February 2013

FINAL REPORT

REGIONAL WATER CONSERVATION PLAN

IN SUPPORT
OF
ARKANSAS VALLEY CONDUIT AND RELATED PROJECTS

Prepared for the

SOUTHEASTERN COLORADO
Water Conservancy District
"Your investment in water"

Prepared by:

GREAT WESTERN INSTITUTE

Table of Contents

Introduction 1

- Plan Funding
- Objectives of the Regional Water Conservation Plan
- Planning Horizon

Profile of Water Supply for the Plan Participants 5

- Population and Customers Served
- Current Water Demand
- Future Water Demand
- Water Supply Options
- Water Supply Gap

Plan Participant's Water Supply Infrastructure 17

- Qualification of the Data
- Meters
- Meter Reading and Billing
- Water Rates
- Data Management
- Distribution Piping
- Water Production and Treatment
- Value of Selected Infrastructure

Water Loss and Performance Guidelines 24

- Characteristics of Non-Revenue Water for the RWC Plan Participants
- Performance Guidelines

Ongoing Water Conservation Programs 29

Water Conservation Goals 34

Identification of Water Conservation Measures and Programs 36

Evaluation and Selection of BMPs by Plan Participants 38

- Local Water Conservation Planning
- Best Management Practices
- Funding Support
- Water Use Tracking and Reporting

Implementation Tasks 43

References 45

Table of Contents (continued)

Appendices

Appendix A – Map of Plan Participant Locations in Lower Arkansas River Basin
Appendix B – System Wide Water Audits – Overview of Work Performed
Appendix C – Meter Size and Age Data from Plan Participants
Appendix D – Distribution Pipe Material and Size from the Plan Participants
Appendix E – Water Treatment Requirements for the Plan Participants
Appendix F – Estimated Water Production and Treatment Energy Cost
Appendix G – Colorado Revised Statute 37.60.126.5
Appendix H – Funding Options Summary for Local Water Conservation Planning and Implementation
Appendix I – Notice of Public Review
Appendix J – Responses to Public Comments Received

List of Figures

Figure 1 – Non-Revenue Water for Each Plan Participant
Figure 2 – Breakdown of Water Loss by Occurrence and Water Demand
Figure 3 – Non-Revenue Water versus Meter Age
Figure 4 – Non-Revenue Water versus Miles of Distribution Piping

List of Tables

Table 1 – Listing of Regional Water Conservation Plan Participants
Table 2 – Summary of Plan Participant Populations Served and Number of Customers
Table 3 – Summary of Participant Current Water Demands and Water Uses
Table 4 – Summary of Participant Future Demands with and without Passive Savings
Table 5 – Plan Participants with Radionuclide Contaminated Water
Table 6 – Summary of Participant Future Water Supplies
Table 7 - Listing of Plan Participants that May Need to Rely on Existing or Other Supplies to Meet Water Demand in 2070
Table 8 – Unmetered Water Uses Identified During Data Collection
Table 9 – Estimate of Selected Infrastructure Costs
Table 10 – Categorization of Non-Revenue Water Losses for the Plan Participants
Table 11 – Summary of Leak Management Target-Setting Guidelines
Table 12 – Summary of Ongoing Water Conservation Efforts
Table 13 – Plan Participant Interest in Future Water Conservation
Table 14 – Summary of Water Conservation Measures that Should Be Considered in the Development of a Water Conservation Plan
Table 15 – Overview of BMPs in the Water Conservation Measures Tool Box

Introduction

The Southeastern Colorado Water Conservancy District (hereafter "District" or "SECWCD") is a cooperating agency in the Arkansas Valley Conduit (AVC) project, which would be a federally owned feature of the Fryingpan-Arkansas Project (Fry-Ark). Public Law 87-590 authorized the Secretary of the Interior to "construct, operate and maintain" the Fry-Ark Project. As such, the U.S. Department of the Interior, Bureau of Reclamation (hereafter "Reclamation") is responsible for obtaining permits for construction of the AVC, if the Record of Decision related to the Environmental Impact Statement selects an action alternative. If the AVC is constructed, the District would be responsible for repayment of the 35% local share of the project, but not for obtaining permits.

The AVC consists of a pipeline that would carry Fry-Ark Project water (Fry-Ark or Project water), which has been diverted from the western slope to be used in the water short areas of southeastern Colorado, as supply for approximately 40 different water providers. The alignment of the pipeline will be roughly along the Arkansas River from Pueblo Reservoir east to Lamar with several lateral spurs to carry water to providers not located immediate on or adjacent to the Arkansas River in Colorado.

In conjunction with Reclamation's requirement that the District must act to ensure that the Fry-Ark Project Water is used efficiently, and is put to beneficial use, the District was obligated to develop a Regional Water Conservation Plan (hereafter "RWC Plan" or "Plan") that would apply to individual project partners, or Plan participants, that choose to receive AVC Project water deliveries. For the purposes of this effort, there are 38 Plan participants[1] as indicated in Table 1.

Note that the Crowley County Commissioners are included in the list of Plan participants; however, they do not provide retail water sales to local customers, and they will not receive Project Water through AVC deliveries. They are included in the listing, and the analyses presented in this report due to their role providing wholesale water supplies to 96 Pipeline, Crowley County Water Authority, Town of Crowley and Town of Ordway.

In addition to Reclamation's requirement indicated above, the District must adhere to the requirements of Section 210 of the Reclamation Reform Act of 1982 Section 210 (b) which states the following:

> *Each district that has entered into a repayment contract or water services contract pursuant to Federal reclamation law or the Water Supply Act of 1958, as amended (43 U.S.C. 390b), shall develop a water conservation plan which shall contain definite goals, appropriate water conservation measures, and a time schedule for meeting the water conservation objectives.*

[1] Avondale and the Town of Cheraw are being analyzed as partners to receive AVC deliveries; however, these entities are not participating in the development of the RWC Plan and therefore are not listed as Plan participants.

Table 1 – Listing of Regional Water Conservation Plan Participants

County	Entities	County	Entities
Bent	Hasty Water Company	Otero	Homestead Improvement Association
	Las Animas		La Junta, City of
	McClave Water Association		Manzanola, Town of
Crowley	Crowley County Commissioners		Newdale-Grand Valley Water Company
	96 Pipeline Company[a]		North Holbrook Water
	Crowley County Water Association[a]		Patterson Valley Water Company
	Crowley, Town of[a]		Rocky Ford, City of
	Ordway, Town of[a]		South Side Water Association
	Olney Springs, Town of		South Swink Water Company
	Sugar City, Town of		Swink, Town of
Kiowa	Eads, Town of		Valley Water Company
Otero	Beehive Water Association		Vroman
	Bents Fort Water Company		West Grand Valley Water Inc.
	East End Water Association		West Holbrook Water
	Eureka Water Company	Prowers	Lamar, City of
	Fayette Water Association		May Valley Water Association
	Fowler, Town of		Wiley, Town of
	Hancock Inc.	Pueblo	Boone, Town of
	Hilltop Water Company		St. Charles Mesa Water District
	Holbrook Center Soft Water		

[a] Receives a portion of its water, if not all, from the Crowley County Commissioners. The Crowley County Commissioners are whole sale water purveyors and do not provide water service directly to any individual residential, commercial, industrial and/or irrigation customer.

The RWC Plan was originally developed to address the efficient use of Project Water associated with the Fry-Ark Project. This concept was included in the scopes of work that the District developed and both Reclamation and the Colorado Water Conservation Board (CWCB) funded. However, since the inception of the RWC Plan in 2010, specifics regarding the nature of AVC water deliveries have been clarified to include both Project and non-project water, as defined below. The RWC Plan has therefore been developed to address both of these water sources types.

> **Project water**, as described in the EIS Appendix A.1, includes Fry-Ark supplies (including Fry-Ark allocations and "not previously allocated non-irrigated water" (NPANIW)), and Fry-Ark return flows which are surface water flows that can be captured and reused in some locations (see EIS Appendix D.1 for calculations and acceptable uses of Fry-Ark return flows).
>
> **Non-project water** are additional supplies (from both surface water and groundwater sources) that individual Plan Participants will maintain and manage through the long-term excess capacity Master Contract for storage in Pueblo Reservoir through the District as well as through other sources through exchanges and transfers.

In addition, concepts and recommendations contained in the RWC Plan may be relevant to all of those entities that receive water through partnership with the District, including for example the long-term excess capacity Master Contract. However, the scope of the RWC Plan as agreed to by Reclamation and the CWCB, precludes the application of the RWC Plan to any organizations beyond the 38 Plan participants at this time.

The District and its partners may evaluate a broader application of the RWC Plan at some point in the future, as needed.

Project Funding

The RWC Plan has been funded through generous grants from both Reclamation through the Water Conservation Field Services Grant Program and the CWCB's Office of Water Conservation and Drought Planning, through its Water Efficiency Grant Fund. These funds were provided to support data collection, organization and analysis, as well as RWC Plan preparation. Matching funding was provided through a cash contribution from the District and in-kind contributions from the District and all 38 Plan participants.

Objectives of the Regional Water Conservation Plan

The Regional WC Plan objectives are focused on finding appropriate and cost-effective means to support regional and local water conservation programs that are aimed at improving local water use efficiency for the Plan participants. Overall the goals of the Plan are to:

- Support the AVC project and its requirements;
- Support water use efficiency of Project and non-Project water by the 38 AVC participants; and
- Support local water conservation planning and water use efficiency.

The Plan and its content have been developed in a manner consistent with the requirements of the State of Colorado and Reclamation to the extent feasible.[2]

To achieve the objectives, and in keeping with the project funding, the Plan consists of the following:

- A profile of the existing water supply system for the Plan participants, including:
    - A listing of population served
    - A listing of current water demand, and
    - An overview of current infrastructure
- An overview of ongoing water conservation programs conducted currently by the Plan participants
- A summary of expected future water demands and water supply options.
- A listing of water conservation goals set by the District

[2] The Plan is a first of its kind in Colorado. Colorado statute requires water conservation plans from "covered entities" which are those water providers that have retail sales of 2,000 acre-feet or more of water for M&I use. The District is not a covered entity by definition although it serves three Plan participants that are covered entities (Lamar, La Junta, and St. Charles Mesa Water District). Therefore, the State statutes do not apply directly to the regional water conservation planning effort. The Bureau of Reclamation, on the other hand, has Section 210(b) of the Reclamation Reform Act of 1982 presented above and guidelines for water conservation planning, as contained in Reclamation's "Achieving Efficient Water Management - A Guidebook for Preparing Municipal Water Conservation Plans," 1997. This Plan has been prepared to adhere to the spirit, and to the extent possible and practical, the requirements of the Federal and State oversight agencies; without being encumbered by irrelevant and non-applicable regulations and requirements. In this way, this Plan will provide the guidance and direction that the District and its partners need to plan for and implement meaningful water conservation without having to adhere to requirements that do not apply to the Project situation.

- A listing of best management practices that may be used to support local water conservation planning and implementation
- A summary of the implementation steps that will be performed by the District and Plan participants over the planning horizon

Vital to the Plan, will be the development of a water conservation "tool box", which will contain content and processes relevant to and in support of local water conservation planning efforts, since the value of the RWC Plan will be, in part, based on how it encourages and supports local water conservation efforts[3].

As indicated above, an important component of the RWC Plan will be the delineation of plan implementation steps, including how the AVC Plan participants and the District will coordinate and share data in the future – especially those data that will be used to characterize future water use, and track ongoing water conservation/water use efficiency efforts. To this point, the RWC Plan will establish the means and methods for all the Plan participants to track, quantify, and report water use demand and improved water use efficiencies at the local level – to support the District's reporting obligations to the Federal and State oversight agencies.

Planning Horizon

The RWC Plan has been developed with multiple planning horizons in mind. To begin with, Reclamation requires a Plan update every 5 years; whereas, the State of Colorado requires an update no less than once every seven years for covered entities[4]. To this end, the District will be updating its RWC Plan every 5 years. However, the timeframe for goal setting and local plan development is tied more to the permitting and the potential future operation of the AVC than the reporting requirements of Reclamation. Therefore, the planning horizon for the RWC Plan includes milestones set when the AVC, if permitted, is predicted to be operational (i.e., starting in 2022) and 2030 and 2050, which were selected to support long-range planning efforts at both the local and regional levels.

[3] Meaningful water conservation related to the implementation of this Plan relates entirely to water demand reductions that are realized by the Plan participants and their customers, since these organizations and their customers are the end users of the Project and non-project water delivered by the AVC. The District is simply responsible for the transmission of AVC deliveries from source to end user. All retail sales of AVC deliveries occur though the distribution systems owned and managed by the 38 Plan participants.

[4] The State statutes require conservation plan updates at least once every seven years for covered entities. This requirement does not apply directly to the District or the Plan participants with the exception of Lamar, La Junta and St. Charles Mesa Water District, which are all covered entities (The Engineering Company (2010, 2011) and Young Technology Group (2010), respectively).

Profile of Water Supply for the Plan Participants

This section of the Plan presents an overview of the current water supply attributes and characteristics for the 38 AVC Plan participants (see Appendix A for a detailed set of maps of the area locating each of the Plan participants). Detailed information related to the subject matter contained in this section can be found in Reclamation's Arkansas Valley Conduit and Long-Term Excess Capacity Master Contract Draft Environmental Impact Statement (EIS) (USBR, 2012) and Pre-NEPA State and Tribal Assistance Grant (STAG) Reports (Black and Veatch, 2010). It was also supplemented by the System Wide Water Audits conducted by the District, and actively supported by the Plan participants, in 2011 and 2012. The System Wide Water Audit report is available under separate cover (Great Western Institute, 2012); however, the majority of the content is reproduced in this Plan for convenience and to support the overall planning effort. The background of the System Wide Water Audits and an overview of the work performed are provided in Appendix B.

Population and Customers Served

Estimates of future water demand, as well as tracking of the effectiveness of future water conservation programs relies on population estimates and the number of customer connections, for these data are used to support calculations of per capita and per connection water use over time. Therefore, information regarding current and predicted future population and customer connections is presented herein.

Current and future service area population estimates for 2010 and 2070, respectively were made for the Plan participants by the USBR (2012) in the Draft EIS. Table 2 presents the 2010 and 2070 population estimates based on the information presented by this source A linear interpolation between the 2010 and 2070 population data was used to estimate 2020, 2030 and 2050 populations as shown in Table 2.

A key source of information was used to estimate customer connection data. A survey was sent to each participant in October 2009 by Merrick as part of the STAG Report (Black and Veatch, 2010) to gather information about service populations, current and future water demands, water quality issues, augmentation supplies, treatment processes, and distribution systems. Each participant submitted responses to the survey between November 2009 and January 2010. The number of customer connections was identified by each of the Plan participants in their survey responses. Table 2 presents the number of customer connections for each entity in 2010 and an estimate of future connections based on the current ratio of population to customer connections for 2020 and 2030.

Note that since the Crowley County Commissioners provide potable wholesale water to the 96 Pipeline Company, the Town of Crowley, part of the Town of Ordway, and part of the Crowley County Water Association (CCWA), it was concluded that the population served by Crowley County Commissioners double-count the population served by its wholesale customers. Therefore, the total population served listed in Table 2 excludes the population reported for the Crowley County Commissioners.

Table 2 – Summary of Plan Participant Populations Served and Number of Customers

County	Plan Participant	Population					Number of Customers (based on metered and unmetered connections)		
		2010[1]	2020[2]	2030[2]	2050[2]	2070[1]	2010[3]	2020[4]	2030[4]
Bent	Hasty Water Company	285	297	308	332	355	114	119	123
	Las Animas, City of	4,405	4,586	4,766	5,127	5,488	1,345	1,400	1,455
	McClave Water Assoc.	440	458	477	513	550	176	183	191
Crowley	Crowley County Commissioners						See footnote at base of Table 1		
	96 Pipeline Co.	160	176	191	223	254	101	111	121
	Crowley County Water Assoc.	3,130	3,436	3,742	4,353	4,965	360	395	430
	Crowley, Town of	200	220	239	278	317	110	121	131
	Ordway, Town of	1,270	1,394	1,518	1,767	2,015	523	574	625
	Olney Springs, Town of	390	428	466	543	619	212	233	253
	Sugar City, Town of	280	307	335	389	444	164	180	196
Kiowa	Eads, Town of	626	626	626	625	625	75	75	75
Otero	Beehive Water Assn.	165	173	180	195	210	91	95	99
	Bents Fork Water Co.	900	943	987	1,073	1,160	350	367	384
	East End Water Assn.	75	79	83	92	100	34	36	38
	Eureka Water Co.	330	346	362	393	425	145	152	159
	Fayette Water Assn.	60	63	67	73	80	28	29	31
	Fowler, Town of	1,700	1,781	1,861	2.022	2,183	1,350	1,414	1,478
	Hancock Inc.	150	158	165	180	195	46	48	51
	Hilltop Water Co.	284	298	311	338	365	119	125	130
	Holbrook Center Soft Water	50	53	55	60	65	27	29	30
	Homestead Improvement Ass.	67	70	73	79	85	27	28	29
	La Junta, City of	7,102	7,438	7,775	8,447	9,120	3,220	3,372	3,525
	Manzanola, Town of	476	498	521	565	610	212	222	232
	Newdale-Grand Valley Water Co.	463	485	507	551	595	195	204	214
	North Holbrook Water	40	42	43	47	50	24	25	26
	Patterson Valley	96	101	106	115	125	40	42	44
	Rocky Ford, City of	3,994	4,183	4,373	4,751	5,130	1,655	1,733	1,812
	South Side Water Assoc.	48	50	52	56	60	25	26	27
	South Swink Water Co.	610	638	667	723	780	247	258	270
	Swink, Town of	664	695	726	788	850	302	316	330
	Valley Water Co.	325	340	355	385	415	117	122	128
	Vroman	150	158	165	180	195	61	64	67
	West Grand Valley Water Inc.	84	88	93	101	110	35	37	39
	West Holbrook Water	23	24	25	28	30	12	13	13
	Lamar, City of	8,171	8,393	8,614	9,057	9,500	3,527	3,623	3,718
	May Valley Water Assoc.	1,500	1,540	1,580	1,660	1,740	623	640	656
	Wiley, Town of	434	446	458	481	505	220	226	232
Pueblo	Boone, Town of	324	367	409	495	580	167	189	211
	St. Charles Mesa Water District	10,937	12,371	13,805	16,672	19,540	4,051	4,582	5,113
Totals		**50,408**	**53,749**	**57,086**	**63,757**	**70,435**	**20,130**	**21,408**	**22,686**

[1] From Appendix A.1 Draft EIS (USBR, 2012)
[2] Linear interpolations between 2010 and 2070 population estimates
[3] From the "Merrick Participant Surveys", (Black and Veatch, 2010)
[4] Extrapolated to 2030 using product of estimated 2020 and 2030 and ratio of the number of 2010 customers to the 2010 population

Current Water Demand

The Plan participants' current water demand was obtained from the Draft EIS (USBR, 2012) Appendix A.1 are presented in Table 3. Table 3 also presents the per capita water use on a system wide basis for each of the Plan participants based on values reported by USBR (2012).

Water use by the Plan participant customers varies depending on water provider location and local water demands. A listing of the various water uses supported by the individual Plan participants is also provided in Table 3. Note that per capita water use for each of the Plan participants varies according to the customer types being served by the individual water providers. For example, those Plan participants that provide water for feedlots[5] typically have higher per capita water use than those that do not. Overall, the Plan participants maintain a system-wide per capita water use of about 181 gallons per person per day (gpcd).

Note that data collected during the System Wide Water Audits further characterized the water demand for each of the Plan participants. In general, the Plan participants do not have large outdoor irrigators, per se. Some of the individual water providers have schools and prisons as customers, and these entities may use potable water to irrigate outdoor spaces; however most large irrigation is performed using non-potable supplies such as private wells and/or ditch water. Many of the largest water users are feedlots that have peak use during various times of the year. To this point, peak demand is not necessarily concurrent with summertime irrigation except in the cities and towns. Monthly water use data which was used to characterize peak demand is contained in the System Wide Water Audit Report (Great Western Institute, 2012).

Future Water Demand with and without Passive Savings

Future water demands for the Plan participants are predicted to increase in the future as a result of growing population in the service areas of the various organizations. As indicated in Table 2, population in the lower Arkansas River Valley served by the Plan participants is expected to grow on average by about 40% over the next 60 years (between 2010 and 2070), creating an increase of about 20,000 persons during this time.

[5] Based on Public Law 87-590, irrigation is an authorized purpose of Fry-Ark Project water; however, AVC deliveries are authorized only for municipal and industrial water uses including residential uses and feedlots and other industrial and commercial uses. It should be noted that many residential customers, especially in the rural areas utilize residential water for cattle and horses.

Table 3 - Summary of Participant Current Water Demands and Water Uses

County	Participant	2010 Per Capita Water Use (gpcd)[1]	2010 demand[1] (Acre-Feet)	Water Customer Types[2]					
				Feedlot	Other Commercial	Other Industrial	Municipal	Residential	Other[3]
Bent	Hasty Water Company	100	32		✓			✓	✓
	Las Animas, City of	116	570		✓	✓	✓	✓	✓
	McClave Water Assoc.	114	56	✓	✓			✓	✓
Crowley	Crowley County Commissioners								
	96 Pipeline Co.	311	56	✓				✓	
	Crowley County Water Assoc.	165	580			✓		✓	
	Crowley, Town of	151	34		✓		✓	✓	✓
	Ordway, Town of	169	240	✓	✓		✓	✓	✓
	Olney Springs, Town of	92	40		✓	✓	✓	✓	
	Sugar City, Town of	261	82		✓		✓	✓	
Kiowa	Eads, Town of	357	250		✓	✓	✓	✓	✓
Otero	Beehive Water Assn	43	8	✓				✓	
	Bents Fort Water Co.	62	63	✓				✓	✓
	East End Water Assn.	131	11					✓	
	Eureka Water Co.	200	74					✓	
	Fayette Water Assn.	179	12	✓				✓	
	Fowler, Town of (potable only)	110	210	✓	✓	✓	✓	✓	✓
	Hancock Inc.	101	17					✓	
	Hilltop Water Co.	141	45	✓				✓	
	Holbrook Center Soft Water	321	18	✓				✓	
	Homestead Improvement Assn.	93	7					✓	
	La Junta, City of	256	2,040		✓	✓	✓	✓	✓
	Manzanola, Town of	73	39		✓		✓	✓	✓
	Newdale-Grand Valley Water Co.	110	57	✓	✓			✓	
	North Holbrook Water	156	7					✓	
	Patterson Valley Water Co.	139	15					✓	
	Rocky Ford, City of	199	890		✓	✓	✓	✓	✓
	South Side Water Assoc.	130	7					✓	
	South Swink Water Co.	126	86					✓	✓
	Swink, Town of	51	38		✓		✓	✓	✓
	Valley Water Co.	104	38	✓				✓	
	Vroman	190	32	✓				✓	
	West Grand Valley Water Inc.	266	25	✓				✓	
	West Holbrook Water	543	14					✓	
Prowers	Lamar, City of	262	2,400	✓	✓	✓	✓	✓	✓
	May Valley Water Assoc.	244	410	✓	✓	✓		✓	✓
	Wiley, Town of	49	24		✓		✓	✓	✓
Pueblo	Boone, Town of	182	66		✓		✓	✓	✓
	St. Charles Mesa Water District	135	1,660		✓			✓	✓
Total			**10,253**						

[1] From Appendix A.1 Draft EIS (USBR (2012)) (gpcd – gallons per capita per day)

[2] From the "Merrick Participant Surveys," (Black and Veatch, 2010) with water customer data augmented by System Wide Water Audits (Great Western Institute, 2012)

[3] Includes institutional (e.g., schools), cemeteries, State Park, etc.

