Arapahoe County Water and Wastewater Authority
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April 18, 2016

Mr. Ben Wade
Colorado Water Conservation Board
1313 Sherman Street, Room 721
Denver, CO 80203

RE: Arapahoe County Water and Wastewater Authority Water Efficiency Plan Update

Dear Mr. Wade:

Arapahoe County Water and Wastewater Authority (ACWWA) is submitting a locally adopted Municipal Water Efficiency Plan update for review and approval by the Colorado Water Conservation Board's (CWCB) Office of Water Conservation and Drought Planning. This letter is also intended to meet the Cover Letter Submittal Requirements for CWCB review.

Name and contact information:

Arapahoe County Water and Wastewater Authority
Attn: Steve Witter, P.E., General Manager
13031 E. Caley Avenue
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switter@arapahoewater.org

List of organizations and individuals that assisted in plan development:

Clear Water Solutions, Inc.
Nathan Alburn, Michelle Hatcher, and Steve Nguyen

Quantity of retail water delivery and population for past five years:

Table 1: Water Demand by Customer Category

Customer Category	2010	2011	2012	2013	2014	*Average*
	Values in AF unless otherwise stated					
Commercial	1,015	1,071	1,079	1,092	1,114	*1,074*
Commercial Irrigation from Well Sources	1,278	1,390	1,504	1,003	1,079	*1,251*
Residential (1)	591	616	660	592	566	*605*
Residential Irrigation from Well Sources	72	76	86	188	59	*96*
Irrigation from Reg 84	141	457	465	320	346	*346*
Construction Hydrant	12	27	26	21	29	*23*
Total billed	3,109	3,637	3,821	3,218	3,193	*3,396*
Non-Revenue	642	732	367	591	817	*630*
Residential Population	12,218	12,334	12,369	12,445	12,506	
Estimated Transient Population	19,183	19,384	19,669	19,917	20,184	
Residential GPCD	43.2	44.6	47.5	42.5	40.4	*43.6*
Residential w/ Irrigation GPCD	48.4	50.1	53.8	56.0	44.6	*50.6*
Total GPCD	88.4	102.4	106.2	88.8	87.2	*94.6*

(1) A sizable portion of ACWWA's residential water use includes irrigation water. This skews the "Residential GPCD" customer category. The multi-family units' (e.g., apartments) irrigation use is contained within either the "Commercial" or "Commercial Irrigation" customer categories.

Table 2: ACWWA Residential Population

Year	Population	Growth Rate
2010	12,218	-
2011	12,334	1.0%
2012	12,369	0.3%
2013	12,445	0.6%
2014	12,506	0.5%
2015	12,977	3.8%
2016	13,455	3.7%
2017	13,620	1.2%
2018	13,781	1.2%
2019	13,939	1.1%
2020	14,093	1.1%
2021	14,243	1.1%
2022	14,391	1.0%
2023	14,535	1.0%
2024	14,677	1.0%

Public review and comment information:

ACWWA held its public-review period from January 11, 2016 to March 11, 2016. Notification of the review period was posted in the Aurora Sentinel and the Douglas County News Press on January 21, 2016. This notification announced the public review timeframe and stated that a draft plan was available for the public to review at ACWWA's main office. The draft plan was also posted on ACWWA's website from January 11, 2016 through March 11, 2016. During the public review period ACWWA received no comments on the Municipal Water Efficiency Plan update.

ACWWA is pleased with the Municipal Water Efficiency Plan update that has been developed and will commit the resources necessary, as they become available, for the implementation of the plan.

Please let me know if you have any further requirements.

Sincerely,

Steve Witter, P.E.
General Manager

ARAPAHOE COUNTY WATER AND WASTEWATER AUTHORITY

2015 MUNICIPAL WATER EFFICIENCY PLAN UPDATE

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EXECUTIVE SUMMARY

Arapahoe County Water and Wastewater Authority (ACWWA) serves an area of more than 14 square miles in the southeastern Denver metropolitan area, approximately 10 miles southeast of downtown Denver. ACWWA's service area is primarily in Arapahoe County but includes some areas in northern Douglas County as well as an area in Elbert County. The service areas and general locations are shown in **Figure 1.1a**, **Section 1.1**. In 2014, ACWWA's residential population was estimated to be approximately 12,500. It is also estimated over 20,000 additional people were served by ACWWA on a typical work day in 2014. These additional people are made up of employees and other individuals associated with the hundreds of businesses within the service area.

ACWWA has developed this Municipal Water Efficiency Plan (MWEP) update in accordance with the Water Conservation Act of 2004 and to meet the provisions of Colorado Revised Statute (CRS) section 37-60-126. As part of CRS 37-60-126, a State-approved MWEP will qualify ACWWA for continued funding from the Colorado Water Conservation Board (CWCB) and the Colorado Water Resources and Power Development Authority for water supply and delivery projects. ACWWA has made a number of efforts in the last 10 years to improve their water use efficiency and has implemented a number of steps and programs throughout that time. ACWWA looks forward to its continued partnership with CWCB and the State to continuously improve its efficiency and conservation efforts.

ACWWA's water supply consists of multiple sources of water. In the past, nearly all of ACWWA's water came from alluvial groundwater wells and non-renewable deep groundwater wells. As part of ACWWA's efforts to reduce its dependency on non-renewable groundwater sources, ACWWA began the ACWWA Flow Project (ACWWA Flow) in 2009. ACWWA is currently in the process of adjudicating 4,400 acre-feet (AF) of additional surface water rights from various sources. ACWWA started water deliveries via a Substitute Water Supply Plan from Phase 1 of the ACWWA Flow in June 2013. More details about ACWWA Flow will be included within the main body of this MWEP. ACWWA's potable distribution system also includes three treated water storage tanks, six pressure zones, three pump stations, and over 168 miles of pipeline.

ACWWA also has two non-potable irrigation systems. The first non-potable source comes from alluvial wells within ACWWA's system. This non-potable system consists of approximately 19.8 miles of pipeline. The second non-potable source is a reclaimed water system governed under Colorado State Regulation 84 (Reg 84). The Reg 84 system consists of approximately six miles of pipeline.

In 2014, ACWWA's customers utilized approximately 3,040 AF of treated water. ACWWA is expected to increase its annual water demand through new growth to approximately 3,813 AF of treated water (or 4,520 AF of raw water) over the planning period which extends to 2024. Water savings from this water conservation planning effort is estimated to save approximately 565 AF annually by the end of the planning period. The savings from this planning effort will make a considerable contribution toward reducing the water supplies needed to serve the 2024 demand.

This report documents ACWWA's water system, past and future water use, and the water efficiency planning process used in accordance with CWCB's Municipal Water Efficiency Plan Guidance Document.

Past and Current Water Efficiency Activities

ACWWA has implemented a variety of water efficiency activities over the years, especially since 2006 when their first Water Conservation Plan (2006 WCP) was prepared. The water efficiency activities that have been historically implemented are shown in **Table ES-1**.

Table ES-1: ACWWA's Existing and On-going Water Efficiency Activities

Historical and Current Water Efficiency Activities	Historical Period of Implementation
Foundational Activities	
Submetering for Large Users (Indoor and Outdoor)	*Ongoing*
Frequency of Meter Reading (monthly)	*1987 – present*
Tracking Water Use by Customer Type	*2006 – present*
Upgrade Billing System to Track Use by Sufficient Customer Types	*2006 – present*
Water Rate Adjustments	*In Progress*
Frequency of Billing (monthly)	*1987 – present*
Volumetric Billing	*1990 – present*
Inclining/Tiered Rates	*2001 – present*
Master Plans/Water Supply Plans	*Drafting in next 2 years*
Capital Improvement Plans	*Ongoing*
Water Conservation Coordinator	*2014 – present*
Water Reuse System	*2006 – present*
Targeted Technical Assistance and Incentives	
Irrigation Scheduling/Timing	*Ongoing*
Residential Outdoor Meter Installations	*Ongoing*
Water Efficient Washing Machine Rebates	*2010 – present*
Efficient Irrigation Equipment Rebates (Rain Sensors)	*2010 – present*
Landscape Water Budgets Information and Customer Feedback	*Ongoing*
Dye Tab Give-away	*2008 – present*
Ordinances and Regulations	
Water Waste Ordinance (BP 5) (Voluntary unless triggered)	*1992 – present*
Time of Day Watering Restriction (Voluntary unless triggered)	*2002 – present*
Day of Week Watering Restriction (Voluntary unless triggered)	*2002 – present*
Turf Restrictions (BP 9) (Only in Elkhorn)	*Ongoing*

Historical and Current Water Efficiency Activities (*cont.*)	Historical Period of Implementation
Education Activities	
Bill Stuffers	*2006 – present*
Web Pages	*2006 – present*
Message Development/Campaign	*Ongoing*
Xeriscape Demonstration Gardens and Classes (Tagawa Gardens within ACWWA's service area provides classes, but these are not directly run by ACWWA). Linked on website.	*2006 – present*
Water Conservation Expert Available (in conjunction with South Metro Water Authority)	*2000 – present*

As an example of the benefits from ACWWA's efforts, the water savings from the filter backwash at the Lone Tree Creek Water Reclamation Facility (LTCWRF) and the washing machine rebate program are shown in **Tables ES-2** and **ES-3** respectively. Recycling filter backwash saves an estimated 287 AF of water per year, and it is estimated that 1.75 AF or over 0.5 million gallons of water have been saved during the five years since the implementation of the washing machine rebate program.

Table ES-2: Water Savings Estimates for the LTCWRF Filter Backwash

Current Water Efficiency Activity	Estimated Accumulated Annual Water Savings for Five Years (AF)					Total Five-Year Water Savings (AF)	*Average Annual Savings (AF)*
	2010	***2011***	***2012***	***2013***	***2014***		
Recycling Filter Backwash at LTCWRF	117	379	386	266	287	**1,436**	***287***

Table ES-3: Water Savings Estimates for Washing Machine Rebates

Current Water Efficiency Activity	Estimated Accumulated Annual Water Savings for Five Years (AF)					Total Five-Year Water Savings (AF)	*Average Annual Savings (AF)*
	2010	***2011***	***2012***	***2013***	***2014***		
Washing Machine Rebates; estimated savings	0.21	0.27	0.37	0.43	0.46	**1.75**	***0.35***
Other Washing Machine Rebate Demographic Information							
Category	***2010***	***2011***	***2012***	***2013***	***2014***	**Total (rebates)**	***Average / Weighted Average***
Number of Rebates	36	17	23	17	4	**97**	***19.4***
Average Number of Wash Loads per Household	4.5	4.3	4.7	4.4	3.5		***4.58***

The water savings from other activities have not been recorded consistently or are more difficult to quantify. In the future, ACWWA hopes to keep better track of available data to see realized savings of specific activities and overall trends in usage.

Water Efficiency and Water Supply Planning

A preliminary set of goals were developed prior to the selection of the water efficiency activities to provide a means to screen and evaluate the selected activities. Goals from ACWWA's 2006 WCP were assessed and incorporated into the new goal development process. A meeting was initially held with ACWWA staff to discuss water efficiency goals appropriate for ACWWA. The following preliminary goals were established by ACWWA staff:

- In keeping with the savings goal established in ACWWA's 2006 WCP, the targeted water savings goal for this MWEP was to lower the total per capita water use by 10% over the ten-year planning period.
- The targeted ten-year water savings goals for the following customer categories were as follows:
    - Commercial: 5.0%
    - Commercial Irrigation from Well Sources: 8.0%
    - Residential: 10.0%
    - Residential Irrigation from Well Sources: 15.0%
    - Irrigation from Reg 84: 15.0%
    - Construction Hydrant: 1.0%
    - Non-Revenue Water: 20.0%
- To develop a water efficiency program that can be implemented into ACWWA staffing constraints and with staff approval.
- To implement water efficiency activities that are compatible with the community and ACWWA Board members.

ACWWA used a four-phase process for selecting and fully evaluating water efficiency activities. The four phases include: 1) assessment; 2) identification; 3) qualitative screening; and 4) evaluation and selection.

The initial screening of the water efficiency activities with ACWWA staff resulted in selecting 22 candidate activities for further evaluation. Some of the activities were combined within the Statewide Water Supply Initiative Levels Framework to assist in evaluation and avoid double counting savings. The second screening was accomplished by evaluating each activity based on the following evaluation criteria:

- Cost effectiveness and budgetary considerations
- Ease of implementations
- Public acceptance
- Consistency with other programs and policies
- Staff and Board approval

Of the 22 evaluated activities, 16 were chosen for continuation or implementation. The activities selected are as follows:

- Meter Testing and Replacement/Meter Upgrades
- Control of Apparent Losses (with Metering)
- System Wide Water Audits
- Automatic Water Meter Reading Installation and Operations
- Water Reuse System
- Water Efficiency Rate Structure with Regular Updates to Rates Study
- Leak Detection and Repair
- LTCWRF Filter Backwash
- Water Conservation Officer
- Master Plans/Water Supply Plans
- Residential and Commercial Ultra-High-Efficiency Toilet Upgrade Service
- Water Efficient Washing Machine Rebates
- Rebate for Rain Sensors on Irrigation System Controllers
- Time of Day Watering Restrictions
- General Educational Activities
    - Bill Stuffers
    - Newsletters
    - Newspaper Articles
    - Mass Mailings
    - Website Updates
- Landscape Design, including Xeriscape options, and Maintenance Classes

Table ES-3 compares the anticipated water savings from the selected activities with the original goals and then adjusts the water saving goals for this MWEP. Over the ten-year planning period, the selected activities provide an overall estimated water savings of 5,330 AF. The preliminary goals were adjusted as the cost-benefit calculations were analyzed. ACWWA staff believe the adjusted goals are obtainable. After the goals were adjusted to reflect the expected water savings, the estimated water use reduction is 12.5%. Therefore, ACWWA will target an overall reduction from their forecasted water use by 12.5% over the planning period because of implementation of this MWEP.

Table ES-3: Water Efficiency Goals Comparison

Water Use Categories:	Total Projected Water Use (2015 to 2024)	Reduction Goals for Planning Horizon		Adjusted Reduction Goals for Planning Horizon	
				Total Water Savings from Activities	Resulting Reduction
	(AF)	(%)	(AF)	(AF)	(%)
Commercial	10,199	5.0%	510	355	3.5%
Commercial Irrigation from Well Sources	12,299	8.0%	984	643	5.2%
Residential	6,262	10.0%	626	672	10.7%
Residential Irrigation from Well Sources	995	15.0%	149	120	12.1%
Irrigation from Reg 84	3,401	15.0%	510	185	5.4%
Construction Hydrant	227	1.0%	2	2	1.1%
Non-Revenue Water	6,192	20.0%	1238	2,974	48.0% (1)
Total Water Production:	39,575				
Total Demand Reduction:			4,020	4,951	
Total Percent Reduction:			10.2%		12.5%

(1) Note: The 48% reduction of Non-Revenue Water includes "LTCWRF Filter Backwash", an activity that happens prior to the metering. Because of this fact, this represents a higher percentage than post-metering activities alone.

Implementation and Monitoring Plan

The implementation plan defines the process necessary to carry out the selected water efficiency activities. Monitoring types of demand data is beneficial in tracking the savings generated from implementing a water efficiency plan. ACWWA monitors reclaimed water produced on a daily basis and total treated water produced on a weekly basis. Other categories of raw and treated water and customer accounts are monitored on a monthly and annual basis. The demand data to be collected during the monitoring period of the MWEP is presented in **Table ES-4**. Steve Witter, *General Manager*, Katie Spahr, *Water Resource Engineer*, and Patty Pratt, *Customer Service Manager*, will be chiefly responsible for coordinating the implementation of this MWEP. They realize that the most successful plan is one that involves a team effort from many staff, other key personnel, and assistance outside of ACWWA's employees.

Table ES-4: Selection of Demand Data for Efficiency Plan Monitoring

Monitoring Data	HB 10-1051 Reporting Requirement					Selection			
	Annual	Monthly	Weekly	Daily		Annual	Monthly	Weekly	Daily
Total Water Use									
Total treated water produced (metered at wells, the Joint Water Purification Plant (JWPP), and ACWWA Flow)						X	X	X	
Total treated water delivered (sum of customer meters)	√					X	X		
Raw non-potable deliveries						X	X		
Reclaimed water produced (metered at LTCWRF discharge)						X	X		X
Reclaimed water delivered (sum of customer meters)						X	X		
Per capita water use						X			
Indoor and outdoor treated water deliveries						X			
Treated water peak day produced						X	X		
Reclaimed water peak day produced						X	X		
Raw water peak day produced/delivered						X	X		
Non-revenue water-built into Water Loss Report	√					X	X		
Water Use by Customer Type									
Treated water delivered		√				X	X		
Raw non-potable deliveries						X	X		
Reclaimed water delivered						X	X		
Residential per capita water use						X	X		
Unit water use (e.g. AF/account or AF/irrigated acre)						X	X		
Indoor and outdoor treated water deliveries						X	X		
Large users						X	X		
Other Demand Related Data									
Irrigated landscape (e.g. AF/acre or number of irrigated acres)						X			
Precipitation						X	X		
Temperature						X	X		
Evapotranspiration						X	X		
Drought index information						X			
Economic conditions						X			
Population						X	X		
New taps						X	X		

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INTRODUCTION

Arapahoe County Water and Wastewater Authority (ACWWA) is a political subdivision formed in 1988 by an agreement between Arapahoe County and the Arapahoe County Water and Wastewater Public Improvement District (PID) for the purpose of developing water resources, systems and facilities, wastewater collection and treatment facilities for ACWWA's service area ACWWA serves an area of more than 14 square miles in the southeastern Denver metropolitan area, approximately 10 miles southeast of downtown Denver. The service area is primarily in Arapahoe County but includes some property in northern Douglas County as well as an independent location in Elbert County. The service areas and general locations are shown in **Figure 1.1a**, **Section 1.1**.

ACWWA's service area is comprised mostly of office complexes, commercial, and light industrial areas. Significant multi-family residential development has been added primarily in the eastern part of the service area. Along with providing water service within its own service area, ACWWA provides water service for several contract areas including the City of Aurora, Antelope, Chaparral, Estancia, and the Town of Foxfield. ACWWA also provides wholesale wastewater treatment service to the Cottonwood Water and Sanitation District (CWSD) in Douglas County and to Inverness Water and Sanitation District (IWSD)

In 2014, ACWWA's residential population was estimated to be approximately 12,500. It is also estimated that over 20,000 additional people are served by ACWWA on a typical work day. These additional people are made up of employees and other individuals associated with the hundreds of businesses within the service area.

ACWWA's water supply consists of multiple sources of water. In the past, nearly all of ACWWA's water came from alluvial groundwater wells and non-renewable deep groundwater wells. As part of ACWWA's efforts to reduce its dependency on non-renewable groundwater, they began the ACWWA Flow Project (ACWWA Flow) in 2009. ACWWA is currently in the process of adjudicating 4,400 acre-feet (AF) of additional surface water rights from various sources. More details will be included later about the ACWWA Flow Project.

ACWWA developed a Water Conservation Plan in 2006 (2006 WCP). Many water efficiency activities were already in place prior to the 2006 WCP, and several others were scheduled to be implemented within a few years after the adoption of 2006 WCP. Due to the economic recession that occurred from 2007 through 2009 that greatly impacted the businesses within the service area, ACWWA was unable to follow through with many of its goals. Even with the struggling economy, several activities were continued, and some new activities

were implemented such as a rebate program and a water conservation page on the website.

Several documents were reviewed and utilized to develop this Municipal Water Efficiency Plan (MWEP or Plan) update. The Colorado Water Conservation Board (CWCB) *Municipal Water Efficiency Plan Guidance Document* (Guidance Document) was used as a guide to develop this plan. The 2006 WCP, the Alan J. Leak 2014 Expert Report ("Re: ACWWA's Planning Projections for Build-out Water Demands and Growth for Case No. 09CW283"), ACWWA's Water Conservation Response Plan, and ACWWA's website pages were also used for comparisons to previous goals, implementations, and projections. There are many acronyms, terms, and terminology that are commonly used in water efficiency and planning, along with terms are common in this geographical area included in this document. A list of terms and their meanings is included in **Appendix A**.

SECTION 1.0 – PROFILE OF EXISTING WATER SUPPLY SYSTEM

1.1 Overview of Existing Water Supply System

Service Area

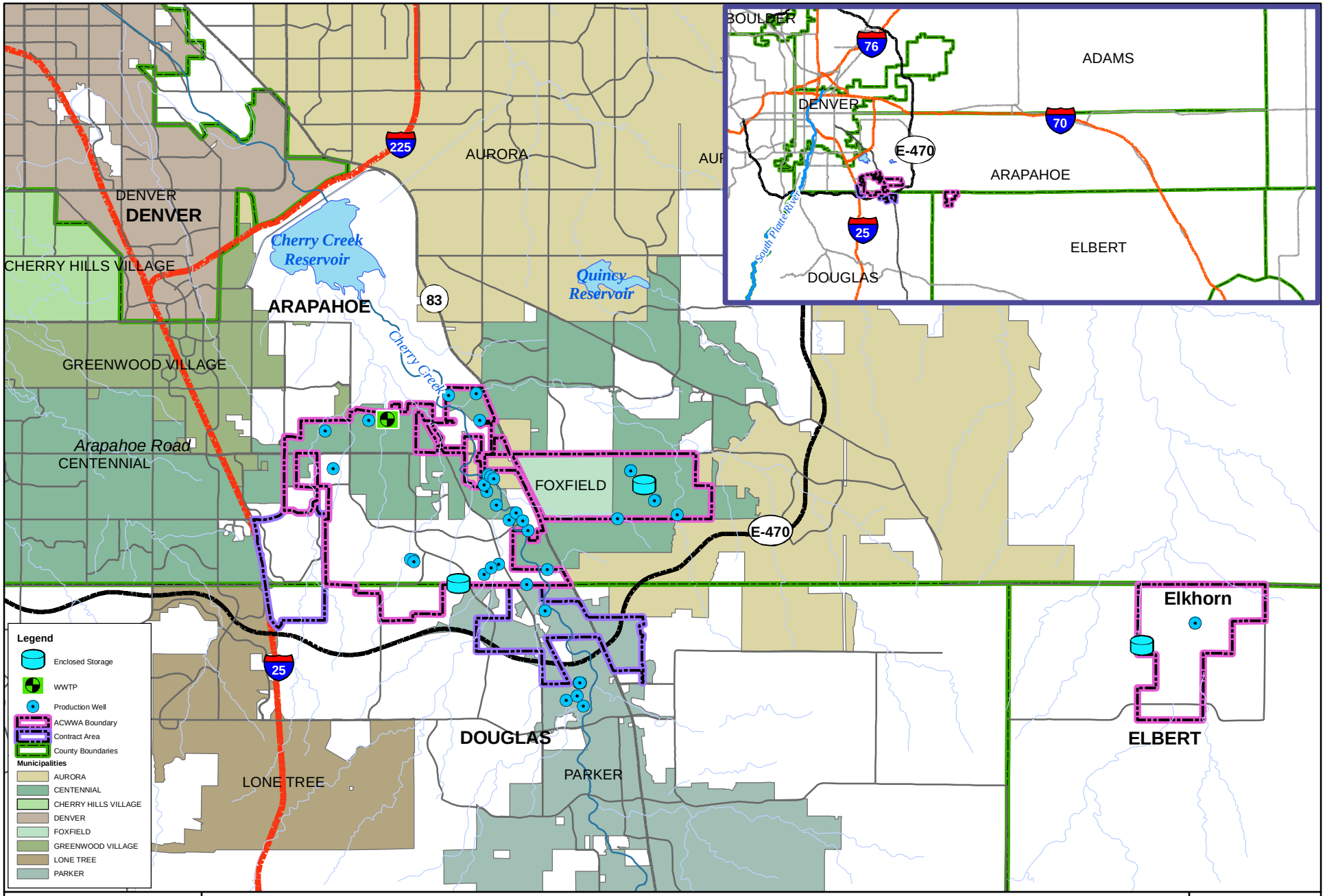
ACWWA is located in the southeastern Denver metropolitan area. The original service area encompassed approximately eight square miles. ACWWA also provides water services under contract to other areas, totaling and additional six square miles. The service area is depicted in **Figure 1.1a**. The figure shows the various boundaries of the service area as well as elements of ACWWA's water supply network. The service area is primarily in a small portion of southeast Arapahoe County (see smaller inset map within **Figure 1.1a**). The service area also includes some properties in northern Douglas County and the Elkhorn Community in Elbert County. ACWWA provides water services, wastewater services, and a combination of the two to its various areas. The scope of this document covers the efficiency of ACWWA's water service portion only and does not include their wastewater services.

The residential population for a water service area such as ACWWA's is difficult to determine because it is comprised of many different governing entities. Census data can be obtained for counties and municipalities, even regions, but data is not available for special districts. ACWWA has an extra challenge in determining the number of people served by its system due to the transient nature of the employees working at the hundreds of businesses within the service area. To determine the residential population for ACWWA, the number of households was calculated from the tap data and multiplied by the average number of people per household. A value of 2.6 people per household for single-family units and 2.1 people per household (at 90% occupancy) for multi-family units was used for this report. This is based on the portions of counties and municipalities served by ACWWA. The estimated residential population and residential growth rate of the service area for the last five years is shown in **Table 1.1a**. Also included in **Table 1.1a** are the estimated tap equivalent (TE) values (see **Appendix A** for an explanation of TE's).

Table 1.1a: Service Area Population for Past Five Years

Year	Estimated Residential Population (1)	Residential Population Growth Rate	Total TE's (2)
2010	12,218	-	6,282
2011	12,334	1.0%	6,346
2012	12,369	0.3%	6,410
2013	12,445	0.6%	6,475
2014	12,506	0.5%	6,540

(1) Residential population estimated from TE's, demographic, and other information available.
(2) Total TE's includes Residential, Commercial, and Irrigation taps.



