, then the cost of water would be higher than it would have to be to supply the same amount of water. This could have a negative economic impact and is not an efficient use of resources.

b. Quantify estimated costs including planning, design, and/or construction, environmental compliance, operation, maintenance, repair, and administrative costs or other. [10]

See 3.b. above – We estimate a present value cost (2009$) of $10.4 million for implementation of water conservation programs throughout the four-county area. Administrative costs are $312,000 with planning costs of $150K. **Total = $10,862,000**

c. Identify the source of local contributions and demonstrate the commitment and ability to pay any local cost-share for project proposal, including any applicable exchange costs [1 point for every % of project cost to be borne by local sponsor up to 50 points]

Federal and state funds are available for water conservation projects and a cost share requirement (30%) could be built into the grant process.

Given that this project does not involve an exchange for CAP water, the project would not be responsible for any exchange costs.

6. [120] Describe how the proposal addresses the needs of a particular group or groups or interests on the issues of

a. Historic uses, traditions, cultures, and customs. [up to 10 points]

Implementation of municipal water conservation measures throughout southwestern New Mexico is a means to make this historical use of water more efficient in order to decrease the amount of groundwater mining occurring in the region and ensure reliable supply for future generations.

b. Current and future demands for water in the Southwest Planning Region. [up to

[52] Whitener, L. "Policy Options for a Changing Rural America," Amber Waves, April 2005.
[53] To put potential tourism benefits in context, tourism contributed $48 million to the economy of Grant County in 2002 according to the NM Department of Tourism.
[54] NM OSE "A Water Conservation Guide for Public Utilities" http://www.ose.state.nm.us/water-info/conservation/pdf-manuals/nm-water-manual.pdf p. 2.

20 points]

Municipal demand management can reduce withdrawals from groundwater in the four-county area by 3,679 – 4,269 acre-feet per year thus extending the life of groundwater supplies and averting or delaying the need to develop additional new infrastructure for SWNM communities. Silver City has said that municipal conservation can fulfill 50% of their future water needs. The Deming 40-year water plan states that water conservation could meet 10% of their future needs.

c.Flood control.[up to 20 points]

This project does not address flood control.

d. Fire protection, prevention, or suppression. [up to 20 points]

This project does not address fire protection, prevention or suppression.

e. Recreation. [up to 20 points]

To the extent that water conservation can extend the life of our existing water supplies and preclude the need to build a costly diversion project on the Gila River with associated environmental impacts, recreation in the Gila Basin will benefit.

f. Environmental protection and/or enhancement. [up to 20 points]

This project promotes conservation of our groundwater supplies so that communities can utilize these supplies in a more sustainable way for an overall benefit to the environment.

The EPA states that water conservation also "helps to maintain aquatic habitats; restore wetlands and fisheries; protect groundwater from depletion and contamination; and reduce the amount of energy used to pump, heat, and treat drinking water and to pump and treat wastewater."[55]

According to the Southwest New Mexico Regional Water Plan, "water conservation tools can significantly reduce local demand on local water supply and treatment facilities. For significant populations to be supported in the Southwest Region without eventually depleting local groundwater resources and quality of life, municipal conservation must continue to be emphasized, thereby contributing to the long-term sustainability of water resources. If a municipality were to dedicate the amount of water conserved to the preservation of a particular species or sensitive habitat, then a conservation program could directly benefit the environment."[56]

g. Any others. [up to 10 points]

Water conservation can extend the life of our existing water supplies and preclude the need to build a costly diversion project on the Gila River. **Taxpayers around the state and water users can benefit tremendously** from getting water needs met at low cost.

[55] www.epa.gov
[56] DBSA. SWNM Regional Water Plan" p. 8-36.

Water conservation can help **sustain our quality of life** in southwestern New Mexico. Quality of life influences household location decisions. If the region's environmental amenities are negatively affected by a diversion, then economic growth could be affected due to fewer households and businesses locating in the area. Water conservation can preclude the need for a Gila River diversion project and thus maintain these quality of life values for the region.

7. [40] List those supporting the application, including federal, state, and local government entities; Indian nations, tribes or pueblos; irrigation or conservation districts; non-profit organizations; and other entities. Provide letters or resolutions of support for the application. [up to 40 points]

City of Deming
Town of Silver City
The Nature Conservancy of New Mexico (letter sent directly to Estevan Lopez)
Southwest New Mexico Green Chamber of Commerce (representing over 150 local businesses in Grant, Luna and Hidalgo counties)

8. [30] Describe whether the proposal would benefit one or more than one of the counties in the Southwest New Mexico Planning Region – Catron, Grant, Hidalgo, and/or Luna Counties. [10 points/county up to 40 points]

Municipalities and public water suppliers from all four counties in the Southwest New Mexico Water Planning Region would be eligible to apply for funding for water conservation.