Future water demands associated with the increase in population served can be predicted assuming that per capita water use rates will not change over the coming decades, resulting in an estimated demand of about 13,888 AF for the Plan participants (see Table 4), which is up from the 2010 demand of 10,253 AF for the same entities – an increase of 3,635 AF over the 60 years.

However, passive savings related to the natural replacement of toilets, clothes washers and dish washers in single family and multi-family residences with more water efficient fixtures and appliances is expected to reduce per capita water use over the next 60 years. Therefore, calculations were made to account for the expected impact of passive water savings on future demands. The calculations used to characterize future water demands for the Plan participants were made based on the following assumptions:

- Future water demands can be reasonably estimated using the product of current (i.e., 2010) per capita water use and predicted future population served, based on 2010 per capita water use reported by the AVC participants and summarized by Reclamation; and
- The impact of passive savings[6] can be estimated by developing an adjusted per capita water use using the methodology presented in the CWCB Report "SWSI Conservation Levels Analysis Report", Great Western Institute (2010). The passive savings are related to the natural replacement of only toilets, clothes washers and dish washers in single family and multi-family residences. The replacement of other water saving devices is not accounted for in this analysis for those reasons detailed in the CWCB report.

Estimating passive savings using the methodology contained in the SWSI Conservation Levels Report hinges on determining the population served by each local water provider, or in this case Plan participant, in three key years – 1994, 2005 and 2015. These times relate to when key federal or state legislation impacted (or will impact) the availability of water conserving fixtures and/or appliances.

To estimate the populations served by each of the Plan participates in 1994, 2005 and 2015, the flowing methodology was used:

1. The ratio of current (i.e., 2010) population served by each AVC participant to the current county population within which each resides was calculated.
2. The relevant County populations for 1994 and 2005 were obtained from the SWSI Conservation Levels Report (which utilized the SWSI Phase I Report (CDM, 2004) and the State Demographers Office as sources for past population data).
3. The ratio developed in Step 1 was multiplied by the 1994 and 2005 relevant County population to estimate the AVC participant population served in 1994 and 2005.
4. The Reclamation estimate of AVC participant population was obtained for 2070.
5. A straight-line interpolation of the AVC participant population from 2010 to 2070 was developed to estimate the 2015 population for all AVC participants.

[6] Passive (or naturally-occurring) water conservation savings are defined as water savings that result from the impacts of plumbing codes, ordinances, and standards that improve the efficiency of water use. These conservation savings are called "passive" savings because water utilities do not actively fund or implement programs that produce these savings. In contrast, water conservation savings from utility-sponsored water conservation programs are referred to as "active" savings (SWSI I, Appendix E, (CDM, 2004)).

Table 4 - Summary of Forecasts Water Demands with and without Passive Savings

County	Participant	2010 per capita water use (gpcd)[1]	Forecasted 2070 Demands (Acre Feet)			
			Without Passive[2]	With Minimum Passive Savings	With Maximum Passive Savings	EIS Demand[1]
Bent	Hasty Water Company	100	40	34	33	33
	Las Animas, City of	116	713	628	604	602
	McClave Water Assoc.	114	70	62	59	70
Crowley	Crowley County Commissioners					
	96 Pipeline Co.	311	88	87	86	85
	Crowley County Water Assoc.	165	918	894	879	883
	Crowley, Town of	151	54	52	51	51
	Ordway, Town of	169	381	370	364	366
	Olney Springs, Town of	92	64	61	59	59
	Sugar City, Town of	261	130	128	126	127
Kiowa	Eads, Town of	357	250	236	232	232
Otero	Beehive Water Assn	43	10	7	6	10
	Bents Fort Water Co.	62	81	61	55	81
	East End Water Assn.	131	15	13	13	13
	Eureka Water Co.	200	95	88	86	86
	Fayette Water Assn.	179	16	15	14	14
	Fowler, Town of (potable only)	110	269	232	222	223
	Hancock Inc.	101	22	19	18	18
	Hilltop Water Co.	141	58	51	50	50
	Holbrook Center Soft Water	321	23	22	22	22
	Homestead Improvement Assn.	93	9	7	7	9
	La Junta, City of	256	2,615	2,459	2,417	2,421
	Manzanola, Town of	73	50	39	37	50
	Newdale-Grand Valley Water Co.	110	73	63	60	60
	North Holbrook Water	156	9	8	8	8
	Patterson Valley Water Co.	139	19	17	17	17
	Rocky Ford, City of	199	1,144	1,056	1,032	1,031
	South Side Water Assoc.	130	9	8	7	7
	South Swink Water Co.	126	110	97	93	92
	Swink, Town of	51	49	34	30	49
	Valley Water Co.	104	48	41	39	39
	Vroman	190	42	38	37	37
	West Grand Valley Water Inc.	266	33	31	30	30
	West Holbrook Water	543	18	18	18	17
Prowers	Lamar, City of	262	2,788	2,614	2,567	2,157
	May Valley Water Assoc.	244	476	444	435	435
	Wiley, Town of	49	28	18	16	28
Pueblo	Boone, Town of	182	118	112	111	111
	St. Charles Mesa Water District	135	2,955	2,760	2,698	2,651
	Total		13,888	12,923	12,637	12,274

[1] from Draft EIS (USBR, 2012) (Appendix A.1 and Table 1-7) (gpcd – gallons per capita per day)
[2] calculated as the product of 2070 population (from Table 2) and 2010 per capita water use

Once the key year service populations were estimated, the estimates of annual demand adjustments were developed. The demand adjustments were obtained by multiplying the subject population for each AVC participant by the reduced gallons per capita per day (gpcd) associated with each of three different passive water conservation actions:

- After 1994, only low flow toilets (1.6 gallons per flush (gpf)) could be purchased by residential water users.
- After 2005, only Energy Star clothes washers and dish washers could be purchased by residential water users[7].
- After 2015, only 1.28 gpf toilets will be available on the market in response to California's "point-of-sales" laws that will require these types of toilets be installed prior to any property sale that takes place.

Given the size of the California market, changes in California State laws that affect the supply chain in that state are expected to affect the supply chain in all western states, including Colorado.

A high and low passive saving estimate of the adjustment to future water demand was calculated based on the following:

- Passive savings change over time depending on the rate at which the fixtures and appliances are replaced. For toilets, the replacement rate was estimated to be between 25 and 83 years (Great Western Institute, 2010). For clothes washers and dishwashers, the replacement rate was estimated to be between 12 and 15 years (Great Western Institute, 2010).
- The change to the gpcd associated with the gradual replacement of the subject fixtures and appliances was obtained from the SWSI Conservation Levels Report.
- The gradual decrease in future water demand for each AVC participant was estimated by multiplying the reduced gpcd associated with each type of passive retrofit (i.e., toilet, clothes washer, dish washer) by the target population.
- The decreased water demand for all three fixtures and appliances were summed and the difference between the water demands for each water provider was determined for the period from 2010 to 2070.

Note that in accordance with the SWSI Conservation Levels Report, both a high and low passive savings estimate was calculated for 2070. The difference between the two scenarios chiefly address expected differences in replacement rates for the fixtures and appliances in question and the variability of water use between different models of the new fixtures and appliances.

The results of the passive savings estimates are presented in Table 4, which contains the 2070 forecasted demand without passive savings and the 2070 forecasted demand with both high and low estimates of passive savings. Overall the passive savings were estimated to range from about 7 to 9 percent of total forecasted 2070 water demand; however, on a per participant basis the variability was found to be substantially larger – varying from about 2.5% to over 40% depending on the age of the housing stock[8], the predicted growth rate of the service population, and the current per capita water use. For example, entities with large per capita water use

[7] Energy Star clothes and dishwashers, which were developed in association with California State laws that required energy use reductions by all residential customers, included substantial reductions in appliance water use.
[8] Population was used as a surrogate parameter for housing stock.

have a smaller percentage change in future demand associated with the impacts from passive savings as compared to those with low per capita water usage.

Overall, the reduction in forecasted 2070 water demand associated with passive savings is estimated to be between 965 and 1,251 AF for all the AVC participants combined. It should be noted that the actual passive savings that may be realized by the Plan participants may exceed the estimated "high" demand reductions as other, more efficient residential and/or commercial fixtures and appliances which were not accounted for are replaced (e.g., showerheads, pre-rinse spray nozzles, etc.). Therefore, the calculated 2070 demands with "high passive savings are considered more likely to occur than the 2070 demands associated with "low" passive savings.

Note that the 2070 water demands predicted in support of the EIS (USBR, 2012) are based in part on predicted passive savings estimates presented herein; however the EIS analyses did not include passive savings estimates for community with lower than state average per capita water use (e.g., McClave, Beehive, Bents Fort, etc.). In addition, the analyses presented in the EIS included demand reductions for active conservation efforts that will be conducted by Lamar, La Junta and St. Charles Mesa Water District over the coming decades without including passive savings in these three communities. The high and low passive savings calculations presented in Table 4 do not account for any demand reductions related to active water conservation programs that are implemented locally.

The major difference between the maximum passive savings predicted 2070 water demands (i.e., 12, 637 acre-feet) and the EIS predicted 2070 water demands (i.e., 12,274 acre-feet) relates to demand reductions predicted by Lamar in association with its active water conservation program. Lamar predicts over 600 AF of demand reduction associated with its active water conservation programs for this community which is about 400 acre-feet more than is expected from passive savings alone. Future monitoring and verification of the impact of its active water conservation programs on water demand will be an important component of the City's efforts.

Water Supply Limitations and Needs

Current supplies of water to the 38 Plan participants are managed through 38 individual water systems, dominated by individual, or sets of individual, production wells that tap the shallow and deep aquifer systems that underlie the organizational service areas (or nearby areas). Most of these wells were installed between 30 to 60 years ago, and have been maintained to meet the requirements of state and federal regulations. However, in recent years, it has been discovered through regulatory mandated monitoring programs, that 14 of the 38 Plan participants that use deep bedrock aquifers have levels of radionuclides (including alpha activity, radium and uranium) above acceptable primary drinking water standards. These organizations have been placed under enforcement action by the Colorado State health Department over the past several years.

The enforcement actions were issued after consistent violations of maximum contaminant levels for combined radium and/or gross alpha particle activity were observed. Each enforcement action outlines a timeline for the water provider to identify methods to achieve long-term compliance with the maximum contaminant levels and implement a solution. Failure to comply with an enforcement action can result in fines and criminal penalties. Homestead Improvement Association complied with its enforcement action by purchasing water from La Junta. Additionally, Rocky Ford recently purchased the Hancock water system, which will satisfy Hancock's

enforcement action. The remaining 12 participants under enforcement action must identify and implement a new source of water or treatment technology within a specified time to become compliant.

Seven additional AVC participants have elevated levels of radionuclides, but have not consistently exceeded maximum contaminant levels and, therefore, are not currently under an enforcement action. The Health Department will continue to monitor AVC participants for compliance with the primary drinking water standards and also will continue to issue enforcement actions, as necessary.

The importance of alternative water supply for the 14 to 21 Plan participants with known radionuclide contamination in their existing water supply is vital. No level of future water conservation will replace these impacted water supplies; however, water conservation will support the efficient use of future water supplies, and in doing so meet the requirements of Reclamation.

Table 5 - Plan Participants with Radionuclide Contaminated Water Supplies

County	Participant	Water Quality Concerns	Violation Resulting in Enforcement Action
Otero	East End Water Assoc.	Radionuclides	Combined radium
	Eureka Water Co.	Radionuclides	Gross alpha particle activity, combined radium
	Fayette Water Assoc.	Radionuclides	Combined radium
	Hancock Inc.	Radionuclides	Gross alpha particle activity, combined radium[1]
	Hilltop Water Co.	Radionuclides	Combined radium
	Holbrook Center Soft Water	Radionuclides	Combined radium
	Homestead Improvement Assoc.	Radionuclides	Gross alpha particle activity, combined radium[2]
	La Junta, City of	Radionuclides, TDS	None
	Manzanola, Town of	Radionuclides	None
	Newdale-Grand Valley Water Company	Radionuclides	None
	North Holbrook Water	Radionuclides	Combined radium
	Patterson Valley	Radionuclides	Gross alpha particle activity, combined radium
	South Swink	Radionuclides	Gross alpha particle activity, combined radium
	Swink, Town of	Radionuclides	Combined radium
	Valley Water Co.	Radionuclides	Combined radium
	Vroman	Radionuclides	Combined radium
Bent	Las Animas	Radionuclides, TDS	None
	Mc Clave Water Assoc.	Radionuclides	None
Prowers	May Valley Water Assoc,	Radionuclides	Gross alpha particle activity, combined radium
	Wiley, Town of	Radionuclides	None

TDS – total dissolved solids
(1) Enforcement action for Hancock Inc. will be satisfied by combining with Rocky Ford's system.
(2) Enforcement action for Homestead Improvement Association was satisfied by purchasing water from La Junta. This enforcement action occurred in the past and is no longer in effect.

As shown in Table 6, if constructed, the AVC would deliver 10,256 ac-ft per year to AVC participants to help meet 2070 water demands (10.062 acre-feet will be delivered to the 38 Plan participants with another 194 acre-feet for Avondale and Cheraw). The AVC would deliver Fry-Ark Project Water allocations, including not previously allocated non-irrigation water (NPANIW) and reusable return flows, plus a portion of existing and future non-

Table 6 - Summary of Participant Future Water Supplies

County	Participant	2070 Water Supply (AF)				
		Available Deep[1]	Available Tributary[1]	AVC Deliveries[1]	Continued Use of Existing Supplies Needed	2070 Demand with Passive Savings
Bent	Hasty Water Company	32		33	No	33
	Las Animas, City of		570	602	Yes	604
	McClave Water Assoc.	56		59	No	59
Crowley	Crowley County Commissioners					
	96 Pipeline Co.		51	27	Yes	86
	Crowley County Water Assoc.		320	617	Yes	879
	Crowley, Town of			51	No	51
	Ordway, Town of	125		366	No	364
	Olney Springs, Town of		226	59	No	59
	Sugar City, Town of		82	127	No	126
Kiowa	Eads, Town of		266	116	Yes	232
Otero	Beehive Water Assn	8		10	No	6
	Bents Fort Water Co.	35		81	No	55
	East End Water Assn.	11		13	No	13
	Eureka Water Co.	74		86	No	86
	Fayette Water Assn.	12		14	No	14
	Fowler, Town of (potable only)		210	220	Yes	222
	Hancock Inc.	7		18	No	18
	Hilltop Water Co.	45		40	Yes	50
	Holbrook Center Soft Water	18		22	No	22
	Homestead Improvement Assn.	7		9	No	7
	La Junta, City of		2,040	2,299	Yes	2,417
	Manzanola, Town of	10	29	50	No	37
	Newdale-Grand Valley Water Co.	57		60	No	60
	North Holbrook Water	7		8	No	8
	Patterson Valley Water Co.	15		17	No	17
	Rocky Ford, City of		1,122	576	Yes	1,032
	South Side Water Assoc.	7		5	Yes	7
	South Swink Water Co.	86		92	Yes	93
	Swink, Town of	38		49	No	30
	Valley Water Co.	38		39	No	39
	Vroman	32		37	No	37
	West Grand Valley Water Inc.	25		15	Yes	30
	West Holbrook Water	14		9	Yes	18
Prowers	Lamar, City of		2,400	1,241	Yes	2,567
	May Valley Water Assoc.	213		222	No	435
	Wiley, Town of	24		28	No	16
Pueblo	Boone, Town of		66	94	Yes	111
	St. Charles Mesa Water District		200	2,651	Yes	2,698
	Total			10,062[2]		12,637

[1] From Appendix A.1 EIS (USBR, 2012)

[2] AVC Deliveries do not include Avondale (164 AF) or Cheraw (30 AF)

Fry-Ark water supplies that are required to meet future demand. In the EIS Action Alternatives (USBR, 2012) it is assumed that participants with enforcement actions for radionuclides would abandon their current supply because of treatment difficulties and would be served exclusively by AVC.

Other AVC deliveries are based on each participant's requested AVC delivery as contained in the STAG Report (Black and Veatch, 2010) and subsequent evaluations in this EIS. More details on AVC participant future demands, AVC supplies, and integration of AVC into existing water systems are in presented in the EIS - Appendix A.1 (USBR, 2012).

Based on a comparison of the water supply available in 2070 to the predicted 2070 water demands with passive savings included (see Table 6), 16 Plan participants will have to continue to rely on existing water supplies to met expected demand assuming no additional water conservation occurs – by Plan participants or their customers. Table 7 presents a listing of those entities that may have to continue to rely on existing supplies to meet 2070 demands. In addition, Table 7 indicates the percentage of the 2070 demand that may need to be supplied with sources other than AVC deliveries.

The entities listed in Table 7 may find substantial benefit in developing aggressive water conservation programs to help offset expected alternative water supply needs given known water quality issues with non-project water; and the costs to produce, treat and distribute alternative water supplies. This is not to say that all 38 Plan participants will benefit from water conservation programs, just that the 16 entities listed in Table 7 may have additional impedance to plan and implement meaningful water conservation efforts.

Table 7 – Listing of Plan Participants that May Need to Rely on Existing or Other Supplies to Meet Water Demand in 2070

Entity	(as % of 2070 Demand)	Entity	Gap (as % of 2070 Demand)
96 Pipeline Comp.	219%	Las Animas, City of	<1%
Boone, Town of	18%	**May Valley Water Assoc.**	96%
Crowley County Water Authority	42%	Rocky Ford, City of	79%
Eads, Town of	100%	South Side Water Association	40%
Fowler, Town of	1%	**South Swink Water Co.**	1%
Hilltop Water Co.	25%	St. Charles Mesa Water District	2%
La Junta, City of	5%	West Grand Valley Water Inc.	100%
Lamar, City of	107%	West Holbrook Water	100%

Bold indicates that the entity is under an enforcement action.

Variability in Water Supply and Demand

Both water supply and water demand are subject to variations in climate and river conditions. Variations in precipitation, temperature, wind, and evaporation may impact project water yields and availability; as well as other water supply sources that the Plan participants rely upon. The values of Project Water yields and AVC deliveries developed in the STAG Report and the EIS are based on average conditions from 1981 to 2009. As such, the average deliveries are expected for 5 out of 10 years. In other words, in 5 out of 10 years, less water will be yield by the project and therefore, delivered to the Plan participants.

Confounding this reality is that in those years when project yield and deliveries are reduced due to ambient weather conditions, it is likely that individual water customer consumption will increase, since warm dry weather typically increase demands while decreasing supply. Therefore, water conservation programming,

which can help to reduce system demand; drought response planning, which can limit customer demands during acute water shortages; and water resources planning should be integrated at both the local and regional level to help manage water supply and water demand during non-average dry years. In addition, the valuation of water conservation programs should be assessed for not only average conditions, but for periods of drier than average conditions to best characterize the importance of water conservation to the overall water resources management portfolio.

Plan Participant's Water Supply Infrastructure

The Plan participants provided substantial data to the water audit team during the period August through September of 2011[9] which has been used to characterize the water supply infrastructure (see Appendix B for the scope of work).

Specifically, the data that were collected were used to determine the following for all 38 of the Plan participants:

- Meter Information – age, size and amount of automation (i.e., radio reads) currently in place.
- Billing/General Record Keeping – nature of record keeping (i.e., electronic vs. hardcopy files), regularly of meter reading and billing including reading of master meters and customer meters
- Distribution Pipe Information – size, material, and amount (length) (age of pipe materials was discussed with all Plan participants but was not typically reported by the majority of the Plan participants)
- Water Treatment Plant Information – nature of water treatment and for those with filtration, how backwash water is managed

Qualification of the Data

The data that were provided by the Plan participants came to the audit team in various formats, for various timeframes, and in varying states of completeness. This occurred since the organizations that collect and use these data manage and oversee the operations of substantially different water systems, which differ in size and complexity, location and type of source water; and are funded through substantially different mechanisms. Nonetheless, the data provided was considered adequate in characterizing those system attributes of the various water providers to allow for the development of comparisons and evaluations on a regional basis.

However, the specific accuracy of all the data collected during the System Wide Water Audits is not entirely understood given the nature of the data collection and management systems in place[10]. Therefore, some screening and qualification of the data was deemed necessary to support a consistent and fair use of those data that were provided by the Plan participants. To this point, the data that was collected and is presented in the tables that follow were considered to be of acceptable quality and quantity to support regional planning efforts. A more rigorous use of the data may not be warranted without a better understanding of the data background and history, which was beyond the scope of this effort.

Meters

The Plan participants, in general, are fully metered, such that they are all able to measure water use at the connections with all of their customers. There are a few uses identified by various Plan participants that are not metered, such as some town facilities, an occasional church or other grandfathered user, and some hydrants or

[9] With the exception of the City of Fowler, which was conducted in March 2012.

[10] For example, the length of distribution water line was estimated in some cases from scaling maps, or from anecdotal information; meter age was estimated from institutional knowledge; water line material was provided anecdotally to the audit team. These data were considered reasonably quantifiable within the limitations of the data use – that being for regional planning purposes.

stand pipes; however the vast majority of uses are metered. Table 8 presents a summary of the unmetered uses found during the audit.

Table 8 - Unmetered Water Uses Identified During Data Collection

Church	Other Water Treatment Plant Uses
Construction Water (from hydrants and/or standpipes)	Street Cleaning
Filter Backwash	Sewer Collection Cleaning
Fire Suppression	Town Hall
Firehouse	Town Shop
Hydrant and Line Flushing	Town/City Parks

Note that not all Plan participants had unmetered uses; nor were all churches, for example, unmetered. It was found that for each of the uses listed in Table 8, at least one of the Plan participants had this type of unmetered use.

A summary of the data collected to characterize the size and age of the Plan participant's meters is presented in Appendix C. As this table indicates, over 19,300 meters are owned and maintained by the Plan participants collectively in the Lower Arkansas River Valley. Of these meters, roughly 95% are 5/8 by 3/4 inch meters; which are typically used for single family residential customers based on the efficacy of the meters and the excepted volume and flow of water to a domestic tap. The vast majority of the water customers in the Lower Arkansas River Valley served by the Plan participants are in fact single family residential user. In addition, most single family residential users do not utilize their domestic supply for seasonal outdoor irrigation, per se. They do; however, utilize potable water for stock water. In fact, some of the largest water users outside of City limits in the Lower Arkansas River Valley are feedlots. Prisons, parks, schools, nursing homes, apartment buildings and other multi-user entities (e.g., trailer parks) are also large water users in this area.

Another important characteristic of meters owned and maintained by the Plan participants is their age. For instance, about two thirds of the meters currently in place are older than 10 years, and in some locations over 90% of the meters are older than 10 years. Although a residential water meter may last beyond 10 years[11], it is important that the Plan participants maintain accurate customer meters such that water sales are consistent with water use. Large diameter meters are more susceptible to under reading actual usage than are typical domestic meters; however, all meters can become inaccurate with age and use. Since all meters tend toward under reading actual use, old meters can negatively impact cash flow for operating water companies. Given the

[11] One of the most important best practices that will be proposed for the Plan participants involves tracking individual water meter use. Mr. Norman Noe of South Swink has collected data indicating that a water meter tends to lose reasonable accuracy after passing about 2 million gallons of water. For his systems, he therefore tracks water use for each meter and attempts to replace meters as they reach 2 million gallons. This method may not be effective for all Plan participants, depending on local conditions (e.g., corrosive water, water high in iron or manganese, etc.) which may compromise meters sooner; however, a general tracking of water use for each meter installed would be an effective method to identify and budget for appropriate meter replacement programs.

percentage of non-revenue water measured for the Plan participants (see the next section), it is anticipated that a portion of the non-revenue water is attributable to under reading meters[12].