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Miles

Figure 1.1a
Arapahoe County Water and Wastewater Authority Service Areas

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Date:	03-17-2016
Drawn By:	NEA
Scale:	As Shown
Job No:	14-210

Water Supply

ACWWA relies on multiple sources of water. In the past, nearly all of ACWWA's water came from alluvial groundwater wells and non-renewable deep groundwater wells. In 2009 ACWWA began the ACWWA Flow Project. As part of ACWWA Flow, ACWWA is in the process of adjudicating 4,400 AF of additional surface water rights from various sources. ACWWA started water deliveries via a Substitute Water Supply Plan (SWSP) from Phase 1 of ACWWA Flow in June 2013. ACWWA has two non-potable systems for irrigation purposes: The first source comes from alluvial wells within ACWWA's system. The second source is a reclaimed water system governed under Colorado State's Regulation 84 (Reg 84). A more detailed explanation of the sources of both potable and non-potable water will be included later within this Plan. **Figure 1.1b** illustrates ACWWA's sources of water over the previous years (2010 – 2014). Note the introduction of ACWWA Flow water has reduced the quantities from other sources.

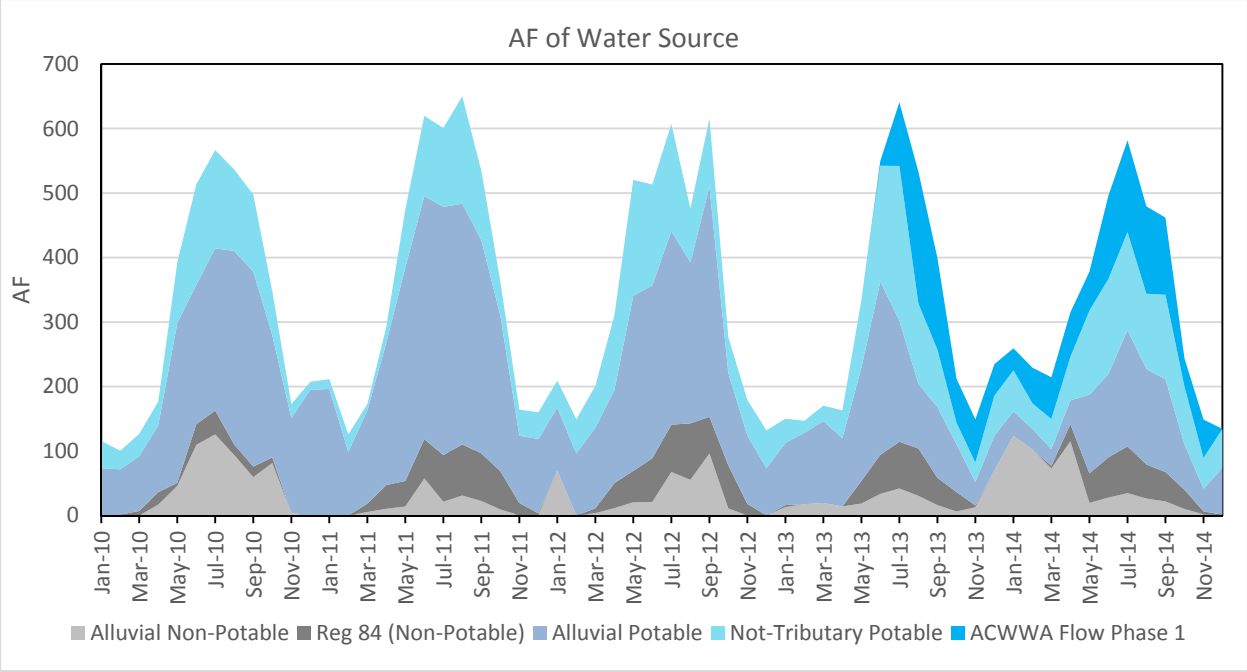

Figure 1.1b: Sources of ACWWA Water Represented by Percentages

Key Existing Facilities

ACWWA receives its potable water from three main sources: alluvial well water pumped from Cherry Creek, deep well water pumped from the Denver Basin Aquifer, and ACWWA Flow. Water from alluvial wells is either treated at the Joint Water Purification Plant (JWPP) or chlorinated and pumped directly into the distribution system. The remaining alluvial wells meet drinking (potable) water standards, but due to aesthetics, are considered a non-potable source. ACWWA Flow water comes from a joint project with East Cherry Creek Valley Water and Sanitation District (ECCV).

ACWWA strongly believes in the benefits of regional projects. Joining forces with other service providers allows large projects to be built that benefit all entities for much less

cost to any one entity. The JWPP is a partnership between ACWWA and CWSD. As part of ACWWA Flow ACWWA is working with ECCV and United Water and Sanitation District (United) to develop and operate the components of the project. ECCV is a neighboring water district that serves a portion of the City of Centennial and unincorporated Arapahoe County. It is located north and east of the service area. In 2004, ECCV built a large pipeline to deliver water from a reverse osmosis plant near Brighton to ECCV's service area. At that time ACWWA saw the benefit of buying capacity in the plant and pipeline and purchased some capacity for future use. In addition to water treatment facilities, ACWWA has partnered with IWSD for the Lone Tree Creek Water Reclamation Facility (LTCWRF) located within ACWWA's boundaries. **Figures 1.1c** and **1.1d** show portions of the LTCWRF. In the far background of both photos are examples of the large office complexes that are fairly commonplace within the ACWWA service area. Furthermore, ACWWA is part of the South Metro Water Supply Authority (SMWSA), a partnership of 13 various water providers within Douglas and Arapahoe counties. SMWSA members pool together resources to develop renewable water solutions for the South Denver Metro Area. ACWWA has seen benefits from some ongoing joint projects associated with SMWSA.

Figure 1.1c: Lone Tree Creek Water Reclamation Facility

Figure 1.1d: Lone Tree Creek Water Reclamation Facility

ACWWA's potable distribution system includes over 168 miles of water supply lines ranging from ¾ to 36 inches. Pipe materials consist of ductile iron, asbestos cement, and polyvinyl chloride (PVC). ACWWA's potable system is comprised of three main pressure zones: the Red Zone (*or high zone*), the Blue Zone (*or middle zone*), and the Green Zone (*or low zone*). Each of the main pressure zones are further broken into smaller pressure zones for a total of six zones throughout the system. The Red Zone is supplied from a four million-gallon storage tank and serves the eastern portion of the service area (east of Parker Road, CO Hwy 83). The Blue Zone is supplied from a one million-gallon storage tank and serves everything west of the Red Zone and south of Arapahoe Road. The Green Zone serves the northern portion of the service area north of Arapahoe Road and west of Parker Road. Elkhorn has its own well, system and one 536,000 gallon storage tank. ACWWA's system also includes three pump stations. **Figure C1** in **Appendix C** illustrates the main pressure zones within the service area.

As mentioned earlier, there are a number of wells within ACWWA's network that have been dedicated to a non-potable system for dual system customers and irrigation only customers. Wells dedicated for non-potable uses meet drinking water standards but have aesthetic water quality issues that make the water more appropriate for irrigation

purposes. The alluvial non-potable system consists of approximately 19.8 miles of water supply lines ranging from ¾ to 36 inches.

In addition to the alluvial non-potable system, ACWWA also has a Reg 84 system in place to reclaim or recycle a portion of its wastewater. Reg 84 water is chlorinated tertiary treated effluent, making it suitable for applications such as irrigation, cooling, and other non-potable purposes. ACWWA's non-potable Reg 84 system consists of approximately six miles of supply lines ranging from 6 to 12 inches.

1.2 Water Supply Reliability

Water supply reliability is the ability of ACWWA's water supplies to meet the needs of its customers during times of stress on the system. Stresses may be caused by drought or other emergency situations. ACWWA is located in the South Platte River Basin where the 2010 Statewide Water Supply Initiative (SWSI) identified a 58% gap between water needs and water supplies in the basin by 2050. A major driving force behind the anticipated gap is the development in the Denver South Metro area. Water efficiency is one method the SWSI report identified for meeting this gap.

Alluvial Wells

ACWWA currently has seven wells that pump water from the Cherry Creek Alluvium. The Cherry Creek alluvial aquifer between Parker and Cherry Creek Reservoir is a renewable water supply that is replenished by upstream and side-tributary surface flow as well as underflow. There have been reports of reduced alluvial well yield during the peak summer demand period, especially during dry years. As alluvial well use by ACWWA has increased with growth, there are concerns regarding the level of alluvial well pumping that can be sustained during dry periods.

Denver Basin Wells

ACWWA has 10 wells that pump from the deeper confined aquifers within the Denver Basin. The Denver Basin consist of Arapahoe, Denver, Dawson, and Laramie Fox Hills (LFH) aquifers. All of ACWWA's deep wells pump from the Arapahoe and Dawson aquifers. **Table 1.2a** summarizes both the alluvial and Denver Basin Wells. Aquifers within the Denver Basin are generally considered a non-renewable source of water. In many areas these aquifers have experienced a steady decline in their water tables especially with increasing water withdrawal. Groundwater levels have been diminishing due to pumping rates exceeding recharge rates. ACWWA is seeing evidence of this. For example between 1990 and 2000, depth to groundwater levels in the Arapahoe aquifer declined from 100 to almost 300 feet. Some areas have experienced dramatic declines where there has been high volume pumping from the Arapahoe aquifer. In a few areas, 40 foot drops per year have been recorded, and it is anticipated well flow rates will diminish during the next decade. Due to these issues, ACWWA realizes it can no longer solely rely on the Denver Basin wells to supply current demands over time.

Table 1.2a: Current ACWWA Wells (both alluvial and deep wells)

Well and Type of Pumping	Average Annual Pumping (2010 - 2014) (AF)
Alluvial Well Pumping	
Potable Supplies	
Loyd-2	653
Ford-2	183
Murdoch-2	58
Race 4	22
CCC-4	159
Alluvial Well Pumping *(cont.)*	
Non-Potable Supplies	
Braun	60
Smith-2	215
Raw Alluvial Supplies	
Deem	109
Non Tributary Pumping	
LFH 5 (1)	4
Denmark Arapahoe	210
Airport -3	114
A-1	195
A-2	232
JWPP Well Pumping	
Race-1	753
HC-1 (CWSD WTP 1)	38
HC-2 (CWSD WTP 2)	6
HC-3 (CWSD WTP 3)	45
Chaparral / Elkhorn	
Chaparral Arapahoe A1	26
Chaparral Arapahoe A2	112
Chaparral Dawson D2	37
Elkhorn Arapahoe	53

(1) Note: LFH 5 was only used in 2011 during this time period.

ACWWA Flow – Ditch Rights

As the water levels of the aquifers within the Denver Basin showed significant declines, the ability of ACWWA to depend on these aquifers for its future water supply began to be questioned. With these facts in mind, ACWWA began investigating alternative sources of water. In 2009, ACWWA began a partnership with ECCV and United to develop and operate the ACWWA Flow Project.

The goal of the project is to better serve the service area customers. This goal will be accomplished by supplementing the current water sources (alluvial and Denver Basin

wells) with renewable water from the South Platte River Basin. In 2014, ACWWA took delivery of over 900 AF of water from ACWWA Flow. ACWWA anticipates delivery of 1,500 AF in 2015. Eventually the project will result in an annual average delivery of 4,400 AF of water. The water rights purchased for the ACWWA Flow project, number of shares, and status of these rights is listed in **Table 1.2b**.

Some additional components of the project include:

- Water storage
- Easements, alluvial wells and storage, and delivery infrastructure to deliver water to ECCV's Northern Water Treatment Plant (Northern Plant)
- Water treatment capacity in ECCV's Northern Plant
- Additional capacity in the existing ECCV Northern Pipeline, a 48" pipeline that travels from the Barr Lake area south to the ECCV service area
- Interconnect line to deliver water supplies from the ECCV service area to ACWWA's service area
- Chambers Reservoir, near E-470 and Chambers Road, has been constructed for non-potable water storage

Water from ACWWA Flow will have a greater reliability and quality than the currently sources of water both during dry periods and for the long term.

Table 1.2b: ACWWA Flow Water Rights

List of ACWWA Flow Project Water Rights		
Name	Number of Shares	Change Case
WATER RIGHTS PURCHASED BY ACWWA/ACWWA PID		
Farmers Independent Ditch Company	20.00	2012CW73
Fort Morgan Reservoir and Irrigation Company	166.50	Not yet filed
Fulton Irrigating Ditch Company	182.00	2010CW313
Lake Canal Company	41.00	Not yet filed
Lake Canal Reservoir Company	14.00	Not yet filed
Larimer and Weld Irrigation Company	16.00	Not yet filed
Larimer and Weld Reservoir Company	19.00	Not yet filed
New Cache La Poudre Irrigating Company	96.00	2013CW3026
Cache La Poudre Reservoir Company	20.00	2013CW3026
Water Supply and Storage Company	2.75	Not yet filed
Weldon Valley Ditch Company	42.00	2011CW151
Western Mutual Ditch Company	40.00	Not yet filed
Whitney Irrigation Company	7.00	Not yet filed
Windsor Reservoir and Canal Company	7.00	Not yet filed

List of ACWWA Flow Project Water Rights *(cont.)*		
Name	Number of Shares	Change Case
WATER RIGHTS HELD IN RESERVE BY UNITED FOR ACWWA		
Fort Morgan Reservoir and Irrigation Company	1.00	Not yet filed
Lake Canal Company	2.00	Not yet filed
Lower Latham Ditch Company	7.00	Not yet filed
Lower Latham Reservoir Company	4.50	Not yet filed
Weldon Valley Ditch Company	20.625	2011CW151

Other Factors that Potentially Impact Water Supply

ACWWA's water supplies would also be vulnerable in an extended drought. Over a decade ago, Colorado experienced one of its severest water shortages on record during the drought of 2002. More recently, Colorado experienced a drought that stretched from 2012 through August of 2013. ACWWA's drought contingency plan (also known as Water Conservation Response Plan) was implemented during these shortages, and they were able continue to provide adequate water for their clients. A copy of the Water Conservation Response Plan (updated in 2013) is included in **Appendix B**.

Floods also bring particular challenges to water suppliers like ACWWA. In September 2013, the Front Range experienced some of the largest rainfall amounts recorded for this area in the last 100 years. Floods can often cause unforeseen damages. As a result water providers can incur expenses beyond the normal anticipated capital improvement and operational costs. The 2013 flood and the heavy rains in the spring of 2015 impacted ACWWA. Because some of the water rights ACWWA holds are many miles north of their location, these rains and high flows caused those northern projects to be further delayed.

For various long term shortages and emergencies, ACWWA is continually expanding its water portfolio with projects like ACWWA Flow. For short term deficiencies and emergencies (e.g. compromises to the system from natural disasters, human error, or aging infrastructure), ACWWA maintains interconnections with CWSD, ECCV and Chaparral Metro District.

1.3 Supply-Side Limitations and Future Needs

ACWWA System Limitations

ACWWA is making an effort with Capital Improvement Plans (CIPs) to address the system limitations. These CIPs are updated annually if not more frequently. The main goals of the current CIP are as follows:

- Meet contractual obligations to ECCV regarding expansion of facilities associated with ACWWA Flow
- Expand the wastewater treatment plant for growth
- General maintenance and repair of aging infrastructure

As portions of ACWWA's infrastructure continues to age, some pipelines are being replaced on an as needed basis. Other portions of ACWWA's treatment and distribution system are relatively new, and with proper maintenance are expected to last well past the planning period (2024) of this document.

Water quality has been a challenge at times as additional treated effluent is returned into Cherry Creek, a supply source for a number of ACWWA's alluvial wells. Because ACWWA utilizes ground water for its drinking water supplies, both from alluvial and deep aquifer wells, certain characteristics common to ground water sources can lead to customer complaints. Ground water contains several naturally occurring minerals. These minerals can affect the color, odor, and clarity of the drinking water, but do not cause adverse health effects. The drinking water that ACWWA provides has been tested and continues to be routinely tested for compliance with all drinking water regulations. ACWWA's water meets or exceeds all primary and secondary drinking water standards. A Consumer Confidence Report that identifies all the testing results is mailed annually to water customers in July. ACWWA's 2014 Drinking Water Quality Report is available on their website, http://acwwa.com/.

In general water quality has been improving due to the introduction of ACWWA Flow water into the system. This has led to a reduced need for alluvial sources. Additionally, there are plans to switch some alluvial wells to the expanded non-potable system. Both of these efforts will lead to an improvement in ACWWA's water quality.

Future Water Supply

Increasing demand on water supplies from population growth in the Front Range has driven the price for raw water up significantly in the last 10 to 15 years. Although ACWWA does not utilize any Colorado-Big Thompson (C-BT) water, the price of C-BT shares gives a good indication of the value of water rights along the Front Range and in Northeastern Colorado. **Figure 1.3a** illustrates the price of C-BT shares over the years. In January of 2015, shares of C-BT water sold for $26,000 at an auction. This translates to approximately $52,000 per AF of water. If shares are available in a water provider's area, there still remain obstacles to overcome before the water can be utilized. Each situation is different with most water rights involving the additional high cost of changing water rights from agricultural use to municipal use. Water providers need to maintain a balance between revenue generated from their customers and the cost of system operation, maintenance and water acquisition. As evidenced by the ACWWA Flow Project, much of ACWWA's primary focus has been in addressing water rights for their customers' future water supply.

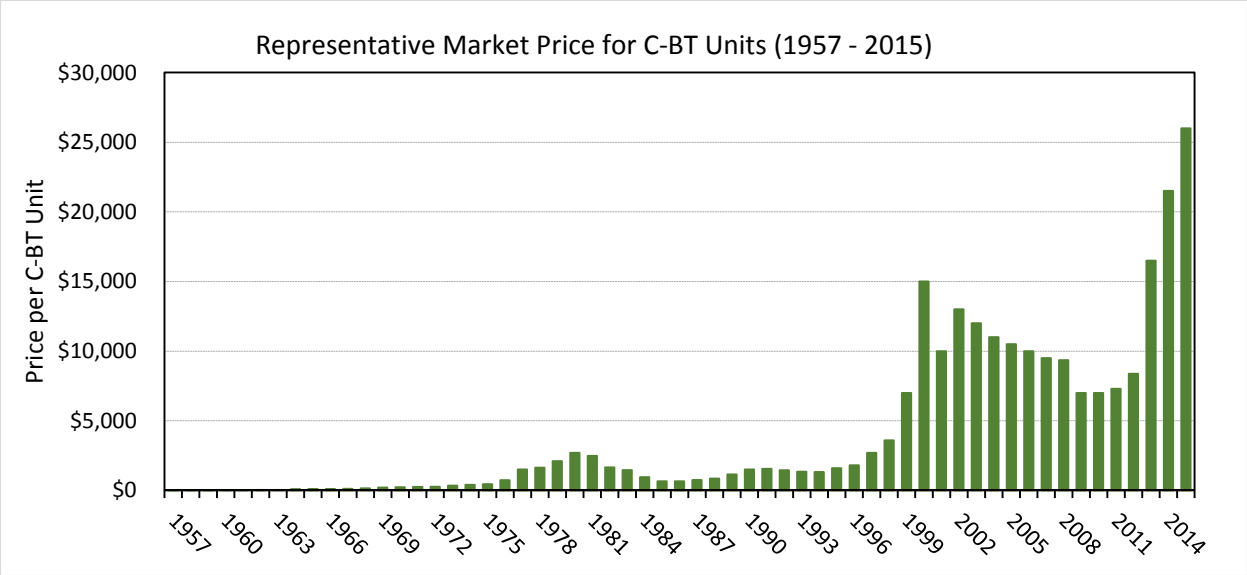

Figure 1.3a: Historical Prices of C-BT Water as a Reference for Other Water Rights

SECTION 2.0 – PROFILE OF WATER DEMANDS AND HISTORICAL WATER EFFICIENCY ACTIVIES

2.1 Demographics and Key Characteristics of the Service Area

ACWWA delivers potable, non-potable, and fire protection water to the service area that encompasses approximately 14 square miles. The area that ACWWA serves is characterized by hundreds of various businesses and commercial clients. Residential customers make up a much smaller portion of the clientele that receive water.

ACWWA provides service to approximately 4,300 taps for various end users. Over the past 25 years ACWWA has seen a steady growth overall. There have been periods of very rapid growth (e.g., 2000) and much slower growth (e.g. after the economic recession of 2007 – 2009). **Figure 2.1b** illustrates how the TE's have grown over the years since ACWWA was first established.

The majority of the service area is zoned for commercial and light industrial businesses. ACWWA's approximate 12,500 full-time residents have remained fairly steady over the last several years. Residential properties within the service area are nearly built out.

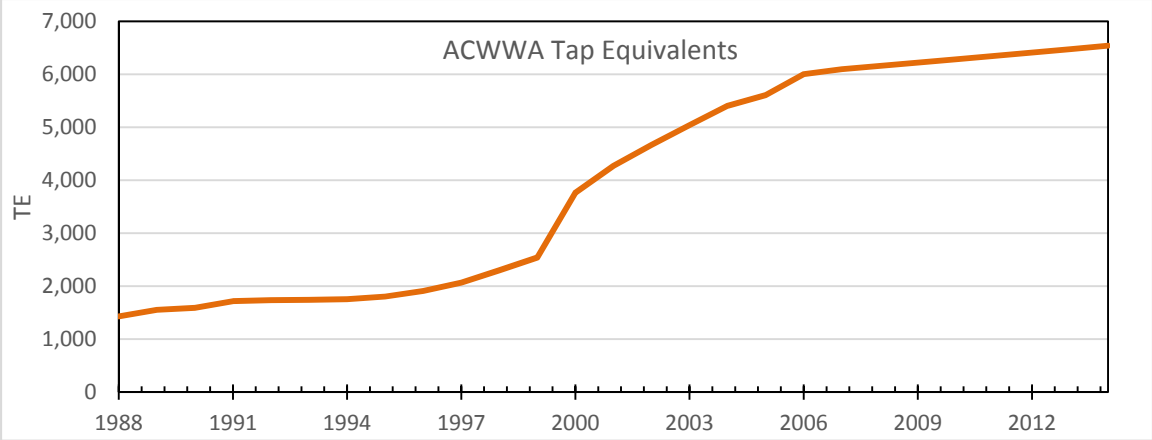

Figure 2.1b: History of Tap Equivalents at ACWWA

ACWWA splits its billing system into the following categories: Commercial, Residential, Municipal, and Other. ACWWA's Engineering Department has additional customer categories to further analyze volumes and patterns of usage. These categories are: Commercial, Residential, Irrigation from Well Sources (both Commercial and Residential), Irrigation from Reg 84, and Construction Hydrant. In some cases the Irrigation from Well Sources category is further separated into either commercial or residential specific use. Each of these categories will be discussed in more detail in **Section 2.2**. For the purposes of the majority of this document, the customer categories used by the engineering department will be utilized.

2.2 Historical Water Demands

Historical water demands consist of three main categories: Treated Potable Water, Non-Potable Water, and Reclaimed Water. **Table 2.2a represents the category usage for the years 2010-2014**. The months of January, February, and March of 2010 had missing data from four potable water wells in the Chaparral and Elkhorn areas. To fill in the missing data the following formula was utilized: during the same three months in 2011 to 2014, the four wells contributed between 2.0% and 9.0% of the quarterly potable water. This translates to 0.3% to 1.2% of the annual potable water (or less than 40 AF).

Table 2.2a: Annual Water Deliveries for Each Water Source within ACWWA's System

Year	Potable Water (AF)	Non-Potable (Alluvial) Water (AF)	Reclaimed (Reg 84) Water (AF)	Total Raw Water Supply (AF)
2010	3,073	539	141	3,753
2011	3,738	174	457	4,369
2012	3,368	357	465	4,190
2013	3,068	294	320	3,683
2014	3,040	557	345	3,942
Average	***3,258***	***384***	***346***	***3,987***

Annual Treated Potable Water

ACWWA receives its treated potable water from three sources: Denver Basin deep (non-tributary) wells, Cherry Creek alluvial wells, and ACWWA Flow water from the South Platte River. As ACWWA Flow has come on line, the percentage from each of these sources has changed. The approximate annual percentage from these sources is represented in **Figure 2.2a**. As shown in **Table 2.2a**, ACWWA's annual potable water deliveries have ranged from 3,040 to 3,738 AF with an average of 3,258 AF. After the water is treated and fed into the system from the various sources, water is delivered to the end users through the system taps.

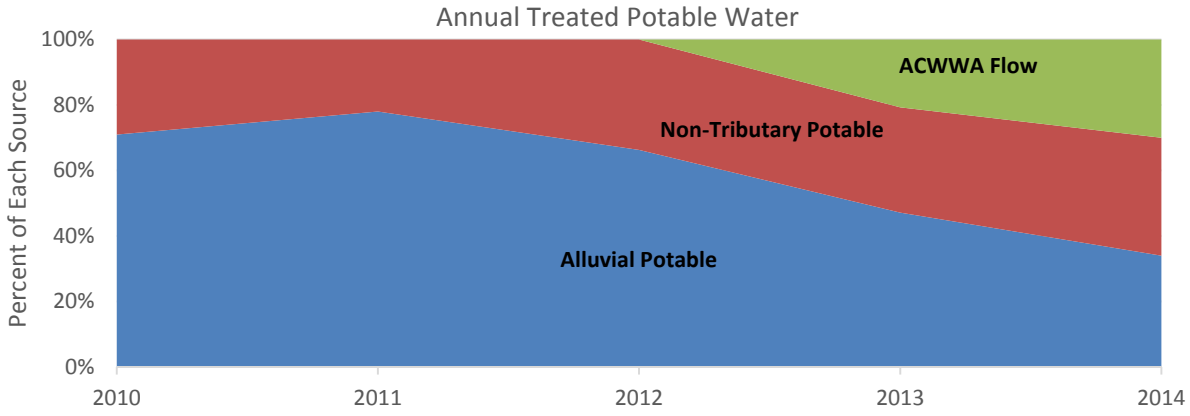

Figure 2.2a: Percentage of Total Potable Water Supply from Each Source

Non-Potable Water

ACWWA has two sources of non-potable water: certain alluvial wells and Reg 84 water. Some of the alluvial wells meet quality standards for drinking water, but have aesthetic issues due to high levels of iron and manganese. These wells have therefore been allocated for irrigation. Non-potable alluvial water goes to the customers that have dual metered systems or irrigation only systems. As shown in **Table 2.2a**, ACWWA's annual non-potable alluvial water deliveries have ranged from 174 to 557 AF with an average of 384 AF. The Reg 84 water is utilized by only a limited number of ACWWA's customers and will be discussed further within the customer categories. Also shown in **Table 2.2a**, ACWWA's annual Reg 84 water deliveries have ranged from 141 to 465 AF with an average of 346 AF.