9. [50] Describe whether the proposal would support economic growth or benefit one or more than one of the following interests in the Southwest New Mexico Planning Region – agricultural, ranching, municipal, recreational, or other (specify). [10 points/interest up to 50 points]

This proposal supports the regional economy and has benefits that accrue to all of the listed interests in the Southwest New Mexico Water Planning Region. Apart from total economic value of the water saved through this project as discussed in 5a, water conservation provides benefits to the regional economy that are difficult to quantify, including a secure (less risky), sustainable water supply that is not dependent upon a high risk, high cost diversion project subject to federal management through the Central Arizona Project. Although sustainable water supply is one of the necessary factors needed for economic growth, it may not guarantee economic growth.[57] The four county area is able to meet its current and future water supply needs with the resources it already has.[58] Currently, the

[57] Hanemann states: "The notion that water supply contributes to economic growth and development is highly intuitive. After all, it is known that many of the world's major cities owe their origin to their location along coasts or rivers where water-borne transportation was facilitated. But, the relevant question is whether an increment in water availability would generate an increment in economic activity today, and how much. In the US, federal water projects have long been advocated for their claimed contribution to regional economic development. However, the actual empirical evidence is less obvious and more negative. As Howe (1968) noted, in industrial processes, water costs are a relatively small fraction of total production costs even in water-intensive industries, and there are many examples of firms in such industries choosing to locate plants in water deficient areas because of market or non-water input considerations." Michael Hanemann, "The Value of Water" University of California Berkeley 2005 http://www.ctec.ufal.br/professor/vap/Valueofwater.pdf

[58] Rice, Jennie and Ernie Nemie. 2005.

local water supply in the four county area supports economic activity of approximately $1 billion in gross receipts.[59]

Assuming a diversion were constructed rather than water conservation and other non-diversion alternatives to meet future water needs and that the region's environmental amenities would be negatively affected by a diversion, economic growth in the region could be negatively affected due to fewer new households and businesses locating in the area to take advantage of quality of life amenities.

According to the Southwest New Mexico Regional Water Plan, "growth of the residential, municipal and commercial sectors in Grant County will most likely be driven by increased tourism and in-migration of residents seeking quality of life, including retirees." The plan goes on to observe that increased tourism is currently shifting and will continue to shift commercial development toward services for visitors to the area, and that businesses that serve county residents will continue to locate in the Silver City area.[60]

Implementation of water conservation and non-diversion alternatives would allow the ecological values of the Gila River to be maintained providing recreation, tourism and quality of life benefits. A recent Economic Research Service study finds that tourism and recreational development in rural areas leads to increases in local employment, income, and wage levels, and improvements in social conditions, such as poverty, education and health.[61] **Thus pursuing water conservation programs to meet future water needs rather than a diversion project can contribute to economic growth, recreation and tourism[62], job growth and quality of life benefits in addition to the economic values presented above**.

This proposal would benefit the following interests in the SWNM Water Planning Region:

Agricultural – water conservation would decrease drawdown of the water table, helping irrigators with their well production and maintaining or reducing pumping costs since water would not need to be pumped up from deeper levels or new wells drilled as water levels are lowered.

Ranching - water conservation would decrease drawdown of the water table, helping ranchers with their well production and maintaining or reducing pumping costs since water would not need to be pumped up from deeper levels or new wells drilled as water levels are lowered.

Municipal - Water conservation measures reduce the demand for water and therefore reduce the need to develop new water supplies. Averting or delaying the need to develop new sources of water has a financial benefit to the municipality and the water users that it supplies by lowering the costs of providing water. Water conservation also reduces operation and maintenance costs.

Recreational – Implementation of water conservation rather than a diversion project to meet future water needs would allow the Gila River to remain a healthy system and therefore maintain recreational opportunities. Recreation has a direct connection to tourism dollars brought in to the local economy.

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[59] http://bber.unm.edu/econ/grrec.htm

[60] DBSA, Appendix E4, pp. 9, 12

[61] Whitener, L. "Policy Options for a Changing Rural America," Amber Waves, April 2005.

[62] To put potential tourism benefits in context, tourism contributed $48 million to the economy of Grant County in 2002 according to the NM Department of Tourism.

Other – Taxpayers – Water conservation is "almost always the least costly water supply alternative" according to the NM Office of the State Engineer. So by implementing cost-effective water conservation rather than a high cost diversion project to meet future water needs, federal and state taxpayers would benefit since they wouldn't have to subsidize an unnecessary and expensive water development project.

Other – Future Generations – Water conservation would extend the life of our water supplies and keep water in reserve for future generations, an "interest" that the present generation has the responsibility to plan and provide for.