An effective meter age was calculated for each of the Plan participants for comparative purposes. The calculation was developed by assuming that meters less than 5 years old average 2.5 years in place; meters between 5 and 10 years old averaged 7.5 years in place; and meters older than 10 years in place averaged 15 years old. A result of this calculation, based on these assumptions is presented in Appendix C.

Appendix C also presents a listing of the number, and related percentage, of automated meter reading (AMR) devices (aka - radio read devices) that were installed and operational at the time of the audits. This totaled to over 3,600 AMR devices, which is about 19% of all meters in the Lower Arkansas River Valley. Eight of the 38 Plan participants have AMR devices, with two organizations – the Town of Swink and Crowley County Water Authority having all of their meters connected to radio read devices[13].

Meter Reading and Billing

The vast majority of the Plan participants collect master meter data and customer meter data on a monthly basis; turning around use data within weeks to bill their customers. Most small Plan participants read customer meters in one or two days near the end of the month and bill at either the end of the month or at the first of the following month using these data. There are a few organizations that read meters over a longer period of time due to the number of customers or the geography of their customer base; and then bill on the first of the month, but these are not the typical operations. In addition, there are a few operations that read meters and bill at uneven increments; when time is available.

It is important to note that for many of the smaller water providers, meter reading (which include gaining access to the meters), meter data translations into billing software or billing files, and storage of master meter data, as well as customer water use data is managed by volunteers and unpaid (or under paid) staff. It is through the shear goodwill of numerous individuals that many small Plan participants manage to maintain cash flow. It is not clear how goodwill is to be translated into the future, as volunteers leave and staff is replaced. This is an issue for the long-term sustainability of some organizations and may need to be addressed by adopting a best practice related to staffing and training, as well as future data management.

Water Rates

Most Plan participants follow similar practices in billing for water use. These practices involve billing all customers for a fixed fee, or service fee, that typically includes a modest amount of water as part of the fee[14].

[12] This kind of water loss is termed “an apparent loss” since the water company does not bill or receive revenue for this water, but has to pay to treat and distribute it.

[13] AMR devices are considered a best practice for rural water systems. Although the cost of installation is high, the ease of data collection and data management are considered to be highly desirable by rural water providers, in general, and the Plan participants, specifically.

[14] For example, a service fee of $24 is charged to all customers and it carries 3,000 gallons of water with it. After 3,000 gallons of water is used during a single billing period, the customer is then charged a flat rate for each 1,000 gallons of

Most Plan participants also use a flat rate for water varying from between $1.50 and $3.50 per thousand gallons, although some organizations have seasonal rates or inclining tiered water rates that increase with water use. Organizations are sensitive to the needs of their customers, and therefore are hesitant to raise rates due to a concern that customers may stop outdoor irrigation causing blight, or that those on fixed incomes will not be able to afford an increase.

Best practices related to water rate structures for many Plan participants may include establishing lower service fees and charging for all water used[15], perhaps even on a per gallon or per hundred gallon basis[16]. Given that many residential customers use some increment of 1,000 gallons per billing period, it may be of benefit to local water providers to obtain more accurate meters, which read in ten or hundred gallon increments. This change would carry a cost related to upgrading all customer meters; however, it would also make billing more accurate and better aligned with actual usage. It may also help characterize non-revenue water, since errors related to meter reading increment would be reduced.

Data Management

Overall data management is variable across the different Plan participants. Some organizations have sophisticated data archives; whereas others have hard copy archives which may or may not be subject to risk from flood or fire. Future data management for all Plan participants may require more uniform data reporting and storage protocols, since it is anticipated that each organization will provide data to the District on a regular basis to support project water administration and AVC operations. No specific protocols have been identified at this time; however, it may become important for the District and the Plan participants to track various metrics in the future such as non-revenue water; total billed water; total produced water; total AVC deliveries; etc. The RWC Plan will discuss this issue further.

Distribution Piping

Perhaps the largest sunk cost related to water supply in the Lower Arkansas River Valley is distribution piping[17], which spans over about 1,000 miles, varying in sizes from 1-inch to 12-inches in diameter. Appendix D presents a summary of the pipe material and size data collected during the System Wide Water Audits. As can be seen in the table in Appendix D, a majority of the distribution piping is PVC (about 70%), followed by ABS (about 15%), steel and concrete (8%), and various other materials. A substantial portion of the PVC piping is new since 2000; however some of it dates back 40 plus years. For the smaller water supply systems, PVC of appropriate thickness (dependant on system pressures) is the preferred distribution pipe material due to its availability, cost, lack of reactivity to corrosive soils, and ease of installation.

---

water used above 3,000 gallons (e.g., if 5,000 gallons are used, then the customer is billed the service fee plus the cost of 2,000 gallons of water).

[15] Changing the service fee structure would reduce the bill of some customers that use less than the allotted amount of "free water" that comes attached to the service fee.

[16] Changing the cost for water from per thousand gallons to per gallon or per hundred gallons would have to be supported by meters that read in graduations of less than 1,000 gallons.

[17] This is the piping that delivers water from the production well and/or treatment facility to the customers, linking the water supply system to the customer service lines. Service lines, both before the customer meters and after the customer meters are not included in these quantities.

ABS (acrylonitrile butadiene styrene) is another type of plastic pipe that was used in the past for distribution piping; however, this pipe material has proven to be brittle and difficult to repair. It is known for splitting due to pressure impacts and age. Not all ABS pipe is prone to leaking, but it may be desirable for local water providers with this pipe material to plan for its replacement as soon as practical. For many Plan participants, this is not necessarily cumbersome, for most organizations with ABS pipe have implemented partial replacement efforts due to past pipeline failures and leaks. St. Charles Mesa Water District, the Town of Ordway, South Swink Water Company and Bents Fort Water Company, which current maintain about 94% of the ABS pipe in the ground in the Lower Arkansas River Valley, are the exceptions. Even though these water providers do not exhibit unusually large amounts of non-revenue water, which would be expected if their water systems leaked, individual organizations may wish to consider specific programs that may be need to replace the ABS in their distribution systems as a preventative measure.

Another characteristics of the small water supply systems operated by the majority of the Plan participants are that they are not looped (which is required for fire fighting and to maintain system pressures in City supplied systems) and do not have isolation valving and submetering, which are beneficial in locating and repairing leaks. One best practice that may be recommended in the RWC Plan will be the installation of isolation valving and submetering within the small water provider systems for just these purposes.

Another best practice that may be of some benefit to the small water providers would be to maintain detailed distribution system maps that would identify pipe and appurtenance locations; piping materials; and piping age. This information would be of benefit to document and pass along current institutional knowledge that may not currently be adequately archived.

Finally, leak detection testing using sonic devices have had substantial success in some rural settings in Colorado and in other locations across the country, dependent on the pipe materials and pipe accessibility (test pits may have to be dug to provide access for placement of listening devices on the buried pipe in some locations). The Plan participants have voiced an interest in having access to leak detection equipment and trained staff to support local leak detection efforts. The Colorado Rural Water Association, among others, may be able to team with the District to help address the needs of the local water providers. To this point, leak detection programs may be considered as a Best Management Practice (BMP) in the RWC Plan.

Water Production and Treatment

Most of the Plan participants utilize groundwater production wells for local water supply. Most of the wells are contained in the soft water portion of the hard rock aquifer systems that underlie the Lower Arkansas River Valley; although some operate shallow alluvial wells. For those entities with soft water sources, groundwater production and treatment may only require chlorination prior to distribution. For others, filtration and/or chemical addition is needed to maintain reasonable potable water quality. Although the soft water systems are typically of higher quality than the hard water systems, both water sources may require treatment. Appendix E presents a summary of the current potable water treatment requirements for each system as verified at the time of the audit. Noteworthy is that the City of Fowler, operate two systems – a hard water and soft water system – with two separate distribution piping systems. The work performed during the system wide audit only addressed the soft water, potable system at the City of Fowler.

Groundwater production within the Lower Arkansas River Valley utilizes substantial energy to lift water from depths of dozens to hundreds of feet below the ground surface to elevated surface storage tanks which are used to maintain system head and provide peaking supplies. It is estimated that the total energy use for groundwater production by the Plan participants is in the range of 3.3 million kilowatt-hours (kWh) per year. Assuming a cost of electricity as $0.08 per kWh[18], the total annual groundwater production cost for energy is about $270,000 (see table in Appendix F).

Water treatment also comes at a high cost for the Plan participants. Based on the data collected during the System Wide Water Audits, 14 of the 38 Plan participants (37%) use filters to treated produced groundwater prior to distribution. Some of these water providers also use chemical additions to inhibit scale. Finally, a more energy intensity treatment process, reverse osmosis (RO), is used by three water providers. The combined energy use for water treatment by the Plan participants is estimated to be about 2 million kWh per year; or about $162,000 (see Appendix F).

Nearly all of those Plan participants with iron filters to enhance potable water quality pump filter backwash to waste (e.g., nearby lagoons or ditches) outside of their distribution systems. These water discharges are inefficient and could be improved or eliminated with the AVC project water. Filter back wash waste accounts for about less than 1% of the total water demand by the Plan participants; however, eliminating this waste would make the individual water provider systems more efficient reducing current demand by 10-20 acre-feet per year.

Value of Selected Infrastructure

The value of the infrastructure currently maintained by the 38 Plan participants is presented in Table 9, estimated from the data collected during the System Wide Water Audits and qualified as indicated in the table footnotes.

Table 9 – Estimate of Selected Infrastructure Costs

Item		Estimated Capital Cost	Estimated OM&R Cost
Infrastructure			
	Replacement Meters	$ 3,500,000	n/a
	Submeters (for rural systems)	230,000	n/a
	Pipe Replacement [a]	25,000,000	n/a
	Automated Meter Reading Systems	3,100,000	195,000
	Automated Meter Infrastructure Systems	680,000	
	Totals	32,510,000	195,000

[a] does not include piping for 5 largest utilities (Lamar, La Junta, Las Animas, Rocky Ford, St. Charles Mesa WD). These entities were excluded since they have capital improvement programs and other funding mechanisms that can support water line replacement projects.

If the infrastructure listed in Table 9, with the exception of the pipe, was scheduled to be completed over a 10 year period, the annual cost would be approximately $750,000 per year for each of the 10 years. Adding the

[18] State of Colorado average from the U.S. Energy Information Administration (http://www.eia.gov/cneaf/electricity/st_profiles/e_profiles_sum.html)

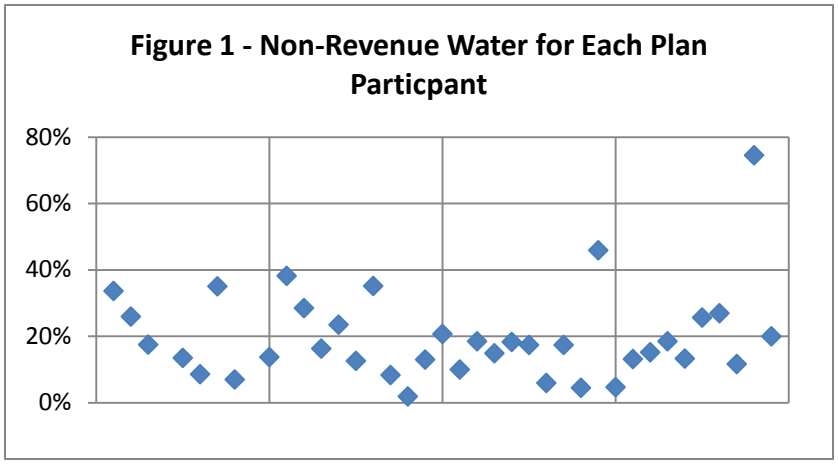
pipe replacement using a 50-year replacement period, would add $500,000 to the annual capital costs, making the total $1,250,000. These costs are in additional to currently budgeted capital improvement projects (CIPs) planned by the 38 Plan participants, which include pipe repairs and upgrades, water treatment plant improvements and water rate evaluations.

The ongoing OM&R costs, based on the estimates presented in Table 9 including nearly $200,000 to pay for the operations and maintenance of new AMR/AMI infrastructure and radio transmitter systems, if these systems were installed and operated by the Plan participants[19].

[19] Note that since the System Wide Water Audit was completed, St. Charles Mesa Water District and Rocky Ford have invested in installing AMR and AMI infrastructure into portions and all of their delivery systems, respectively.

Characteristics of Non-Revenue Water for the AVC Plan participants

Non-revenue water was characterized and estimated using the water production and billing data provided by each of the individual Plan participants. In addition, the auditing process helped to identify and estimate quantities of unmetered and metered, unbilled water use within each individual distribution system. Based on these calculations, non-revenue water was found to vary from about 2 to 74 percent of total water produced as illustrated in Figure 1, with the average amount of non-revenue water (based on volume) for all Plan participants combined at about 20% of produced water, or about 2,000 acre-feet of water per year (since current demand based on 2010 (see Table 3) is about 10,000 acre-feet. This is water that is either lost from the distribution systems as leaks or is lost due to metering and/or billing inaccuracies, and/or unbilled uses (e.g., line flushing, street cleaning, filter backwash pumped to waste, etc.).



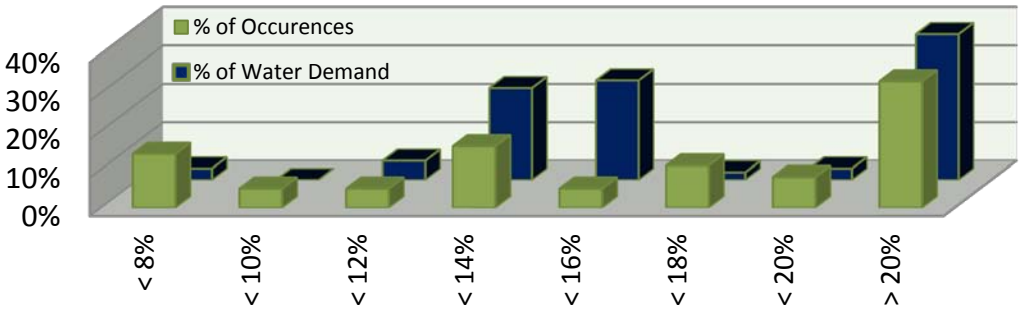
A breakdown of the amount of non-revenue water for the Plan participants is provided in Table 10. This table shows that there are five water providers with non-revenue water below 8%, which represents 14% of the Plan participants; however these five water providers produce only 3% of the total water deliveries in the AVC service area.

Noteworthy is that there are eight water providers that have non-revenue water losses of between 12 and 16%, which represents about 21% of the water providers, but about 50% of the total water deliveries. Therefore, it appears that the larger water providers in the partnership have non-revenue water losses of greater than 12%. Figure 2 presents these data contained in Table 8 in graphic form.

Table 10 – Categorization of Non-Revenue Water Losses for the Plan Participants

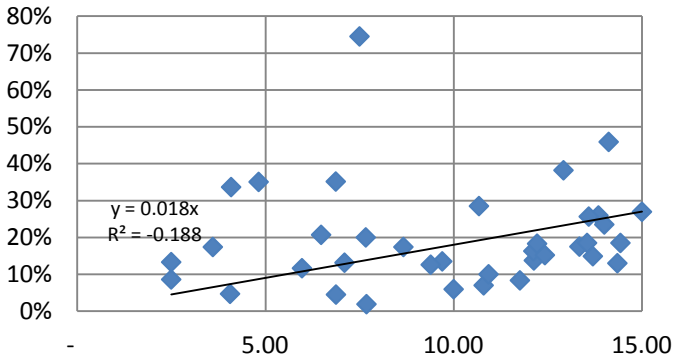
Occurrence	Number of Occurrences	% of Occurrences	Amount of Water (1000s of gallons)	% of Total Water Deliveries
< 8%	5	14%	101,115	3%
< 10%	2	5%	5,966	0%
< 12%	2	5%	163,732	5%
< 14%	6	16%	819,185	24%
< 16%	2	5%	875,826	26%
< 18%	4	11%	66,334	2%
< 20%	3	8%	85,758	3%
> or = 20%	13	35%	1,254,373	38%

Figure 2 - Breakdown of Water Loss by Occurrence and Water Demand
(% of the 38 Plan Participants and 10,000 Acre-Feet of Current Annual Demand)



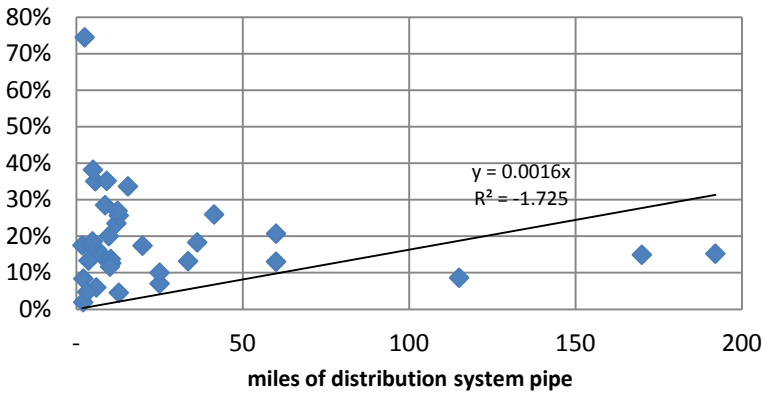
Water loss was found to correlate poorly to meter age – indicating that water provider systems with older meters did not necessarily have a larger percent of non-revenue water (see Figure 3). Similarly, water loss did not correlate well to the length of distribution pipe in the ground (see Figure 4), since the systems with the most miles of pipe in the ground had some of the lowest rates of water loss observed. Water loss was also found uncorrelated to total water use for the Plan participants.

Figure 3 - Non-Revenue Water vs. Meter Age



The characteristics of water loss are perhaps best characterized by a few noteworthy anecdotes. To begin with, real line loss due to leaks and breaks can be to some extent correlated to the quality of the pipe installation, more so than pipe age or material. Older pipe installed with proper bedding materials and protected from surface loads can perform at a high level for a long period of time versus newer or more robust pipe that is placed with poor craftsmanship.

Figure 4 - Non-Revenue Water vs. Miles of Pipe



Another important characteristic related to real line loss is system pressure. For a number of smaller water systems, wintertime losses are higher (as a percentage of total water production) than in the summer. This observation may be related to increased summertime demands reducing line pressure, which in turns reduces total line losses due to small and chronic leaks[20]. ABS pipe, which can

[20] Wintertime losses can also be attributed to periods of time when snow pack can impact collecting meter readings, thereby creating apparent losses (as opposed to real line losses).

become brittle with age, can be most susceptible to pressure variations, especially in settings that have significant elevation variation where low areas can experience substantial pressure build-up.

One other noteworthy contributor to line loss relates to the existence of corrosive soils, which occur at various locations throughout the valley[21]. A number of Plan participants indicated that they experience some degree of locally extensive corrosive soils; however, a complete characterization of the location and extent of corrosive soil impacts on line losses was beyond the scope of this project.

As previously indicated, about 70% of the pipe currently in the ground being used for water distribution by the Plan participants is PVC (varying from 1-inch to 12-inch diameter); however, over 250 miles of pipe in use is not PVC[22]. PVC pipe is not as susceptible to corrosive soils as other distribution piping material.

Apparent water losses, related to inaccurate meters, data handling errors, and unmetered water uses also are expected to influence the non-revenue water characteristics of the Plan participants. The vast majority of the meters in place are $^{5}/_{8}$ by $^{3}/_{4}$ inch meters connected to older homes (built before 1980)[23]. It is anticipated that these meters cannot accurately measure small leaks on the customer side of the meter (e.g., dripping faucets, leaking toilet flappers) which can average about 10 gallons per day per connection[24]. At this rate, inaccurate metering can attribute for 1 to 2% of observed non-revenue water on average. Unmetered water uses may contribute another 1 to 3%, as well, to the average amount of non-revenue water per Plan participant. Just controlling these two features of non-revenue water could increase overall water sales in the valley by 2 to 5%, accounting for 200 to 500 acre-feet in sales per year[25].

Overall, system wide water loss from real and apparent losses cannot be specifically correlated to meter or material age, or amount of pipe in the ground. It appears that water loss is based on a combination of variables (e.g., water pressure, elevation variability, etc.); including the manner in which water production and customer water use data is collected. Nonetheless, Plan participants will be able to reduce their non-revenue water by reducing both real and apparent losses by replacing meters, installing automated meter reading devices, improving data handling, reporting[26], and management techniques, replacing and repairing leaking pipe, and tracking unmetered water uses. Various BMPs that have been identified to support local water provider needs will be evaluated and assessed for effectiveness and cost in the RWC Plan.

---

[21] Soil corrosion is a complex phenomenon, with a multitude of variables involved. Chemical reactions involving almost each of the existing elements are known to take place in soils, many of which are not yet fully understood. The relative importance of variables changes for different materials, making a universal guide to corrosion impossible. Soils with high moisture content, high electrical conductivity, high acidity, and high dissolved salts will be most corrosive. http://corrosion-doctors.org/SoilCorrosion/Introduction.htm

[22] Includes cast iron, ABS (acrylonitrile butadiene styrene), black rolled pipe, concrete, asbestos concrete

[23] roughly 95% of all meters in place are $^{5}/_{8}$ by ¾ inch meters

[24] Water Conservation Handbook, Vickers, 2003

[25] At $3.00/thousand gallons, this amounts to about $200,000 to 500,000 in currently lost revenue to the Plan participants.

[26] One key recommendation that will come out of the planning effort will be to standardize data collection methodologies, to the extent practical, such that water loss information can be assessed consistently from water provider to water provider.

Performance Guidelines

The concept of performance guidelines which would promote water use efficiency at the individual water provider level stems from the requirement of the U.S. Bureau of Reclamation (hereafter "Reclamation") that the District must ensure that Fryingpan-Arkansas Project water is used efficiently, and is put to beneficial use. To this point, performance guidelines would support more efficient water use by each Plan participant – promoting improved water use efficiency over currently observed levels, and in the process reducing non-revenue water, and therefore lost water sales receipts, for under-performing water providers.

Therefore, the policy that is explored in this report relates to developing a non-revenue water "goal" for all Plan participants including:

- The assessment of a numerical goal
- The identification of a timeframe to achieve the goal
- The BMPs that Plan participants may choose to implement to achieve the goal
- The potential financial tools that the District can employ to encourage Plan participants to achieve the goal and support local infrastructure investments that will improve overall water use efficiency
- The reporting mechanisms that would be needed to support tracking of progress toward achieving and maintaining the goal.

Background - Developing a guideline for water loss – as a combination of real and apparent losses[27] – is challenging given the breadth of water providers that are party to the AVC and share the Fryingpan- Arkansas water resources. However, it makes sense to develop a single performance guideline for all project partners, since any losses that occur compromise the District's and Reclamation's defined mission - to ensure water is used efficiently; and is put to beneficial use by the Plan participants.

The American Water Works Association (AWWA) has developed target setting guidelines for leak management based on specific water resource, operational and financial constraints[28]. These guidelines are summarized in Table 11, noting that these values are for infrastructure leakage index, which is a measurement of real losses only.