Historical Metered Use by Customer Category

ACWWA's annual water demand for 2010 - 2014 by customer category is shown in **Table 2.2b**. The total annual billed water usage from 2010 – 2014 ranged from 3,109 to 3,821 AF and averaged 3,396 AF. Also shown in **Table 2.2b** is the residential and total per capita water use, expressed as gallons per capita per day (GPCD). The GPCD is calculated as the residential water use divided by the residential population and the total water use divided by the total population. Total population is defined as the resident population including transient workers and other people utilizing the system on a regular basis but not residing within the service area. **Figure 2.2b** further illustrates the percentage of metered use by each customer category as an average of the years represented in **Table 2.2b**. Each customer category is described in detail in the following table and chart.

Table 2.2b: Annual Metered Water Use by Category

Customer Category	2010	2011	2012	2013	2014	*Average*
	Values in AF unless otherwise stated					
Commercial	1,015	1,071	1,079	1,092	1,114	***1,074***
Commercial Irrigation from Well Sources	1,278	1,390	1,504	1,003	1,079	***1,251***
Residential [(1)]	591	616	660	592	566	***605***
Residential Irrigation from Well Sources	72	76	86	188	59	***96***
Irrigation from Reg 84	141	457	465	320	346	***346***
Construction Hydrant	12	27	26	21	29	***23***
Total billed	3,109	3,637	3,821	3,218	3,193	***3,396***
Non-Revenue	642	732	367	591	817	***630***
Residential Population	12,218	12,334	12,369	12,445	12,506	
Estimated Transient Population	19,183	19,384	19,669	19,917	20,184	
Residential GPCD	43.2	44.6	47.5	42.5	40.4	***43.6***
Residential w/ Irrigation GPCD	48.4	50.1	53.8	56.0	44.6	***50.6***
Total GPCD	88.4	102.4	106.2	88.8	87.2	***94.6***

(1) Much of ACWWA's residential water use includes irrigation water. This skews the Residential GPCD. The Multi-Family units (e.g., apartments) irrigation use is contained within the Commercial or Commercial Irrigation water values.

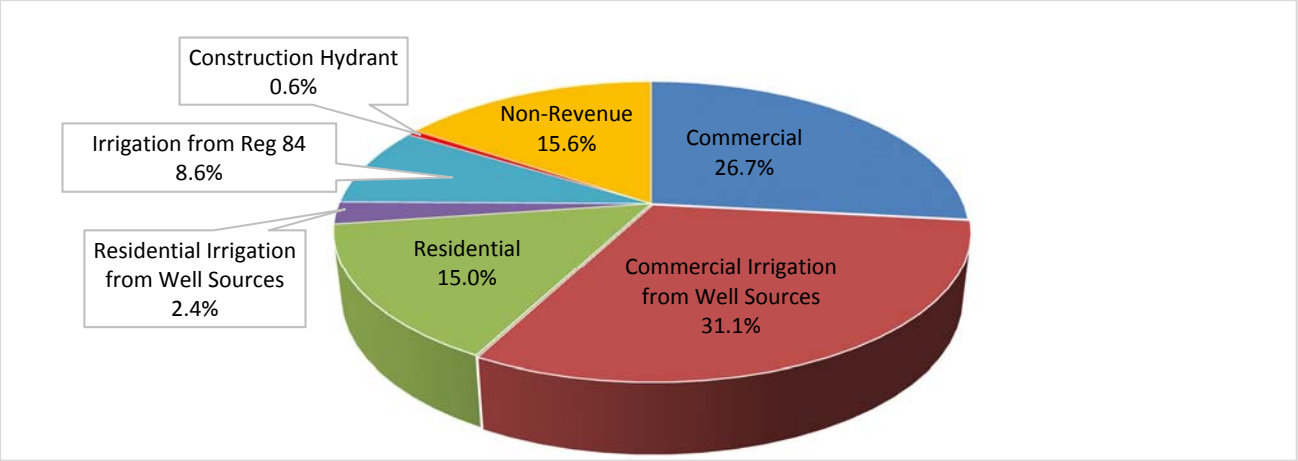

Figure 2.2b: Average Metered Water Use for Customer Categories (2010 – 2014)

Commercial

Commercial water users in the service area include office buildings, hotels, schools, retail stores, restaurants, car washes, and manufacturing and light industrial facilities. A portion of the commercial water users have dual systems that supply both potable water for indoor use and non-potable for irrigation. Non-potable water is not included in this category, but will be included in the following category. The commercial category also includes some very distinct users. Dove Valley, home of the headquarters to a professional football team and its training facilities, is within the service area. Other examples of unique users include, the Arapahoe County Detention Facility and Centennial Airport. Commercial water use is the second largest water use category in the service area. Commercial water use averaged 1,074 AF per year (2010 – 2014) which constituted 26.7% of the raw water produced.

Commercial Irrigation from Well Sources

As mentioned earlier, some commercial users have dual systems. Commercial irrigation from well sources includes both dual system-users as well as consumers whose main need for water is irrigation. For example parks, open spaces, home owner associations (HOAs), business parks, and common landscaping areas are often included in this category. Commercial irrigation from well sources is the largest water use category in the service area. This category averaged 1,251 AF per year (2010 – 2014) which constituted 31.1% of the raw water produced.

Residential

Residential water use includes all residential housing, comprised of single-family homes and multi-family residences (e.g., apartments and condominiums). Depending on the area, residential water use can encompass both indoor and outdoor use. Some residential customers have a dual system available for irrigation, but only the indoor potable water is included in this category for those customers. Overall, residential water use averaged 605 AF for the years 2010 – 2014. This constituted only 15.0% of the raw water produced.

Residential Irrigation from Well Sources

As mentioned in the prior category, some residential customers have a dual system that has metered potable water for indoor use (residential) and metered non-potable water for irrigation (residential irrigation from well sources). From 2010 through 2014, ACWWA supplied an average 96 AF of non-potable water per year to residential irrigation customers. This accounted for 2.4% of the total raw water produced. These customers may include some HOA's depending on how their individual system is set up.

Irrigation from Reg 84

From 2010 through 2014, ACWWA supplied an average 346 AF of Reg 84 water per year for irrigation and other non-potable uses. This accounted for 8.6% of the total raw water produced. The majority of the Reg 84 water is utilized by the Valley Country Club (VCC) Golf Course. The other main customer for Reg 84 water is an apartment complex within the service area. Some discussions have occurred concerning converting the irrigation at other properties to Reg 84, but nothing is included in the current CIP. Future Master Planning efforts are expected to address potential Reg 84 expansion.

Construction Hydrant

ACWWA supplies water from various hydrants for temporary uses such as construction projects and special events. ACWWA supplied an average of 23 AF per year (2010 – 2014) for the construction hydrant category or 0.6% of the total raw water produced. This amount is variable from year to year and depends on the number of construction projects occurring in the service area. Demand for temporary use of water from hydrants is expected to increase in the next few years as commercial development continues to grow.

Non-Revenue Water

Non-revenue water consists of unbilled authorized uses, documented system losses, and unaccounted losses. From 2010 through 2014, 15.6% of all raw water produced by ACWWA wells, ACWWA Flow, and LTCWRF facilities was lost. This constituted an average of630 AF water per year. ACWWA will continue to make an effort to reduce the system losses and increase the efficiency of water distribution.

Indoor and Outdoor Demands

Indoor and outdoor use was estimated using the total usage per month for the five years (2010 – 2014) of data. The total monthly water use during the months December through March was assumed to be associated with indoor use. The basis for this assumption was determined by analyzing monthly use patterns over the previous five years. A daily average for indoor use was calculated by dividing the total winter water use (December through March) by the number of days during the same four month period. The indoor use for the remaining months of the year (April through November) was calculated as the average indoor use per day multiplied by the number of days per month. The outdoor monthly use was assumed to be the difference between the total monthly use and the indoor monthly use. **Figure 2.2c** is a chart depicting the estimated

average monthly indoor and outdoor water use. During the course of an average year from2010 – 2014, outdoor use constituted an estimated 59.5% of the total billed usage.

Because of ACWWA's unique demographics, with a majority of customers fitting into the commercial category, it was determined that the percentage of outdoor use for each category would be beneficial to identify. For example, using the 2010-2014 data, the commercial category has an average total water use of 1,074 AF representing 31.6% of the overall average water consumption; commercial's outdoor use of167 AF only represents 4.9% of the overall water consumption. Irrigation from well sources, including both commercial and residential customers, the largest customer category has an average total water use of 1,347 AF; this represents 39.7% of the overall water consumption. As it stands to reason, because of the nature of the category, irrigation from well sources represents a large portion - 37.5% of the overall average outdoor water consumption. All categories and the percentages represented are presented in **Table 2.2c**. The benefit to analyzing each category in this manner is to identify those areas that may realize the greatest water savings with implemented water efficiency programs. It also assists in pinpointing the types of programs best suited to target those customers. It should be noted that the customer categories represented in Table 2.2c are not the same as Table 2.2b due to data availability.

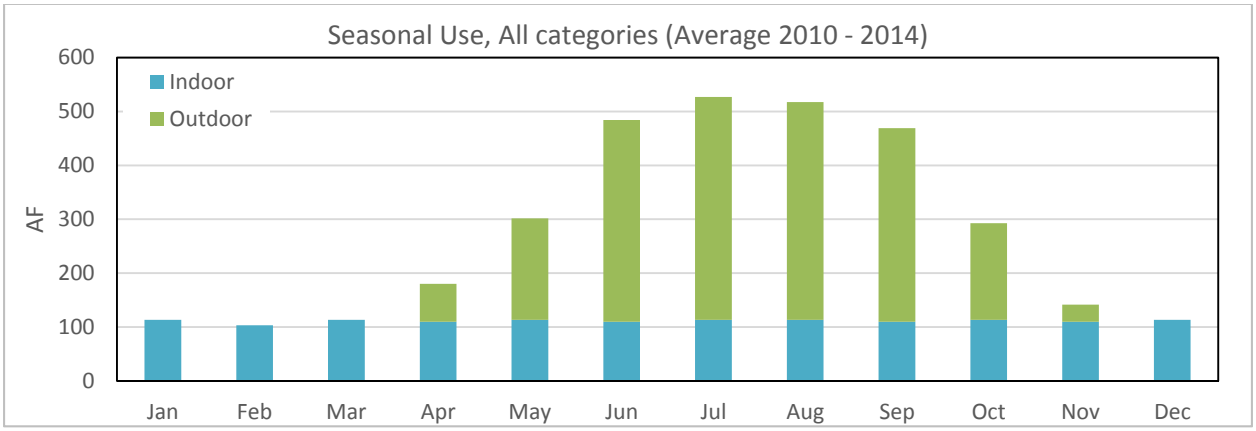

Figure 2.2c: Seasonal Use, Monthly Indoor & Outdoor Water Use

Table 2.2c: Percentage of Indoor, Outdoor, and Total Water Consumed by Each Customer Category

	Percent of Water Used for Outdoor for Each Category	Percent of Overall Water Consumption (outdoor use)	Percent of Overall Water Consumption (indoor use)	Percent of Overall Water Consumption (total use)
Commercial	15.5%	4.9%	***26.7%***	***31.6%***
Residential	40.0%	7.1%	10.7%	17.8%
Irrigation from Well Sources	94.5%	***37.5%***	1.1%	***39.7%***
Irrigation from Reg 84	93.3%	9.5%	0.7%	10.2%
Construction Hydrant	60.9%	0.4%	0.3%	0.7%
Total	59.5%	59.5%	39.4%	100%

2.3 Past and Current Water Efficient Activities and Impact to Demands

Current Water Efficiency Measures

Table 2.3a shows existing and on-going water efficiency activities for ACWWA. As can be seen from the Water Efficiency Activities list, ACWWA is continuously making efforts to improve its foundational activities such as its inclining/tier water rates. ACWWA is in the process of a rate evaluation to determine if adjustments need to be made. ACWWA also strives to encourage its customers to be water conscious by offering incentives such as the high efficiency washing machine rebate and promoting educational activities such as "Conservation Tips" webpage. Even when ACWWA is not able to offer a service, they partner with nearby providers and companies to illustrate water conservation. For example, with the help of the Boy Scouts, ACWWA recently planted a small xeriscape garden near the entrance to their main building (see **Figure 2.3a**). ACWWA also provides website links to the Tagawa Gardens' website, a local greenhouse offering free xeriscape classes.

Table 2.3a: ACWWA's Existing and On-going Water Efficiency Activities

Historical and Current Water Efficiency Activities	Historical Period of Implementation
Foundational Activities	
Submetering for Large Users (Indoor and Outdoor)	*Ongoing*
Frequency of Meter Reading (monthly)	*1987 – present*
Tracking Water Use by Customer Type	*2006 – present*
Upgrade Billing System to Track Use by Sufficient Customer Types	*2006 – present*
Water Rate Adjustments	*In Progress*
Frequency of Billing (monthly)	*1987 – present*
Volumetric Billing	*1990 – present*
Inclining/Tiered Rates	*2001 – present*
Master Plans/Water Supply Plans	*Drafting in next 2 years*
Capital Improvement Plans	*Ongoing*
Water Conservation Coordinator	*2014 – present*
Water Reuse System	*2006 – present*
Targeted Technical Assistance and Incentives	
Irrigation Scheduling/Timing	*Ongoing*
Residential Outdoor Meter Installations	*Ongoing*
Water Efficient Washing Machine Rebates	*2010 – present*
Efficient Irrigation Equipment Rebates (Rain Sensors)	*2010 – present*
Landscape Water Budgets Information and Customer Feedback	*Ongoing*
Dye Tab Give-away	*2008 – present*

Historical and Current Water Efficiency Activities *(cont.)*	Historical Period of Implementation
Ordinances and Regulations	
Water Waste Ordinance (BP 5) (Voluntary unless triggered)	*1992 – present*
Time of Day Watering Restriction (Voluntary unless triggered)	*2002 – present*
Day of Week Watering Restriction (Voluntary unless triggered)	*2002 – present*
Turf Restrictions (BP 9) (Only in Elkhorn)	*Ongoing*
Education Activities	
Bill Stuffers	*2006 – present*
Web Pages	*2006 – present*
Message Development/Campaign	*Ongoing*
Xeriscape Demonstration Gardens and Classes (Tagawa Gardens is within the ACWWA service area and provides classes; these are not directly run by ACWWA). Linked on website.	*2006 - present*
Water Conservation Expert Available (in conjunction with South Metro Water Authority)	*2000 – present*

Figure 2.3a: Xeriscape Demonstration Garden at ACWWA

Water conservation occurs from both passive savings and active programs. Passive savings are those correlated with changes made by customers without a utility incentive. Examples of these could be replacing old inefficient fixtures with newer more

efficient models. Active programs, on the other hand, are like those listed in **Table 2.3a** that have been initiated by the utility, in this case ACWWA.

Numerous factors can contribute to overall water usage, so it is difficult to pinpoint the greatest contributor to increases and decreases in usage. Drought and drought restrictions (e.g., droughts of 2002, 2006, and 2012) will reduce water usage considerably. An improving economy will often include additional construction and overall increase in total water use. Some other factors may include tourism, floods such as those in September of 2013, and other significant events.

Water Savings Estimates of Individual Activities

Although ACWWA had several water efficiency programs and activities in place, mechanisms were not in place to track their annual water savings. Recycling Water Treatment Plant (WTP) filter backwash was estimated by the number of filter cleanings that occur during the typical year. Estimates of the recycling WTP backwash are presented in **Table 2.3b**. Washing machine rebates were tracked by customer participation and potential water savings. The results of the rebate program is summarized in **Table 2.3c**.

Table 2.3b: Water Savings Estimates for Recycling WTP Filter Backwash

Current Water Efficiency Activity	Estimated Accumulated Annual Water Savings for Five Years (AF)					Total Five-Year Water Savings (AF)	*Average Annual Savings (AF)*
	2010	***2011***	***2012***	***2013***	***2014***		
Recycling WTP Filter Backwash at LTCWRF	117	379	386	266	287	**1,436**	**287**

Table 2.3c: Water Savings Estimates for Washing Machine Rebates

Current Water Efficiency Activity	Estimated Accumulated Annual Water Savings for Five Years (AF)					Total Five-Year Water Savings (AF)	*Average Annual Savings (AF)*
	2010	***2011***	***2012***	***2013***	***2014***		
Washing Machine Rebates; estimated savings	0.21	0.27	0.37	0.43	0.46	**1.75**	***0.35***
Other Washing Machine Rebate Demographic Information							
Category	***2010***	***2011***	***2012***	***2013***	***2014***	**Total (rebates)**	***Average/ Weighted Average***
Number of Rebates	36	17	23	17	4	**97**	***19.4***
Average Number of Wash Loads per Household	4.5	4.3	4.7	4.4	3.5		***4.58***

Recycling Wastewater Treatment Plant Filter Backwash

Since being commissioned in June of 2008, the LTCWRF has been recycling the water it uses to clean its filters. The facility treats an average of 2.4 MG per day of wastewater. The facility is located next to Cherry Creek Reservoir. A portion of the water treated by LTCWF is also returned into the Reg 84 system. This measure is essential for conserving water and for alleviating demand on the potable water supplies.

Rebate for High Efficient Washing Machines

Since 2010, ACWWA has offered $100 rebates customers who purchased a new high-efficient clothes washer. Qualifying washing machines must meet an energy star water factor rating of 6.0 or less. A large portion, 46%, of the customers heard about the program through information from appliance stores. Another significant portion of the customers,40%, were made aware of the rebate program through ACWWA's website or other communication efforts by ACWWA such as newsletters, flyers, bill stuffers, etc. It is estimated that the washing machine rebate program has saved 1.75 AF or over 0.5 million gallons of water over the five years of implementation. Of the 97 rebates given, 23 rebates were for new homes as reported by the customers receiving rebates. Those 23 rebates were not used for calculating the estimates in water savings.

Water Savings Estimates Using Demand Data

Despite the resources available to estimate water savings, the savings of activities which are highly dependent on human behavior (e.g. public education programs) are much more difficult to quantify. In many cases they cannot be estimated with reasonable accuracy. Because data acquisition has been inconsistent or was unavailable for years prior to 2010, overall trends of usage are difficult to determine due to the small quantity of data.

Although more usage data is needed to show clear and overall trends, water consumption can vary considerably year to year. **Figure 2.3b** shows the estimated residential GPCD for the years 2010 – 2014. There is a large spike in use during 2012, which was a very dry year. **Figure 2.3b** also shows the pumping data for nearly 20 years and how it has varied. It is likely that the pumping data does not directly line up with the same spike as the residential customers due to a reduction in commercial customers during that time. Commercial customers historically consume a much larger percentage of the total water supplied by ACWWA.

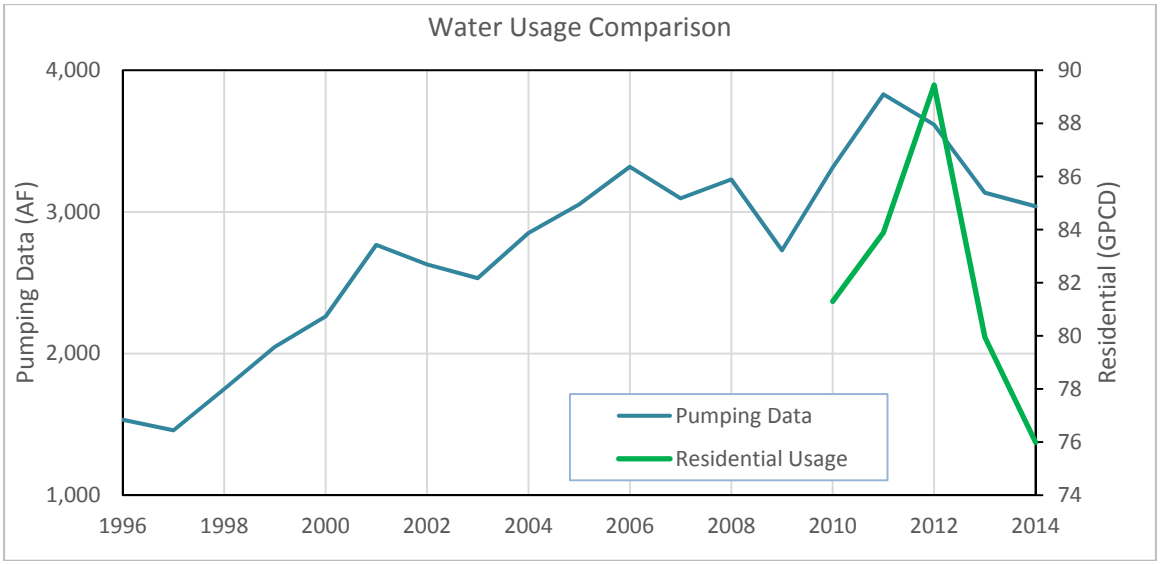

Figure 2.3b: Water Usage Comparison

Other area water providers with data extending further back than 2010 have indicated that much of the variability in the water usage can easily be linked to the variances in the climate. As a comparison, both the average yearly temperature and total precipitation are shown for several years in **Figure 2.3c**. When the spike in usage occurred in 2012, there was a combination effect of higher than average temperatures along with extremely low precipitation. As ACWWA continues to gather and record data, a clearer overall picture should appear.

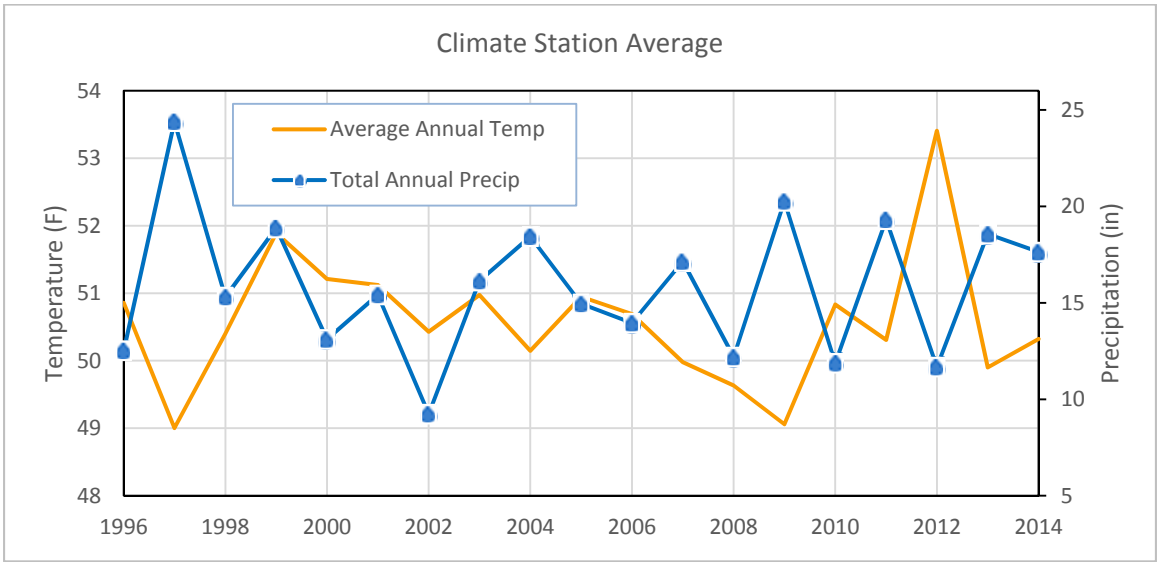

Figure 2.3c: Nearby Climate Data

2.4 Demand Forecasts

Population estimates for the previous 20 years and projected population for the next 10 years are presented in **Table 2.4a**. The data is shown in five year increments and illustrated by way of TE's in **Figure 2.4a**. A conservative future estimate was developed

by ACWWA's staff. The staff based these estimates on the general growth trend of the service area following the recent recession and economic recovery. An estimated 250 TE's per year was used as a higher growth rate. Most of the areas zoned for residential use are close to buildout in the service area, so it is estimated that the majority of the growth in the future years will be in the commercial and commercial irrigation categories.