An additional source of guidance that may be leveraged to assess a performance guideline is the Colorado Water Conservation Board's (CWCB) Conservation Strategy developed as a component of Statewide Water Supply Initiative (SWSI) (Aquacraft, 2010). This document indicated that water loss goals, for combined real and apparent losses when managed properly should be in the range of 6 to 8%. Coupling the CWCB target with the AWWA guidelines would indicate that a reasonable target for apparent losses would be in the range of 3% of

[27] Real losses relate to distribution and service line leaks (before the customer meter) and storage tank overflows; apparent losses relate to unauthorized consumption, inaccurate customer meters and systematic data handling errors (which can include labeling unmetered uses as losses).
[28] Based on information provided in AWWA, 2009.

total water production. Noteworthy is that Colorado water providers with water conservation plans on file with the CWCB report an average non-revenue water loss of just over 10%[29] (Great Western Institute, 2011).

Table 11 – Summary of Leakage Management Target-Setting Guidelines

Target Range %	Water Resources Constraints	Operational Constraints	Financial Constraints
1-3	Available resources are greatly limited and are difficult and/or environmentally unsound to develop.	Operating with system leakage above this level would require expansion of existing infrastructure and/or additional water resources to meet demand.	Water resources are costly to develop or purchase. Ability to increase revenues via water rates is greatly limited due to regulation or low rate payer affordability.
3-5	Water resources are believed to be sufficient to meet long-term needs, but demand management interventions (leakage management, water conservation) are included in long-range planning.	Existing water supply infrastructure capability is sufficient to meet long-term demand as long as reasonable leakage management controls are in place.	Water resources can be developed or purchased at reasonable cost. Periodic water rate increases can be feasible and are tolerated by the customer base.
5-8	Water resources are plentiful, reliable, and easily developed and/or produced.	Superior reliability, capacity and integrity of the water supply infrastructure make it relatively immune to supply shortages.	Costs to purchase or develop water are low, as are rates charged to customers.
>8	While operational and financial considerations may allow a long-term target greater than 8, such a level of leakage is not an effective utilization of water as a resource, such that setting a target greater than 8 is discouraged.		

Proposed Level of Non-Revenue Water - Based on these various information sources, it would appear that a performance guideline of 6 to 10 % would be reasonable – accounting for real losses of between 4 and 7% and apparent losses accounting for the other 2 to 3%.

Timeframe - The performance guideline proposed for evaluation in the RWC Plan is suggested to be in place for each of the Plan participants at a time when each local organization is satisfied with the need, the data available to characterize water loss, and funding needed to support improved water loss management. By default, the District suggests that each Plan participant may want to consider meeting this performance guideline by 2050 (which is roughly consistent with the District's overall goal – see the following section of the Plan). However, it is the intent of the District to have each Plan participant define its own goal for water loss management, and the timeframe for reaching that goal – given that some organizations are at or below a proposed performance guideline of 6 to 10%; and others are substantially above that level. To this point, some of the Plan participants may choose to have goals that are achieved at 10-years, 20-years or 40-years into the future.

[29] Covered entities that reported water loss in their water conservation plans reported "unaccounted for" water, rather than non-revenue water loss. There was no standard method provided to allow for a consistent comparison of reported water loss from entity to entity.

Ongoing Water Conservation Programs

Understanding and characterizing the extent of ongoing water conservation programs in the AVC service area is not readily obtained due to a number of realities. First, there is a long tradition of water use efficiency by water customers and citizens in the area who have long been sensitive to water shortages and water supply limitations due to the area's warm, dry climate; the impact of past state water litigation; ongoing water transfers and leases allowing for the removal of water from the basin to neighboring basins; and the overall culture of the agricultural community that exists from Pueblo to the state line along the Arkansas River. In addition, the community in this portion of the state is sensitive to changes in costs of water and other basic utilities due to the per capita income (which is among the lowest in the state) and the economic condition of the area; such that wasteful water use is not often found.

Second, historic water use data is not readily available from the Plan participants. Without these data, it is not possible to identify changes in water use demand over time in response to ongoing formal water conservation efforts. It is anticipated that similar to the rest of the state, water use demand decreased across the District's serve area in response to the drought in 2002 and 2003. It is also expected that water use demand increased since the drought, as restrictions and State wide messaging relaxed regarding water use and water supply concerns.

For these reasons, individual water provider water conservation programs have not been or needed to be rigorous or far-reaching. In addition, some of the smaller water providers have been challenged to simply meter their customers and collect billings on a regular basis. Planning for and implementing meaningful water conservation measures and programs have been a low priority given the other challenges that the water providers regularly face.

Nonetheless, formal water conservation programs are in place impacting both local water use in the larger cities, and regional water use efficiency due to District sponsored activities. To this point there are three covered entities in the 38 Plan participants that are required by the State to have CWCB approved water conservation plans. La Junta, Lamar and St. Charles Mesa Water District have submitted plans to the CWCB for review and approval – and to date, Lamar's and St. Charles Mesa Water District have received approvals[30].

In addition, the District has many regional programs that it sponsors and conducts that are focused on maintaining a commitment to stewardship of the region's water resources and the fulfillment of its responsibility to Reclamation related to ensuring efficient use of Project water. The programs and practices that the District conducts, in addition to its broad range of educational efforts, include the following:

- Water allocation policies and principles that define mechanisms for water sharing, water allocation and carryover storage all of which allow for improved system reliability and wise use of water resources;
- Water accounting protocols that allow for the tracking of Project water use and allocations;
- Return flow management program to ensure appropriate reuse and/or sale of Project water return flows;

[30] This is not to say that water conservation efforts are not underway in all three of these locations, but rather that the CWCB does not have a full record of the local efforts that are ongoing. Noteworthy is that the City of La Junta has a draft plan submitted to the CWCB; however, as of the date of this writing, it has not been approved.

- Project water request protocols that allow for more accurate purchases and use of Project water, reducing waste and inefficiencies;
- Reallocation procedures for Project water made available through agricultural dry-up;
- Enhanced data collection to characterize water availability and use through federal and state partnerships with SNOTEL, satellite stream gauging program, and other cooperative agreements;
- Tamarisk control program and the Arkansas Watershed Invasive Plant Program (ARKWIPP) to reduce the impact of evapotranspiration along open conveyances; and
- Maintaining a water conservation coordinator that supports public education, Xeriscape demonstration gardening, and municipal water conservation efforts.

Additional details related to these programs can be found in the District's 2010-2014 Water Conservation and Management Plan (2010)[31].

To better characterize and understand local water conservation efforts, the District conducted a survey in 2006 to collect information regarding ongoing water conservation programs being conducted and supported by the 38 Plan participants, and to identify overall interest in future types of water conservation planning and implementation. The key results are provided in Table 12.

To being with, about one half of the Plan participants completed the survey, in part based on overall interest in local water conservation planning. Of those that responded, ten entities indicated that they had water conservation plans in place; however only four of the entities have staff members that are responsible for water conservation.

Overall, it is unclear what water conservation programs have been implemented at the local level. All entities should have 100% metering in place, and benefit from the 1992 National Energy Policy Act that requires only the installation of water efficient toilets, showerheads and faucet aerators in new construction and retrofits. In addition, local ordinances related to seasonal water restrictions are in place in some locations (e.g., the City of Lamar).

The District also provides educational resources to all its partners – including:

- Website resources on indoor and outdoor wise water use; Xeriscaping and use of native planting materials; and weather data including evapotranspiration monitoring.
- Printed materials on wise water use.
- Xeriscape demonstration garden.
- K-12 educational resources – including support for water fairs, K-12 water education for teachers (Project WET), and in classroom presentation support.

As for ongoing and/or future water conservation efforts, Plan participants have indicated an interest in developing water conservation programs for various reasons. A summary of self-stated interests by local water providers associated with their willingness to participate in a regional water conservation effort, as well as develop and implement a local water conservation plan, is provided in Table 13, based on the 2006 survey.

[31] Reclamation supports and partners with the District on many water conservation programs including public education, District educational website management, Xeriscape demonstration garden, SNOTEL, and the satellite stream gauging programs, for example.

Table 12 - Summary of Ongoing Water Conservation Efforts

County	Participant	Water Conservation Staff[1]	WC Plan In Place[1]	Current Tools[1]		
				Public Information	School Ed	Award Programs
Bent	Hasty Water Company					
	Las Animas, City of	No	Yes	Yes	Yes	
	McClave Water Assoc.	No	No		Yes	
Crowley	Crowley County Commissioners	No	No			
	96 Pipeline Co.					
	Crowley County Water Assoc.					
	Crowley, Town of					
	Ordway, Town of					
	Olney Springs, Town of	No	Yes	Yes		
	Sugar City, Town of					
Kiowa	Eads, Town of	Yes	Yes	Yes	Yes	
Otero	Beehive Water Assn					
	Bents Fort Water Co.					
	East End Water Assn.	No	No		Yes	
	Eureka Water Co.					
	Fayette Water Assn.	No	No			
	Fowler, Town of (potable only)	Yes	Yes	Yes	Yes	
	Hancock Inc.	No	No			
	Hilltop Water Co.	No	Yes	Yes		
	Holbrook Center Soft Water					
	Homestead Improvement Assn.					
	La Junta, City of	Yes	Yes	Yes	Yes	
	Manzanola, Town of	No	Yes	Yes	Yes	
	Newdale-Grand Valley Water Co.	No	Yes	Yes		
	North Holbrook Water	No	No			
	Patterson Valley	No	No			
	Rocky Ford, City of					
	South Side Water Assoc.	No	No		Yes	
	South Swink Water Co.	No	No			
	Swink, Town of					
	Valley Water Co.					
	Vroman					
	West Grand Valley Water Inc.					
	West Holbrook Water					
Prowers	Lamar, City of	Yes	Yes	Yes	Yes	Yes
	May Valley Water Assoc.	No	No	Yes		
	Wiley, Town of					
Pueblo	Boone, Town of					
	St. Charles Mesa Water District	No	Yes		Yes	

1 From the "Merrick Participant Surveys"

Table 13 - Participant Interest in Future Conservation

County	Participant	Reasons to Conserve[1]						
		Offset Growth	Reduce Costs to Meet Future Peak Demands	Drought Preparedness	Citizen Demand	Right to Do	Environmental Benefits	Loan or Permit Requirement
Bent	Hasty Water Company							
	Las Animas, City of			Yes		Yes		
	McClave Water Assoc.							
Crowley	Crowley County Commissioners							
	96 Pipeline Co.							
	Crowley County Water Assoc.							
	Crowley, Town of							
	Ordway, Town of							
	Olney Springs, Town of			Yes				
	Sugar City, Town of							
Kiowa	Eads, Town of			Yes	Yes			
Otero	Beehive Water Assn							
	Bents Fort Water Co.							
	East End Water Assn.							
	Eureka Water Co.							
	Fayette Water Assn.							
	Fowler, Town of (potable only)			Yes		Yes		
	Hancock Inc.	Yes						
	Hilltop Water Co.			Yes				
	Holbrook Center Soft Water							
	Homestead Improvement Assn.							
	La Junta, City of	Yes	Yes	Yes		Yes		Yes
	Manzanola, Town of			Yes		Yes		
	Newdale-Grand Valley Water Co.			Yes				
	North Holbrook Water							
	Patterson Valley Water Co.							
	Rocky Ford, City of							
	South Side Water Assoc.							
	South Swink Water Co.							
	Swink, Town of							
	Valley Water Co.							
	Vroman							
	West Grand Valley Water Inc.							
	West Holbrook Water							
Prowers	Lamar, City of			Yes		Yes		Yes
	May Valley Water Assoc.							
	Wiley, Town of							
Pueblo	Boone, Town of							
	St. Charles Mesa Water District					Yes		

1 From the "Merrick Participant Surveys"

It will be important that future water conservation efforts on a local and a regional scale strive to collect and report those data that can be used to determine the effectiveness and value of those measures and programs that are selected for implementation. To this point, all Plan participants can begin to collect the appropriate data needed to support water conservation planning and water loss management as soon as possible to help facilitate local plan development. The RWC Plan will provide information on how local and regional data collection and reporting will be coordinated not only to support water conservation efforts, but regional water resources management as well.

Water Conservation Goals

The nature of water conservation goals for the District is based on the fact that the District does not provide Project water for retail sale; instead the District has an administrative role that includes being the local contracting agency with Reclamation who is responsible for repayment of locally funded construction costs of the AVC and related projects (e.g., Long-Term excess capacity Master Contract[32]). Therefore, the District will be in the position in the future to collect and report data associated with AVC deliveries from the Plan participants – including total water deliveries and customer water sales. These data will be used to help track the future benefits of water conservation and water use efficiency programs being implemented by local water providers.

For this reason, the District does not directly control how local water providers and their customers will leverage the benefits of local water conservation programs to reduce water demand. However, the District is committed to provide financial and technical resources to support local water conservation efforts being planned and implemented by the 38 Plan participants.

Given that the efforts of the District and the 38 Plan participants will over time will improve local water use efficiency though improvements to water loss control and overall system water management, as well as other water conservation measures and programs, the District has developed the following broad goals for improved water use efficiency by the combined group of Plan participants:

- By 2030, reduce water loss from 20% to 15% of total water production (reducing demand by about 540 acre-feet from estimated 2030 demands (10,811 acre-feet)); and
- By 2050, reduce water loss from 15% to 10% of total water production (reducing demand by another 600 acre-foot for a total of about 1,140 acre-feet from expected 2050 demands (11,423 acre-feet)).

These goals were developed to align with the expected gaps in future water supply discussed previously in the Plan.

Additionally, the District is requesting that the Plan participants:

- Develop local water conservation plans that document water demand reduction goals (including water loss management improvements);
- Select water conservation measures from the District's Toolbox to support local water conservation efforts; and
- Implement the selected activities (or an appropriate portion thereof) by 2022 (which is when the AVC is predicted to be constructed and operational, and each Plan participant would have to execute a contract with the District to receive AVC deliveries)

[32] This is a long-term contract between the District and Reclamation allowing for storage of non-Project water in Pueblo Reservoir when space is available. The water providers that could benefit from the existence of the Master Contract are all located within the District's service boundaries. The AVC participants that are also participating in the Master Contract may store non-Project water for delivery through the AVC. Non-AVC water providers that are participating in the Master Contract would use existing water systems or the Arkansas River to receive water deliveries.

In addition, the District suggests that the Plan participant water use efficiency goals identify potential water demand reductions that may be expected in 2030 and 2050 as a result of implementing the individual water conservation plans.

The District will strive to facilitate and support the development of 28 local water conservation plans by 2022 (which is 80% of the Plan participants that are not covered entities).

It is fully anticipated that Plan participant water conservation programs will evolve over time as data collection improves, and management systems and technology changes. For this reason, some Plan participants may choose to have water conservation plans that focus on data collection and interpretation activities before developing longer term plans that address water loss management and/or customer demand reductions.

Identification of Water Conservation Measures and Programs

The State of Colorado and Reclamation have guidelines that must be considered in developing water conservation plans. Reclamation requires that any entity that enters into a repayment contract (such as the District) "develop a water conservation plan which shall contain definite goals, appropriate water conservation measures, and a time schedule for meeting the water conservation objectives" (as per the Water Supply Act of 1958, as amended (43 U.S.C. 390b)). The guidelines that Reclamation has prepared to direct the development of said plans include tasks for:

- Providing a description of the water supply system, including delineating sources and amounts of water, and identifying opportunities and challenges to the current water supply system that would potentially benefit from improved water use efficiency;
- Developing water conservation goals that are measurable and address specific water supply limitations and needs;
- Reviewing, evaluating and selecting water conservation measures including considering a listing (see Table 14) provided by Reclamation; and
- Specifying a schedule for implementing the selected water conservation measures to meet the stated goals.

Reclamation's guidelines are nearly identical to those that have been established by the State of Colorado, which were developed in part to adhere to the current regulations (CRS 37.160.26, see Appendix G). The State's regulations while not applicable to the District's RWC Plan, are relevant and appropriate to use to guide and direct the process. Within the Colorado statutes are a listing of water conservation measures and programs "each covered entity shall, at a minimum, consider." These are also listed in Table 14.

By necessity, the District and the Plan participants have developed a culture of water conservation over the decades, given the environment and realities of the lower Arkansas River basin. Certain water conservation measures have naturally been implemented as a matter of course. Other water conservation measures, as listed in Table 14, have not been considered per se, due to expected or perceived cost, organizational constraints, and/or lack of available resources. However, the District and the Plan participants realize that the future may require that any and/or all of the water conservation measures listed by Reclamation and the State may be important to future demand reduction management and water use efficiency programs that are needed locally in the valley.

To this point, the District will develop a Water Conservation Measures Tool Box (or Tool Box, for short) that will be design to fully encompass all listed "to be considered" water conservation measures; and expanded to include others that are relevant to currently identified local needs. The Tool Box, which is being developed through funding from Reclamation and will be completed within the first quarter of 2013, will house information on best management practices (BMPs) that may be applied to any and every water provider within the AVC service area.

Table 14 – Summary of Water Conservation Measures that Should Be Considered in the Development of a Water Conservation Plan

Water Conservation Measure to be Considered	Reclamation Guidelines	State of Colorado Regulations	Current Status in the AVC Service Area	Included in Water Conservation Measures Toolbox
Metering all water deliveries to customers	Fundamental	Covered by another regulation	Implemented by all Plan Participants	Included as updating and repairing meters; use of new technologies
Maintaining water pricing structures that encourage customer water use efficiency (i.e., having pricing that is based on quantity of water used)	Fundamental	To be considered	Implemented by all Plan participants[33]	Included as water rates and water rate structures
Provide information and education for water customers designed to promote increased water use efficiency	Fundamental	To be considered	Implemented by the District throughout the service area	Included as education and training, and messaging to customers
Designate a Water Conservator Coordinator	Fundamental	Not contained in State Regulation	Implemented by the District throughout the service area	Included as management of human collateral
Residential/Government/Institutional Audits and Incentives	To be considered	To be considered		Included
Commercial/Industrial Audits and Incentives	To be considered	To be considered		Included
Landscape Programs	To be considered	To be considered		Included
Distribution System Wide Audit Program	To be considered	To be considered		Included
Drought & Water Supply Contingency Plans	To be considered			Included as integrated resource planning
Wastewater Reclamation and Recycling	To be considered	To be considered		Included as alternative water supplies
Plumbing Regulations (for fixtures)	To be considered	To be considered		Included as regulatory
Fixture Replacement	To be considered	To be considered		Included
Conjunctive Use	To be considered	Not contained in State Regulation		Included as alternative water supplies

[33] Some Plan participants maintain a service fee that provides a nominal fixed volume of water to each customer, with water use above this fixed volume charged on a per unit volume of water delivered.

Evaluation and Selection of BMPs by the Plan Participants

Local Water Conservation Planning

The Plan participants are being requested to develop a local water conservation plan that is consistent with the needs and the resources of the local area; based on the ideals and objectives described in the RWC Plan. The District, in its role as a facilitator of regional resources, is committed to providing technical assistance to support these local water conservation planning efforts, to help Plan participants:

- Develop reasonable and measurable conservation goals (for the 2022, 2030 and 2050 timeframes[34]);
- Understand options for evaluating and selecting water conservation measures;
- Maintain reasonable expectations regarding the effectiveness and cost of implementation; and
- Develop an implementation plan that is meaningful and supports the needs of the local community.

In addition, the District will assist the Plan participants by identifying and facilitating funding from various State and Federal sources.

A key component of the District's support to the Plan participants will be the development and deployment of a Water Conservation Measures Tool Box.

It is the intent of the District to provide enough information in the Tool Box for each BMP such that the Plan participants can:

- Determine what the BMP is and how it may help their specific circumstance;
- Understand how to plan for and implement the BMP; and
- Have examples that include links to technical resources, templates and other relevant materials to assist in scoping and costing the BMP.

The decision whether to select and implement any specific water conservation measure contained in the Tool Box will depend on business and political decisions made by the individual Plan participants.

It is also the intent of the District to update and enhance the Tool Box with information, anecdotes and examples of local practices and efforts, as they become available in the future. For this reason having a "live" website that can be updated and added to in real time will become increasingly relevant to local planning and implementation efforts as Plan participants conduct water conservation measures and add to the knowledge base. The District will therefore maintain the role of data warehouse "keeper" as water conservation and water use efficiency efforts mature in the AVC service area.

Vital to local planning will be the identification of local water conservation plan elements that allow for appropriate business decision-making at the water Board level to occur. To this point, local water providers should look upon the water conservation planning effort as a process that supports the

[34] These timeframes coincide with not only the specified District goals, but with the projected beginning of the AVC operation (2022) at which time each Plan participant will be required to enter into a contract with the District to define the terms and conditions of AVC water delivery, payment, data reporting, etc.

development of appropriate information and data that can be collected over time to support future business decision-making. For example, some water providers may find that their first water conservation plan focuses on the collection and organization of data characterizing customer water use, water loss and non-revenue water, and/or fixed and variable costs associated with water production, treatment and delivery. Once these data have been collected in a meaningful and consistent manner over a period of months to years, the water conservation plan could be updated to include metering improvements, water rate studies, and/or other water conservation measures that could not be properly evaluated previously. Using a step-wise approach, local water providers can:

- Maintain a forward movement in their local water conservation and water use efficiency programs;
- Develop supporting data for business assessment and decision-making; and
- Potentially access funding for each of the steps along the way.

The District will provide technical support to those Plan participants that wish to develop a plan for collecting adequate data to support Board decision-making; as well as to those that wish to begin implementation of more aggressive programs including the three covered entities in the AVC service area (i.e., St. Charles Mesa Water District, La Junta and Lamar). Given the timeframe for water demand reductions to be achieved (i.e., by 2022, 2030 and 2050), the Plan participants have the time to develop data collection programs before developing water conservation programs focused on demand reductions.

Of course, there will be those organizations that have adequate data to support business assessments and analyses in the near term. These organizations may choose to develop a plan and implement water conservation measures without additional data collection. Still others may decide that their current water use efficiency is adequate for their ongoing circumstance such at water conservation planning is not needed at this time. Although the District would urge all Plan participants to develop some form of meaningful water conservation plan, it will ultimately be the decision of each local water provider as to the extent of planning and implementation that will best serve their community.

Irrespective of the decision made by local water providers to plan or not plan, they will have the District and the Tool Box as resources to support assessments and business decision-making by each local Board.

Best Management Practices

The tool box has been designed and conceived to support all the different types of water conservation measures that may be applicable to the Plan participants, including those identified by Reclamation and the State. The focus of the Tool Box on water system management and operations resulted from numerous discussions with the Plan participants and recent CWCB policy assessments (CWCB, 2010, 2011).

To this point, the Tool Box has been organized into five categories of water conservation practices, as follows:

- System Management
- Water production and treatment
- Water Distribution
- Water Delivery (to customers)
- Customer Water use

Table 15 lists the specific BMPs that fall within each of these five categories. The Tool Box will be populated to include each of these BMPs providing information that is relevant to and supports local water provider planning and implementation needs.

Funding Support

The District will develop a portfolio of financial tools that may become available to support and/or augment local water provider water conservation and water use efficiency planning and/or implementation efforts. The financial tools will include:

- Developing and maintaining an accurate listing of federal and State grant and loan programs that may be available to support local planning and/or implementation efforts;
- Developing and maintaining sample grant and loan applications that may inform local application efforts; and
- Providing grant and loan writing technical support.

A listing of the currently available funding options that has been identified as a result of the District's planning efforts is provided in Appendix H.

It is anticipated that the Plan participants will evaluate and determine their individual funding needs independently, depending on program type, financial need, scope and budget of plan and/or implementation task, and organizational mission or structure[35]. In addition, local water providers will have to determine whether they will pursue funding alone, in teams and/or with regional partners. The District will provide technical assistance on an as-needed basis to support funding assessments performed by local water providers.

Finally, the District will consider developing technical assistance programs that are either stand-alone or in partnership with selected small water system service providers (e.g., Colorado Rural Water Association). Technical assistance may include services such as:

- System Wide Water Audits
- Water rate studies
- Leak detection testing
- Meter testing
- Water conservation data tracking
- Professional training

[35] Different types of grant and low interest loans have restrictions regarding the type of organization that qualify for funding.

Table 15 – Overview of BMPs in the Water Conservation Measures Tool Box

System Management	Water Production and Treatment	Water Distribution System	Water Delivery to Customers	Customer Water Use
Data Collection (e.g., synchronizing reading of Master Meters with Customer Meters)	Data Collection and Management (e.g., collection of master meter readings, data warehousing, etc.)	Data Collection - Tracking water line breaks and repairs	Data Collection and Management - Timing of Meter Readings - Tracking Water Delivery per Meter - Submetering	Data Collection and Management - Water Use Tracking (real time) - Submetering
Data Management and Archiving (maps, standard operating procedures, electronic filing of data, etc.)	Master Meter Testing and Replacement	Small Systems infrastructure - Submetering - Looping - Isolation valving	Meter Replacement - Testing and Replacement - Low Flow Batching - Yokes and PRVs	Customer Messaging/Surveys - Message development - Customer feedback/Surveys Campaign management
Organizational Structure(s) - Districts and Associations - Authorities - Regionalization/MOUs	Metering Unmetered Uses - Filter backwash - RO Reject - WTP/WWTP Uses	Leak Detection - testing - system monitoring (flow, pressure) - system shocking	Metering Unmetered Use - Tracking - Metering Options	Technical Assistance for Customers - Training - Licensing/Certifications - Audits (Kits and Resources) - Demonstration Gardens
Evaluate and Update Water Rates - Tracking fixed and variable costs - Tracking customer water use by category - Maintaining reserves - Budgeting for capital improvements - Evaluating Water Rate Structures	System Storage Water Management (e.g., overflow prevention switches)	Metering Unmetered Uses - Hydrant flushing - Fire fighting - Construction water	Alternative Metering Technologies - AMR touch pads - AMR radio reads - AMI remote reading	Customer Audits - Residential - Commercial/Industrial - Institutional
Integrated Resources Management - Raw Water Master Planning - Drought Planning - Contingency Planning	Alternative Water Supplies - Conjunctive use - Reuse/reclaimed wastewater - Interconnects - Carry-over storage - Exchange water options	Pressure Management - Pressure Reducing Values - Tank Placement and Management	Repairs - Service Lines	Policies and Regulations - Guidelines - Regulations
System-Wide Water Audits		Repairs - Distribution pipe and pipe materials - Hydrants - Service Lines		Customer Retrofits (give-aways, incentives) - Indoor - Outdoor
Billing and Bill Collection				Customer Education - General Outreach - Newletters - Interactive Website - K-12 Education
Management of Human Collateral (board development, staffing, training, operator licensing)				
Data Reporting - Funder requirements - Contracting requirements - Board requirements				

All of these programs – maintaining and updating BMPs, developing and administering financial support, and providing technical assistance - may require that some funding mechanism(s) be established to support the District's efforts in the future.

Water Use Tracking and Reporting

It will be incumbent on the District to maintain contact with all the Plan participants to track individual water provider water use, water loss, and water use efficiency prior to and once the AVC is operational. The terms of data sharing and reporting will be by necessity contained in the contract terms and conditions that will be created between the District and each of the Plan participants prior to the AVC becoming operational; however, the District currently has Memorandum of Agreement (MOAs) with the AVC participants that commits the participants to provide information to track the effectiveness of implemented WCP or participates in a RWC Plan (Section V.A.9.). This language is as follows:

> *Participant will provide information to SECWCD, as requested, in order to track the effectiveness of implemented water conservation plans, whether the Participant has its own water conservation plan or participates in a regional water conservation plan.*

The District has considered the data collection and reporting requirements of both Reclamation and the State with regards to the District repayment contract, as well as the District's RWC Plan in developing its requirements for Plan participant reporting. Reclamation requires an update of the RWC Plan every 5 years, whereas the State requires updates no longer than every 7 years. In addition, the District became aware of the current data collection activities that all the Plan participants undertake as a result of the System Wide Audits that were performed in 2011 and 2012. As a result, the District has developed the following annual reporting requirements for all Plan participants, beginning in 2014, to include, at a minimum:

- Monthly data production data
- Monthly water sales data (by customer category if possible)
- Number of active connections by customer category
- Non-revenue water (as a percent of annual water production)
- Status of local water conservation planning efforts
- Listing of implemented water conservation programs (in the last year)
- Current water rates (base fee and fee structure)

Implementation Tasks

The District, working with the Plan participants have identified the following tasks as necessary and appropriate for implementing the RWC Plan over the coming 5 to 7 years. These tasks include the following:

- Complete the design and programming of the Water Conservation Measures Tool Box;
- Conduct workshop(s) with the Plan participants to roll out the Water Conservation Measures Tool Box;
- Identify those Plan participants that plan to develop local water conservation plans;
- Identify those Plan participants that would like to receive technical support from the District, within the coming two calendar years (for now, then extending this program in years hence), for purposes of water conservation plan development;
- Pursue funding by the District in partnership with selected Plan participants in 2013 and 2014 to support local water conservation planning (extending this program in years hence as needed); and
- Review and provide guidance to any Plan participant that has developed a local water conservation plan to assist local efforts to link conservation goal setting with resources from the Tool Box and ongoing and future data collection efforts.

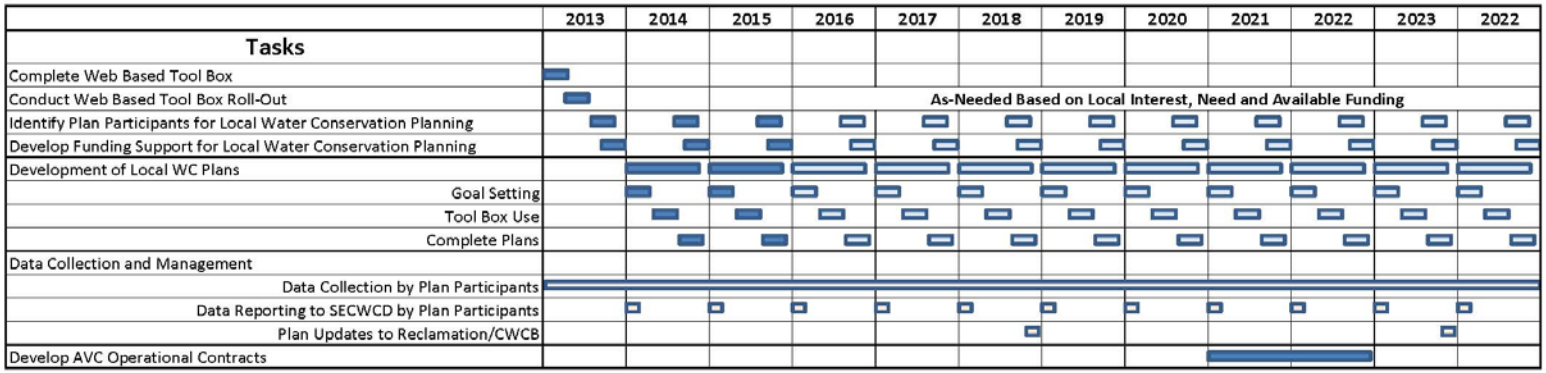
In addition, the District will maintain and update the Tool Box, collecting information and reference material from the Plan participants and other interested organizations to keep the Tool Box relevant, accessible and current.

The District will also make technical resources available to support water conservation measure implementation, on an as-needed basis. Resources may be allocated for performing the following tasks:

- Holding workshops related to local water conservation planning, the AVC, and the Tool Box
- Conducting water provider and customer water use efficiency training
- Maintaining the District Xeriscape Demonstration Garden
- Printing and disseminating water conservation information and educational materials
- Supporting basin wide conservation message development and broadcasting
- Supporting K-12 water education throughout the valley

Finally, the District will develop specific data reporting requirements for the Plan participants related to their individual AVC contracting terms and conditions, which will take into account Reclamation and State of Colorado reporting requirements, local water conservation planning efforts, and overall AVC Plan participant water use efficiency.

A schedule for implementation tasks is provided below.



Public Review and Comment

The Draft RWC Plan was distributed and otherwise made available for public comment on November 26, 2012. Public comment was open for 60 days as per the announcement placed in local papers (see Appendix I). Public input was sought and obtained prior to the close of the public comment period which was on January 25, 2013. Copies of the Final Draft RWC Plan were made available at the District's offices, on line, and via email.

All comments received are listed in Appendix J along with a response related to how the comment was incorporated into the Plan, as appropriate, based on the goals and objectives of the Plan, the available information, the requirements of the law, and the direction of the District Board.

References

American Water Works Association, 2009, "AWWA Manual of Water Supply Practices M36 (3rd Edition): Water Audits and Loss Control Programs," Denver, CO.

Aquacraft Inc., and Headwaters Corp., 2010, "SWSI 2010 Municipal and Industrial Water Conservation Strategies Report," Colorado Water Conservation Board, Denver, CO.

Black and Veatch, 2010, "Arkansas Valley Conduit Pre-NEPA State and Tribal Assistance Grant (STAG) Reports," Southeastern Colorado Water Conservancy District, Pueblo, CO.

CDM, 2004, "Statewide Water Supply Initiative Phase I," Colorado Water Conservation Board, Denver, CO.

Colorado WaterWise and Aquacraft, Inc., 2010, "Guidebook of Best Practices for Municipal Water Conservation in Colorado," Boulder, CO.

Great Western Institute, 2010, "SWSI Conservation Levels," Colorado Water Conservation Board, Denver, CO.

Great Western institute, 2011, "SWSI Conservation Levels Phase II," Colorado Water Conservation Board, Denver, CO.

Great Western Institute, 2012, "System Wide Water Audits in Support of Regional Water Conservation Planning," Southeastern Colorado Water Conservancy District, Pueblo, CO.

Southeastern Colorado Water Conservancy District, 2010, "2010-2014 Water Conservation and Management Plan," Pueblo, CO.

The Engineering Company, 2010, "City of Lamar- Water Conservation Plan," Fort Collins, CO.

The Engineering Company, 2011, "City of La Junta- Water Conservation Plan," Fort Collins, CO.

USBR, 2012, "Arkansas Valley Conduit and Long-Term Excess Capacity Master Contract Draft Environmental Impact Statement (EIS)," Great Plains Region, Bismarck, MT.

USBR, 1997, "Achieving Efficient Water Management - A Guidebook for Preparing Municipal Water Conservation Plans," Lower Colorado Region, Boulder City, NV.

Young Technology Group, LLC., 2010, "Water Conservation Plan for The St. Charles Mesa Water District," Pueblo, CO.

Appendix A - Map of Plan Participants

RECLAMATION
Managing Water in the West

Legend
- Limited Access
- Highway
- Major Road
- Local Road
- Minor Road
- Other Road
- Ramp
- Ferry
- Pedestrain Way
- Railroads (Local)
- Perennial Stream
- Intermittent Stream
- Intermittent Canal

Pueblo West
Pueblo
Pueblo Army Depot Activity
Pueblo County
St. Charles Mesa Water District
St Charles Mesa Delivery
AVONDALE
Avondale Delivery
Avondale
Boone
Boone Delivery

AVC DELIVERY LOCATIONS UPDATED MAY 2011

SHEET #1

These data represent a comparison of Arkansas Valley Conduit project delivery locations used in the appraisal study versus delivery locations updated in May 2011. The conduit route is from Pueblo Reservoir to Lamar, Colorado utilizing several spurs to provide water to the participants along the route.

N
W E
S

Tap & Delivery Legend
- **TAP & DELIVERY POINTS**
- DELIVERY POINTS UPDATED MAY 2011
- **Counties**

Bureau of Reclamation Contact:
Technical Service Center
Remote Sensing and Geographic Information Team
Denver Co, 80225

0 0.5 1 2 3 4 5 Miles

RECLAMATION
Managing Water in the West

AVC DELIVERY LOCATIONS UPDATED MAY 2011

SHEET #2

These data represent a comparison of Arkansas Valley Conduit project delivery locations used in the appraisal study versus delivery locations updated in May 2011. The conduit route is from Pueblo Reservoir to Lamar, Colorado utilizing several spurs to provide water to the participants along the route.

Bureau of Reclamation Contact:
Technical Service Center
Remote Sensing and Geographic Information Team
Denver Co, 80225

N W E S

Tap & Delivery Legend

- **TAP & DELIVERY POINTS**
- DELIVERY POINTS UPDATED MAY 2011
- **Counties**

0 0.5 1 2 3 4 5 Miles

Legend

- Limited Access
- Highway
- Major Road
- Local Road
- Minor Road
- Other Road
- Ramp
- Ferry
- Pedestrain Way
- Railroads (Local)
- Perennial Stream
- Intermittent Stream
- Intermittent Canal

Pueblo County

Crowley County

Otero County

Boone
Boone Delivery
Crowley, Town of
Crowley
Crowley Delivery
Olney Springs Delivery
Olney Springs
Crowley County Water Association
Olney Springs
Fowler Delivery
Fowler
FOWLER
Valley Water Delivery
Valley Water Company
Manzanola
Manzanola Delivery
Vroman Water Company
Vroman Delivery
Fayette Water Association
Patterson Valley Water Company

209
96
50
207
167
202

RECLAMATION
Managing Water in the West

AVC DELIVERY LOCATIONS UPDATED MAY 2011

SHEET #3

These data represent a comparison of Arkansas Valley Conduit project delivery locations used in the appraisal study versus delivery locations updated in May 2011. The conduit route is from Pueblo Reservoir to Lamar, Colorado utilizing several spurs to provide water to the participants along the route.

Bureau of Reclamation Contact:
Technical Service Center
Remote Sensing and Geographic Information Team
Denver Co, 80225

N
W E
S

Tap & Delivery Legend

- TAP & DELIVERY POINTS
- DELIVERY POINTS UPDATED MAY 2011
- Counties

0 0.5 1 2 3 4 5 Miles

Legend

- Limited Access
- Highway
- Major Road
- Local Road
- Minor Road
- Other Road
- Ramp
- Ferry
- Pedestrain Way
- Railroads (Local)
- Perennial Stream
- Intermittent Stream
- Intermittent Canal

Pueblo County

Crowley County

Sugar City

96 Pipeline Company

Sugar City Delivery

96 Pipeline Delivery

Crowley County Water Delivery

Ordway

Ordway Delivery

Crowley, Town of

Crowley Delivery

Olney Springs Delivery

Olney Springs

Crowley County Water Association

Olney Springs

Fowler Delivery

North Holbrook Delivery

North Holbrook Water Company

West Holbrook Delivery

71 96 207 266

RECLAMATION
Managing Water in the West

Crowley County

Otero County

Bent County

Legend
- Limited Access
- Highway
- Major Road
- Local Road
- Minor Road
- Other Road
- Ramp
- Ferry
- Pedestrain Way
- Railroads (Local)
- Perennial Stream
- Intermittent Stream
- Intermittent Canal

Beehive Water Association
East End Water Association
Southside Water Association
CHERAW
Cheraw
The West Holbrook Water Pipeline Association
Holbrook Center Soft Water Association
Holbrook Center Soft Water
Cheraw Delivery
Beehive Delivery
Southside Water Delivery
East End Water Delivery
North Holbrook Delivery
North Holbrook Water Company
West Holbrook Delivery
Fayette Water Association
Fayette Delivery
Patterson Valley Delivery
Patterson Valley Water Company
Eureka Water Company
Eureka Delivery
Rocky Ford, City of
Rocky Ford Delivery
Hancock Delivery
Hilltop Delivery
Hill Top Water Company
Swink - North Route
Swink Delivery
Swink
Swink - Hwy 50 Route
Newdale-Grand Valley Water Co
Newdale-Grand Valley Delivery
West Grand Valley Delivery
West Grand Valley Water Incorporated
South Swink Water Company - Fairview
South Swink Delivery
South Swink Water Company - Fairmont
Homestead Delivery
Homestead Improvement Association
La Junta Delivery
La Junta, City of
Bents Fort Delivery
Bents Fort Water Company

AVC DELIVERY LOCATIONS UPDATED MAY 2011

N
W E
S

SHEET #4

These data represent a comparison of Arkansas Valley Conduit project delivery locations used in the appraisal study versus delivery locations updated in May 2011. The conduit route is from Pueblo Reservoir to Lamar, Colorado utilizing several spurs to provide water to the participants along the route.

Tap & Delivery Legend
- **TAP & DELIVERY POINTS**
- DELIVERY POINTS UPDATED MAY 2011
- **Counties**

Bureau of Reclamation Contact:
Technical Service Center
Remote Sensing and Geographic Information Team
Denver Co, 80225

0 0.5 1 2 3 4 5 Miles

RECLAMATION
Managing Water in the West

Legend
- Limited Access
- Highway
- Major Road
- Local Road
- Minor Road
- Other Road
- Ramp
- Ferry
- Pedestrain Way
- Railroads (Local)
- Perennial Stream
- Intermittent Stream
- Intermittent Canal

Mc Clave Water Association, Inc.
McClave Delivery
Hasty Water Company
Hasty Delivery

Las Animas, City of
Las Animas Delivery

50
183
194
101

Bent County

AVC DELIVERY LOCATIONS UPDATED MAY 2011

SHEET #5

N
W E
S

These data represent a comparison of Arkansas Valley Conduit project delivery locations used in the appraisal study versus delivery locations updated in May 2011. The conduit route is from Pueblo Reservoir to Lamar, Colorado utilizing several spurs to provide water to the participants along the route.

Tap & Delivery Legend
- **TAP & DELIVERY POINTS**
- DELIVERY POINTS UPDATED MAY 2011
- **Counties**

Bureau of Reclamation Contact:
Technical Service Center
Remote Sensing and Geographic Information Team
Denver Co, 80225

0 0.5 1 2 3 4 5
Miles

Kiowa County

RECLAMATION
Managing Water in the West

Bent County

Prowers County

Legend
- Limited Access
- Highway
- Major Road
- Local Road
- Minor Road
- Other Road
- Ramp
- Ferry
- Pedestrain Way
- Railroads (Local)
- Perennial Stream
- Intermittent Stream
- Intermittent Canal

May Valley Delivery
May Valley Water Association #1
May Valley Water Association #2
287
196
Wiley
Wiley #1
Wiley Delivery
Wiley #2
Mc Clave Water Association, Inc.
McClave Delivery
Hasty Water Company
Hasty Delivery
50
385
Lamar, City of
Lamar Delivery

AVC DELIVERY LOCATIONS UPDATED MAY 2011

N W E S

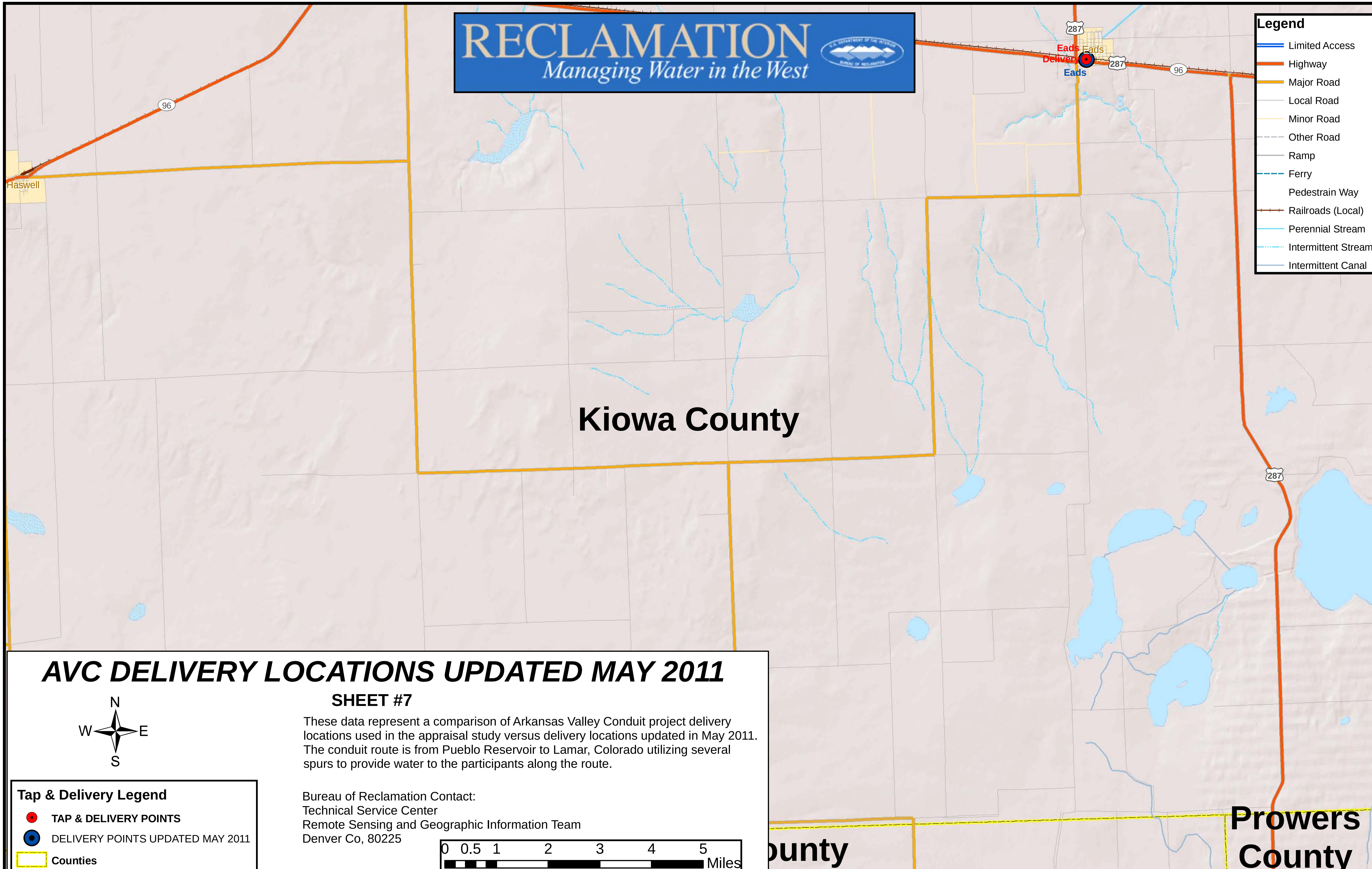
SHEET #6

These data represent a comparison of Arkansas Valley Conduit project delivery locations used in the appraisal study versus delivery locations updated in May 2011. The conduit route is from Pueblo Reservoir to Lamar, Colorado utilizing several spurs to provide water to the participants along the route.

Tap & Delivery Legend
- **TAP & DELIVERY POINTS**
- DELIVERY POINTS UPDATED MAY 2011
- **Counties**

Bureau of Reclamation Contact:
Technical Service Center
Remote Sensing and Geographic Information Team
Denver Co, 80225

0 0.5 1 2 3 4 5 Miles



AVC DELIVERY LOCATIONS UPDATED MAY 2011

SHEET #7

These data represent a comparison of Arkansas Valley Conduit project delivery locations used in the appraisal study versus delivery locations updated in May 2011. The conduit route is from Pueblo Reservoir to Lamar, Colorado utilizing several spurs to provide water to the participants along the route.

Bureau of Reclamation Contact:
Technical Service Center
Remote Sensing and Geographic Information Team
Denver Co, 80225

Appendix B – System Wide Audit Scope

Appendix B

System Wide Water Audits - Overview of Work Performed

The System Wide Water Audits were conducted using a modification of the methodology contained in Manual-36 – Water Audits and Loss Control Programs – prepared by the American Water Works Association (AWWA). This manual of water supply practices defines a water audit program that "is an effective tool available to utilities to quantify consumption and losses that occur in the distribution system and the management of these processes." The manual provides step-by-step instructions on how to compile the information and calculate performance factors for water distributors.