Table 2.4a: ACWWA Residential Population and TE Growth in Five Year Increments

Year	Estimated Residential Population	Total Tap Equivalents	Average Yearly TE Growth Rate
1995	3,446	1,803	-
2000	7,192	3,763	16.8%
2005	10,718	5,608	8.4%
2010	12,218	6,282	2.3%
2015	12,977	6,790	1.6%
2020	14,093	8,040	3.4%
2025	14,816	9,290	2.9%

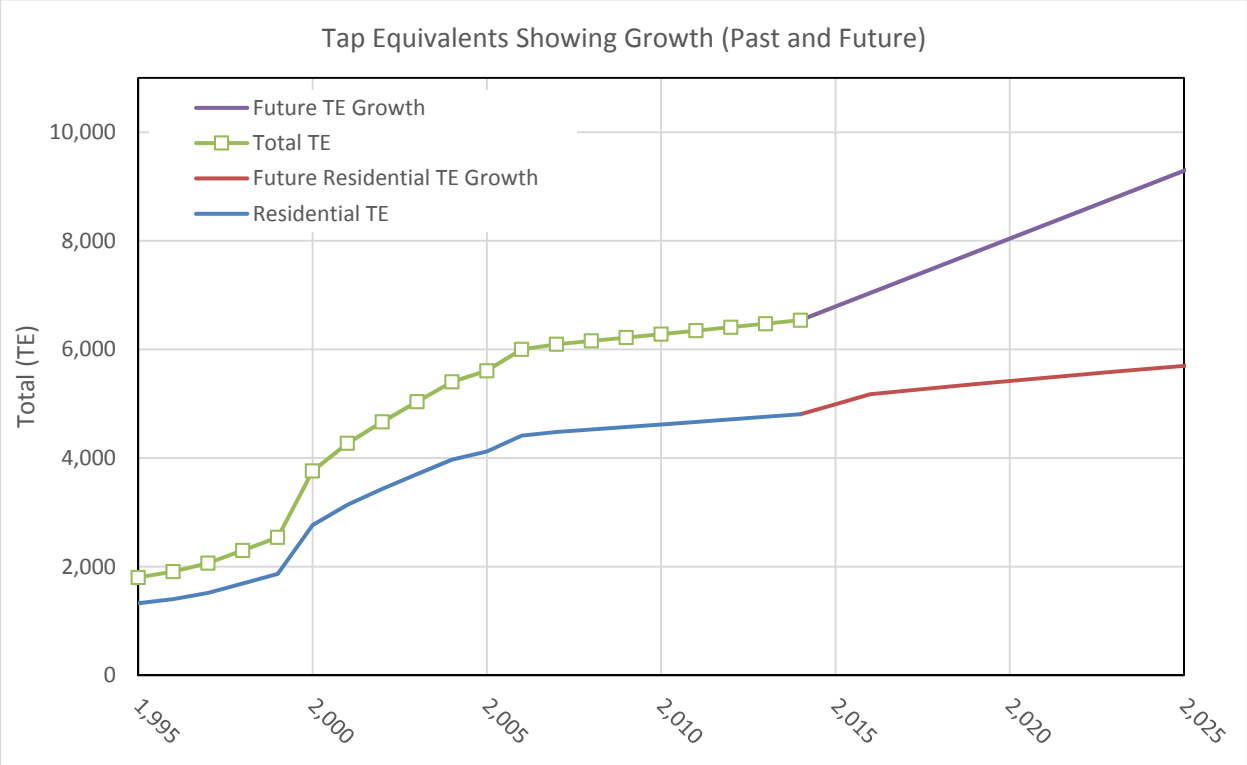

Figure 2.4a: ACWWA Population (TE) Growth

Determining water demand forecasts for ACWWA is difficult because of the varied customer base. There are several potential ways to estimate future use including approximating square footage of service area and calculating future use based on those

estimations. For this Plan, previous usage patterns, ongoing planning efforts, and various other sources were evaluated and utilized to project future use. TE's were used to quantify the water demand for each of the customer categories. TE's were then converted to average day use per tap by using a factor of approximately 450 gpd/TE (or 0.50 AF per year per TE). **Table 2.4b** shows the forecast of residential population, total TE's for all categories, and water demands for the planning horizon of this Plan (year 2024). As mentioned earlier, residential areas are nearly built out and therefore residential and residential irrigation are expected to taper off in the near future. The commercial and irrigation categories, however, are not expected to reach buildout during the planning horizon of the MWEP.

As part of this plan, a baseline demand forecast has been estimated. The baseline is unchanged from overall current use patterns. The baseline does not incorporate any future water conservation or efficiency activities. As is shown in **Table 2.4c**, it is anticipated that the majority of treated water will continue to be used by the commercial and commercial irrigation customer categories. Some growth and therefore demand is anticipated in all categories with varying percentages representing each customer category. Estimations for residential population, TE's, and demand projections were determined from information and input provided by ACWWA, the 2014 Alan J. Leak Report, and the 2006 WCP.

Table 2.4b: Demand Projections

Year	Residential Population	Total Tap Equivalents (TE)	Avg Day Demand (mgd)	Total Raw Water Demand (AF)
2015	12,977	6,790	3.03	3,395
2016	13,455	7,040	3.14	3,520
2017	13,620	7,290	3.25	3,645
2018	13,781	7,540	3.37	3,770
2019	13,939	7,790	3.48	3,895
2020	14,093	8,040	3.59	4,020
2021	14,243	8,290	3.70	4,145
2022	14,391	8,540	3.81	4,270
2023	14,535	8,790	3.92	4,395
2024	14,677	9,040	4.04	4,520

Table 2.4c: Demand Projections for Customer Categories

Year	Total Treated Water Demand (AF)	Commercial (AF)	Commercial Irrigation from Well Sources (AF)	Residential (AF)	Residential Irrigation from Well Sources (AF)	Irrigation from Reg 84 (AF)	Construction Hydrant (AF)
2015	2,864	804	1,055	598	95	292	19
2016	2,969	852	1,094	604	96	303	20
2017	3,075	900	1,133	611	97	313	21
2018	3,180	948	1,172	617	98	324	22
2019	3,286	996	1,210	623	99	335	22
2020	3,391	1,044	1,249	629	100	345	23
2021	3,496	1,092	1,288	635	101	356	24
2022	3,602	1,140	1,327	642	102	367	25
2023	3,707	1,187	1,366	648	103	378	25
2024	3,813	1,235	1,405	655	104	388	26

3.1 Water Efficiency and Water Supply Planning

Forecasted Modified Water Demands

A modified demand forecast that includes the impacts of the proposed water efficiency activities is shown in **Figure 3.1a** and summarized in **Table 3.1a**. Under the revised forecast it is estimated that total demands in 2024 will be about 1,125 AF greater than in 2015. By the end of the planning period, it is estimated that ACWWA will see a savings of 565 AF annually. This represents 565 AF of savings above savings if no new water efficiency activities were implemented. ACWWA plans to accomplish this level of water efficiency by continuing successful programs such as Reg 84 water reuse and washing machine rebate programs. Additionally, ACWWA will repeat important programs such as the use of a water efficient rate study and Update, as well as implementing new programs such as the leak detection and repair service, and ultra-high-efficiency toilet upgrade service). Projected water savings is expected to be seen due to a steady reduction of per capita or per TE use. Overall raw water demand, however, will continue to increase.

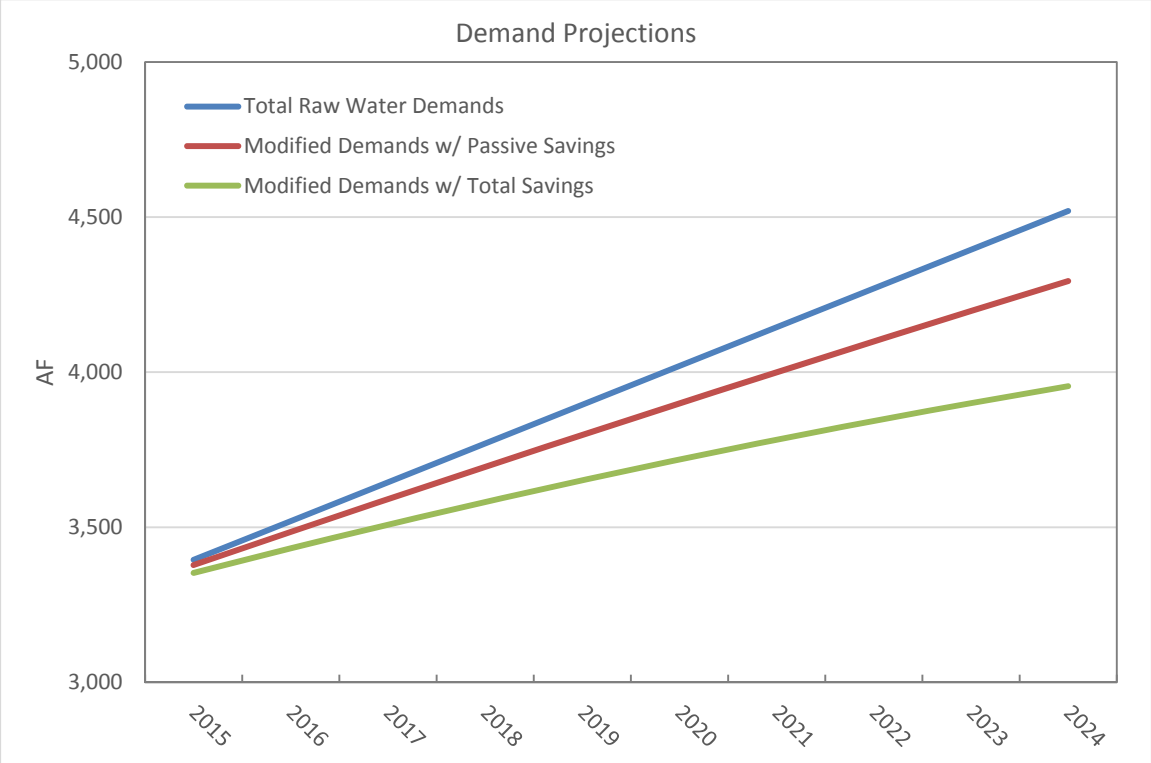

Figure 3.1a: Demand Projections with Modified Demands

Table 3.1a: Demand Projections – Unmodified and Modified

Year	Unmodified Raw Water Demands (AF)	Raw Water Demand with Passive Savings (AF)	Raw Water Demands with Combination Savings (AF)
2015	3,395	3,378	3,353
2016	3,520	3,485	3,432
2017	3,645	3,590	3,508
2018	3,770	3,695	3,581
2019	3,895	3,798	3,651
2020	4,020	3,899	3,718
2021	4,145	4,000	3,782
2022	4,270	4,099	3,843
2023	4,395	4,197	3,900
2024	4,520	4,294	3,955
Savings		5.0%	12.5%
Increase from 2015	1,125	916	602
Difference from Unmodified		226	565

Impacts to Future Water Facilities and Supply Acquisitions

Water efficiency planning is very important to ACWWA. The benefits of this water efficiency planning effort may include:

- Freeing up water supplies for increased growth and development
- Additional water to cover shortages in droughts or other emergency situations
- Delaying purchase of additional water supplies

3.2 Water Efficiency Goals

Water efficiency goals are intended to lay out a set of targeted objectives that if accomplished will result in the identified benefits. A preliminary set of goals were developed prior to the selection of the water efficiency activities in order to provide a means to screen and evaluate the selected activities. Goals from ACWWA's 2006 WCP have been assessed and incorporated into the new goal development process.

A meeting was initially held with staff to discuss water efficiency goals appropriate for ACWWA. The following preliminary goals were established by staff:

- In keeping with the savings goal established in ACWWA's 2006 Water Conservation Plan, the targeted water savings goal for this plan will be to lower the total water use by 10% over the ten-year planning period.
- The targeted 10-year water savings goals for the following customer categories were identified as follows:
    - Commercial: 5.0%

    - Commercial Irrigation from Well Sources: 8.0%
    - Residential: 10.0%
    - Residential Irrigation from Well Sources: 15.0%
    - Irrigation from Reg 84: 15.0%
    - Construction Hydrant: 1.0%
    - Non-Revenue Water: 20.0%
- To develop a water efficiency program that can be implemented within staffing constraints and with staff approval.
- To implement water efficiency activities that are compatible with the community and ACWWA Board members.

The success of the stated goals will be measured through monitoring of billing data, screening and evaluating activities that are acceptable to staff, and soliciting Board member and community feedback on water efficiency activities.

SECTION 4.0 – SELECTION OF WATER EFFICIENCY ACTIVITIES

4.1 Summary of Selection Process

ACWWA used a four-phase process for selecting and fully evaluating water efficiency activities. The four phases include: 1) assessment; 2) identification; 3) qualitative screening; and 4) evaluation and selection.

Assessment, Identification, and Qualitative Screening

Using the analysis presented in Section 2.3, ACWWA staff identified areas where water efficiency could be enhanced. With the water saving success of the Reg 84 water reuse system and the benefits of the automatic meter reading (AMR) system, ACWWA would like to continue and expand these activities as well as include a number of others. In addition to the activities listed above, ACWWA generally wants to focus on activities that assist with meeting their water efficiency goals.

Worksheets D-G from the *Municipal Water Efficiency Plan Guidance Document* were utilized to identify a list of water efficiency activities that are generally compatible with ACWWA's needs. A copy of Worksheets D-G can be found in **Appendix D** of this report. Other worksheets from the guidance document utilized within the production of this Plan are also included in **Appendix D**.

The list of activities evaluated are organized according to the SWSI Levels Framework. The SWSI Levels Framework was developed as a component of the 2010 SWSI update to organize water efficiency activities into a model that assists municipalities in prioritizing and selecting activities. The framework may be represented as a cylinder consisting of the following four categories, which are represented in **Figure 4.1a**.

SWSI Levels Framework includes the following levels of water efficiency activities:

- **Foundational Activities** – These activities focus on system operations and water efficiencies that are under ACWWA's direct control and can improve the effectiveness of planning efforts by ensuring sufficient metering and data tracking.
- **Targeted Technical Assistance and Incentives** – These measures cover activities that ACWWA and its customers can do to improve existing water efficiency.
- **Ordinances and Regulations** – These measures include regulatory activities designed to encourage water efficiency.
- **Education Activities** – These efforts educate the public on the benefits of water efficiency, inform customers on how they can reduce their water usage, and publicize water efficiency activities that ACWWA is implementing.

Further discussion regarding the SWSI Levels Framework are provided in subsequent sections.

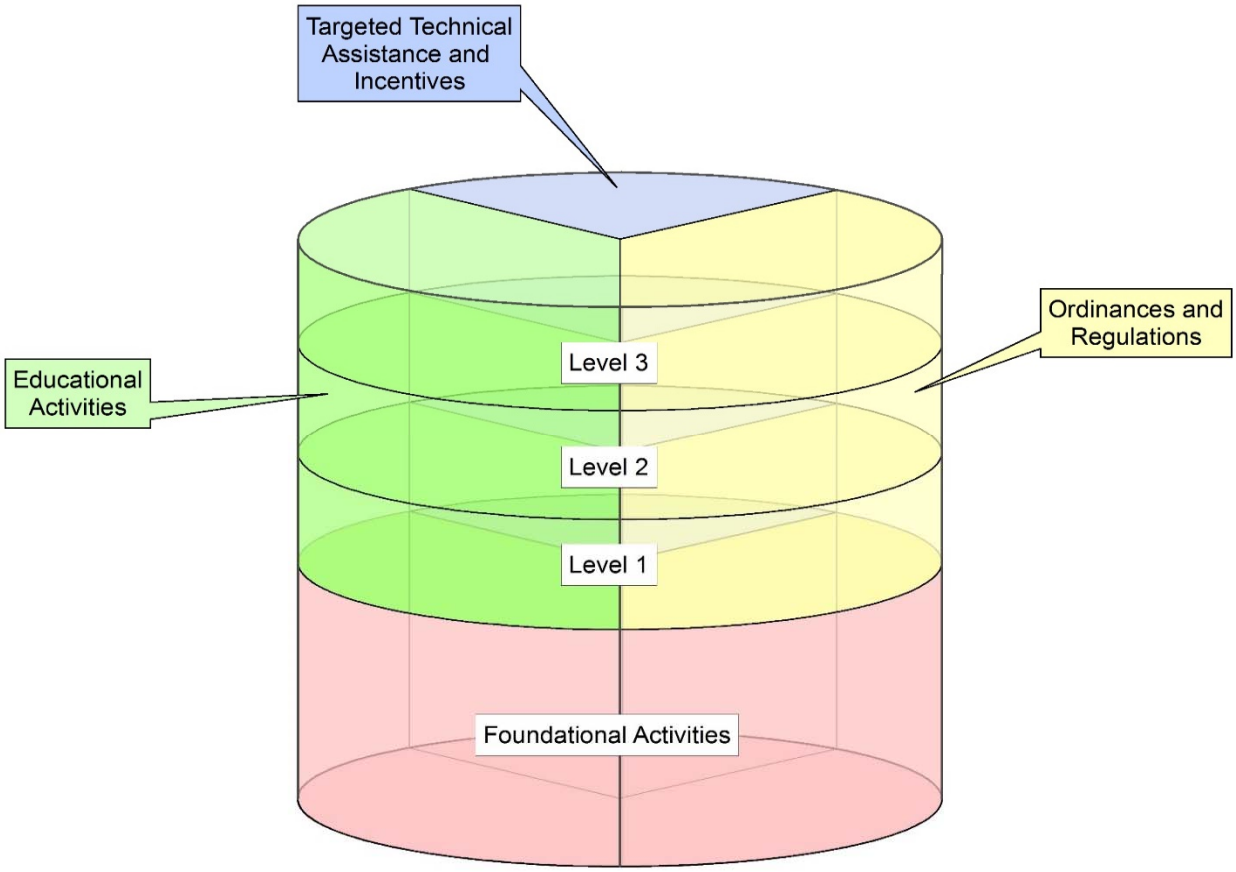

Figure 4.1a: SWSI Levels Framework

Staff developed qualitative initial screening criteria used to evaluate the preliminary list of activities. Some activities were not feasible at this time and therefore eliminated. The screening criteria included:

- Be within ACWWA's ability to implement
  - Since ACWWA is not a city or town municipality, it has many limitations on what kind of policies and ordinances it is able to enforce.
- High start-up costs
  - Because of the demographics of ACWWA, the area it serves suffered considerably during the 2009 economic downturn. The area has continued to see recovery, but budgets are still limited.
- Significant administration time constraint
  - ACWWA has limited staff in which to dedicate to new programs.
- Not applicable to ACWWA
  - Some programs and activities do not apply to ACWWA because of its demographics, locality, or other factors.

Evaluation and Selection

The evaluation and selection phase of the selection process involved development of evaluation criteria, evaluation of the activities, and selection of the final activities for implementation. The evaluation criteria included:

- Cost effectiveness and budgetary considerations
- Ease of implementations
- Public acceptance
- Consistency with other programs and policies
- Staff and Board approval

4.2 Water Efficiency Activities

The initial screening of the water efficiency activities with staff resulted in the selection of 22 candidate activities for further evaluation. Eliminated activities may be reevaluated with future planning efforts. Some of the activities were combined within their SWSI Levels Framework to assist in evaluation and avoid double counting savings. The benefits and costs of the initially-selected measures and programs are shown in **Table C1** in **Appendix C**. The programs that were eventually eliminated with reasons for the elimination are highlighted in yellow. Details about the cost-benefit evaluation and information about each measure can be found in **Appendix E**.

4.3 Selection of Activities for Implementation

The second screening was accomplished by evaluating each activity based on the evaluation criteria discussed in Section 4.1. Those criteria were: cost effectiveness and budgetary consideration, ease of implementations, public acceptance, consistency with other programs and policies, staff and Board approval. Of the 22 original activities evaluated, 16 of those activities were chosen for implementation. Details about the final 16 activities chosen can be found in the following descriptions.

<u>Foundational Activities</u>

- **Meter Testing and Replacement/Meter Upgrades**
  Existing meters are tested periodically for leaks and accuracy and are replaced with upgrades on an as needed basis. Faulty meters account for apparent losses (i.e. losses due to meter inaccuracies) and real losses (also known as physical losses). ACWWA hopes to make a more proactive effort to test and replace meters on a more regular basis.
- **Control of Apparent Losses (with Metering)**
  This measure would entail utilizing existing meters as well as adding additional meters to determine where system losses are occurring. This measure is often coupled with system wide water audits since they have similar benefits. Metering assists in the auditing process.
- **System Wide Water Audits**
  ACWWA plans to utilize the American Water Works Association M36 methodology for system wide water audits. By pairing the audits with other measures such as metering, ACWWA hopes to better identify unmetered and

unbilled treated water uses to assess where losses are occurring and how losses can be best addressed. These losses are considered non-revenue water.

- **Automatic Water Meter Reading Installation and Operations**
  For the last several years ACWWA began installing an Automatic Meter Reading (AMR) system that also has the capability of being transitioned to an Automatic Metering Infrastructure (AMI). The AMR system currently covers approximately 25% of the customers. At the time of this report, no AMI updates had been performed. ACWWA hopes to continue with the installation of the AMR meters and look further into the AMI capabilities. Once installed and upgraded, the AMI system would allow water meters to be read hourly. Yet another update to the system and meters would allow water customers to view and manage their water usage through customer interaction software and web access. These types of systems offer a secure website where customers can set up alerts for notification on possible water leaks, irrigation usage issues, promote water conservation, set monthly water usage budgets, and receive alerts if a set budget is going to be exceeded.
- **Water Reuse System**
  Beginning in 2005, ACWWA began building and implementing its water reuse system or Reg 84 system. It was first utilized by the Valley Country Club (VCC). Some of VCC's deliveries predate the 2005 upgrades when an alternative method for applying non-tertiary treated effluent to the land was used. Since then the Reg 84 system has been expanded to other customers, but VCC is typically its largest consumer. Although the water reuse system does not directly conserve water by reducing water demands, the system allows for water to be used a second time for a demand that would otherwise require additional capacity. This non-potable system has had some expansion since it was implemented, but there are plans for further expansion.
- **Water Efficiency Rate Structure with Regular Updates to Rates Study**
  ACWWA is in the process of evaluating its water and wastewater rate structure. An outside firm, Carollo Engineering, was contracted to perform this study. In addition, ACWWA hopes to perform an internal evaluation on an annual or biennial basis to determine if rate adjustments are needed. ACWWA believes it is better to incorporate small rate increases over time rather one large increase after several years of no increase. ACWWA's current rate structure prior to the Carollo study and other fees are presented in **Tables 4.3a**, **4.3b**, and **4.3c**. The Board is considering the rates represented in Blocks 3 and 4 in 2016 for 2017.

Table 4.3a: ACWWA's Single Family Rate Structure

Single Family Residential Rates and Fees
There will be a monthly service fee of $41.04 plus a monthly volume charge per 1,000 gallons as follows:

Usage gal/month	From	To	Rate
Block 1	0	4,000	$3.58
Block 2	4,001	10,000	$4.48
Block 3	10,001	30,000	$5.59
Block 4	30,001	Above 30,001	$7.00

Table 4.3b: ACWWA's Multi-Family, Commercial and Industrial Water Service Fees

Multi-family, Commercial and Industrial Water Service Fee (Water & Irrigation) A monthly water service fee will apply to all multi-family, commercial and industrial customers based on meter size as follows:			
Meter Size	**Monthly Service Fee**	**Meter Size**	**Monthly Service Fee**
¾"	$41.04	3"	$738.58
1"	$82.06	4"	$1,559.20
1 ½"	$164.12	6"	$2,954.27
2"	$328.24		

Table 4.3c: ACWWA's Multi-Family, Commercial, and Industrial Water Service Block Rate Structure

Meter Size	¾"	1"	1 ½"	2"	3"	4"	6"
Block Determination Chart							
Block 1 to	40,000	40,000	40,000	90,000	252,000	288,000	1,620,000
Block 2 from	40,001	40,001	40,001	90,001	252,001	288,001	1,620,001
Block 2 to	100,000	100,000	100,000	225,000	672,000	768,000	2,700,000
Block 3 from	100,001	100,001	100,001	225,001	672,001	768,001	2,700,001
Block 3 to	300,000	300,000	300,000	600,000	1,320,000	1,344,000	3,960,000
Block 4	>300,001	>300,001	>300,001	>600,001	>1,320,001	>1,344,001	>3,960,001
Fee per 1,000 gallons based on Block Determination							
Block 1	$4.12	$4.12	$4.12	$4.12	$4.12	$4.12	$4.12
Block 2	$5.15	$5.15	$5.15	$5.15	$5.15	$5.15	$5.15
Block 3	$6.44	$6.44	$6.44	$6.44	$6.44	$6.44	$6.44
Block 4	$8.06	$8.06	$8.06	$8.06	$8.06	$8.06	$8.06

- **Leak Detection and Repair**
  Currently ACWWA addresses leaks as they become apparent or are brought to staff's attention. ACWWA hopes to take a more proactive approach. Initially this effort would likely involve an outside firm to electronically detect leaks throughout the system. The goal would be to incorporate leak detection and repair into ACWWA's overall program to reduce losses.
- **Recycling Water Treatment Plant Filter Backwash**
  ACWWA estimates 95% of the backwash at the LTCWRF is recycled back into the treatment process. This accounts for an average of 287 AF per year that would otherwise go directly into the river.
- **Water Conservation Officer**
  Katie Spahr currently holds the position of Water Resource Engineer at ACWWA. A portion of her job description incorporates the duties of a Water Conservation Officer.
- **Master Plans/Water Supply Plans**
  ACWWA has seen many benefits in developing, updating, and evaluating Master Plans, Water Supply Plans, Capital Improvement Plans, and Water Efficiency Plans. These plans have increased ACWWA's awareness of activities and

programs they can incorporate to help play their part in this region's overall need for water efficiency.

Targeted Technical Assistance and Incentives

- **Residential and Commercial Ultra-High-Efficiency Toilet Upgrade Service**
  ACWWA plans to participate in the ultra-high-efficiency toilet upgrade service offered by the Center for ReSource Conservation (CRC). The CRC is a non-profit organization that offers several water efficiency programs and activities for municipalities and water providers. CRC has found that participation in the upgrade service is better received over rebate programs because the participants will have a toilet installed immediately versus sending in a rebate and installing the toilet themselves. According to CRC's website, participants can "Save thousands of gallons of water per year with the breakthrough technology of the Niagara Stealth Toilet."
- **Water Efficient Washing Machine Rebates**
  As mentioned in Section 2.3, rebates are offered by ACWWA for water efficient washing machines. This program was established in 2010 and has been fairly popular with ACWWA customers. There have been an average of 20 participants per year. It is estimated that over 0.5 million gallons of water have been saved since the program's implementation.
- **Rebates for ET Irrigation System Controllers**
  Although it has not been as well utilized, ACWWA also offers a rebate to customers who install rain sensors on their irrigation controllers. ACWWA will provide a rebate to water account customers covering up to 50% of the purchase price on the cost of a rain sensor. The maximum rebate amount is $50 and installation costs are not covered.

Ordinances and Regulations

- **Time of Day Watering Restrictions**
  Watering restrictions are voluntary and recommended even when a drought contingency plan is in place. ACWWA continues to encourage its customers to use water wisely. During times of drought, ACWWA has four stages of contingencies outlined and ready to put in place depending on the severity of the water shortage. For a complete copy of the "Water Conservation Response Plan", please see **Appendix B**.

Educational Activities

- **General Educational Activities**
  These general educational activities include: bill stuffers, newsletters, newspaper articles, mass mailings, and webpages offering water efficiency and other information. For ease of evaluating and avoiding overlap of the costs and benefits, these activities were combined into the one category. ACWWA hopes to make a much stronger effort to communicate and educate its customers. ACWWA realizes that other activities will be better received and utilized if its customers understand the objectives and motivations behind the decisions and changes.

- **Landscape Design (Xeriscape) and Maintenance Classes**
  Although ACWWA does not offer any classes at this time, Tagawa Gardens) provides classes. Tagawa Gardens is located within the service area. ACWWA has a link on their website for interested parties to sign up for the classes and is exploring options of partnering with Tagawa Gardens on other efforts. ACWWA is also interested in participating in the "Garden in a Box" program offered by CRC.

Comparison of Costs and Benefits

As shown in **Table C1**, the estimated cost for the evaluated activities varied from $0.04 per 1,000 gallons for the *"recycling WTP filter backwash"* to $155.09 per 1,000 gallons for the *"water line replacement program".* The 16 selected water efficiency activities and associated water savings were arranged within the targeted customer categories to more easily compare the anticipated savings to the original goals. Some of the measures contribute savings to more than one category. **Table 4.3d** shows the water savings for the selected activities, sub-totaled for each category.

Table 4.3d: Combined Water Savings of Selected Water Efficiency Activities

Conservation Measures and Programs	Estimated Annual Water Savings (MG)	Estimated Total Water Savings over Planning Period (MG)
Non-Revenue Water		
Meter Testing and Replacement/Meter Upgrades	5.0	50
Control of Apparent Losses (with Metering)	4.0	40
System Wide Water Audits	5.0	50
Automatic Water Meter Reading Installation and Operations	2.0	20.2
Leak Detection and Repair	10.1	101
Recycling Water Treatment Plant Filter Backwash	70.0	700
Water Conservation Officer	0.2	2
Master Plans/Water Supply Plans	0.5	5
Subtotal (MG)	**96.9**	**969**
Subtotal (AF)	**297.4**	**2,974**

Conservation Measures and Programs *(cont.)*	Estimated Annual Water Savings (MG)	Estimated Total Water Savings over Planning Period (MG)
Commercial		
Automatic Water Meter Reading Installation and Operations	1.7	17
Water Reuse System	1.7	17
Water Efficiency Rate Structure with Regular Updates to Rates Study	3.3	33
Water Conservation Officer	0.3	3
Master Plans/Water Supply Plans	0.8	8
Residential and Commercial Ultra-High-Efficiency Toilet Upgrade Service	0.5	27
Time of Day Watering Restrictions	0.3	3
Education Activities (Combined areas not including Landscape Design category)	0.8	8
Subtotal (MG)	**9.4**	**116**
Subtotal (AF)	**28.8**	**355**
Commercial Irrigation from Well Sources		
Automatic Water Meter Reading Installation and Operations	4.0	40
Water Reuse System	6.0	60
Water Efficiency Rate Structure with Regular Updates to Rates Study	6.0	60
Water Conservation Officer	0.4	4
Master Plans/Water Supply Plans	1.0	10
Time of Day Watering Restrictions	2.0	20
Education Activities (Combined areas not including Landscape Design category)	1.0	10
Landscape Design (Xeriscape) and Maintenance Classes	0.1	5
Subtotal (MG)	**20.5**	**209**
Subtotal (AF)	**63.0**	**643**

Conservation Measures and Programs *(cont.)*	Estimated Annual Water Savings (MG)	Estimated Total Water Savings over Planning Period (MG)
Residential		
Automatic Water Meter Reading Installation and Operations	5.1	51
Water Reuse System	2.0	20
Water Efficiency Rate Structure with Regular Updates to Rates Study	10.2	102
Water Conservation Officer	0.2	2
Master Plans/Water Supply Plans	0.5	5
Residential and Commercial Ultra-High-Efficiency Toilet Upgrade Service	0.0	2
Water Efficient Washing Machine Rebates	0.03	2
Rebate for ET Irrigation System Controllers	0.002	0.1
Time of Day Watering Restrictions	0.4	4
Education Activities (Combined areas not including Landscape Design category)	3.1	31
Landscape Design (Xeriscape) and Maintenance Classes	0.00	0.2
Subtotal (MG)	**21.6**	**219**
Subtotal (AF)	**66.3**	**672**
Residential Irrigation from Well Sources		
Automatic Water Meter Reading Installation and Operations	1.0	10
Water Reuse System	0.5	5
Water Efficiency Rate Structure with Regular Updates to Rates Study	1.6	16
Water Conservation Officer	0.03	0.3
Master Plans/Water Supply Plans	0.1	0.8
Rebate for ET Irrigation System Controllers	0.003	0.2
Time of Day Watering Restrictions	0.2	2
Education Activities (Combined areas not including Landscape Design category)	0.5	4.9
Landscape Design (Xeriscape) and Maintenance Classes	0.01	0.5
Subtotal (MG)	**3.9**	**39**
Subtotal (AF)	**11.8**	**120**

Conservation Measures and Programs *(cont.)*	Estimated Annual Water Savings (MG)	Estimated Total Water Savings over Planning Period (MG)
Irrigation from Reg 84		
Automatic Water Meter Reading Installation and Operations	0.6	6
Water Reuse System	1.1	11
Water Efficiency Rate Structure with Regular Updates to Rates Study	2.2	22
Water Conservation Officer	0.1	1
Master Plans/Water Supply Plans	0.3	3
Time of Day Watering Restrictions	0.6	6
Education Activities (Combined areas not including Landscape Design category)	0.3	3
Landscape Design (Xeriscape) and Maintenance Classes	0.2	9
Subtotal (MG)	**5.3**	**60**
Subtotal (AF)	**16.2**	**185**
Construction Hydrant		
Water Reuse System	0.04	0.4
Water Efficiency Rate Structure with Regular Updates to Rates Study	0.02	0.2
Water Conservation Officer	0.01	0.1
Master Plans/Water Supply Plans	0.02	0.2
Subtotal (MG)	**0.08**	**0.81**
Subtotal (AF)	**0.25**	**2.50**
Grand Total (MG)	***158***	***1,613***
Grand Total (AF)	***484***	***4,951***

These savings were compared to the original goals set in Section 3. **Table 4.3e** compares the anticipated water savings from the selected activities with the original goals, then adjusts the water saving goals for this plan. Over the 10-year planning period, the selected activities provide an overall estimated water savings of 5,330 AF. The preliminary goals were adjusted as the cost-benefit calculations were analyzed. The adjusted goals reflect what is believed to be obtainable by staff. After the goals were adjusted to reflect the expected water savings, estimated water use reduction is 12.5%. Therefore, ACWWA will target an overall reduction of water use by 12.5% over the planning period because of implementation of this plan.

Table 4.3e: Water Efficiency Goals Comparison

Water Use Categories:	Total Projected Water Use (2015 to 2024)	Reduction Goals for Planning Horizon		Adjusted Reduction Goals for Planning Horizon	
				Total Water Savings from Activities	Resulting Reduction
	(AF)	(%)	(AF)	(AF)	(%)
Commercial	10,199	5.0%	510	355	3.5%
Commercial Irrigation from Well Sources	12,299	8.0%	984	643	5.2%
Residential	6,262	10.0%	626	672	10.7%
Residential Irrigation from Well Sources	995	15.0%	149	120	12.1%
Irrigation from Reg 84	3,401	15.0%	510	185	5.4%
Construction Hydrant	227	1.0%	2	2	1.1%
Non-Revenue Water	6,192	20.0%	1238	2,974	48.0% (1)
Total Water Production:	39,575				
Total Demand Reduction:			4,020	4,951	
Total Percent Reduction:			10.2%		12.5%

(1) Note: The 48% reduction of Non-Revenue Water includes "Recycling Water Treatment Plant Filter Backwash", an activity that happens prior to the metering. Because of this fact, this represents a higher percentage than post-metering activities alone.

SECTION 5.0 – IMPLEMENTATION AND MONITORING PLAN

5.1 Implementation Plan

The implementation plan defines the process necessary to carry out the selected water efficiency activities. Steve Witter, *General Manager*, Katie Spahr, *Water Resource Engineer*, and Patty Pratt, *Customer Service Manager*, will be chiefly responsible for coordinating the implementation of this plan. Some of the details ACWWA will use to implement the water efficiency plan are presented in Worksheet J, **Appendix D**. ACWWA will continue to budget money and pursue CWCB water efficiency implementation grants to meet its water efficiency goals.

5.2 Monitoring Plan

Monitoring types of demand data can be beneficial in tracking the savings generated from implementing a water efficiency plan. ACWWA monitors reclaimed water produced on a daily basis and total treated water produced on a weekly basis. Other categories of raw and treated water and customer accounts are monitored on a monthly and annual basis. The demand data collected during the monitoring period of the plan is presented in Worksheet K, **Appendix D**. An abbreviated table of Worksheet K is presented in the following **Table 5.2a.**

Table 5.2a: Selection of Demand Data for Efficiency Plan Monitoring

Monitoring Data	HB 10-1051 Reporting Requirement					Selection			
	Annual	Monthly	Weekly	Daily		Annual	Monthly	Weekly	Daily
Total Water Use									
Total treated water produced (metered at wells, JWPP, and ACWWA Flow)						X	X	X	
Total treated water delivered (sum of customer meters)	√					X	X		
Raw non-potable deliveries						X	X		
Reclaimed water produced (metered at LTCWRF discharge)						X	X		X
Reclaimed water delivered (sum of customer meters)						X	X		
Per capita water use						X			
Indoor and outdoor treated water deliveries						X			
Treated water peak day produced						X	X		
Reclaimed water peak day produced						X	X		
Raw water peak day produced/delivered						X	X		
Non-revenue water-built into Water Loss Report	√					X	X		

Monitoring Data *(cont.)*	HB 10-1051 Reporting Requirement					Selection			
	Annual	Monthly	Weekly	Daily		Annual	Monthly	Weekly	Daily
Water Use by Customer Type									
Treated water delivered		√				X	X		
Raw non-potable deliveries						X	X		
Reclaimed water delivered						X	X		
Residential per capita water use						X	X		
Unit water use (e.g. AF/account or AF/irrigated acre)						X	X		
Indoor and outdoor treated water deliveries						X	X		
Large users						X	X		
Other Demand Related Data									
Irrigated landscape (e.g. AF/acre or number of irrigated acres)						X			
Precipitation						X	X		
Temperature						X	X		
Evapotranspiration						X	X		
Drought index information						X			
Economic conditions						X			
Population						X	X		
New taps						X	X		

SECTION 6.0 – ADOPTION OF NEW POLICY, PUBLIC REVIEW, AND FORMAL APPROVAL

6.1 Public Review Process

A public review process is required for all State-approved plans. Since ACWWA had a Water Conservation Plan in 2006, the public may be familiar with the water efficiency concept and activities. ACWWA's prior public education program may have contributed to this level of awareness. For this water efficiency planning process, the public was notified of the 60-day comment period and how to submit comments. The comment period was from January 11, 2016, to March 11, 2016. The plan was available on ACWWA's website and in its office for review. No public comments were received during the 60 day comment period. Copies of public notice announcements are provided in **Appendix F**.

6.2 Local Adoption and State Approval Process

The ACWWA Board adopted the plan at its meeting on April 13, 2016, and the Plan was subsequently submitted to CWCB. The signed ACWWA Board Meeting minutes indicating the official plan acceptance are provided in **Appendix F**.

CWCB provided written notification of approval, conditional approval, or disapproval within 90 days of submittal. Conditions for conditional approval or disapproval were addressed as necessary. The soonest possible approval of the Municipal Water Efficiency Plan will be in the summer of 2016. Research and set up of programs can begin upon approval and implementation of the selected measures will begin in late 2016. The cover letter prepared for CWCB, CWCB's Approval Checklist, and CWCB's formal approval letter are included in **Appendix G**.

6.3 Periodic Review and Update

ACWWA plans to review and update this conservation plan every seven years. The next update is scheduled to be completed in 2022.

APPENDIX A

Definition of Terms

Acre-foot (AF)	The amount of water it would take to cover one acre of land to a depth of one foot; approximately 325,851 gallons
ACWWA	Arapahoe County Water and Wastewater Authority
ACWWA Flow	A new water supply project to better serve the ACWWA service area. The project is designed to supplement current water supplies. The project utilizes renewable water rights vs. the well water that has been traditionally relied upon for ACWWA customers.
Average Day Demand	Average daily treatment plant production divided by the total tap equivalents served
AMI	Advanced Metering Infrastructure: AMI meters, also known as Smart meters are updated, digital versions of the traditional electrical meter attached to the outside of a home or business. These new meters not only measure how much water (electrical and other meters are also common) is used, but also at what times during the day. More advanced Smart meters are also designed to transmit pricing and water information from the utility company to the consumer (two-way communication). Utility companies who provide their customers with Smart meters are able to implement a variety of water reduction and saving programs, helping reduce the cost of providing water to a community.
AMR	Automatic Meter Reading: AMR meters are an older technology that only collects electrical energy consumption and transfers that data from the electric meter on the home to the utility (one-way communication). Typically AMR meters are a “drive-by” type that require the utility to be in close proximity in order to read the meter. (also see AMI)
BMP	Best Management Practice
Build-out	Maximum development of a city, town, district, or service area
CIP	Capital Improvement Plan
CWCB	Colorado Water Conservation Board
Demand Management	The implementation of water efficiency activities to reduce water deliveries (demands) and or improve efficiencies within the distribution system. For purposes of this document, demand management refers to both system and customer water demands. Demand management is used interchangeably with water efficiency. Under CWCB’s new MWEP Guidance Document, demand-side and supply-side water use efficiency activities are all categorized under the one term “water efficiency activity”.

Demand-side	The distribution and consumption of treated water supplies for domestic purposes or the delivery and use of reclaimed water or untreated raw (i.e. ditch water, groundwater) for non-potable purposes such as irrigation or industrial processes.
Dual Water Supply Systems	Water supply systems that use a combination of treated water to meet potable water needs and reclaimed water and/or non-treated water (i.e. untreated ditch water and groundwater) to meet non-potable water needs.
ECCV	East Cherry Creek Valley Water and Sanitation District: ECCV is a neighboring water district that constructed a large pipeline from the Barr Lake area. ACWWA has purchased some capacity within the pipeline for future use.
ET Controllers	Evapotranspiration controllers adjust the amount of water applied from sprinkler systems based on soil moisture and weather conditions.
GPCD	Gallons Per Capita per Day
gpd	Gallons per day
JWPP	Joint Water Purification Project: Cooperative venture between ACWWA and Cottonwood Water and Sanitation District
Maximum Day	The largest amount of water used in a single day.
MWEP	Municipal Water Efficiency Plan
Non-Potable Use	Water that is not treated and used for irrigation or other uses than potable.
Non-revenue Water	Annual non-revenue water (previously referred to as unaccounted for water) consists of unbilled authorized uses (i.e. hydrant flushing), apparent losses, and real losses. Real losses consist of leaks in the water distribution system that does not reach the end user. Apparent losses consist of unauthorized consumption, customer metering inaccuracies, and data handling errors
Peak Hour	The largest amount of water used in a single hour – typically occurs on the Maximum Day
Phreatophytes	Species of plants and trees that consume groundwater through their root zones below the water table such as Cottonwood and Russian Olive trees
PID	Public Improvement District
PIF	Plant Investment Fee: fee charged to developers for on-going maintenance cost of infrastructure replacement and repair
Potable Use	Water that is treated to drinking water standards for municipal use, including residential and commercial use.

SFE	Single Family Equivalent: unit of measure used in planning to adjust water use for multi-family dwellings, such as ACWWA homes or condominiums, to a single residential equivalent.
Supply-side	Water supply operations and facilities that include the diversion, extraction, storage, and transmission of untreated water.
SWSP	Substitute Water Supply Plan: A temporary plan to augment a change of use of a water right until the final decree can be processed through the Water Court
System Water Demand	Volume of water necessary to meet customer water needs within a certain period of time. System water demand is typically measured at the point of discharge from the water treatment plant and includes non-revenue water. In dual water supply systems, system water demand may also include the distribution and delivery of non-potable water (i.e.: reclaimed water and untreated ditch and groundwater) to meet irrigation needs.
TE	Tap Equivalent: A unit of measure used by ACWWA to adjust water use for larger taps such as multi-family or commercial, to a single residential tap equivalent of 5/8".
Water Efficiency Activities	Traditionally water efficiency activities have been referred to as water conservation measures and or water conservation programs. For purposes of this document, measures and programs are replaced with water efficiency activities. Water efficiency activities encompass all efforts to either save water or improve efficiencies within a water supply system.
Water Efficiency	Water efficiency includes the practices, techniques, and technologies that extend water supplies either directly through water savings or through substituting alternative supplies such as reuse. For purposes of this document, water efficiency is inclusive of water conservation and is used instead of "water conservation." The term water efficiency captures the essential objective of a local plan which is to improve the efficiency of a municipal demand and water supply system. Water efficiency includes both system demands and customer water demands.
WTP	Water Treatment Plant
WWTP	Wastewater Treatment Plant

APPENDIX B

Ordinances and Regulations

Water Conservation Response Plan

For

Arapahoe County Water and Wastewater Authority

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1.0 Declaration of Policy, Purpose, and Intent

Arapahoe County Water and Wastewater Authority (ACWWA) provides water to customers. In cases of extreme drought, periods of abnormally high usage, system contamination, or extended reduction in ability to supply water due to equipment failure, ACWWA may require water customers to institute temporary restrictions to limit non-essential water usage. This Water Conservation Response Plan (Plan) is designed to protect the available water supply and protect the integrity of water supply facilities, with particular regard for domestic water use, sanitation and fire protection during the periods or other water supply emergencies.

Water uses regulated or prohibited under this Plan are considered to be non-essential and continuation of such uses during times of water shortage or other emergency water supply conditions are deemed to constitute a waste of water.

2.0 Authorization

The designated manager or official of ACWWA is hereby authorized and directed to implement the applicable provisions of this Plan upon determination that such implementation is necessary to protect public health, safety, and welfare. The designated manager or official of ACWWA shall have the authority to initiate or terminate drought or other water supply emergency response measures as described in this Plan. This authorization was designated as part of the Plan's approval by the ACWWA's Board of Directors.

3.0 Public Education

The designated manager or official of ACWWA will periodically provide its employees, members, and the general public with information about this Plan, including the importance of the Plan, information about the conditions under which each stage of the Plan is to be initiated, processes used to reduce water use, and impending or current drought conditions. Dissemination of this information will occur via ACWWA's website and through direct mailings.

4.0 Initiation and Termination of Response Stages

The ACWWA general manager along with staff shall monitor water supply and demand conditions on a regular basis and shall determine when conditions warrant initiation and termination of each stage of this Plan. Water supply conditions will be determined by the source of supply, system capacity, and weather conditions.

ACWWA currently operates two distinct water systems, where the water supplies and systems are not comingled. The initiation of the following steps could cover both systems together or separately. These systems are: 1) ACWWA's main system, with services in Arapahoe and Douglas Counties; and 2) ACWWA's satellite system with services in Elbert County.

Public notification of the initiation or termination of drought response stages shall be by a variety of ways, examples include: bill inserts, e-mail, website postings or a combination of these methods.

The following triggering criteria shall apply to ACWWA's water system and customer service area:

4.1 Triggering Criteria for Initiation and Termination of Stages, Targets and Measures of Water Conservation Response Plan

(1) STAGE 1 - Mild Water Shortage Conditions (Voluntary Measures)

A. Requirements for Initiation: Customers shall be requested to adhere to the Stage 1 of the Water Conservation Response Plan from May 1 through October 31 of each calendar year.

B. Requirements for Termination: Stage 1 of the Plan will remain in place.

C. Targets for Water-Use Reductions:

1. Water Supply Reduction Target: No specific target; looking to provide consistent water usage (no one day or time of day seeing substantial increases in water usage).

D. ACWWA Customer Measures:

1. Supply Management Measures: ACWWA will review system operations and identify ways to improve system efficiency and accountability.

2. Demand Management Measures:

   a. Ask customers to voluntarily comply with the current Watering Schedule, including watering landscapes no more than three times per week;

   b. Ask ACWWA's high volume customers to voluntarily reduce water usage [targeting fifteen percent (15%)].

   c. Actively promote drought related issues and the need to conserve.

(2) STAGE 2 - Moderate Water Shortage Conditions (Mandatory Measures)

A. Requirements for Initiation - Customers shall be required to adhere to the Stage 2 of the Water Conservation Response Plan when one or a combination of such triggering criteria occurs, such as equipment failure, reduced yield from ACWWA's wells and/or shortages in ACWWA's approved augmentation plan.

B. Requirements for Termination - Stage 2 of the Plan may be rescinded when staff determines ACWWA's water supply has returned to normal and is adequate to meet the normal daily needs of its customers.

C. Targets for Water-Use Reductions:

1. Achieve a 30% reduction in water use.

D. ACWWA Customer Measures:

1. Supply Management Measures:

   a. Apply all water-use restrictions prescribed for Stage 2 of the Plan for ACWWA utility owned facilities and properties;

   b. Discontinue water main and line flushing unless necessary for public health reasons; and

   c. Keep customers informed about issues regarding current and projected water supply and demand conditions.

2. Demand Management Measures: Under threat of additional charges, the Following water-use restrictions shall apply to all retail water customers:

   a. Any water usage reaching billing blocks 3 and 4 will be charged an additional fifteen percent (15%) over and above ACWWA's current rates.

   b. Irrigation of Landscaped Areas:

      i. Irrigation of landscaped areas with hose-end sprinklers or in-ground irrigation systems shall be limited to a no more than a TWICE weekly watering schedule determined by ACWWA and based on the nature of the current drought or water emergency. Irrigation of commercial landscapes and recreational areas may apply for a variance but must still develop a schedule where no part of the landscape is watered more than twice per week. *See Appendix A – ACWWA Water System - Recommended Watering Schedule.*

      ii. Outdoor watering hours will be limited to between midnight and 10 a.m. and between 7 p.m. and midnight on designated days. This prohibition does not apply to irrigation of landscaped areas if it is by means of a hand-held hose;

      iii. New landscapes may be installed and re-vegetation seeding only if performed under these specific criteria:

         aa. A completed water schedule variance form has been submitted to ACWWA and has been approved prior to the installation of the landscape, or re-vegetation seed application

bb. Irrigation of the new landscape follows the schedule identified in the new landscape variance. The schedule will be developed to minimize water waste.

cc. Areas being re-vegetated for soil stabilization must also comply with the (aa) and (bb) specific criteria above. Options for re-vegetation may be available in times of low water supply.

dd. Variances for new landscapes may be issued for a period of no more than 30 days from the day of issuance. A variance is not an exemption from compliance with the permanent water use restrictions under Section 6.2 of this Plan. Variances will not be granted for seasonal "color bed" or temporary grass installation (overseeding).

c. Vehicle Washing: Use of water to wash any motor vehicle, such as an automobile, truck, motorbike, boat, trailer, or airplane is prohibited except on designated watering days between the hours of midnight and 10 a.m. and between 7 p.m. and midnight. Such activity, when allowed, shall be done with a hand-held bucket or a hand-held hose equipped with a positive shutoff nozzle. A vehicle may be washed any time at a commercial car wash facility or commercial service station. Further, this activity is exempt from these regulations if the health, safety, and welfare of the public are served by washing the vehicle, such as a truck used to collect garbage or used to transport food and perishables.

d. Pools:

i. Filling of all new and existing swimming pools, hot tubs, wading pools, is prohibited. Replenishing to maintenance level is permitted. Draining is permitted only onto pervious surfaces or onto a surface where water will be transmitted directly to a pervious surface, and only if:

aa. Draining excess water from pool due to rain in order to lower water to maintenance level;

bb. Repairing, maintaining or replacing pool components that have become hazardous; or

cc. Repair of a pool leak.

ii. Refilling of public/community swimming pools is permitted only if pool has been drained for repairs, maintenance, or replacement as outlined in items above.

e. Outside Water Features: Operation of outside water features, such as, but not limited to, fountains, splash pad type fountains or outdoor misting systems, is prohibited, except where such features are used to sustain

aquatic life or maintain water quality. (This provision includes fountains associated with aesthetic ponds and swimming pools).

f. Ponds: Ponds used for aesthetic, amenity, and/or storm water purposes may maintain water levels only necessary to preserve the integrity of the liner and operating system. ACWWA may request specific design documentation regarding a pond and the intended purpose.

g. Golf Courses: Golf courses receiving any amount of treated water from a ACWWA utility must develop a drought contingency plan that meets the minimum water reduction target set for Stage 2.

h. Events: Events involving the use of water such as: car washes, festivals, parties, water slides, and other activities involving the use of water are permitted, if the water being used drains to a recirculating device, or onto a pervious surface to prevent water waste.

i. Restaurants: All restaurants are encouraged to serve water to their patrons only upon request.

j. Fire Hydrants: Use of water from fire hydrants shall be limited to firefighting and activities necessary to maintain public health, safety, and welfare. Use of water from designated fire hydrants for construction purposes may be allowed under special conditions and requires a meter; a variance application must be submitted with an explanation of the special conditions.

k. Recreational areas (includes parks and athletic fields): The areas can only be used for designated or scheduled events or activities. Unnecessary foot traffic must be discouraged. Watering must follow a no more than twice per week schedule. A variance can be obtained if watering cannot be completed on the designated two day schedule.

l. Water Waste: The following non-essential uses of water are prohibited at all times during periods in which restrictions have gone into effect:

i. Washing sidewalks, walkways, driveways, parking lots, street, tennis courts, and other impervious surfaces is prohibited except for immediate health and safety;

ii. Washing buildings, houses or structures with a pressure washer or garden hose is prohibited for aesthetic purposes but allowable for surface preparation of maintenance work to be performed;

iii. Flushing gutters or flooding gutters is prohibited except for immediate health and safety; and

iv. Controlling dust is prohibited, unless there is a demonstrated need to do so for reasons of public health and safety, or as part of

an ACWWA approved construction plan.