The scope of the AWWA's methodology is admittedly grander than what is needed for many of the AVC Plan participants; however, the themes and the concepts remain the same regardless of the size or sophistication of the distributer. Therefore, slight modifications to the M-36 methodology were incorporated to address the needs of the project without creating undue hardship on the Plan participants.

Objectives

The overall objective of the System Wide Water Audits was to develop an understanding of the challenges faced and successes realized by the Plan participants in managing ongoing water loss - including both real and apparent losses - from their collective water supply systems. Key components of the project were therefore performed to:

- Inventory existing infrastructure including number and sizes of master meters, customer meters, treatment works and distribution piping (including materials);
- Estimate and characterize non-revenue water (aka, water loss) within each local water supply system; and
- Identify best management practices (BMPs) which would improve local water use efficiency by addressing current and future water loss.

In addition, these data collected through the audit process were used to support evaluations of potential performance guidelines and assessments of costs related to planning for and implementing regional water efficiency programs.

Preliminary Audit Tasks/Data Collection Request

Prior to the audits being performed, communications were made with each Plan participant to inform them of the nature and intent of the water audit; and to request that specific data be made available (in any format that was easy) for the audit team on their arrival. The transmittal included:

- A request for the definition of the system boundaries and area;
- Setting a specific time period over which data will be collected and reported; and
- Setting the units of measure.

Based on this request, the Plan participants were asked to assemble the data and have it prepared to provide to the audit team upon their arrival. Data was typically made available in hard copy format – based on files maintained in either electronic and/or handwritten formats.

The specific data request included:

- List of all the meters serviced by size (preferably in table format).
- When each meter, by size category, was last tested/replaced (including master meters).
- For small systems: A map showing locations of well head(s) and other source water, master meter and service area.
- For larger systems: A map showing locations of water treatment plant(s), master meter(s) and service area.
- Estimates of master meter accuracy (and what regular adjustments are used).
- Monthly master meter data for two years, with date read.
- For smaller systems: Monthly water delivery data for all customers for two years (including unbilled, billed, and date billed).
- For larger systems: Monthly water delivery data for all customers, by customer category, for two years (including unbilled and billed, and date billed).
- Listing of metered, unbilled accounts, if they exist (for example City Parks, water treatment use, and so on).
- List of unmetered water use for past two years (examples include flushing flows, firefighting, filter backwash, leaks and line breaks).
- Any other useful data.

Noteworthy is that the majority of the Plan participants were able to compile the requested data; however, as expected, the form and the completeness of the data was not consistent from organization to organization. In addition, some of the data collected was anecdotal in nature such that the results of the analyses performed must be tempered based on the known limitations of the available data.

Notwithstanding the limitations in the data and the data collection process, the System Wide Water Audits succeeded in determining the nature of water loss management for each of the Plan participants and the characteristics of data collection and management related to overall water production and delivery tracking to the extent needed to support regional water conservation planning and the District's permitting requirements.

Conducting the Audit

The in-the-field audit team performed the audits over the five week period from August 29th to September 30th[36]. During this time, 37 of the 38 Plan participants were visited individually in face-to-face meetings with staff, operators, and/or board members. The meetings were used to update the Plan participants regarding the ongoing development of the RWC Plan, and to conduct the business of the audit. In particular, the following tasks were completed in conducting the audit:

- Water production and distribution information were collected (including a map of the system and production records);

[36] With the exception of the City of Fowler, which was conducted in March 2012.

- Water billing information were collected; and
- Other key water distribution system information and policies information were collected (e.g., system wide pressure, length of pipelines, piping material, number of customer tie-ins, history of recent leaks, leak detection and repair policies, meter testing and replacement policies, quantity and nature of unbilled and unmetered uses).

These data were used by the audit team to determine the key characteristics of each of the Plan participant systems; to estimate non-revenue water; and characterize real and apparent system losses for each operating system. These data were also crucial in helping to identify ongoing best management practices that are in use within current operational programs.

Developing the Database and Calculations

The audit team organized the data collected from each of the Plan participants into an Excel database associated with each of the key attributes of the data collected including:

- Meter sizes and age (including whether or not automated meter reading devices (AMR) have been installed);
- Distribution system pipe diameter, length, and materials;
- Water treatment plant/system characteristics; and
- Comparison of produced water to water sold (including accounting for unbilled, unmetered and unbilled, metered water uses).

The calculations for non-revenue water were developed based on these data using methodologies discussed in the M-36 Manual including:

- Total water supplied (including cross connects with other water sources (e.g., water supplied by the Crowley County)) per period
- Total billed authorized consumption per period
- Calculated non-revenue water per period[37]
- Estimated unbilled consumption per period
- Estimated total water losses per period

Develop Project Summary and Data Compilations

The audit team prepared this report to summarize the results of the audit for each Plan participant, which includes a data compilation and the results of the calculations for each organization that participated in the system wide audit. This report will be used to inform the RWC Plan such that information regarding the scope of and need for water loss control programs can be ascertained and cost benefit calculations can be developed.

[37] Non-revenue water is a term that has been developed by the American Water Works Association (AWWA) to describe the water that a water company or utility produces by does not sell. The components of non-revenue water include real losses (due to leaks, etc.) and apparent losses (due to inaccurate meters, etc.). Non-revenue water also includes unbilled authorized uses such as hydrant flushing, filter backwash, etc. This report will use the term non-revenue water in place of the less accurate term unaccounted for water.

In addition, a data compilation (AKA, white paper) was produced for each Plan participant based on the information collected during the audit. The individual white papers include a summary of the data collected by each Plan participant, as well as a list of recommendations that each participating organization may wish to consider to manage and reduce current system wide water loss – including both real and apparent losses.

Appendix C – Meter Size and Age for the Plan Participants

Appendix C
Summary of Meters Served By Plan Participants
(size, age and number with electronic read capability)

	Meter Size (inches)							Age		% by Age			Effective Meter
	5/8 to 3/4	1	1.5	2	3	4	6	< 5 yrs	> 10 years	< 5 yrs	> 10 years	Total	Age (yrs)
Beehive Water Assn	88							58	0	66%	0%	**88**	4.20
Bents Fort Water Co.	330	1						30	300	9%	91%	**331**	13.84
Boone, Town of	150			3				15	128	10%	84%	**153**	13.28
Crowley County Commissioners (includes #1 96 Pipeline Company, #8 Crowley County Water Association, #9 Town of Crowley, and #29 Town of Ordway)													
96 Pipeline	63		2	1				16	30	24%	45%	**66**	9.70
CCWA	360					2		362	0	100%	0%	**362**	2.50
Town of Crowley	110							0	110	0%	100%	**110**	15.00
Ordway	530	6		10				180	360	33%	66%	**546**	10.80
CCC													
Eads, Town of	401	1	3	7	3	3		60	298	14%	71%	**418**	12.13
East End Water Assn.	30							5	25	17%	83%	**30**	12.92
Eureka Water Co.	134							50	84	37%	63%	**134**	10.34
Fayette Water Assn.	26							6	20	23%	77%	**26**	12.12
Fowler, Town of (potable only)	687		7	4	2			35	630	5%	90%	**700**	14.00
Hasty Water Company	117	1			1			30	50	25%	42%	**119**	9.39
Hilltop Water Co.	118	1						60	30	50%	25%	**119**	6.87
Holbrook Center Soft Water	27							7	20	26%	74%	**27**	11.76
Homestead Improvement Assn.	27							11	8	41%	30%	**27**	7.69
La Junta, City of	2,907	189	47	53	6	11		100	3000	3%	93%	**3,213**	14.35
Lamar, City of	3,025	267	31	96	15			2200	1000	64%	29%	**3,434**	6.48
Las Animas, City of	1,090	54	4	17	-	1	1	250	700	21%	60%	**1,167**	10.93
Manzanola, Town of	180		4	3				14	160	7%	86%	**187**	13.54
May Valley Water Assoc.	568	8	5					30	500	5%	86%	**581**	13.70
McClave Water Assoc.	165	2						30	125	18%	75%	**167**	12.22
Newdale-Grand Valley Water Co.	191	2						60	70	31%	36%	**193**	8.67
North Holbrook Water	24							6	12	25%	50%	**24**	10.00
Olney Springs, Town of	239			3				220	21	91%	9%	**242**	3.61
Patterson Valley	40							20	10	50%	25%	**40**	6.88
Rocky Ford, City of	1,649		4	2				60	1500	4%	91%	**1,655**	14.12
South Side Water Assoc.	24							21	3	88%	13%	**24**	4.06
South Swink Water Co.	219		1					70	35	32%	16%	**220**	7.10
St. Charles Mesa Water District	3,945	104	5	7	1	1		800	3200	20%	79%	**4,063**	12.42
Sugar City, Town of	169	1	3	2				5	165	3%	94%	**175**	14.43
Swink, Town of	285	2		1				0	0	0%	0%	**288**	7.50
Valley Water Co.	115							10	100	9%	87%	**115**	13.59
Vroman	59							0	59	0%	100%	**59**	15.00
West Grand Valley Water Inc.	36							20	6	56%	17%	**36**	5.97
West Holbrook Water	12							6	4	50%	33%	**12**	7.50
Wiley, Town of	218		4	3				0	5	0%	2%	**225**	7.67
Total	**18,358**	**639**	**120**	**212**	**28**	**18**	**1**	4847	12768				
							19,376	25%	66%				

Appendix C
Summary of Meters Served By Plan Participants
(size, age and number with electronic read capability)

	Automated Meter Reading							
	Number	**%**	**Largest Meter Customer(s)**					
Beehive Water Assn	-	0%						
Bents Fort Water Co.	-	0%	State Park					
Boone, Town of	-	0%	vendor tower, school					
Crowley County Commissioners (includes #1 96 Pipeline Company, #8 Crowley County Water Association, #9 Town of Crowley, and #29 Town of Ordway)								
96 Pipeline	-	0%						
CCWA	362	100%						
Town of Crowley	-	0%	Prisons					
Ordway	40	7%	Nursing home, schools, apartments					
CCC								
Eads, Town of	-	0%	fairgrounds, football field, pool, hospital, school					
East End Water Assn.	-	0%						
Eureka Water Co.	-	0%						
Fayette Water Assn.	-	0%						
Fowler, Town of (potable only)	-	0%	School, nursing home, apartments					
Hasty Water Company	-	0%	Colorado State Parks					
Hilltop Water Co.	-	0%	Feed Lot					
Holbrook Center Soft Water	-	0%						
Homestead Improvement Assn.	-	0%						
La Junta, City of	-	0%	College, irrigation customers					
Lamar, City of	2,200	64%	Large commercial, City Pool, County Prison, Hospital College					
Las Animas, City of	50	4%	Nursing home and prison (CCA)					
Manzanola, Town of	-	0%						
May Valley Water Assoc.	-	0%	Large commercial, feed lots, school					
McClave Water Assoc.	-	0%	school, livestock					
Newdale-Grand Valley Water Co.	-	0%	feed lots					
North Holbrook Water	-	0%	2 meters are for livestock only					
Olney Springs, Town of	-	0%	ball park, trailer park, large commercial					
Patterson Valley	-	0%						
Rocky Ford, City of	50	3%	nursing home, football field					
South Side Water Assoc. (LaJunta)	-	0%						
South Swink Water Co.	-	0%	trailer park (in the past)					
St. Charles Mesa Water District	472	12%						
Sugar City, Town of	159	91%	park, county shop, commercial					
Swink, Town of	288	100%	school, apartments					
Valley Water Co.	-	0%						
Vroman	-	0%						
West Grand Valley Water Inc.	-	0%						
West Holbrook Water	-	0%						
Wiley, Town of	-	0%	school, apartments					
Total	3621							
	19%							

Appendix D – Distribution Pipe Material and Size for the Plan Participants

Appendix D
Summary of Pipe Materials and Sizes
(all lengths in feet unless otherwise noted)

		Material	**PVC**												
		Diameter (inches)	**1**	**1.25**	**1.5**	**2**	**2.5**	**3**	**3.5**	**4**	**6**	**8**	**10**	**12**	**Total**
3	Beehive Water Assn	Otero				63,360		18,480							81,840
4	Bents Fort Water Co.	Otero									18,500				18,500
5	Boone, Town of	Pueblo								7,160	2,440				9,600
7	Crowley County Commissioners (includes #1 96 Pipeline Company, #8 Crowley County Water Association, #9 Town of Crowley, and #29 Town of Ordway)	Crowley													
	96 Pipeline							31,680		15,840					47,520
	CCWA		not available												343,200
	Town of Crowley									13,200		1,800			15,000
	Ordway					21,120				21,120		52,800			95,040
	CCC											36,960	79,200		116,160
10	**Eads, Town of**	Kiowa		1,200		4,250				22,300	10,340	14,300	1,800	400	54,590
11	**East End Water Assn.**					21,120		3,960							25,080
12	Eureka Water Co.	Otero				21,120	11,352			9,240					41,712
13	Fayette Water Assn.	Otero	1,320		1,320	19,800	10,560								33,000
14	**Fowler, Town of (potable only)**	Otero													-
16	Hasty Water Company	Bent				29,040		23,760							52,800
17	Hilltop Water Co.	Otero	3,334	5,675	3,570	21,288	5,020	6,547		2,735					48,169
18	Holbrook Center Soft Water	Otero				9,768									9,768
19	Homestead Improvement Assn.	Otero				3,960				1,600	5,300				10,860
20	**La Junta, City of**	Otero	specific lengths of each not available - most distribution pipe is PVC and concrete												105,600
21	Lamar, City of	Prowers													26,400
22	**Las Animas, City of**	Bent	specific lengths of each not available - most distribution pipe is PVC												105,600
23	Manzanola, Town of	Otero				5,280					20,400				25,680
24	May Valley Water Assoc.	Prowers	52,536	63,096	143,246	229,046	105,600	156,288	23,760	122,496	1,056				897,125
25	**McClave Water Assoc.**	Bent	1,320	14,520	29,700	52,800		51,150		26,400					175,890
26	Newdale-Grand Valley Water Co.	Otero			31,900	12,480	6,000		21,000	15,600	18,000				104,980
27	North Holbrook Water	Otero				31,680									31,680
28	Olney Springs, Town of	Crowley						1,160		7,970	9,990	5,295			24,415
30	Patterson Valley	Otero			25,080	7,920		7,920		2,640					43,560
31	Rocky Ford, City of	Otero	not available												
32	**South Side Water Assoc.**	Otero			5,280	5,280		6,600							17,160
33	South Swink Water Co.	Otero				65,920		51,040		22,230	4,900				144,090
34	St. Charles Mesa Water District	Pueblo	specific lengths of each not available - most distribution pipe is PVC, ductile iron and ABS												538,560
35	Sugar City, Town of	Crowley						999		14,652	6,956	2,812			25,419
36	Swink, Town of	Otero				1,460		1,210		2,710	5,530	8,360			19,270
37	Valley Water Co.	Otero	6,336		12,672	12,672				15,840	15,840				63,360
48	Vroman	Otero		8,766	7,500	10,923	5,280	12,400		12,600					57,469
49	West Grand Valley Water Inc.	Otero		16,368		13,728				15,312	7,920				53,328
40	West Holbrook Water	Otero	5,280			6,600									11,880
41	Wiley, Town of	Prowers								5,280	21,120	25,080			51,480
		Total (miles)													**667.76**

Appendix D
Summary of Pipe Materials and Sizes
(all lengths in feet unless otherwise noted)

		Material	ABS								Steel/Concrete	Cast iron					AC	Blk Rolled	ABS	Total
		Diameter (inches)	1	1.25	1.5	2	2.5	3	4	Total	various	2	4	6	8	12	6	2	Miles	Miles
3	Beehive Water Assn	Otero								-									-	16
4	Bents Fort Water Co.	Otero				25,280		67,780	107,000	200,060									38	41
5	Boone, Town of	Pueblo								-							900		-	2
7	Crowley County Commissioners (includes #1 96 Pipeline Company, #8 Crowley County Water Association, #9 Town of Crowley, and #29 Town of Ordway)	Crowley																		-
	96 Pipeline									-									-	9
	CCWA									-									50	115
	Town of Crowley									-									-	3
	Ordway					36,960				36,960									7.0	25
	CCC									-									-	22
10	**Eads, Town of**	Kiowa								-									-	10
11	**East End Water Assn.**							1,320		1,320									0.3	5
12	Eureka Water Co.	Otero				1,320	1,320	1,320		3,960									0.8	9
13	Fayette Water Assn.	Otero								-									-	6
14	**Fowler, Town of (potable only)**	Otero								-		18,540	6,470	19,870	17,290	1,385			-	12
16	Hasty Water Company	Bent	2,640							2,640									0.5	11
17	Hilltop Water Co.	Otero								-									-	9
18	Holbrook Center Soft Water	Otero				1,320				1,320								6,600	0.3	3
19	Homestead Improvement Assn.	Otero								-									-	2
20	**La Junta, City of**	Otero								-	211,200									60
21	Lamar, City of	Prowers								-	158,400						52,800		-	45
22	**Las Animas, City of**	Bent								-	26,400									25
23	Manzanola, Town of	Otero								-									-	5
24	May Valley Water Assoc.	Prowers								-									-	170
25	**McClave Water Assoc.**	Bent								-	15,840								-	36
26	Newdale-Grand Valley Water Co.	Otero								-									-	20
27	North Holbrook Water	Otero								-									-	6
28	Olney Springs, Town of	Crowley								-									-	5
30	Patterson Valley	Otero			7,920			15,840		23,760									4.5	13
31	Rocky Ford, City of	Otero																	-	-
32	**South Side Water Assoc. (LaJunta)**	Otero								-								5,280	-	4
33	South Swink Water Co.	Otero	3,400	2,640		15,840		6,640	4,640	33,160									6.3	34
34	St. Charles Mesa Water District	Pueblo								475,200									90	192
35	Sugar City, Town of	Crowley								-									-	5
36	Swink, Town of	Otero								-									-	4
37	Valley Water Co.	Otero	3,960							3,960									0.8	13
48	Vroman	Otero			7,920					7,920									1.5	12
49	West Grand Valley Water Inc.	Otero								-									-	10
40	West Holbrook Water	Otero	1,320							1,320									0.3	3
41	Wiley, Town of	Prowers								-									-	10
		Total (miles)								**149.92**	**78.00**					**12.04**	**10.17**	**2.25**		
																			200	**970**

Appendix D
Summary of Pipe Materials and Sizes
(all lengths in feet unless otherwise noted)

		Material	Comment
		Diameter (inches)	
3	Beehive Water Assn	Otero	All PVC from 1980s
4	Bents Fort Water Co.	Otero	Original ABS from 1960s plus new PVC main in 2005
5	Boone, Town of	Pueblo	PVC is new in 2007; AC is from years before
7	Crowley County Commissioners (includes #1 96 Pipeline Company, #8 Crowley County Water Association, #9 Town of Crowley, and #29 Town of Ordway)	Crowley	
	96 Pipeline		most from 1964
	CCWA		half is 30 yo; other replaced in 1992
	Town of Crowley		from 1981
	Ordway		8 inch from 1980, 4 inch from 2007, 2 inch various dates; all ABS is in alleys from 1980s and earlier
	CCC		All lines from 1980
10	**Eads, Town of**	Kiowa	Replaced older PVC and AC with PVC in 2000 (including 12900 8 inch, 10340 6 inch, all 12 inch and 250 4 inch, rest is older back to 1956
11	**East End Water Assn.**		3-inch PVC is 2-3 years old; rest is 10 plus yo
12	Eureka Water Co.	Otero	no good receords on past replacements
13	Fayette Water Assn.	Otero	All new between 1990 and 1997
14	**Fowler, Town of (potable only)**	Otero	Built in 1977 plus earlier
16	Hasty Water Company	Bent	All pipe from late 1980s except 2.5 miles of 2010 2 inch PVC
17	Hilltop Water Co.	Otero	some ABS but not indicated on drawings; PVC from 1980s and some 1995
18	Holbrook Center Soft Water	Otero	PVC newer, but no good records on replacement
19	Homestead Improvement Assn.	Otero	4 inch and 6 inch PVC new in 2007
20	**La Junta, City of**	Otero	half of system is 30 yo; some new in past 5 years
21	Lamar, City of	Prowers	replaced lot of old steel and cast iron in 1970s w/ AC, some new PVC
22	**Las Animas, City of**	Bent	significant new PVC being installed since 2009
23	Manzanola, Town of	Otero	most from 1972, w/ 2-3 miles since 1999
24	May Valley Water Assoc.	Prowers	limited new PVC; most is from the 1960s
25	**McClave Water Assoc.**	Bent	some new 4 inch since 2000; rest is 20 plus yo
26	Newdale-Grand Valley Water Co.	Otero	PVC from 1960s, except new PVC along Route 50
27	North Holbrook Water	Otero	all new in 1991
28	Olney Springs, Town of	Crowley	All new in 2004
30	Patterson Valley	Otero	various ages; not much new
31	Rocky Ford, City of	Otero	mainly cast iron and AC from 1970s or earlier
32	**South Side Water Assoc. (LaJunta)**	Otero	PVC all new since 2005; black rolled pipe from 1998
33	South Swink Water Co.	Otero	continual upgrade from ABS to PVC each year
34	St. Charles Mesa Water District	Pueblo	begins in 1988, with some recent ABS replaced with PVC
35	Sugar City, Town of	Crowley	all new in 2005
36	Swink, Town of	Otero	all new in 2005
37	Valley Water Co.	Otero	
48	Vroman	Otero	no good receords on past replacements
49	West Grand Valley Water Inc.	Otero	most replaced in 2009
40	West Holbrook Water	Otero	ABS is original; PVC from mid 1990s
41	Wiley, Town of	Prowers	All new PVC in 1980-81
		Total (miles)	

Appendix E – Treatment System Summary for the Plan Participants

Appendix E
Summary of Potable Water Treatment for Plan Participants

	Chlorination	Iron Filters	Ozone	Scale Sequestration	Nitrate Removal	Reverse Osmosis	Backwash Disposal
Beehive Water Assn	yes						
Bents Fort Water Co.	yes						
Boone, Town of	yes				yes		
Crowley County Commissioners (includes #1 96 Pipeline Company, #8 Crowley County Water Association, #9 Town of Crowley, and #29 Town of Ordway)							
96 Pipeline	yes						
Crowley County Water Authority	yes						
Town of Crowley	yes						
Ordway	yes						
Crowley County Commissioners	no						
Eads, Town of	yes						
East End Water Assn.	yes						
Eureka Water Co.	yes	yes					pumped to waste
Fayette Water Assn.	yes	yes	yes				pumped to waste
Fowler, Town of (potable only)	yes						
Hasty Water Company	yes						
Hilltop Water Co.	yes	yes					pumped to waste
Holbrook Center Soft Water	yes						
Homestead Improvement Assn.	connected to La Junta						
La Junta, City of	yes					yes	reject to WWTP
Lamar, City of	yes						
Las Animas, City of	yes					yes	reject to WWTP
Manzanola, Town of	yes	yes					pumped to waste
May Valley Water Assoc.	yes	yes		yes			pumped to waste
McClave Water Assoc.	yes						
Newdale-Grand Valley Water Co.	yes	yes					pumped to waste
North Holbrook Water	yes			yes			
Olney Springs, Town of	yes						
Patterson Valley	yes	yes					pumped to waste
Rocky Ford, City of	yes	yes (future only)					pumped to WWTP
South Side Water Assoc.	yes						
South Swink Water Co.	yes	yes					pumped to waste
St. Charles Mesa Water District	yes	yes					recycled to supply
Sugar City, Town of	yes						
Swink, Town of	yes	yes				yes	pumped to WWTP
Valley Water Co.	yes	yes					pumped to waste
Vroman	yes	yes					pumped to waste
West Grand Valley Water Inc.	yes	yes	yes				pumped to waste
West Holbrook Water	yes						
Wiley, Town of	yes	yes					Parks or fire fighting

Appendix F – Energy and Treatment Cost Savings Estimates for the Plan Participants

Appendix F Summary of Energy Savings for Plan Participants

This appendix presents an analysis of the annual energy, greenhouse gas, and operating cost impacts of the groundwater pumping and water treatment currently conducted by the Plan participants.