Upon termination of Stage 2, Stage 1 becomes operative.

(3) STAGE 3 - Severe Water Shortage Conditions (Mandatory Measures)

A. Requirements for Initiation: Customers shall be required to adhere to the Stage 3 of the Water Conservation Response Plan when one or a combination of such triggering criteria occurs, such as equipment failure, reduced yield from ACWWA's wells and/or shortages in ACWWA's approved augmentation plan.

B. Requirements for Termination: Stage 3 of the Plan may be rescinded when staff determines ACWWA's water supply has returned to normal and is adequate to meet the normal daily needs of its customers.

C. Targets for Water-Use Reductions: Achieve a minimum 50% reduction in water use.

D. ACWWA Customer Measures:

1. Supply Management Measures: In addition to measures implemented in the preceding stages of the Plan, affected ACWWA water utility systems will explore additional emergency water supply options.

2. Demand Management Measures: Under threat of additional charges, all retail customers are required to further reduce non-essential water uses as follows. All requirements of Stage 2 shall remain in effect during Stage 3, with the following modifications and additions.

   a. Any water usage reaching billing blocks 3 and 4 will be charged an additional twenty-five percent (25%) over and above ACWWA's current rates.

   b. Irrigation of Landscaped Areas:

      i. Irrigation of landscaped areas shall be limited to a no more than ONCE per week watering schedule determined by ACWWA and based on the nature of the current drought or water emergency. Irrigation of commercial landscapes and recreational areas may apply for a variance but must still develop a schedule where no part of the landscape is watered more than once per week.

      ii. No new landscapes may be installed.

c. Vehicle Washing: Use of water to wash any motor vehicle, motorbike, boat, trailer, airplane, or other vehicle is prohibited. A vehicle can be washed at any time at a commercial car wash facility or commercial service station that recycles its water. Further, this activity is exempt from these regulations if the health, safety, and welfare of the public are served by washing the vehicle, such as a truck used to collect garbage or used to transport food and perishables.

d. Pools: Installation of swimming pools is prohibited. The filling or replenishing of water to swimming pools, hot tubs, wading pools, and other types of pools is prohibited. Public/community swimming pools may be exempt from this prohibition to maintain safe levels of water quality for human contact.

e. Golf Course: Golf courses receiving any amount of treated water from ACWWA must develop a drought contingency plan in accordance with ACWWA Water Conservation Response Plan and will implement its Stage 3 mandatory restrictions in conjunction with ACWWA.

f. Events: Events involving the use of water such as: car washes; festivals; parties; water slides; and other activities involving the use of water are prohibited.

g. Recreational areas (includes parks and athletic fields): The areas can only be used for designated or scheduled events or activities. Unnecessary foot traffic must be discouraged. Watering is prohibited except with a hand-held hose.

Upon termination of Stage 3, Stage 2 becomes operative.

(4) STAGE 4- Emergency Water Conditions

A. Requirements for initiation: Customers shall be required to adhere to the Stage 4 of the Water Conservation Response Plan when one or a combination of such triggering criteria occurs, such as equipment failure, reduced yield from ACWWA's wells and/or shortages in ACWWA's approved augmentation plan.

B. Requirements for termination: Stage 4 of the Plan may be rescinded when staff determines ACWWA's water supply has returned to normal and is adequate to meet the normal daily needs of its customers.

C. Targets for Water-Use Reductions: As determined by the ACWWA Board.

D. ACWWA Customer Measures: Under threat of additional charges for violation, all customers are required to reduce nonessential water uses during an emergency. All requirements of Stages 1 through 3 are also in effect during stage 4, with the following modifications and additions:

1. Any water usage reaching billing blocks 3 and 4 will continue to be charged an additional twenty-five percent (25%) over and above ACWWA's current rates.

2. Irrigation of landscaped areas is prohibited.

3. Use of water from fire hydrants shall be limited to firefighting and activities necessary to maintain public health, safety, and welfare only.

4. No applications for new, additional, expanded, or larger water service connections, meters, service lines, pipeline extensions, mains, or water service facilities of any kind shall be allowed or approved.

Upon termination of Stage 4, Stage 3 becomes operative.

5.0 Variances

(1) The general manager, or his designee may grant variances:

A. From specific applications of the outdoor water schedule, providing that the variances do not increase the time allowed for watering but rather alter the schedule for watering;

B. Allowing the use of alternative water sources (i.e., ground water, reclaimed wastewater) that do not increase demand on potable water sources for outdoor use. Variance requests may be submitted to staff and need not meet the requirements of subsection below; and

C. If requirements of the Plan would cause a direct and substantive negative economic impact to a business being able to perform their core purpose.

(2) The general manager, or his designee, may grant in writing temporary variances for existing water uses otherwise prohibited under this Plan if it is determined that failure to do so would cause an emergency adversely affecting the public health, sanitation, or fire protection, and if one or more of the following conditions are met:

A. Compliance with this Plan cannot be accomplished during the duration of the time the Plan is in effect; or

B. Alternative methods can be implemented that will achieve the same level of reduction in water use.

(3) Persons requesting a variance from the provisions of this Plan shall file a petition for variance with ACWWA any time the Plan or a particular drought response stage is in effect. The general manager or his designee will review petitions for variances. The petitions shall include the following:

- Name and address of the petitioner

- Purpose of water use
- Specific provision of the Plan from which the petitioner is requesting relief.
- Detailed statement as to how the specific provision of the Plan adversely affects the petitioner or what damage or harm the petitioner or others will sustain if petitioner complies with this Plan
- Description of the relief requested
- Period of time for which the variance is sought
- Alternative water use restrictions or other measures the petitioner is taking or proposes to take to meet the intent of this Plan and the compliance date
- Other pertinent information

(4) Variances granted by ACWWA shall be subject to the following conditions, unless waived or modified by the general manager, or his designee:

A. Variances granted shall include a timetable for compliance.

B. Variances granted shall expire when the Plan, or its requirements, is no longer in effect, unless the petitioner has failed to meet specified requirements.

(5) No variance shall be retroactive or otherwise excuse any violation occurring before the variance was issued.

6.0 Plan Updates

The Plan will be reviewed and updated as needed.

7.0 Appendices

Appendix A – Watering Schedule, No More Than Twice Per Week

ACWWA Water System

Irrigate outdoors using an in-ground irrigation system or hose-end sprinkler no more than **TWICE per week** and only during scheduled days and times as indicated below:

Residential and Commercial (including large landscapes such as HOA common areas):

Odd number addresses: Wednesdays and Saturdays
Even number addresses: Thursdays and Sundays

Watering Hours:

Between 12:00 midnight and 10:00 a.m. and between 7:00 p.m. and 12:00 midnight.

Appendix B – Enforcement Provisions

Enforcement

The following enforcement provisions shall apply to all ACWWA water customers:

(1) No person shall knowingly or intentionally use or allow the use of water from a ACWWA water utility system for residential, commercial, industrial, agricultural, governmental, or any other purpose in a manner contrary to any provision of this Plan, or in an amount in excess of that permitted by the drought response stage in effect at the time.

(2) Any person who violates this Plan shall be subject to the following additional charges and/or conditions of service:

A. Following the first documented violation, the violator shall be given a notice specifying the type of violation and the date and time it was observed. Additional charges and restrictions on service that may result from additional violations;

B. Following the second documented violation, the violator shall:

1. be subject to an additional charge of $100.00

C. Following the third documented violation, the violator shall:

1. be subject to an additional charge of $250.00

D. Following the third documented violation, the violator shall:
1. be subject to an additional charge of $500.00

E. Following the fourth documented violation, the violator shall:
1. be subject to an additional charge of $1,000.00
2. ACWWA shall, modify the service with a flow meter, installed and maintained at the violator's expense.

(3) Each day that one or more of the provisions in this Plan is violated shall constitute a separate violation. The owner of the property where the violation occurs and any other person, including one classified as a water customer of ACWWA, in apparent control of the property where a violation occurs or originates, shall be presumed to be the violator. Any such person, however, shall have the right to show that he did not commit the violation. See enforcement process diagram in *Appendix C - Drought Response Retail Enforcement Process for Municipalities.*

(4) The manager or manager's designee of ACWWA shall have the power to enforce the provisions of this Plan.

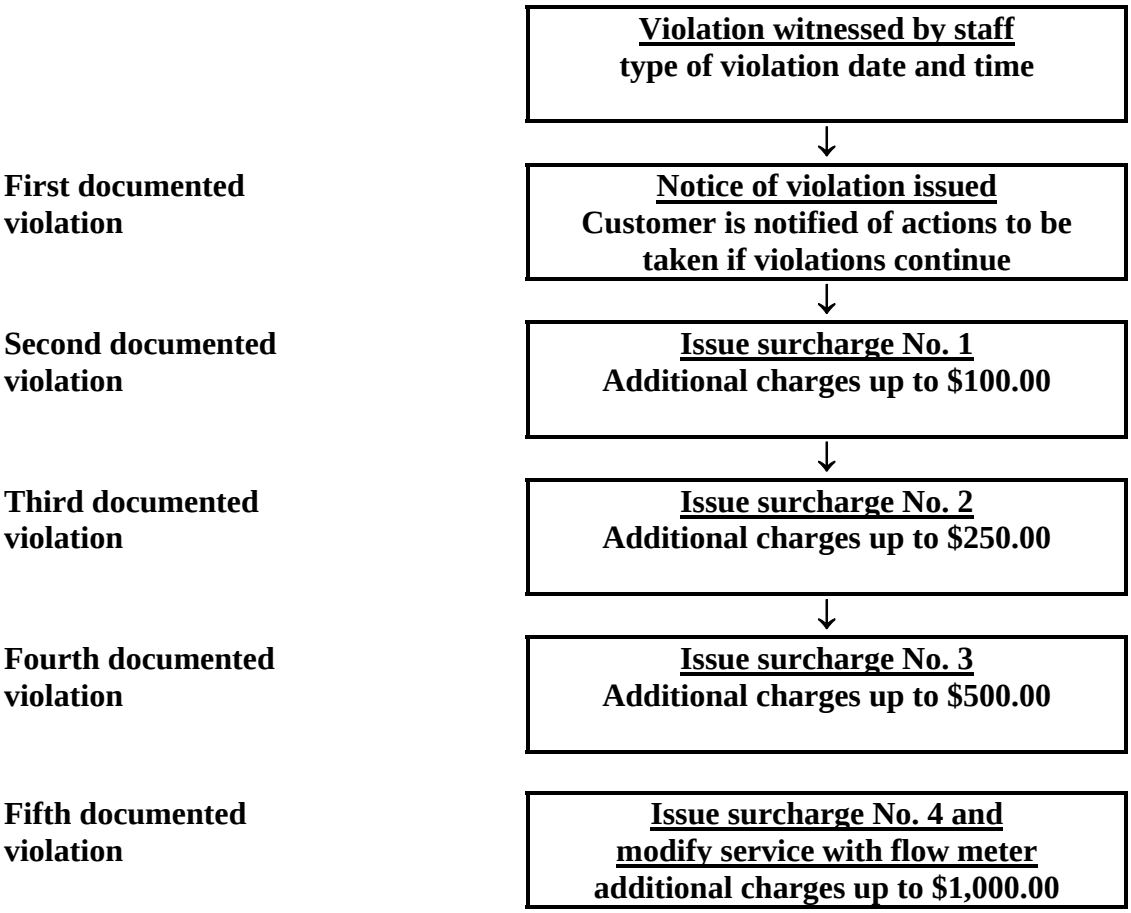
(5) Any court of competent jurisdiction shall have the power to issue to the manager or manager's designee of ACWWA warrants, or other process allowed by law, where necessary to aid in enforcing this Plan.

(6) Judicial enforcement of additional charges issued pursuant to this Plan may be sought through a municipal court, district court or small claims court having jurisdiction over the matter.

(7) Compliance with this Plan also may be sought through injunctive relief in state district court.

(8) ACWWA may use any method allowed by its Rules and Regulations to enforce the requirements of this Plan and collection of additional charges for violations, including but not limited to, shut-off of service, lien recording and foreclosure, and collection of late charges, interest, and all costs of collection and enforcement.

Appendix C – Drought Response Enforcement Process for All ACWWA Customers



APPENDIX C

Additional Figures and Tables

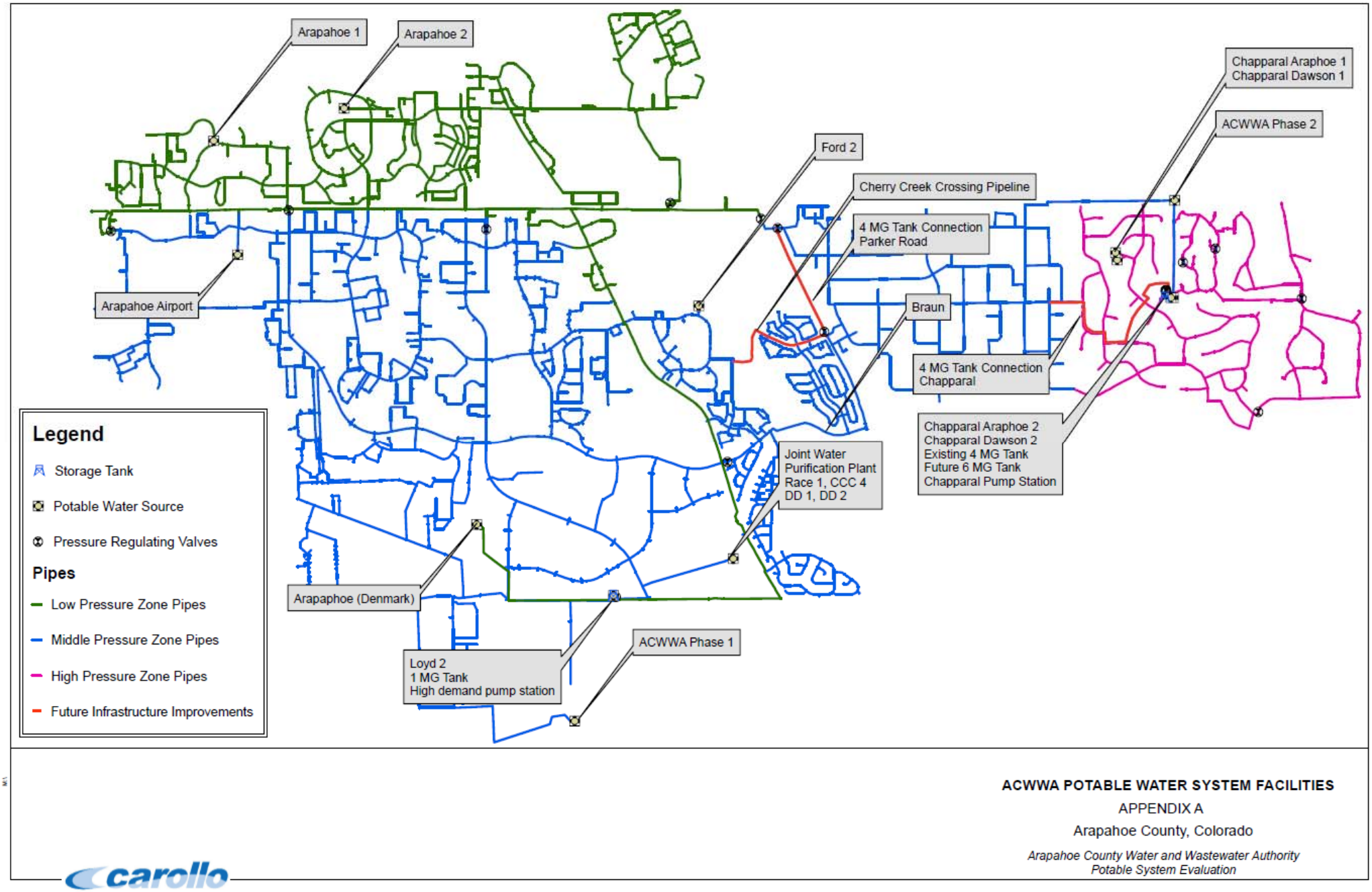


Figure C1: ACWWA Pressure Zones

Table C1: Water Efficiency Activity Evaluation

Water Efficiency Activities for Evaluation	Existing/ Potential Activity	Targeted Customer Category	Review of Qualitative Screening			Evaluation									Final Selection	
			Qualitative Goals			Projected Water Savings						Quantitative Goals				
			Benefit in Water Savings	*Staff Approval and Availability*	*Board and Public Approval*	Total Water Savings over the Planning Period (MG)	Total Water Savings over the Planning Period (AF)	Average Annual Water Savings (MG/yr)	Average Annual Water Savings (AF/yr)	Cost per 1,000 gal saved	Projected Implementation Costs over Planning Period Including Lost Revenue	*Helps to Achieve Overall Savings Goals*	*Low Cost w/ Significant Water Savings*	*Beneficial to Community*	Selected for Implementation	If Eliminated, Reason Why Eliminated
Foundational Activities																
Meter Testing and Replacement/Meter Upgrades	P	Non-Revenue	X	X	X	**50.4**	**154.81**	**5.04**	**15.48**	**$7.87**	**$397,200**	X		X	**X**	
Control of Apparent Losses (with Metering)	P	Non-Revenue	X	X	X	**40.4**	**123.85**	**4.04**	**12.38**	**$11.77**	**$22,700**	X		X	**X**	
System Wide Water Audits	P	Non-Revenue	X	X	X	**50.4**	**154.81**	**5.04**	**15.48**	**$0.95**	**$48,000**	X		X	**X**	
Automatic Water Meter Reading Installation and Operations	E/P	All Categories [a]	X	X	X	**143.1**	**439.29**	**14.31**	**43.93**	**$5.28**	**$756,051**	X		X	**X**	
Water Reuse System	E	All Categories [b]	X	X	X	**113.4**	**348.16**	**11.34**	**34.82**	**$0.53**	**$60,000**	X	X	X	**X**	
Water Efficiency Rate Structure with Regular Updates to Rate Study	E/P	All Categories [b]	X	X	X	**233.9**	**717.88**	**23.39**	**71.79**	**$0.25**	**$0**	X	X	X	**X**	
Leak Detection and Repair	P	Non-Revenue	X	X	X	**100.9**	**309.62**	**10.09**	**30.96**	**$1.27**	**$128,000**	X	X	X	**X**	
Water Line Replacement Program	P	Non-Revenue	X	X	X	**6.4**	**19.79**	**0.64**	**1.98**	**$155.09**	**$1,000,000**	X		X		[c]
Recycling Water Treatment Plant Filter Backwash	P	All Categories	X	X	X	**699.6**	**2,146.94**	**69.96**	**214.69**	**$0.04**	**$31,200**	X	X	X	**X**	
Water Conservation Officer	E	All Categories	X	X	X	**12.9**	**39.58**	**1.29**	**3.96**	**$13.08**	**$168,655**	X		X	**X**	
Master Plans/Water Supply Plans	E	All Categories	X	X	X	**32.2**	**98.94**	**3.22**	**9.89**	**$9.79**	**$315,638**	X		X	**X**	
Targeted Technical Assistance and Incentives																
Slow the Flow Commercial Irrigation Audits	P	Comm Irr, Reg 84	X	X	X	**47.3**	**145.05**	**0.86**	**2.64**	**$7.62**	**$143,200**	X		X		[d]
Slow the Flow Residential Irrigation Audits	P	Res, Res Irr	X	X	X	**0.9**	**2.88**	**0.02**	**0.05**	**$27.55**	**$21,600**	X		X		[d]
Residential and Commercial Ultra High-Efficiency Toilet Upgrade Service	P	Comm, Res	X	X	X	**28.4**	**87.28**	**0.52**	**1.59**	**$6.13**	**$174,367**	X		X	**X**	
Water Efficient Washing Machine Rebates	E	Res	X	X	X	**1.6**	**4.99**	**0.03**	**0.09**	**$22.65**	**$36,805**	X		X	**X**	
Indoor Residential Water Audits	P	Res	X	X	X	**0.4**	**1.15**	**0.01**	**0.02**	**$51.00**	**$19,182**	X		X		[d]
Commercial Indoor Water Audits	P	Comm	X	X	X	**1.5**	**4.71**	**0.03**	**0.09**	**$24.76**	**$38,000**	X		X		[d]
Installation of Water Efficient Irrigation Controls on Large Commercial and Reg 84 Properties	P	Comm Irr, Reg 84	X	X	X	**75.9**	**233.03**	**1.38**	**4.24**	**$7.04**	**$534,716**	X		X		[d]
Rebate for ET Irrigation System Controllers	E	Res, Res Irr	X	X	X	**0.3**	**0.96**	**0.01**	**0.02**	**$30.26**	**$9,250**	X		X	**X**	
Ordinances and Regulations																
Time of Day Watering Restrictions	E	All Categories [a][b]	X	X	X	**33.9**	**103.92**	**3.39**	**10.39**	**$4.06**	**$137,333**	X		X	**X**	
Education Activities																
Bill Stuffers	E	All Categories [a]	X	X	X	**56.6**	**173.59**	**5.66**	**17.36**	**$1.07**	**$60,595**	X	X	X	**X**	
Newsletter	E		X	X	X							X	X	X	**X**	
Newspaper Articles	E		X	X	X							X	X	X	**X**	
Mass Mailings	E		X	X	X							X	X	X	**X**	
Website	E		X	X	X							X	X	X	**X**	
Landscape Design (Xeriscape) and Maintenance Classes	E/P	Comm Irr, Res, Res Irr, Reg 84	X	X	X	**15.0**	**46.07**	**0.27**	**0.84**	**$5.68**	**$22,100**	X		X	**X**	

[a] All categories except Hydrant Meters

[b] All categories except Non-Revenue

[c] Lack of funding to support a fully developed program. Will continue on an as needed basis.

[d] Lack of funding to implement all possible programs. Lack of support from Board.

APPENDIX D

Municipal Water Efficiency Plan Guidance Document Worksheets

KEY FOR WORKSHEETS

Commercial	(Comm)
Commercial Irrigation from Well Sources	(Comm Irr)
Residential	(Res)
Residential Irrigation from Well Sources	(Res Irr)
Irrigation from Regulation 84	(Reg 84)
Construction Hydrant	(Hyd)
Annual non-revenue	(Non-Rev)

WORKSHEET A - WATER SUPPLY LIMITATIONS AND FUTURE NEEDS

Limitation and/or Future Need [1]	[2] Yes	[2] No	Comments on Limitation or Future Need [3]	How is Limitation or Future Need Being Addressed [4]
System is in a designated critical water supply shortage area	X			
System experiences frequent water supply shortages and/or emergencies		X		
System has substantial non-revenue water		X	Average: 14.5%	
Experiencing high rates of population and demand growth		X	Does not appear super high at this point	All residential is built out, only big commercial facilities
Planning substantial improvements or additions	X		ACWWA Flow project	
Increases to wastewater system capacity anticipated		X		
Need additional drought reserves		X		
Drinking water quality issues	X		Hardness / uranium / iron from alluvial wells	Modifications to the JWPP, all wells run through
Aging infrastructure in need of repair	X		Some older lines needing to be replaced	In process of replacing lines
Issues with water pressure in portions of distribution system	X		Issues being addressed, some are on non-potable and eligible for a booster rebate	TBD, non-potable issues will be resolved when Chambers res goes online
Add additional supply limitations and/or future needs				

Instructions:
[1] This column provides a list of limitations/future needs related to planning and operating the water supply system.
[2] Enter an "X" to show whether or not the system exhibits the limitations/future needs.
[3] Include any comments regarding the limitations/future needs that may be useful to consider in the planning process.
[4] If applicable, include how the limitation/future need is being addressed.

WORKSHEET D - IDENTIFICATION AND SCREENING OF FOUNDATIONAL ACTIVITIES

Water Efficiency Activities for Screening [1]	State Statute Requirement [2]	Identification		Qualitative Screening [5]					Carry to Evaluation [6]	Reason for Elimination [7]
		Existing/ Potential Activity [3]	Targeted Customer Category [4]	*Being within ACWWA's ability to implement.*	*Reasonable start-up costs (or already existing)*	*Administration time within Staff's availability*	*Applicable to ACWWA*	Notes on Additional Pros/Cons to Consider		
Metering (BP1)	V, VII									
Automatic Meter Reading Installation and Operations	V, VII	E/P	Non-Revenue	X	X	X	X	AMR Meters installed with ability to transition to AMI Meters	**X**	
Submetering for Large Users (Indoor and Outdoor)	V	E	All Categories [a]	X			X			[f]
Meter Testing and Replacement	V	P	All Categories	X	X	X	X		**X**	
Meter Upgrades	V	P	All Categories	X	X	X	X		**X**	
Identify Unmetered/Unbilled Treated Water Uses	V	P	All Categories	X	X	X	X		**X**	
Add additional activities										
Data Collection - Monitoring and Verification (BP2)										
Frequency of Meter Reading	VII	E	All Categories	X	X	X	X			[c]
Tracking Water Use by Customer Type	VII	E	All Categories [a][b]	X	X	X	X	Not done on a regular basis, could be if benefit is found		[c]
Upgrade Billing System to Track Use by Sufficient Customer Types	VII	E	All Categories [a][b]	X	X	X	X			[c]
Tracking Water Use for Large Customers	VII	E	All Categories [a][b]	X	X	X	X			[c]
Area of Irrigated Lands in Service Area (e.g. acres)	VII	P	Res, Comm Irr, Res Irr, Reg 84	X			X	Large amount of staff time needed		[d]
Add additional activities										
Water Use Efficiency Oriented Rates and Tap Fees (BP1)	VII, VIII									
Volumetric Billing	VII, VIII	E	All Categories [b]	X	X	X	X			[c]
Water Rate Adjustments	VII, VIII	E/P	All Categories [b]	X	X	X	X		**X**	
Frequency of Billing	VII	E	All Categories [b]	X	X	X	X			[c]
Inclining/Tiered Rates	VII, VIII	E	All Categories [b]	X	X	X	X		**X**	
Water Budgets	VII, VIII	P	All Categories [a][b]	X			X			[d]
Tap Fees with Water Use Efficiency Incentives	VII	P	All Categories [a][b]	X			X			[g]
Add additional activities										
System Water Loss Management and Control (BP3)	V									
System Wide Water Audits	V	P	Non-Rev	X	X	X	X		**X**	
Control of Apparent Losses (with Metering)	V	P	Non-Rev	X	X	X	X		**X**	
Leak Detection and Repair	V	P	Non-Rev	X	X	X	X		**X**	
Water Line Replacement Program	V	E	Non-Rev	X			X			[h]
Add additional activities										
Planning (BP2)										
Integrated Water Resources Plans		P	All Categories	X	X	X	X		**X**	
Master Plans/Water Supply Plans		E	All Categories	X	X	X	X		**X**	
Capital Improvement Plans		E	All Categories	X	X	X	X			[c]
Feasibility Studies		E	All Categories	X	X	X	X			[c]
Add additional activities										
Staff (BP4)										
Water Conservation Coordinator		E	All Categories	X	X	X	X	Part of job description Water Resource Project Specialist	**X**	
Other (BP4)	IV									
Water Reuse System		E	Reg 84, Comm Irr, Res Irr	X	X	X	X		**X**	

Instructions:
[1] This column provides a list of possible activities & identifies the Best Practice activity as defined in the Colorado WaterWise Guidebook of Best Practices (BP) for Municipal Water Conservation in Colorado. List additional activities

[2] This column identifies, by roman numeral, the elements that correspond with the best practices and that shall be fully considered in the planning process per Colorado State Statute 37-60-126.
[3] Specify whether the activity is "Existing" or a "Potential" activity to carry through screening by entering an "E" or "P", respectively.
[4] As applicable, specify which customer category (residential, commercial, etc.) is/would be impacted by the activity.
[5] Enter screening criteria based on qualitative goals developed in Step 3 and insert an "X" for activities that meet the listed screening criteria.
[6] Based on the screening process, indicate which activities will be carried onto the evaluation phase with an "X".
[7] If eliminated via screening, comment on why.

[a] All categories except Hydrant Meters
[b] All categories except Non-Revenue
[c] Already existing Activity. Activity not evaluated in cost/benefit analysis because it is difficult to quantify savings.
[d] Not enough staffing resources available at this time
[f] Cost prohibitive at this time; may be considered for a future date
[g] Limited resources. Not evaluated during this planning period. May be evaluated during a future date.
[h] No specific program in place. Addressed as need arrives. Not evaluated in cost/benefit analysis.

WORKSHEET E - IDENTIFICATION AND SCREENING OF TARGETED TECHNICAL ASSISTANCE INCENTIVES

Water Efficiency Activities for Screening [1]	State Statute Requirement [2]	Identification					Qualitative Screening [6]					Carry to Evaluation [7]	Reason for Elimination [8]
		Existing/ Potential Activity [3]	SWSI Framework Levels [4] Level 1 Municipal Uses	Level 2 Customers with the Largest Water Use	Level 3 Customer Type(s) in Service Area	Targeted Customer Category [5]	*Being within ACWWA's ability to implement.*	*Reasonable start-up costs*	*Administration time within Staff's availability*	*Applicable to ACWWA*	Notes on Additional Pros/Cons to Consider		
Installation of Water Efficient Fixtures and Appliances	I												
Indoor Audits	I	P	X	X	X	Comm, Res	X	X	X	X	**Lower start up costs and staff time if utilizing CRC programs**		[g]
Toilet Retrofits	I	P	X	X	X	Comm, Res	X	X	X	X		X	
Urinal Retrofits	I	P	X	X	X	Comm	X	X	X	X			[g]
Showerhead Retrofits	I	P	X		X	Comm, Res	X	X	X	X			[g]
Faucet Retrofits (e.g. aerator installation)	I	P	X	X	X	Comm, Res	X	X	X	X			[g]
Water Efficient Washing Machines	I	E	X		X	Res	X			X			[f]
Water Efficient Dishwashers	I	P	X	X	X	Comm, Res	X			X			[f]
Efficient Swamp Cooler and Air Conditioning Use	I	P	X	X	X	Comm, Res	X			X			[f]
Add additional activities													
Low Water Use Landscapes	II												
Drought Resistant Vegetation	II	P	X	X	X	Comm Irr, Res, Res Irr, Reg 84	X			X			[g]
Removal of Phreatophytes	II	P	X	X	X		X			X			[i]
Irrigation Efficiency Evaluations/Outdoor Water Audits	II	P	X	X	X		X			X			[g]
Outdoor Irrigation Controllers	II	P	X	X	X		X			X			[g]
Irrigation Scheduling/Timing	II	E	X	X	X		X			X			[g]
Rain Sensors	II	E	X	X	X		X			X			[f]
Residential Outdoor Meter Installations	II	P	X	X	X		X			X			[f]
Xeriscape	II	P	X	X	X		X			X			[d]
Other Low Water Use Landscapes	II	P	X	X	X		X			X			[d]
Irrigation Equipment Retrofits	II	P	X	X	X		X			X			[g]
Add additional activities													
Water- Efficient Industrial and Commercial Water-Using Processes	III												
Specialized Nonresidential Surveys, Audits and Equipment Efficiency Improvements	III	P	X	X	X	Comm	X	X		X			[g]
Commercial Indoor Fixture and Appliance Rebates/Retrofits	III	P	X	X	X	Comm	X			X			[g]
Cooling Equipment Efficiency	III	P	X	X	X	Comm, Reg 84	X			X			[i]
Restaurant equipment	III	P	X	X	X	Comm	X			X			[g]
Add additional activities													
Incentives	X												
Toilet Rebates	X	P	X	X	X	Comm, Res	X	X	X	X			[f]
Urinal Rebates	X	P	X	X	X	Comm	X	X	X	X			[f]
Showerhead Rebates	X	P			X	Res	X	X	X	X			[i]
Water Efficient Faucet or Aerator Rebates	X	P	X	X	X	Comm, Res	X	X	X	X			[i]
Water Efficient Washing Machine Rebates	X	E			X	Res	X	X	X	X		X	
Water Efficient Dishwasher Rebates	X	P			X	Comm, Res	X	X	X	X			[i]
Efficient Irrigation Equipment Rebates	II, X	E	X	X	X	Comm Irr, Res, Res Irr, Reg 84	X	X	X	X		X	
Landscape Water Budgets Information and Customer Feedback	II, X	P	X	X	X		X	X		X			[j]
Turf Replacement Programs/Xeriscape Incentives	II, X	P	X	X	X		X			X			[j]
Give-aways	X	E	X	X	X	All Categories [a][b]	X	X	X	X			[c]
Add additional activities													

Instructions:

[1] This column provides a list of activities & if applicable, identifies the Best Practice activity as defined under *Colorado WaterWise Guidebook of Best Practices (BP) for Municipal Water Conservation in Colorado* . List additional activities identified through the planning process.

[2] This column identifies, by roman numeral, the elements that correspond with the best practices and that shall be fully considered in the planning process per Colorado State Statute 37-60-126.

[3] Specify whether the activity is an "Existing" or "Potential" activity to carry through screening by entering an "E" or "P", respectively.

[4] Specify which level the historical/potential activities fall under by entering an "X" in the appropriate column.

[5] As applicable, specify which customer category (residential, commercial, etc.) is/would be impacted by the activity.

[6] Enter screening criteria based on qualitative goals developed in Step 3 and insert an "X" for activities that meet the listed screening criteria.

[7] Based on the screening process, indicate which activities will be carried on the evaluation phase with an "X".

[8] If eliminated via screening, comment on why.

[a] All categories except Hydrant Meters
[b] All categories except Non-Revenue
[c] Already existing Activity. Activity not evaluated in cost/benefit analysis because it is difficult to quantify savings.
[d] Not enough staffing resources available at this time
[f] Cost prohibitive at this time; may be considered for a future date
[g] Limited resources. Not evaluated during this planning period. May be evaluated during a future date.
[h] No specific program in place. Addressed as need arrives. Not evaluated in cost/benefit analysis.
[i] Limited participation or benefit anticipated
[j] Anticipated that public response would be negative

WORKSHEET F - IDENTIFICATION AND SCREENING OF ORDINANCES AND REGULATIONS

Water Efficiency Activities for Screening [1]	State Statute Requirement [2]	Identification					Qualitative Screening [6]					Carry to Evaluation [7]	Reason for Elimination [8]
		Existing/ Potential Activity [3]	SWSI Framework Levels [4]			Targeted Customer Category [5]	*Being within ACWWA's ability to implement.*	*Reasonable start-up costs*	*Administration time within Staff's availability*	*Applicable to ACWWA*	Notes on Additional Pros/Cons to Consider		
			Level 1 Customer Type(s) within the Existing Service Area	Level 2 New Development	Level 3 Point of Sales on Existing Building Stock								
General Water Use Regulations	IX												
Water Waste Ordinance (BP 5)	IX	E	X			All Categories [a][b]		X			No enforcement		Difficult to enforce
Time of Day Watering Restriction	IX	E	X			All Categories [a][b]	X	X			Encouraged through website	X	
Day of Week Watering Restriction	IX	E	X			All Categories [a][b]		X					Difficult to quantify savings
Water Overspray Limitations	IX	P	X					X					Difficult to enforce
Add additional activities													
Landscape Design/Installation Rules and Regulations	IX												
Rules and Regulations for Landscape Design/Installation (BP 9)	IX	P	X	X		Res, Comm Irr, Res Irr, Reg 84		X					Difficult to enforce
Landscaper Training and Certification (BP 8)	IX	P	X	X				X					
Irrigation System Installer Training and Certification (BP 8)	IX	P	X	X				X					
Soil Amendment Requirements (BP 9)	IX	P	X	X				X					
Turf Restrictions (BP 9)	IX	E	X	X				X			Only in Elkhorn, not enforced		
Irrigation Equipment Requirements	IX	P	X	X				X					
Outdoor Water Audits/Irrigation Efficiency Regulations (BP 10)	IX	P	X	X				X					
Outdoor Green Building Construction (BP 8,9)	IX	P	X	X		Comm		X					
Add additional activities													
Indoor and Commercial Regulations	IX												
High Efficiency Fixture and Appliance Replacement (BP 12)	IX	P	X	X	X	All Categories [a][b]		X					Difficult to enforce
Commercial Cooling and Process Water Requirements (BP 14)	IX	P	X	X		Comm, Reg 84		X					
Green Building Construction (BP 12)	IX	P	X	X		Comm		X					
Indoor Plumbing Requirements (BP 12)	IX	P	X	X		All Categories [a][b]		X					
City Facility Requirements (BP 12)	IX	P	X			Comm		X					
Required Indoor Residential Audits (BP 13)	IX	P	X	X	X	Res		X					
Required Indoor Commercial Audits (BP 14)	IX	P	X	X	X	Comm		X					
Commercial Water Wise Use Regulations (Car Washes, Restaurants, etc.)	IX	P	X	X	X	Comm		X					
Add additional activities													

Instructions:

[1] This column provides a list of possible activities & if applicable identifies the Best Practice activity as defined under Colorado WaterWise Guidebook of Best Practices (BP) for Municipal Water Conservation in Colorado. List additional activities identified through the planning process.

[2] This column identifies, by roman numeral, the elements that correspond with the best practices and that shall be fully considered in the planning process per Colorado State Statute 37-60-126.

[3] Specify whether the activity is an "Existing" or "Potential" activity to carry through screening by entering an "E" or "P", respectively.

[4] For current/historical activities, specify which level the activities fall under by entering an "X" in the appropriate column.

[5] As applicable, specify which customer category (residential, commercial, etc.) is/would be impacted by the activity.

[6] Enter screening criteria based on qualitative goals developed in Step 3 and insert an "X" for activities that meet the listed screening criteria.

[7] Based on the screening process, indicate which actives will be carried on the evaluation phase with an "X".

[8] If eliminated via screening, comment on why.

[a] All categories except Hydrant Meters

[b] All categories except Non-Revenue

[c] Already existing Activity. Activity not evaluated in cost/benefit analysis because it is difficult to quantify savings.

[d] Not enough staffing resources available at this time

[f] Cost prohibitive at this time; may be considered for a future date

[g] Limited resources. Not evaluated during this planning period. May be evaluated during a future date.

[h] No specific program in place. Addressed as need arrives. Not evaluated in cost/benefit analysis.

WORKSHEET G - IDENTIFICATION AND SCREENING OF EDUCATION ACTIVITIES

Water Efficiency Activities for Screening [1]	State Statute Requirement [2]	Identification					Qualitative Screening [6]					Carry to Evaluation [7]	Reason for Elimination [8]
		Existing/ Potential Activity [3]	SWSI Framework Levels [4] Level 1 One-Way	Level 2 One-Way with Feedback	Level 3 Two-way communication	Targeted Customer Category [5]	*Being within ACWWA's ability to implement.*	*Reasonable start-up costs*	*Administration time within Staff's ability*	*Applicable to ACWWA*	Notes on Additional Pros/Cons to Consider		
Customer Education (BP6)	VI												
Bill Stuffers	VI	E	X			All Categories [a][b]	X	X	X	X	2x a year,	X	
Newsletter	VI	P	X				X	X		X		X	
Newspaper Articles	VI	P	X				X	X		X		X	
Mass Mailings	VI	P	X				X	X		X		X	
Web Pages	VI	E	X	X			X	X	X	X		X	
Water Fairs	VI	P	X			Res, Res Irr	X			X			Other government entities offer water fairs in area
K-12 Teacher and Classroom Education Programs	VI	P		X	X	Res, Res Irr	X			X			South Metro offers program
Message Development/Campaign	VI	P	X			All Categories [a][b]	X	X		X			Lack of staff time
Interactive Websites	VI	P	X	X	X		X	X		X			Lack of staff time
Social Networking (e.g. Facebook)	VI	P	X	X	X		X	X		X			Lack of staff time
Customer Surveys	VI	P		X			X	X		X			Lack of staff time
Focus Groups	VI	P			X		X	X		X			Lack of staff time
Citizen Advisory Boards	VI	P			X		X	X		X			
Add additional activities													
Technical Assistance	VI												
Customer Water Use Workshops	VI	P		X		All Categories [a][b]	X	X					
Landscape Design and Maintenance Workshops	VI	P		X		All Categories [a][b]	X	X				X	
Xeriscape Demonstration Garden	VI	E	X	X			X	X	X	X	Gardens within service area provide class, not directly run by ACWWA	X	
Water Conservation Expert Available	VI	E			X		X	X	X	X	Somewhat through South Metro partnership		South Metro offers program
Add additional activities													

Instructions:
[1] This column provides a list of possible activities & if applicable identifies the Best Practice activity as defined under Colorado WaterWise Guidebook of Best Practices (BP) for Municipal Water Conservation in Colorado. List additional activities identified through the planning process.
[2] This column identifies, by roman numeral, the elements that correspond with the best practices and that shall be fully considered in the planning process per Colorado State Statute 37-60-126.
[3] Specify whether the activity is an "Existing" or "Potential" activity to carry through screening by entering an "E" or "P", respectively.
[4] For current/historical activities, specify which level the activities fall under by entering an "X" in the appropriate column.
[5] As applicable, specify which customer category (residential, commercial, etc.) is/would be impacted by the activity.
[6] Enter screening criteria based on qualitative goals developed in Step 3 and insert an "X" for activities that meet the listed screening criteria.
[7] Based on the screening process, indicate which activities will be carried on the evaluation phase with an "X".
[8] If eliminated via screening, comment on why.

[a] All categories except Hydrant Meters
[b] All categories except Non-Revenue
[c] Already existing Activity. Activity not evaluated in cost/benefit analysis because it is difficult to quantify savings.
[d] Not enough staffing resources available at this time
[f] Cost prohibitive at this time; may be considered for a future date
[g] Limited resources. Not evaluated during this planning period. May be evaluated during a future date.
[h] No specific program in place. Addressed as need arrives. Not evaluated in cost/benefit analysis.

WORKSHEET J - IMPLEMENTATION PLAN

Selected Water Efficiency Activities [1]	Historical Period of Implementation [2]	Period of Implementation [2]	Implementation Actions [3]	Annual Budget [5]	Entity/Staff Responsible for Implementation [6]	Coordination and Public Involvement [7]
Foundational Activities						
Meter Testing and Replacement/Meter Upgrades [c]		2017 - ongoing	Begin getting estimates for testing meters	$51,465	Distribution/ Engineering	
Control of Apparent Losses (with Metering)		2017 - ongoing		$47,500	Engineering	
System Wide Water Audits		2016 - ongoing	Set up plan in place expected dates of completion	$3,000	Katie Spahr	
Automatic Water Meter Reading Installation and Operations [c]	2006 - present	ongoing, increase coverage	Map out present installations and areas of most beneficial future installations	$29,450	Distribution/ Engineering	
Water Reuse System	2006 - present	ongoing, increase coverage		$6,000	LTCWRF	
Water Efficiency Rate Structure with Regular Updates to Rate Study	2001 - present	ongoing	In progress	$5,800	Steve Witter	
Leak Detection and Repair		As soon as budget allows	Contact indepenent firms for cost estimates	$12,800	Engineering	
Recycling Water Treatment Plant Filter Backwash	2006 - present	ongoing	Conintue present plan	$300	LTCWRF	
Water Conservation Officer	2014 - present	ongoing	Conintue present plan	$2,400	Katie Spahr	
Master Plans/Water Supply Plans	2006 - present	ongoing	Conintue present plan	$19,400	Steve Witter and Katie Spahr	
Targeted Technical Assistance and Incentives						
Residential and Commercial Ultra High-Efficiency Toilet Upgrade Service		2016 - ongoing	Contact CRC	$4,180	Katie Spahr	CRC
Water Efficient Washing Machine Rebates	2010 - present	ongoing	Make contact with local appliance stores in the area to share about rebates	$2,470	Katie Spahr	Additional communication with community and retail stores
Rebate for ET Irrigation System Controllers	2010 - present	ongoing		$775	Katie Spahr	Additional communication with community and retail stores
Ordinances and Regulations						
Time of Day Watering Restrictions	2002 - present	ongoing		$650	Administration	
Education Activities						
Bill Stuffers, Newsletter, Newspaper Articles, Mass Mailings, Website, Social Networking	2006 - present	ongoing		$5,082	Katie Spahr	
Landscape Design (Xeriscape) and Maintenance Classes	Unknown - present	ongoing	Contact Tagawa Gardent to idenify ways to partner with them	$1,073	Katie Spahr	Coordination with Tagawa Gardens

Instructions:
[1] Provide the list of water efficiency activities selected for implementation during Step 4.
[2] Provide period in which activity is going to be implemented.
[3] Include information on specific actions necessary to implement the activites (e.g. advertise rebates to public).
[4] Indicate timing of when the action are scheduled to be implemented (e.g. when leaks will be repaired, when rebate program will start, etc.).
[5] Insert anticipated annual costs.
[6] Specify which entity/staff responsible for implementing the activities.
[7] If applicable, comment on necessary coordination among staff/other entities and how the public will be involved. This includes educational campaigns, feedback, direct participation in certain actions, etc.
[8] Add any additional comments.

WORKSHEET K - SELECTION OF MONITORING DEMAND DATA FOR MONITORING PLAN

Monitoring Data [1]	HB 10-1051 Reporting Requirement [2]				Selection [3]				Entity/Staff Responsible for Data Collection and Evaluation [4]	Schedule/Timing of Monitoring [5]	Comments [6]
	Annual	Monthly	Weekly	Daily	Annual	Monthly	Weekly	Daily			
Total Water Use											
Total treated water produced (metered at wells, JWPP, and ACWWA Flow)					X	X	X		Engineering, JWPP, Admin,		
Total treated water delivered (sum of customer meters)	√				X	X			Admin		
Raw non-potable deliveries					X	X			Admin		
Reclaimed water produced (metered at LTCWRF discharge)					X	X		X	LTCWRF		
Reclaimed water delivered (sum of customer meters)					X	X			Admin		
Per capita water use					X				Engineering/Admin.		Per capita use based on residential population
Indoor and outdoor treated water deliveries					X				Engineering/Admin.		Estimated from daily average use during Dec - Mar
Treated water peak day produced					X	X			Treatment		
Reclaimed water peak day produced					X	X			LTCWRF		
Raw water peak day produced/delivered					X	X					
Non-revenue water-built into Water Loss Report	√				X	X			Engineering		
Water Use by Customer Type											
Treated water delivered		√			X	X			Treatment		
Raw non-potable deliveries					X	X					
Reclaimed water delivered					X	X			LTCWRF		
Residential per capita water use					X	X			Engineering/Admin.		Per capita use based on residential population
Unit water use (e.g. AF/account or AF/irrigated acre)					X	X			Engineering/Admin.		Both taps and TE[a] used to evaluate
Indoor and outdoor treated water deliveries					X	X			Engineering/Admin.		Estimated from daily average use during Dec - Mar
Large users					X	X			Engineering/Admin.		Indivudal customers and aggregate total
Other Demand Related Data											
Irrigated landscape (e.g. AF/acre or number of irrigated acres)					X				Engineering/Admin.		Specify whether total irrigated lands in service area and/or per customer types (e.g. parks)
Precipitation					X	X			Engineering/Admin.		
Temperature					X	X			Engineering/Admin.		
Evapotranspiration					X	X			Engineering/Admin.		
Drought index information					X				Engineering/Admin.		
Economic conditions					X				Engineering/Admin.		
Population					X	X			Engineering/Admin.		
New taps					X	X			Engineering/Admin.		

Instructions:
[1] This worksheets provides a list of possible demand data. Add additional demand data provider would like to monitor.
[2] Specifies annual reporting requirements per HB 10-1051.
[3] Select demand data provider plans to use to monitor effectiveness of water efficiency activities by inserting an "X" in appropriate boxes.
[4] Specify staff/entity reponsible for data collection and evaluation.
[5] Specify the timing and/or set schedule in which data will be collected and evaluated.
[6] Add any additional comments.

APPENDIX E

Activity Cost and Benefit Analysis

Meter Testing and Replacement Program/Meter Upgrades

Existing meters are tested periodically for leaks and accuracy and are replaced with upgrades as necessary. Faulty meters account for apparent losses (i.e. losses due to meter inaccuracies) and real losses (also known as physical losses).

Planning Period	2015 to 2024	
Years in Planning Period	10	
Program Length	10	years

Estimated Water Savings

Annual Estimated Savings Rate	2.5%	
Annual Estimated Non-Revenue Water without Savings	201.78	MG/yr
Estimated Annual Water Savings	**5.04**	MG/yr
Estimated Savings over Planning Period	**50.4**	MG

Notes:

2010 - 2014 average system non-revenue leakage/loss rate was 15.6%. Natural Resources Defense Council estimate 10% of homes have leaks that waste 90 gals or more per day. These leaks are often unaccounted for in faulty meters.

Costs

Total Cost to Water Provider

Labor Costs		
Staff Hours	312.0	
Hourly Cost	$60.00	
Annual Staff Costs	$18,720	
Third Party Costs		
Evaluation and Follow-up Costs		
Annual Labor	**$18,720.00**	
Materials Costs		
Unit Cost	$175.00	/participant
Number of Participants	120	/year
Annual Materials	**$21,000.00**	/year

The $175 weighted average unit cost includes meter testing and replacement costs.

Estimated Annual Cost	**$39,720.00**	/year
Estimated Total Cost over Planning Period	**$397,200.00**	
Cost per 1000 Gallons Saved	**$7.87**	

Control of Apparent Losses (with Metering)

This measure would entail utilizing existing meters as well as adding additional meters to determine where system losses are occurring. This measure is often coupled with System Wide Water Audits since they have similar benefits, and metering helps the auditing process.

Planning Period	2015 to 2024	
Years in Planning Period	10	
Program Length	10	years

Estimated Water Savings

Annual Estimated Savings Rate	2.0%	
Annual Estimated Non-Revenue Water without Savings	201.78	MG/yr
Estimated Annual Water Savings	**4.04**	MG/yr
Estimated Savings over Planning Period	**40.4**	MG

Notes:

2010 - 2014 average system non-revenue leakage/loss rate was 15.6%. One of the first steps in reducing losses is to identify where the losses are occurring. Metering and System Wide Water Audits help in this process.