Groundwater Pumping

The annual energy use required for groundwater pumping by each project partner was determined using the following equations:

$$BHP = \frac{Q \times TDH \times Pump\ Eff. \times Drive\ Eff.}{3960}$$

$$kWh = \frac{BHP * 0.746 * h}{Motor\ Eff.}$$

Where:

Q = flow rate in gallons per minute (GPM);

because this flow rate is used to size the pump a worst case scenario of continual pumping (1,440 minutes) to meet the Summer Maximum Demand (gallons per day)[1] was assumed

TDH = total dynamic head (feet);

depth of well[2] for each project partner plus an additional 100 feet added to account for friction losses, pumping to above ground storage, etc.

Pump Efficiency & Drive Efficiency;

a value of 80 percent was assumed for each

BHP = break horsepower;

continuous horsepower rating of the power unit

h = annual hours of pumping (hours/year);

total 2010 annual supply (acre-feet) for each project partner, converted to gallons, divided by the pump flow rate (gpm) for the respective partner converted to hours

Motor Efficiency;

quantified assuming an EPACT Standard motor and 25 percent oversizing of the motor

kWh = kilowatt hours

annual energy use of the pumping unit

---

[1] from Table 2-3. AVC Treatment Summary of STAG report

[2] State of Colorado Engineers Office (SEO) well data. Depth of pumping values were used in calculations, if available, otherwise depth of water values were used. If neither of these two values were provided, the depth of well was used.

Using the process outlined above, the annual energy use for each Plan participant was estimated. The total energy use by the Plan participants is about 3.3 million kWh/yr. Assuming an electricity rate of $0.08 per kWh[3], the total groundwater pumping annual operating costs for the combined Plan participants are $270,000. The associated greenhouse gas emissions for groundwater pumping by each project partner was calculated assuming an electricity emission factor of 1,916 lbs of carbon dioxide equivalent (CO_2e) per MWh of electricity consumption[4]. The total and average annual emissions in the district are 2,900 metric tons (MT) CO_2e and 77 MT CO_2e, respectively. This is equal to almost 160 car trips from Denver to Pueblo per day for all of the emissions generated in the Lower Arkansas River Valley.

Water Treatment

Depending on the source and use of water there are varying levels of treatment occurring in the district. As part of the Arkansas Valley Conduit pre-NEPA STAG report development, the type(s) of water treatment were collected via surveys and interviews with project partner[5]. Using this information and estimates of the energy use per flow rate for each type of treatment, the treatment energy use by Plan Participant was determined. The average annual treatment flow rate (MGD) was determined by averaging the summer and winter flow averages (GPD) from the STAG report.

The energy use for each of the treatment facilities was estimated using a standard table of energy uses for advanced water treatment plants. The analysis considered processing for both primary and secondary energy uses and was selected only for facilities located in the intermountain area of the United States[8]. A linear regression was approximated for each of the treatment types in order to estimate the energy given the average flow rate (GPD) for each Plan participant. The type of treatment conducted by each Plan participant can be found in Appendix E.

The total energy use within the SECWCD is 2.0 million kWh/yr with an average of 53,000 kWh/yr per Plan participant. Assuming an electricity rate of $0.08 per kWh[7], the total and average annual operating costs for groundwater pumping in the district are $160,000 and $4,400, respectively. The associated greenhouse gas emissions for water treatment by each Plan participant were calculated assuming an electricity emission factor of 1,916 lbs of carbon dioxide equivalent (CO_2e) per MWh of electricity consumption[6]. The total and average emissions in the district are 1,700 metric tons (MT) CO_2e and 46 MT CO_2e, respectively. This is equal to almost 95 trips from Denver to Pueblo per day for all of the emissions generated in the district.

---

[3] State of Colorado average from the U.S. Energy Information Administration (http://www.eia.gov/cneaf/electricity/st_profiles/e_profiles_sum.html)

[4] U.S. Environmental Protection Agency (EPA) eGrid (http://cfpub.epa.gov/egridweb/) for the WECC Rockies eGrid subregion

[5] From Table 2-3. AVC Treatment Summary of STAG report and participant surveys provided by Great Western Institute

[6] State of Colorado average from the U.S. Energy Information Administration (http://www.eia.gov/cneaf/electricity/st_profiles/e_profiles_sum.html)

[7] From the U.S. Environmental Protection Agency (EPA) eGrid (http://cfpub.epa.gov/egridweb/) for the WECC Rockies eGrid subregion

[8] E. Joe Middlebrooks, Charlotte H. Middlebrooks and Sherwood C. Reed, "Energy Requirement for Small Wastewater Treatment Systems", *Journal (Water Pollution Control Federation)* Vol. 53, No. 7 (Jul., 1981), pp. 1172-1197

Table F-1 – Groundwater Pumping and Water Treatment Impacts by Plan Participant

Location	Groundwater Pumping				Water Treatment			
	Energy Use (kWh/yr)	Operating Cost ($/yr)	Operating Cost ($/AF/yr)	GHG Emissions (MT/yr)*	Energy Use (kWh/yr)	Operating Cost ($/yr)	Operating Cost ($/AF/yr)	GHG Emissions (MT/yr)*
Avondale	42,083	$3,497	$22	37	4,192	$348	$2	4
Beehive Water Assn	9,654	$802	$100	8	450	$37	$5	0
Bents Fort Water Co.	85,828	$7,132	$113	75	3,863	$321	$5	3
Boone, Town of	20,662	$1,717	$26	18	4,085	$339	$5	4
Cheraw, Town of	22,602	$1,878	$39	20	4,023	$334	$7	3
Crowley County Commissioners	219,454	$18,237	$20	191	70,559	$5,863	$7	61
Eads, Town of	56,374	$4,685	$19	49	15,615	$1,298	$5	14
East End Water Assn.	8,479	$705	$64	7	641	$53	$5	1
Eureka Water Co.	115,695	$9,614	$130	101	6,030	$501	$7	5
Fayette Water Assn.	19,877	$1,652	$138	17	2,502	$208	$17	2
Fowler, Town of (potable only)	46,495	$3,864	$18	40	13,064	$1,086	$5	11
Hancock Inc.	12,168	$1,011	$144	11	1,448	$120	$17	1
Hasty Water Company	14,547	$1,209	$38	13	1,950	$162	$5	2
Hilltop Water Co.	19,999	$1,662	$37	17	3,738	$311	$7	3
Holbrook Center Soft Water	25,908	$2,153	$120	23	1,078	$90	$5	1
Homestead Improvement Assn.	13,335	$1,108	$158	12	3,489	$290	$41	3
La Junta, City of	417,594	$34,702	$17	363	1,031,605	$85,726	$42	896
Lamar, City of	495,563	$41,098	$17	430	149,980	$12,463	$5	130
Las Animas, City of	122,377	$10,170	$18	106	288,228	$23,952	$42	250
Manzanola, Town of	21,424	$1,780	$46	19	3,200	$266	$7	3
May Valley Water Assoc.	406,709	$33,797	$82	353	33,654	$2,797	$7	29
McClave Water Assoc.	60,757	$5,049	$90	53	3,468	$288	$5	3
Newdale-Grand Valley Water Co.	24,770	$2,058	$36	22	4,844	$403	$7	4
North Holbrook Water	14,420	$1,198	$171	13	390	$32	$5	0
Olney Springs, Town of	13,184	$1,096	$27	11	2,466	$205	$5	2
Patterson Valley	11,772	$978	$65	10	1,025	$85	$6	1
Rocky Ford, City of	209,367	$17,398	$20	182	80,421	$6,683	$8	70
South Side Water Assoc.	12,729	$1,058	$151	11	390	$32	$5	0
South Swink Water Co.	96,152	7,990	$97	84	7,106	$591	$7	6
St. Charles Mesa Water District	389,929	$32,403	$20	339	149,680	$12,438	$7	130
Sugar City, Town of	34,784	$2,891	$35	30	5,090	$423	$5	4
Swink, Town of	29,822	$2,478	$65	26	19,952	$1,658	$44	17
Valley Water Co.	60,905	$5,061	$133	53	3,103	$258	$7	3
Vroman	69,752	$5,796	$181	61	355	$30	$1	0
West Grand Valley Water Inc.	42,740	$3,552	$142	37	28,169	$2,341	$94	24
West Holbrook Water	11,075	$920	$66	10	5,661	$470	$34	5
Wiley, Town of	13,184	$1,096	$46	11	332	$28	$1	0
TOTAL	**3,291,165**	**$273,496**	**$2,713**	**2,860**	**1,955,848**	**$162,531**	**$488**	**1,699**
AVERAGE	**88,950**	**$7,392**	**$73**	**77**	**52,861**	**$4,393**	**$13**	**46**

** MT = metric tons; greenhouse gas emissions are presented in units of carbon dioxide equivalents (CO_2e)*

Appendix G – Colorado Revised Statutes (CRS) 60-37-126.5

COLORADO REVISED STATUTES

*** This document reflects changes passed at the Second Regular Session and First Extraordinary Session
of the Sixty-Eighth General Assembly of the State of Colorado (2012) ***

TITLE 37. WATER AND IRRIGATION
WATER CONSERVATION BOARD AND COMPACTS
ARTICLE 60.COLORADO WATER CONSERVATION BOARD
PART 1. GENERAL PROVISIONS

C.R.S. 37-60-126 (2012)

37-60-126. Water conservation and drought mitigation planning - programs - relationship to state assistance for water facilities - guidelines - water efficiency grant program - repeal

(1) As used in this section and section 37-60-126.5, unless the context otherwise requires:

(a) "Agency" means a public or private entity whose primary purpose includes the promotion of water resource conservation.

(b) "Covered entity" means each municipality, agency, utility, including any privately owned utility, or other publicly owned entity with a legal obligation to supply, distribute, or otherwise provide water at retail to domestic, commercial, industrial, or public facility customers, and that has a total demand for such customers of two thousand acre-feet or more.

(c) "Grant program" means the water efficiency grant program established pursuant to subsection (12) of this section.

(d) "Office" means the office of water conservation and drought planning created in section 37-60-124.

(e) "Plan elements" means those components of water conservation plans that address water-saving measures and programs, implementation review, water-saving goals, and the actions a covered entity shall take to develop, implement, monitor, review, and revise its water conservation plan.

(f) "Public facility" means any facility operated by an instrument of government for the benefit of the public, including, but not limited to, a government building; park or other recreational facility; school, college, university, or other educational institution; highway; hospital; or stadium.

(g) "Water conservation" means water use efficiency, wise water use, water transmission

and distribution system efficiency, and supply substitution. The objective of water conservation is a long-term increase in the productive use of water supply in order to satisfy water supply needs without compromising desired water services.

(h) "Water conservation plan", "water use efficiency plan", or "plan" means a plan adopted in accordance with this section.

(i) "Water-saving measures and programs" includes a device, a practice, hardware, or equipment that reduces water demands and a program that uses a combination of measures and incentives that allow for an increase in the productive use of a local water supply.

(2) (a) Each covered entity shall, subject to section 37-60-127, develop, adopt, make publicly available, and implement a plan pursuant to which such covered entity shall encourage its domestic, commercial, industrial, and public facility customers to use water more efficiently. Any state or local governmental entity that is not a covered entity may develop, adopt, make publicly available, and implement such a plan.

(b) The office shall review previously submitted conservation plans to evaluate their consistency with the provisions of this section and the guidelines established pursuant to paragraph (a) of subsection (7) of this section.

(c) On and after July 1, 2006, a covered entity that seeks financial assistance from either the board or the Colorado water resources and power development authority shall submit to the board a new or revised plan to meet water conservation goals adopted by the covered entity, in accordance with this section, for the board's approval prior to the release of new loan proceeds.

(3) The manner in which the covered entity develops, adopts, makes publicly available, and implements a plan established pursuant to subsection (2) of this section shall be determined by the covered entity in accordance with this section. The plan shall be accompanied by a schedule for its implementation. The plans and schedules shall be provided to the office within ninety days after their adoption. For those entities seeking financial assistance, the office shall then notify the covered entity and the appropriate financing authority that the plan has been reviewed and whether the plan has been approved in accordance with this section.

(4) A plan developed by a covered entity pursuant to subsection (2) of this section shall, at a minimum, include a full evaluation of the following plan elements:

(a) The water-saving measures and programs to be used by the covered entity for water conservation. In developing these measures and programs, each covered entity shall, at a minimum, consider the following:

(I) Water-efficient fixtures and appliances, including toilets, urinals, clothes washers, showerheads, and faucet aerators;

(II) Low water use landscapes, drought-resistant vegetation, removal of phreatophytes, and efficient irrigation;

(III) Water-efficient industrial and commercial water-using processes;

(IV) Water reuse systems;

(V) Distribution system leak identification and repair;

(VI) Dissemination of information regarding water use efficiency measures, including by public education, customer water use audits, and water-saving demonstrations;

(VII) (A) Water rate structures and billing systems designed to encourage water use efficiency in a fiscally responsible manner.

(B) The department of local affairs may provide technical assistance to covered entities that are local governments to implement water billing systems that show customer water usage and that implement tiered billing systems.

(VIII) Regulatory measures designed to encourage water conservation;

(IX) Incentives to implement water conservation techniques, including rebates to customers to encourage the installation of water conservation measures;

(b) A section stating the covered entity's best judgment of the role of water conservation plans in the covered entity's water supply planning;

(c) The steps the covered entity used to develop, and will use to implement, monitor, review, and revise, its water conservation plan;

(d) The time period, not to exceed seven years, after which the covered entity will review and update its adopted plan; and

(e) Either as a percentage or in acre-foot increments, an estimate of the amount of water that has been saved through a previously implemented conservation plan and an estimate of the amount of water that will be saved through conservation when the plan is implemented.

(4.5) (a) On an annual basis starting no later than June 30, 2014, covered entities shall report water use and conservation data, to be used for statewide water supply planning, following board guidelines pursuant to paragraph (b) of this subsection (4.5), to the board by the end of the second quarter of each year for the previous calendar year.

(b) No later than February 1, 2012, the board shall adopt guidelines regarding the reporting of water use and conservation data by covered entities and shall provide a report to the senate agriculture and natural resources committee and the house of representatives agriculture, livestock, and natural resources committee, or their successor committees,

regarding the guidelines. These guidelines shall:

(I) Be adopted pursuant to the board's public participation process and shall include outreach to stakeholders from water providers with geographic and demographic diversity, nongovernmental organizations, and water conservation professionals; and

(II) Include clear descriptions of: Categories of customers, uses, and measurements; how guidelines will be implemented; and how data will be reported to the board.

(c) (I) No later than February 1, 2019, the board shall report to the senate agriculture and natural resources committee and the house of representatives agriculture, livestock, and natural resources committee, or their successor committees, on the guidelines and data collected by the board under the guidelines.

(II) This paragraph (c) is repealed, effective July 1, 2020.

(5) Each covered entity and other state or local governmental entity that adopts a plan shall follow the entity's rules, codes, or ordinances to make the draft plan available for public review and comment. If there are no rules, codes, or ordinances governing the entity's public planning process, then each entity shall publish a draft plan, give public notice of the plan, make such plan publicly available, and solicit comments from the public for a period of not less than sixty days after the date on which the draft plan is made publicly available. Reference shall be made in the public notice to the elements of a plan that have already been implemented.

(6) The board is hereby authorized to recommend the appropriation and expenditure of such revenues as are necessary from the unobligated balance of the five percent share of the operational account of the severance tax trust fund designated for use by the board for the purpose of the office providing assistance to covered entities to develop water conservation plans that meet the provisions of this section.

(7) (a) The board shall adopt guidelines for the office to review water conservation plans submitted by covered entities and other state or local governmental entities. The guidelines shall define the method for submitting plans to the office, the methods for office review and approval of the plans, and the interest rate surcharge provided for in paragraph (a) of subsection (9) of this section.

(b) If no other applicable guidelines exist as of June 1, 2007, the board shall adopt guidelines by July 31, 2007, for the office to use in reviewing applications submitted by covered entities, other state or local governmental entities, and agencies for grants from the grant program and from the grant program established in section 37-60-126.5 (3). The guidelines shall establish deadlines and procedures for covered entities, other state or local governmental entities, and agencies to follow in applying for grants and the criteria to be used by the office and the board in prioritizing and awarding grants.

(8) A covered entity may at any time adopt changes to an approved plan in accordance with this section after notifying and receiving concurrence from the office. If the proposed

changes are major, the covered entity shall give public notice of the changes, make the changes available in draft form, and provide the public an opportunity to comment on such changes before adopting them in accordance with subsection (5) of this section.

(9) (a) Neither the board nor the Colorado water resources and power development authority shall release grant or loan proceeds to a covered entity unless the covered entity provides a copy of the water conservation plan adopted pursuant to this section; except that the board or the authority may release the grant or loan proceeds notwithstanding a covered entity's failure to comply with the reporting requirements of subsection (4.5) of this section or if the board or the authority, as applicable, determines that an unforseen emergency exists in relation to the covered entity's loan application, in which case the board or the authority, as applicable, may impose a grant or loan surcharge upon the covered entity that may be rebated or reduced if the covered entity submits and adopts a plan in compliance with this section in a timely manner as determined by the board or the authority, as applicable.

(b) The board and the Colorado water resources and power development authority, to which any covered entity has applied for financial assistance for the construction of a water diversion, storage, conveyance, water treatment, or wastewater treatment facility, shall consider any water conservation plan filed pursuant to this section in determining whether to render financial assistance to such entity. Such consideration shall be carried out within the discretion accorded the board and the Colorado water resources and power development authority pursuant to which such board and authority render such financial assistance to such covered entity.

(c) The board and the Colorado water resources and power development authority may enter into a memorandum of understanding with each other for the purposes of avoiding delay in the processing of applications for financial assistance covered by this section and avoiding duplication in the consideration required by this subsection (9).

(10) Repealed.

(11) (a) Any section of a restrictive covenant that prohibits or limits xeriscape, prohibits or limits the installation or use of drought-tolerant vegetative landscapes, or requires cultivated vegetation to consist exclusively or primarily of turf grass is hereby declared contrary to public policy and, on that basis, that section of the covenant shall be unenforceable.

(b) As used in this subsection (11):

(I) "Executive board policy or practice" includes any additional procedural step or burden, financial or otherwise, placed on a unit owner who seeks approval for a landscaping change by the executive board of a unit owners' association, as defined in section 38-33.3-103, C.R.S., and not included in the existing declaration or bylaws of the association. An "executive board policy or practice" includes, without limitation, the requirement of:

(A) An architect's stamp;

(B) Preapproval by an architect or landscape architect retained by the executive board;

(C) An analysis of water usage under the proposed new landscape plan or a history of water usage under the unit owner's existing landscape plan; and

(D) The adoption of a landscaping change fee.

(II) "Restrictive covenant" means any covenant, restriction, bylaw, executive board policy or practice, or condition applicable to real property for the purpose of controlling land use, but does not include any covenant, restriction, or condition imposed on such real property by any governmental entity.

(III) "Turf grass" means continuous plant coverage consisting of hybridized grasses that, when regularly mowed, form a dense growth of leaf blades and roots.

(IV) "Xeriscape" means the application of the principles of landscape planning and design, soil analysis and improvement, appropriate plant selection, limitation of turf area, use of mulches, irrigation efficiency, and appropriate maintenance that results in water use efficiency and water-saving practices.

(c) Nothing in this subsection (11) shall preclude the executive board of a common interest community from taking enforcement action against a unit owner who allows his or her existing landscaping to die; except that:

(I) Such enforcement action shall be suspended during a period of water use restrictions declared by the jurisdiction in which the common interest community is located, in which case the unit owner shall comply with any watering restrictions imposed by the water provider for the common interest community;

(II) Enforcement shall be consistent within the community and not arbitrary or capricious; and

(III) Once the drought emergency is lifted, the unit owner shall be allowed a reasonable and practical opportunity, as defined by the association's executive board, with consideration of applicable local growing seasons or practical limitations, to reseed and revive turf grass before being required to replace it with new sod.

(12) (a) (I) There is hereby created the water efficiency grant program for purposes of providing state funding to aid in the planning and implementation of water conservation plans developed in accordance with the requirements of this section and to promote the benefits of water efficiency. The board is authorized to distribute grants to covered entities, other state or local governmental entities, and agencies in accordance with its guidelines from the moneys transferred to and appropriated from the water efficiency grant program cash fund, which is hereby created in the state treasury.

(II) Moneys in the water efficiency grant program cash fund are hereby continuously

appropriated to the board for the purposes of this subsection (12) and shall be available for use until the programs and projects financed using the grants have been completed.

(III) For each fiscal year beginning on or after July 1, 2010, the general assembly shall appropriate from the fund to the board up to five hundred thousand dollars annually for the purpose of providing grants to covered entities, other state and local governmental entities, and agencies in accordance with this subsection (12). Commencing July 1, 2008, the general assembly shall also appropriate from the fund to the board fifty thousand dollars each fiscal year to cover the costs associated with the administration of the grant program and the requirements of section 37-60-124. Moneys appropriated pursuant to this subparagraph (III) shall remain available until expended or until June 30, 2020, whichever occurs first.

(IV) Any moneys remaining in the fund on June 30, 2020, shall be transferred to the operational account of the severance tax trust fund described in section 39-29-109 (2) (b), C.R.S.

(b) Any covered entity or state or local governmental entity that has adopted a water conservation plan and that supplies, distributes, or otherwise provides water at retail to customers may apply for a grant to aid in the implementation of the water efficiency goals of the plan. Any agency may apply for a grant to fund outreach or education programs aimed at demonstrating the benefits of water efficiency. The office shall review the applications and make recommendations to the board regarding the awarding and distribution of grants to applicants who satisfy the criteria outlined in this subsection (12) and the guidelines developed pursuant to subsection (7) of this section.

(c) This subsection (12) is repealed, effective July 1, 2020.

HISTORY: Source:. L. 91: Entire section added, p. 2023, § 4, effective June 4.L. 99: (10) repealed, p. 25, § 3, effective March 5.L. 2003: (4)(g) amended and (11) added, p. 1368, § 4, effective April 25.L. 2004: Entire section amended, p. 1779, § 3, effective August 4.L. 2005: (11) amended, p. 1372, § 1, effective June 6; (1), (2)(b), and (7) amended and (12) added, p. 1481, § 1, effective June 7.L. 2007: (1)(a), (2)(a), (5), (7), and (12) amended, p. 1890, § 1, effective June 1.L. 2008: IP(4) amended, p. 1575, § 30, effective May 29; (12)(a) amended, p. 1873, § 14, effective June 2.L. 2009: (12)(a) amended, (HB 09-1017), ch. 297, p. 1593, § 1, effective May 21; (9)(a) amended, (SB 09-106), ch. 386, p. 2091, § 3, effective July 1.L. 2010: (4)(a)(I) and (9)(a) amended and (4.5) added, (HB 10-1051), ch. 378, p. 1772, § 1, effective June 7; (12)(a)(III), (12)(a)(IV), and (12)(c) amended, (SB 10-025), ch. 379, p. 1774, § 1, effective June 7.

Editor's note: Subsection (12) was originally enacted as subsection (13) in House Bill 05-1254 but was renumbered on revision for ease of location.

Cross references: (1) In 1991, this entire section was added by the "Water Conservation Act of 1991". For the short title and the legislative declaration, see sections 1 and 2 of chapter

328, Session Laws of Colorado 1991.

(2) For the legislative declaration contained in the 2004 act amending this section, see section 1 of chapter 373, Session Laws of Colorado 2004.

Appendix H – Funding Options for Water Conservation Planning and Implementation

Appendix H - Funding Options for Water Conservation Planning and Implementation

Funding Source			Fund Details		Water Loss Management (Infrastructure)					Water Conservation (Catch-all)			
Funding Category	Name of Funder	Name of Fund	Funds Available	Required Match	Meter Replacement	Repairing Distribution Piping	Sub-Metering and Valving	Data Handling	System-Wide Audits	Water Rates	Education Materials	Workshops	Facility Audits and Retrofits
Federal	USBR	Water and Energy Efficiency Grants	**Maximum:** $300k (small projects); $1.5M (large/phased projects) **Average (FY2011):** ~$237k (small projects); ~$577k (large/phased projects)	50%	X	X	X	X	X	X			X
Federal	USBR	System Optimization Review Grant	$300k per project (maxiumum)	50%				X	X				X
Federal	NRWA/ USDA	NRWA Revolving Loan Fund	$100k per project (maxiumum); population <10,000 required	25%	X	X	X						
Federal	USDA	Emergency Water Assistance Grants	$150,000 or $500,000 (maxiumum); population <10,000 and significant decline in quantity or quality due to emergency required	None		X							
Federal	USDA	Water and Waste Disposal Direct Loans and Grants	No stated funding limit; population <10,000 required	Requires funding from other sources	X	X	X						
State	CWRPDA	Drinking Water Revolving Fund	$2M for direct loans; >$2M (leveraged loans) may take additional time; pop. <5,000 can receive grant	20%	X	X	X						
State	CWRPDA	Small Water Resources Projects	**Maximum:** **Invstmt grade:** $500M; **1000+ taps or 2500+ pop.:** $2.55M; **650+ taps or 1000+ pop.:** $250k	None	X	X	X						
State	CWRPDA	Water Pollution Control Revolving Fund	$2M for direct loans; >$2M (leveraged loans) may take additional time; pop. <5,000 can receive grant	20%	X	X	X						
State	CWRPDA	Water Revenue Bonds	**Maximum:** **Invstmt grade:** $500M; **1000+ taps or 2500+ pop.:** $2.55M; **650+ taps or 1000+ pop.:** $250k	None	X	X	X						
State	CWCB	Water Conservation Planning Grants	**Maxiumum:** <$50k can be submitted any time; >=$50k must be submitted by 1st of month prior to bi-monthly Board mtg	25%			X			X	X	X	X
State	CWCB	Water Conservation Implementation Grants	**Maxiumum:** <$50k can be submitted any time; >=$50k must be submitted by 1st of month prior to bi-monthly Board mtg	25%			X			X	X	X	X
State	CWCB	Water Resource Conservation Public Education and Outreach Grants	**Maxiumum:** <$50k can be submitted any time; >=$50k must be submitted by 1st of month prior to bi-monthly Board mtg	25%							X	X	
State	CWCB	Water Supply Reserve Account	**Basin Account:** No Limit; **State Account:** $1M maximum	20%	X	X	X	X	X	X	X	X	X
State	DOLA	Community Development Block Grant	No stated funding limit	Not stated	X	X	X						
State	DOLA	Local Government Water & Wastewater Management	No direct funds	None	DOLA staff support in development of programs and identification of other funding sources for many of the activities listed								
State	CRWA	Technical Assistance	No direct funds	None	CRWA provides technical assistance that may support many of the activities listed								

LEGEND	
CRWA	Colorado Rural Water Asssociation
CWCB	Colorado Water Conservation Board
CWRPDA	Colorado Water Resources and Power Development Authority
DOLA	Department of Local Affairs
NRWA	National Rural Water Association
USBR	United States Bureau of Reclamation
USDA	United States Department of Agriculture

Appendix I – Notice of Public Review

AFFIDAVIT OF PUBLICATION

THE PUEBLO CHIEFTAIN

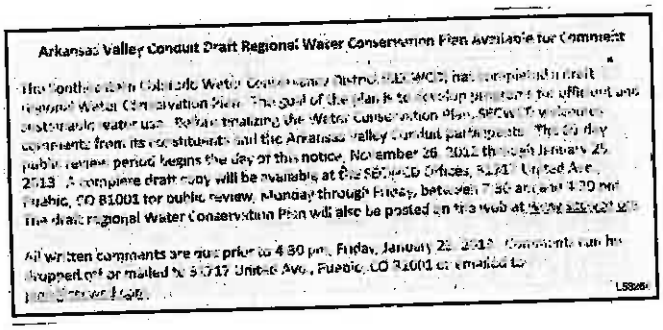
State of Colorado)
Pueblo Chieftain

SOUTHEASTERN COLORADO WATER
CONSERVANCY DISTRICT
31717 UNITED AVE
PUEBLO CO 81001-4817

REFERENCE: 811092
L53264 COMMENTS/SECWCD WATE

GERRI ELIZONDO, being first duly sworn upon her oath says: That she is a representative of THE STAR-JOURNAL PUBLISHING CORPORATION, and has personal knowledge of the facts set forth herein; that said Corporation is a corporation organized under the laws of the State of Colorado and that its principal office and place of business is in the city of Pueblo, in the County of Pueblo, in the State of Colorado; that it is the proprietor, printer and publisher of THE PUEBLO CHIEFTAIN, which is, and at all times herein mentioned was a daily newspaper of general circulation printed and published in said City of Pueblo; that said newspaper is, and at all times herein mentioned was, published daily: has been admitted to the United States Mails as a second class matter under the provisions of the Act of Congress of March 3, 1879, and any amendments thereof, and is duly qualified for publishing legal notices and advertisements within the meaning of the laws of the state of Colorado of which is attached a true copy cut from said newspaper and was published on the following dates:

PUBLISHED ON: 11/26


Arkansas Valley Conduit Draft Regional Water Conservation Plan Available for Comment

The Southeastern Colorado Water Conservancy District (SECWCD) has completed a draft regional Water Conservation Plan. The goal of the plan is to develop strategies for efficient and sustainable water use. Before finalizing the Water Conservation Plan, SECWCD welcomes comments from its constituents and the Arkansas Valley Conduit participants. The 60 day public review period begins the day of this notice, November 26, 2012 through January 25, 2013. A complete draft copy will be available at the SECWCD Offices, 31717 United Ave., Pueblo, CO 81001 for public review, Monday through Friday, between 7:30 am and 4:30 pm. The draft Regional Water Conservation Plan will also be posted on the web at [illegible]

All written comments are due prior to 4:30 pm, Friday, January 25, 2013. Comments can be dropped off or mailed to 31717 United Ave., Pueblo, CO 81001 or emailed to [illegible]

L53264

FILED ON: 12/02/12

In witness whereof, I have hereunto set my hand this 5 day of December A.D. 20 12

Gerri Elizondo

Subscribed and sworn to before me this 5 day of Dec. A.D. 20 12
My commission expires March 5, 2013.
Notary Lynda K Connors

LYNDA K. CONNORS
NOTARY
PUBLIC
STATE OF COLORADO

180 rounds. $40. 547-2170

Ammunition 5.56 mm/7.62x39 500 rounds for $200. 406-1848

Backpacking backpack, NEW. $35. 547-2170

Bike rack. 3 bike trunk rack. $25. 547-2170

Boots, Harley men's, size 11. Good condition. $50. 547-2170

"It was well worth the money!"

J.C.

Treadmill, foldable and programable. Good condition, 10 incline levels. $75. 547-2170

Wanted: 30-30 Rifle/ Lever actions. Local. 701-391-1737

PUBLIC NOTICES

Arkansas Valley Conduit Draft Regional Water Conservation Plan Available for Comment

The Southeastern Colorado Water Conservancy District (SECWCD) has completed a draft regional Water Conservation Plan. The goal of the plan is to develop programs for efficient and sustainable water use. Before finalizing the Water Conservation Plan, SECWCD welcomes comments from its constituents and the Arkansas Valley Conduit participants. The 60-day public review period begins the day of this notice, November 26, 2012 through January 25, 2013. A complete draft copy will be available at the SECWCD Offices, 31717 United Ave., Pueblo, CO 81001 for public review, Monday through Friday, between 7:30 am and 4:30 pm. The draft regional Water Conservation Plan will also be posted on the web at www.secwcd.org.

All written comments are due prior to 4:30 pm, Friday, January 25, 2013. Comments can be dropped off or mailed to 31717 United Ave., Pueblo, CO 81001 or emailed to jgan@secwcd.com.

L53264

REQUEST FOR PROPOSALS

PROCESS SERVING SERVICES

Request for Proposal No. 12-38

Pueblo County is requesting Proposals from qualified firms or individuals to provide Process Serving Services for Pueblo County Department of Social Services, 212 W. 12th Street, Pueblo, CO 81003 as outlined in this RFP. Process serving services proposals will be accepted for the Child Welfare Division, Child Support Division, or both.

Proposals will be accepted until 2:00 p.m. MST, December 17, 2012. Our Clock.

Requests for Proposal documents may be obtained at the Pueblo County Purchasing Department, 215 W. 10th Street, Room 140, Pueblo, CO 81003 by e-mail to pcpurch@co.pueblo.co.us.

Appendix J – Responses to Public Comments Received

Comment Number	Comment Origin	Comment	Comment Response
1	Mark DeHaven, ERO Resources Corp., Denver, CO	TOC page numbers for Water Loss and Performance Guidelines an Ongoing Water Conservation Programs, seem to be off by a page.	Noted and corrected
2		Page 19 - It is not clear what the x-axis legend is for Figure 1.	Noted and revised to reflect that the x-axis represents each of the 38 different Plan Participants without listing the names of the each Plan Participant.
3		Page 27 - I know it's not the intent, but Table 11 seems to convey that a lot of participants are not interested in water conservation.	Noted and text was inserted to indicate that the lack of response does not indicate a lack of water use efficiency practices; but rather a lack of participation in the survey
4		Page 31 - Table 12 on water pricing structure—It may be difficult for smaller entities, but EPA and groups like Western Resource Advocates really like to see tiered water rates structures with higher rates for greater use.	The use of "conservation pricing" with inclining block rates is also promoted by the Colorado Water Conservation Board; however the efficacy of these programs in Colorado, especially with smaller water providers has not been shown to reduce consumption. Nonetheless, the District will support future water rate studies for Plan Participants to evaluate cost of services pricing, as well as, alternative rate structures including inclining rate blocks.
5		General - Need to check for consistency between EIS and Conservation Plan. I notice Sugar City's gpcd is 308 in CP and 261 in Table 1-6 of EIS.	All tables with population, current and future water demand and per capita water demand (in gallons per capita per day) have been revised to be consistent with the Draft EIS Appendix A.1, with the exception of estimated 2070 demands – since the 2070 demands listed in Appendix A.1 included estimates of both active and passive water conservation savings. It was necessary for passive savings estimates to be differentiated from active savings in the Regional Water Conservation (RWC) Plan.
6		Just as a heads-up, the EIS only considered passive water conservation savings of less than 10% in demand forecasting. Some may see this as too conservative with implementation of more active CP measures (i.e. they may	The EIS 2070 demands were developed based on literature values for passive savings (GWI (2010)), which varied for the Plan participants based on age of housing stock, population changes and per capita water use. The EIS did

		believe future demand is overestimated).	not apply passive savings to all communities – only to those communities with per capita water use greater than 120 gpcd or to those Plan participants that are covered entities (Lamar, La Junta and St. Charles Mesa Water District) that have local water conservation plans. For this later trio, the EIS did not include passive savings estimates in the 2070 demands, but rather used active water conservation savings listed in the local water conservation plans. It was necessary for the effects of passive savings to be differentiated from active water conservation savings for all Plan participants to value and characterize future water use demand reductions related to implementation of the RWC Plan. Therefore, the RWC Plan includes 2070 demand estimates with and without passive savings based on the available literature.
7	Joshua Cowan, MWH Global, Fort Collins, CO	Page 1, Paragraph 1, What about non-Fry-Ark water? Is this conservation plan only applicable to Fry-Ark use?	The original intent of the Regional Water Conservation Plan (RWCP), as described in grant applications to both Reclamation and the Colorado Water Conservation Board (CWCB), was to develop a water conservation that met the requirements of both the Federal and State governments for the management of Fry-Ark water (Project Water) related to the Arkansas Valley Conduit (AVC). To this point, the Plan was focused on the role of the District in supporting the 38 Plan Participants in local water conservation planning, to the extent that local organizations wished to engage in the planning and implementation of local water conservation programs. Since the initiation of the RWCP effort in 2010, specifics regarding the nature of AVC deliveries has been clarified to include both Project and non-project water. Since the AVC will deliver both Project and non-Project water to the Plan

			participants, the water conservation measures and programs described in the RWC Plan will be applicable to management of both these water sources. Various changes have been made throughout the RWC Plan to address this issue. Definitions of Project and non-project water have been added to the RWC Plan text.
8		Table 1 - What about Avondale, Cheraw, and, Swink? This list is inconsistent with the FEIS. Does the table need a note to explain why?	The Town of Swink should have been included in Table 1. It has been added to remedy this oversight. Avondale and Cheraw have chosen to not participate and are therefore not included as Plan Participants. A footnote on page 1 was added to clarify this issue.
9		Page 3 - Except Lamar, La Junta, and St. Charles Mesa.	Noted and corrected
10		Page 4 – correct reference to Draft EIS (2012 not 2010).	Noted and corrected (see response to comment 26)
11		Table 2 - Many of these population values don't match what's in the EIS. We had several participants update their 2010 and 2070 population values subsequent to the Reclamation projections.	See response to comment 5. Table 2 was corrected based on population data contained in EIS Appendix A.1.
12		Page 6 – Future Water Demands - Do you mean "supplemented"? "Augmented" is typically used for groundwater discussions, Project water doesn't need to be augmented. If "supplemented" then this sentence may need to be revised because Project water is supplementary to other supplies, not the other way around.	The text in this part of the document was substantially revised to integrate the EIS data on demands, document passive water conservation saving calculations, and challenges and opportunities related to current and future water supply in the area. To this end, Tables 2 and 3 were updated with EIS data; Table 4 is a new table presenting estimated 2070 demands with and without passive savings and comparing these demands to those contained in the EIS Appendix A.1; Table 5 is a new table presenting a summary of radionuclide contaminated water supplies (based on Table 1-4 in the EIS); Table 6 is the revised Table 5 from the Draft RWC Plan; and Table 7 is the revised Table 4 from the Draft RWC Plan. In changing these tables, text was removed and replaced with new passages, including the text related to this comment.

13		Page 6 – Future Water Demands - The EIS would be a more recent, updated reference (versus the STAG Report).	Noted and corrected (See response to comment 12)
14		Table 3 - The population projections document didn't have demands or gpcd. Also, these demands and gpcd don't match what's in the EIS.	See response to comment 12
15		Page 8 – Paragraph 1 – Project Water reference should be expanded to include non-Fry-Ark surface supplies	Noted and corrected. A description of Project and non-project water has been added to Section 1 of the Plan.
16		Table 5 - Again, may match STAG but not EIS. Should Master Contract supplies be considered? What about NPANIW supplies? Perhaps these are discussed later as supplies to fill the gap.	See response to comments 12 and 15. Master Contract supplies, which include non-project water AVC deliveries are included.
17		Page 11, Paragraph 1 - Not sure what this means. Is it trying to say that reduced consumption will increase exchange potential because it leaves more water in the river? Because if an entity reduces consumption, then its return flows are reduced as well.	See response to comment 12
18		Page 19 - Table 7 reference wrong, should be Table 8	Noted and corrected
19		Appendix A - some of the depicted delivery points have been updated by participants during public review of EIS.	Noted; however an updated map is unavailable at this time from Reclamation.
20	Signe Snortland, US Bureau of Reclamation, Bismark, MT	Overall comment – add a literature cited section and standardize citations. It would be hard to locate some of these documents incorporated by reference without full citations.	The literature citations are detailed in the references section of the RWC Plan, which has been added. Please refer to this location for complete citations. Updated citations related to the comments received are included (See response to comment 26)
21		Page 1, paragraph 1, sentence 1 – The Arkansas Valley Conduit (AVC) would be a federally-owned feature of the Fry-Ark Project. Public Law 87-590 authorized the Secretary of the Interior to "construct, operate, and maintain" the Fry-Ark Project. As such, Reclamation is responsible for obtaining permits for construction of the AVC, if the Record of Decision selects an action alternative. The District would be responsible for repayment of the 35% local share of the project, but not for obtaining permits.	Noted and corrected

22		Page 1, paragraph 1, sentence 3 – Suggest changing "will" to "would." Until the Record of Decision is signed, there is no official decision on whether or not to build the AVC.	Noted and corrected
23		Page 1, paragraph 2, sentence 1 – The official name of the agency is the U.S. Department of the Interior, Bureau of Reclamation, not U.S. Bureau of Reclamation.	Noted and corrected
24		Page 1, paragraph 2, last sentence – The AVC EIS (Table 1-2) lists 40 participants rather than 38. Because this water conservation plan will be an appendix to the EIS, it would be helpful if Table 1 explained this discrepancy.	See response to comment 8
25		Page 2, footnote – Reclamation requires as a condition to the requested contracts that the Master Contract participants have a water conservation plan in place. Does this AVC water conservation plan cover all of the Master Contract participants? If so, it would be helpful to note that in the footnote and in Table 1.	The RWC Plan has been scoped and funded by Reclamation and the CWCB to only address the needs of the 38 Plan participants that will be receiving AVC deliveries of Project and non-project water (Avondale and Cheraw chose not to be included in the regional water conservation planning effort). Therefore, the RWC Plan only applies to the Plan participants that will be receiving AVC deliveries. Note that components of the RWC Plan outcomes and recommendations may be relevant to the Master Contract participants; however it was never the intent of the District to have the RWC Plan apply in any way to these organizations. The footnote, Section 1 and Table 1 were altered to clarify this point.
26		Page 4, paragraph 1, sentence 2 – Suggest using the full title of the Draft AVC EIS *Arkansas Valley Conduit and Long-term Excess Capacity Master Contract Draft Environmental Impact Statement*. The official preparer of the document is Reclamation and the publication date is August 2012.	Noted and corrected

27		Page 4, paragraph 1, sentence 4 – Although the official acronym for the Southeastern Colorado Water Conservancy District is established as "District" on page 1, it is referred to here and elsewhere in the report as SECWCD.	Noted. SECWCD was added to page 1.
28		Page 6, footnote – On page 1, "Project Water" is defined as Fry-Ark Project water. Public Law 87-590 states that irrigation is an authorized purpose of the Fry-Ark Project; however the Arkansas Valley Conduit is authorized only for municipal and industrial water.	Noted and clarified.
29	Mark Scott, MWH Global, Colorado Springs, CO	Looks like the plan meets the content requirements of the plans for Colorado.	Noted
30		The Legislative language looks like it will need some editing and Signe is probably the best to do that.	Noted
31		I believe that this plan ties to the Master Contract participants and it appears we have not included all these participants?	See response to comment 25
32		As Josh mentioned we need to determine how we make demands and populations.	See response for comments 11 and 12
33	Norman Noe, South Swink Water Company, Swink, CO	Tables 3 and 5 – Correct South Swink per capita water use and water demand to be consistent with the EIS.	See response to comment 12
34	Valda Terauds, US Bureau of Reclamation, Pueblo, CO	The document does not provide clear conservation and reporting requirements for AVC participants, Master Contract participants, or SECWCD. It is not clear how stated goals will be achieved or what will be expected in terms of tracking and reporting on the part of participants and for SECWCD.	Conservation reporting requirements were clarified for Plan participants including data tracking and reporting, as well as requirements for RWC Plan updates to Reclamation.

35		It is not clear how progress towards goals will be measured by individual participants, or consolidated by SECWCD for reporting to BOR	Metrics for measuring individual participation, as well as District tracking efforts to monitor progress toward achieving goals were clarified.
36		The degree of participant selection and dissemination of water conservation measures is not clear. The document presents only a toolbox of potential measures to be considered in developing individual conservation plans. It is not clear how the sum of implemented measures among participants will lead to achieving the stated conservation goals for AVC. The objectives for conservation among Master Contract participants is not clear.	As indicated in the implementation discussion, selection and implementation of water conservation measures and programs will be determined based on local assessments and needs. The District has an explicit policy, supported by Reclamation that limits the role of the District in local water conservation planning and implementation to technical support, data management and reporting, and potential financial partnering. The implementation schedule was added to clarify the timing of local water conservation plan development – including goal setting and monitoring and verification. There is no explicit nexus between the RWC Plan and Master Contract participants (see response to comment 25).
37		Dates are provided in the goal-setting portions of the plan. It is not clear whether there are timetables for selection, implementation, and funding of conservation measures at the participant level. There are not stated timeframes for water use tracking and reporting other than to cite that Reclamation requires Regional Water Conservation plan updates every 5 years.	See response to comment 36
38		Water budget does not appear to reference most current Draft EIS data	See response to comments 11 and 12
39		While water supply gaps are identified, there is no presentation of overall problems and opportunities for AVC and Master Contract participants.	Section 2 was expanded to better characterize overall problems and opportunities for water conservation related to the Plan participants. There is no explicit nexus between the RWC Plan and

			Master Contract participants (see response to comment 25).
40		Without a comprehensive understanding of regional problems and opportunities, it is hard to develop robust alternatives. The document uses a toolbox/menu-style approach, but is not specific in how conservation goals will be accomplished by individual participants to meet the stated goals at the Regional level of reporting requested of SECWCD.	Regional water supplies problems and opportunities are discussed in detail in Sections 2 and 3. Local water conservation planning and implementation will be performed over the next several years to address the issues raised in this comment (see response to comment 36)
41		Environmental concerns were not addressed.	There are no elements of the RWC Plan that involve federal action and therefore, there are no environmental concerns to address regarding the proposed implementation tasks.
42		Only broad discussion of possible financial tools and technical service assistance is provided. There is no clear commitment from participants as to select measures to be implemented or implementation schedules.	See response to comment 36
43		There was no linkage to the SECWCD Water Conservation and Management Plan (2010-2014) and there were no comparisons provided regarding improvements. The statement was made that it is "unclear what water conservation programs have been implemented at the local level." (page 26)	The linkage between the 2010-2014 Water Conservation and Management Plan occurs in a number of different ways. First, the local water conservation planning by covered entities (i.e., St. Charles Mesa, La Junta and Lamar) are discussed. Next, a number of ongoing water conservation programs being conducted by the District related to return flow management (and therefore water reuse), Tamarisk eradication, public education, management of Xeriscape demonstration gardens, and data collection are also presented. The connection between the 2010-2014 Plan and the RWC Plan were more thoroughly described in the RWC Plan section on ongoing water conservation efforts. In addition, where relevant, the water conservation programs discussed in the 2010-2014 Plan are contained in the Tool Box

			and/or the Implementation Plan.
44		No details provided – data collection and reporting should be explicitly defined for participants and the rollup to regional-level reporting required for SECWCD. This is a key element of the plan that is deferred (see last sentence, page 26 and water use and tracking, page 36).	See response to comment 34