Costs

Total Cost to Water Provider

Labor Costs		
Staff Hours	500.0	
Hourly Cost	$60.00	
Annual Staff Costs	$30,000	
Third Party Costs		
Evaluation and Follow-up Costs		
Annual Labor	**$30,000.00**	
Materials Costs		
Unit Cost	$3,500.00	/meter
Number of New Meters	5	/year
Annual Materials	**$17,500.00**	/year

Meters range in price depending on size and type. Prices range from $2000/unit to over $5,000 per unit. Unit cost represents an approximate average.

Estimated Annual Cost	**$47,500.00**	/year
Estimated Total Cost over Planning Period	**$475,000.00**	
Cost per 1000 Gallons Saved	**$11.77**	

System Wide Water Audits

By utilizing System Wide Water Audits and pairing with other measures (e.g., Metering), ACWWA hopes to identify unmetered and unbilled treated water uses in order to assess where losses are occurring and how losses can be best addressed. These losses are considered non-revenue water.

Planning Period	2015 to 2024	
Years in Planning Period	10	
Program Length	10	years

Estimated Water Savings

Annual Estimated Savings Rate	2.5%	

Category	Average Water Use MG	*Estimated Annual Water Savings gallons/yr*
Non-Revenue Water	201.78	5,044,534

Estimated Annual Water Savings	**5.04**	MG/yr
Estimated Savings over Planning Period	**50.4**	MG

Notes:

By specifically identifying these losses, additional actions can be taken to reduce the water lost. This measure has the potential to improve all categories. A conservative reduction of 2.5% of projected annual water use was assumed.

Although some revenue may be lost on the demand side, more revenue will likely be realized on the supply side.

Costs

Total Cost to Water Provider

Labor Costs		
Staff Hours	80	/year
Hourly Cost	$60.00	/hour
Annual Staff Costs	$4,800.00	
Third Party Costs		/year
Evaluation and Follow-up Costs		/year
Annual Labor	**$4,800.00**	/year

Notes:

Estimated staff costs for Staff to spend approximately 50 hours per year at $60.00/hour to help develop within ACWWA.

Estimated Annual Cost	**$4,800**	/year
Estimated Total Cost over Planning Period	**$48,000**	
Cost per 1000 Gallons Saved	**$0.95**	

Automatic Water Meter Reading Installation and Operations

ACWWA has some automatic meter reading (AMR) meters installed (approximately 25% of meters); they hope to install more over the planning period and bring the system closer to 100% with AMR meters. With additional towers, infrastructure, and software, the AMR meters being installed can eventually be transitioned over to an Automatic Metering Infrastructure (AMI) system. Once installed and upgraded, the AMI system would allow water meters to be read hourly down to a single gallon of water. Yet another update to the system and meters would also allow water customers to view and manage their water usage through customer interaction software and web access. These type of systems offer a secure website where customers can set up alerts for notification on possible water leaks, irrigation usage issues, promote water conservation, set monthly water usage budgets and receive alerts if a set budget is going to be exceeded.

Planning Period	2015 to 2024	
Years in Planning Period	10	
Program Length	10	years

Estimated Water Savings

Customer Category	Avg. Annual Water Use over Planning Period (MG)	Estimated Annual Savings Rate	Estimated Annual Water Savings (MG/yr)
Non-Revenue Water	201.78	1.0%	2.018
Commercial	332.33	0.5%	1.662
Commercial Irrigation from Well Sources	400.77	1.0%	4.008
Residential	204.04	2.5%	5.101
Residential Irrigation from Well Sources	32.41	3.0%	0.972
Irrigation from Reg 84	110.83	0.5%	0.554

Estimated Annual Water Savings	**14.31**	MG/yr
Estimated Savings over Planning Period	**143.14**	MG

Notes:

Estimated savings rate are used until more data can be obtained to establish an actual savings rate.

Costs

Total Cost to Water Provider

Labor Costs

Staff Hours	45	/year
Hourly Cost	$60.00	/hour
Annual Labor	**$2,700.00**	/year

Meters and Materials

Unit Cost	$200.00	
Number of units per year	100	/year
Annual Cost	**$20,000.00**	/year

Notes:

Annual labor costs are for implementing the program, including website access. Estimated annual staff time is estimated at approximately 45 hours. This time includes water savings tracking.

The revenue calculations do not include the base fee since the base fee does not cover any usage volume.

Estimated Revenue assumes that the current rates will not change significantly over the planning period.

Automatic Water Meter Reading Installation and Operations

Customer Internet Portal Service Fees

Setup Fee		
Monthly Fee		
Annual Cost	**$0.00**	/year

Water Rates

Rate Category	Average Monthly Usage (gals/tap)	Current Rates/Fees (per 1,000 gals)
Commercial	36,714	$4.50
Commercial Irrigation from Well Sources	76,306	$4.67
Residential	3,164	$3.94
Residential Irrigation from Well Sources	2,851	$4.18
Irrigation from Reg 84	281,757	$4.57

Water rates are based on a weighted average for each customer category and incorporate seasonal usage.

Estimated Average Annual Revenue without Water Savings	$4,813,671.70	/year
Estimated Average Annual Revenue with Water Savings	$4,760,766.60	/year
Estimated Annual Revenue Loss Related to Water Savings	$52,905.10	/year

Estimated Annual Cost	**$75,605.10**	/year
Estimated Cost over Planning Period not including Lost Revenue	**$22,700.00**	
Estimated Total Cost over Planning Period Including Lost Revenue	**$756,050.97**	
Cost per 1000 Gallons Saved	**$5.28**	

Water Reuse System

ACWWA currently has a water reuse system in place under the State's Regulation 84.

Planning Period	2015 to 2024	
Years in Planning Period	10	
Program Length	10	years

Estimated Water Savings

Customer Category	Avg. Annual Water Use over Planning Period (MG)	Estimated Annual Savings Rate	Estimated Annual Water Savings (MG/yr)
Commercial	332.33	0.5%	1.66
Commercial Irrigation from Well Sources	400.77	1.5%	6.01
Residential	204.04	1.0%	2.04
Residential Irrigation from Well Sources	32.41	1.5%	0.49
Irrigation from Reg 84	110.83	1.0%	1.11
Construction Hydrant	7.40	0.5%	0.04

Estimated Annual Water Savings	**11.34**	MG/yr
Estimated Savings over Planning Period	**113.45**	MG

Notes:

Savings based off of the average number of gallons per year of Reg 84 water metered in ACWWA's system.

Costs

Total Cost to Water Provider

Labor Costs		
Staff Hours	100	/year
Hourly Cost	$60.00	/hour
Annual Labor	**$6,000.00**	/year

Notes:

Staff cost includes maintenance, regulatory enforcement, and other elements to keep the system running and up to date.

Estimated Annual Cost	**$6,000.00**	/year
Estimated Total Cost over Planning Period	**$60,000.00**	
Cost per 1000 Gallons Saved	**$0.53**	

Water Efficient Rate Structure with Regular Updates to Rate Study

Based on many studies, water rates (e.g., inclining and/or tiered) are one of the most effective ways to encourage efficient water use. A rate study is necessary to ensure maximum water conservation savings. ACWWA is currently in the process of having their water and sewer rates evaluated by an independent consultant.

Planning Period	2015 to 2024	
Years in Planning Period	10	
Program Length	10	years

Estimated Water Savings

Customer Category	Average Water Use (MG/yr)	Annual Estimated Savings Rate	*Estimated Annual Water Savings (MG/yr)*
Commercial	332.33	1.0%	3.32
Commercial Irrigation from Well Sources	400.77	1.5%	6.01
Residential	204.04	5.0%	10.20
Residential Irrigation from Well Sources	32.41	5.0%	1.62
Irrigation from Reg 84	110.83	2.0%	2.22
Construction Hydrant	7.40	0.3%	0.02

Notes:

Assumed a conservative reduction of per customer category of projected total billed water. Rate change studies have shown a greater savings (Southwest Florida Water Management District study - 13%).

Estimated Annual Water Savings	**23.4**	MG/yr
Estimated Savings over Planning Period	**234**	MG

Costs

Total Cost to Water Provider

Labor Costs		
Staff Hours	40	/year
Hourly Cost	$60.00	/hour
Annual Staff Costs	$2,400.00	
Third Party Costs (Rate study)	$3,400.00	/year
Evaluation and Follow-up Costs (Labor/Consultant)		/year
Annual Labor	**$5,800.00**	/year

Notes:

Annual staff costs include coordination with consultants.

Annual Revenue Lost due to water savings is not incorporated into the Total Cost to Water Provider because these costs are absorbed and included in the rate adjustments to the customers.

Total Cost to Water Provider

Estimated Annual Cost	**$5,800.00**	/year
Estimated Total Cost over Planning Period	**$58,000.00**	
Cost per 1000 Gallons Saved	**$0.25**	

Leak Detection and Repair Program

Currently ACWWA addresses leaks as they become apparent or are brought to the Staff's attention. ACWWA hopes to take a more proactive water approach. Initially, this effort would likely involve an outside firm to electronically detect leaks throughout the system. The goal would be to incorporate leak detection and repair into ACWWA's overall program to reduce losses.

Planning Period	2015 to 2024	
Years in Planning Period	10	
Program Length	10	years

Estimated Water Savings

Annual Estimated Savings Rate	5.0%	
Annual Estimated Non-Revenue Water without Savings	201.78	MG/yr
Estimated Annual Water Savings	**10.09**	MG/yr
Estimated Savings over Planning Period	**100.9**	MG

Notes:

2010 - 2014 average system unaccounted leakage/loss rate was 15.6%.
Savings is the estimated to most often impact Non-Revenue water.

Costs

Total Cost to Water Provider

Labor Costs		
Staff Hours	80	/year
Hourly Cost	$60.00	/hour
Annual Staff Costs	$4,800.00	
Third Party Costs (Leak Detection Consult)	$8,000.00	/year
Evaluation and Follow-up Costs (Labor/Consultant)		/year
Annual Labor	**$12,800.00**	/year

Notes:

Third Party Costs include:
- Leak survey preformed annually by a consultant.

Annual staff costs include coordination with consultants.

Estimated Annual Cost	**$12,800.00**	/year
Estimated Total Cost over Planning Period	**$128,000.00**	
Cost per 1000 Gallons Saved	**$1.27**	

Water Line Replacement Program

This measure involves a continuing process of replacing old pipes within ACWWA

Planning Period	2015 to 2024	
Years in Planning Period	10	
Program Length	10	years

Estimated Water Savings

Annual Estimated Savings Rate	2.5%	
Estimated Percentage of Usage of Area Affected	2.0%	
Annual Estimated Water Usage for Area Affected	25.79	MG/yr
Estimated Water Production over Planning Period without Savings	257.91	MG
Estimated Annual Water Savings	**0.64**	MG/yr
Estimated Savings over Planning Period	**6.4**	MG

Notes:

The line replacement is estimated to affect approximately 2% of the service area each year.

Costs

Total Cost to Water Provider

Labor & Material Costs		
Cost per year	$100,000.00	/year
Total Costs over Planning Period	**$1,000,000.00**	

Notes:

Costs provided by ACWWA.
Cost accounts for staff labor:
Engineering Staff:
100 hours @ $60/hour
Inspection Staff:
100 hours @ $45/hour
Cost also accounts for general contractor costs + labor and material per foot of pipe replacement.

Estimated Annual Cost	**$100,000.00**	/year
Estimated Total Cost over Planning Period	**$1,000,000.00**	
Cost per 1000 Gallons Saved	**$155.09**	

Recycling Water Treatment Plant Filter Backwash

ACWWA anticipates 95% of the backwash at the Lone Tree Creek Water Reuse Facility will be able to be recycled back into the treatment process.

Planning Period	2015 to 2024	
Years in Planning Period	10	
Program Length	10	years

Estimated Water Savings

Planning Period Savings Rate	5.4%	
Estimated Annual Water Savings	**70.0**	MG/yr
Estimated Savings over Planning Period	**700**	MG

Notes:

Estimated Backwashes: Approximately 84 MG/year total for LTCWRF. ACWWA utilizes approximately 83% of the water produced.

Costs

Total Cost to Water Provider

Labor Costs

Staff Hours	52	/year
Hourly Cost	$60.00	/hour
Annual Staff Costs	$3,120.00	
Annual Labor	**$3,120.00**	/year

Materials Costs

Initial Set Up		
Cost over the planning period	$0.00	/year
Annual Materials	**$0.00**	/year

Notes:

After initial set-up, very little additional labor costs are associated with WTP Filter Backwash. No revenue is lost due to water savings since measure is performed prior to meters.

Estimated Annual Cost	**$3,120.00**	/year
Estimated Total Cost over Planning Period	**$31,200.00**	
Cost per 1000 Gallons Saved	**$0.04**	

Water Conservation Officer

Katie Spahr holds the position of Water Resource Project Specialist at ACWWA. A portion of her job description incorporates the duties of a Water Conservation Officer. The focus of her research for her master's was also in water conservation.

Planning Period	2015 to 2024	
Years in Planning Period	10	
Program Length	10	years

Estimated Water Savings

Annual Estimated Savings Rate	0.10%

Notes:

This measure has the potential to improve all categories. This measure also potentially overlaps with other efficiency measures and programs, therefore a conservative reduction of 0.10% of projected annual water use was assumed.

Category	Average Water Use MG	*Estimated Annual Water Savings gallons/yr*
Non-Revenue Water	201.78	201,781
Commercial	332.33	332,333
Commercial Irrigation from Well Sources	400.77	400,768
Residential	204.04	204,036
Residential Irrigation from Well Sources	32.41	32,407
Irrigation from Reg 84	110.83	110,831
Construction Hydrant	7.40	7,400

Estimated Annual Water Savings	**1.29**	MG/yr
Estimated Savings over Planning Period	**12.9**	MG

Costs

Total Cost to Water Provider

Labor Costs		
Staff Hours	300	/year
Hourly Cost	$40.00	/hour
Annual Staff Costs	$12,000.00	
Third Party Costs		/year
Evaluation and Follow-up Costs		/year
Annual Labor	**$12,000.00**	/year

Notes:

Estimated staff costs for the coordinator to spend approximately 300 hours per year at $40.00/hour to the various efficiency programs, measures, and efforts. Some hours were incorporated into other efficiency measures.

Water Conservation Officer

Water Rates

Rate Category	Current Rates (per 1,000 gals)
Weighted average of all customer rates	$4.47

Estimated Average Annual Revenue without Water Savings $4,865,509.16 /year

Estimated Average Annual Revenue with Water Savings $4,860,643.65 /year

Estimated Annual Revenue Loss Related to Water Savings **$4,865.51** /year

Notes:

The annual revenue loss was estimated based on a weighted average of current rates for all ACWWA customers.

Estimated Revenue assumes that the current rates will not change significantly over the planning period.

Estimated Annual Cost	**$16,865.51** /year
Estimated Cost Over Planning Period not including Lost Revenue	**$120,000.00**
Estimated Total Cost over Planning Period Including Lost Revenue	**$168,655.09**
Cost per 1000 Gallons Saved	**$13.08**

Master Plans/Water Supply Plans

ACWWA plans to continue developing, updating, and evaluating plans (i.e. Master Plans, Water Supply Plans, Capital Improvement Plans, and Water Efficiency Plans) that will improve its overall water efficiency and plan for future use.

Planning Period	2015 to 2024	
Years in Planning Period	10	
Program Length	10	years

Estimated Water Savings

Annual Estimated Savings Rate	0.25%

Notes:

This measure has the potential to improve all categories. A conservative reduction of 0.25% of projected annual water use was assumed.

Category	Average Water Use MG	*Estimated Annual Water Savings gallons/yr*
Non-Revenue Water	201.78	504,453
Commercial	332.33	830,832
Commercial Irrigation from Well Sources	400.77	1,001,919
Residential	204.04	510,090
Residential Irrigation from Well Sources	32.41	81,017
Irrigation from Reg 84	110.83	277,077
Construction Hydrant	7.40	18,500

Estimated Annual Water Savings	**3.22**	MG/yr
Estimated Savings over Planning Period	**32.2**	MG

Costs

Total Cost to Water Provider

Labor Costs		
Staff Hours	90	/year
Hourly Cost	$60.00	/hour
Annual Staff Costs	$5,400.00	
Third Party Costs	$14,000.00	/year
Evaluation and Follow-up Costs		/year
Annual Labor	**$19,400.00**	/year

Notes:

Estimated staff costs for Staff to spend approximately 90 hours per year at $60.00/hour to help develop within the District.

Master Plans/Water Supply Plans

Water Rates

Rate Category	Current Rates (per 1,000 gals)
Weighted average of customer rates	$4.47

Notes:

The annual revenue loss was estimated based on a weighted average of current rates for all ACWWA customers.

Estimated Revenue assumes that the current rates will not change significantly over the planning period.

Estimated Average Annual Revenue without Water Savings $4,865,509.16 /year

Estimated Average Annual Revenue with Water Savings $4,853,345.39 /year

Estimated Annual Revenue Loss Related to Water Savings **$12,163.77** /year

Estimated Annual Cost	**$31,563.77** /year
Estimated Cost over Planning Period not including Lost Revenue	**$194,000.00**
Estimated Total Cost over Planning Period Including Lost Revenue	**$315,637.73**
Cost per 1000 Gallons Saved	**$9.79**

Slow the Flow Commercial Irrigation Audits

Slow the Flow commercial and residential irrigation audits are performed by Center for ReSource Conservation (CRC). Slow the Flow offers a quick and impactful way to evaluate the irrigation practices of commercial properties and make simple suggestions for changes that will reduce waste and eliminate runoff. Slow the Flow's trained technicians provide a detailed analysis of existing sprinkler system and suggest watering pattern and technology changes that will increase efficiency. The 90-minute service will provide suggested improvements that will deliver measurable improvements in water use reduction, saving businesses money and supporting community conservation goals.

Planning Period	2015 to 2024	
Years in Planning Period	10	
Program Length	10	years

Estimated Water Savings

Annual Estimated Savings Rate	5.0%

Customer Category	Outdoor Water Use Per Tap gallons/tap	*Estimated Annual Water Savings gallons/yr/tap*	*Annual Program Participants (taps)*
Commercial Irrigation from Well Sources	915,666	45,783	4
Irrigation from Reg 84	3,381,087	169,054	4

Estimated Annual Water Savings	**0.859**	MG/yr
Estimated Savings over Planning Period	**47.3**	MG

The outdoor use estimates are based on the following approximations for each customer category: Commercial Irrigation = 100%, Reg 84 = 100%
Assumed a conservative estimate of 5% savings of projected outdoor water usage . Customers have to put Auditor's advice and suggestions into practice.
Program Participants based on other water providers' participation rates for similar number of people. Estimated Savings over Planning Period is calculated by compounding the estimated annual water savings per the total number of participants for each given year. As more participants utilize the program, more savings is realized.

Costs

Total Cost to Water Provider

Labor Costs		
Staff Hours	4	/year
Hourly Cost	$60	/hour
Annual Staff Costs	$240	
Third Party Costs	$14,080	/year
Evaluation and Follow-up Costs	$0	/year
Annual Labor	**$14,320**	/year
Materials Costs		

Notes:

Costs include staff time for implementing and evaluation (approximately 1/2 hr. per participant)
Third Party Costs include CRC time.
Commercial audits:
$1,200/audit for <50 sprinkler zones.
$2,000/audit for >50 sprinkler zones.
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Slow the Flow Commercial Irrigation Audits

Water Rates

Rate Category	Current Rates (per 1,000 gals)
Commercial Irrigation from Well Sources	*4.67*
Irrigation from Reg 84	*4.57*

Estimated Average Annual Revenue without Water Savings	$434,234.61	/year
Estimated Average Annual Revenue with Water Savings	$412,522.88	/year
Annual Revenue Loss Related to Water Savings	**$21,711.73**	/year

Notes:

The annual revenue loss was estimated based on current rates for the following District customer categories (Residential, Commercial, and Landscape).

Estimated Revenue assumes that the current rates will not change significantly over the planning period.

Estimated Annual Cost	**$36,031.73**	/year
Estimated Cost over Planning Period not including Lost Revenue	**$143,200.00**	
Estimated Total Cost over Planning Period Including Lost Revenue	**$360,317.30**	
Cost per 1000 Gallons Saved	**$7.62**	

Slow the Flow Residential Irrigation Audits

Slow the Flow commercial and residential irrigation audits are performed by Center for ReSource Conservation (CRC). "The service usually takes 90 minutes and involves a visual inspection, data collection, and in-depth evaluation. The consultant will deliver a clear and actionable list of suggestions to reduce water use and runoff at each property, while keeping landscapes and lawns healthy."

Planning Period	2015 to 2024	
Years in Planning Period	10	
Program Length	10	years

Estimated Water Savings

Annual Estimated Savings Rate	5.0%

Customer Category	Outdoor Water Use Per Tap gallons/tap	*Estimated Annual Water Savings gallons/yr/tap*	*Annual Program Participants (taps)*
Residential	15,176	759	9
Residential Irrigation from Well Sources	34,209	1,710	6

Estimated Annual Water Savings	**0.017**	MG/yr
Estimated Savings over Planning Period	**0.9**	MG

The outdoor use estimates are based on the following approximations for each customer category: Residential = 40%, Residential Irrigtion = 100%
Assumed a conservative estimate of 5% savings of projected outdoor water usage . Customers have to put Auditor's advice and suggestions into practice.
Program Participants based on other water providers' participation rates for similar number of people. Estimated Savings over Planning Period is calculated by compounding the estimated annual water savings per the total number of participants for each given year. As more participants utilize the program, more savings is realized.

Costs

Total Cost to Water Provider

Labor Costs		
Staff Hours	7.5	/year
Hourly Cost	$60	/hour
Annual Staff Costs	$450	
Third Party Costs	$1,710	/year
Evaluation and Follow-up Costs	$0	/year
Annual Labor	**$2,160**	/year
Materials Costs		

Notes:

Costs include staff time for implementing and evaluation (approximately 1/2 hr. per participant)
Third Party Costs include CRC time.
Residential audits = $114/audit

Slow the Flow Residential Irrigation Audits

Water Rates

Rate Category	Current Rates (per 1,000 gals)
Residential	*3.94*
Residential Irrigation from Well Sources	*4.18*

Estimated Average Annual Revenue without Water Savings	$8,595.55	/year
Estimated Average Annual Revenue with Water Savings	$8,165.77	/year
Annual Revenue Loss Related to Water Savings	**$429.78**	/year

Notes:

The annual revenue loss was estimated based on current rates for the following District customer categories (Residential, Commercial, and Landscape).

Estimated Revenue assumes that the current rates will not change significantly over the planning period.

Estimated Annual Cost	**$2,589.78**	/year
Estimated Cost over Planning Period not including Lost Revenue	**$21,600.00**	
Estimated Total Cost over Planning Period Including Lost Revenue	**$25,897.77**	
Cost per 1000 Gallons Saved	**$27.55**	

Residential and Commercial Ultra High-Efficiency Toilet Upgrade Service

ACWWA plans to participate in the Ultra High-Efficiency Toilet Upgrade Service offered by CRC where participants can "Save thousands of gallons of water per year with the breakthrough technology of the Niagara Stealth Toilet."

Planning Period	2015 to 2024	
Years in Planning Period	10	
Program Length	10	years

Estimated Water Savings

Annual Estimated Percent Savings	10%

Annual Estimated Water Use Per Tap without Savings

Customer Category	Water Use gallons/Tap	Annual Program Participants	Estimated Annual Water Savings (MG/yr)
Commercial	440,568	11	0.48
Residential	37,971	9	0.03

Estimated Annual Water Savings	**0.52**	MG/yr
Estimated Savings over Planning Period	**28.44**	MG

Notes:

Estimated Water Use is based on the *following average:*
Commercial ≈ 567,000 gallons/Tap and Residential ≈ 70,000 gallons/Tap

Upgrade service available through CRC.

Savings based on Toilet Rebate program data provided by other water providers. Number of participants were adjusted to fit the population. After the data was filtered, calculated savings came to 10% for the Cost/Benefit analysis.

Estimated Savings over Planning Period is calculated by compounding the estimated annual water savings per the total number of participants for each given year. As more participants utilize the rebates, more savings is realized.

Costs

Total Cost to Water Provider

Labor Costs		
Staff Hours	**19**	/year
Hourly Cost	$60.00	/hour
Annual Labor	$1,140.00	/year
Rebates/Replacements		
Rebate Cost	$190.00	
Number of Participants	19	/year
Annual Rebate Cost	**$3,610.00**	

Annual staff time is estimated at approximately 19 hours (1 hr. per participant). This time includes water savings tracking.

Residential and Commercial Ultra High-Efficiency Toilet Upgrade Service

Water Rates

Rate Category	Average Monthly Usage (gals/tap)	Current Rates (per 1,000 gals)
Commercial	36,714	$4.50
Residential	3,164	$3.94

Revenue losses are only based on the water use and do not include the base rates.

Estimated revenue assumes that the current rates will not change significantly over the planning period.

Estimated Average Annual Revenue without Water Savings	$126,866.78	/year
Estimated Average Annual Revenue with Water Savings	$114,180.10	/year
Annual Revenue Loss Related to Water Savings	**$12,686.68**	/year

Estimated Annual Cost	**$17,436.68**	/year
Estimated Cost over Planning Period not including Lost Revenue	**$47,500.00**	
Estimated Total Cost over Planning Period Including Lost Revenue	**$174,366.78**	
Cost per 1000 Gallons Saved	**$6.13**	

Water Efficient Washing Machine Rebates

ACWWA will continue to offer rebates to customers for High-Efficiency Clothes Washers.

Planning Period	2015 to 2024	
Years in Planning Period	10	
Program Length	10	years

Estimated Water Savings

Annual Estimated Residential Water Use Per Tap without Savings

Customer Category	Water Use gallons/tap	Annual Program Participants
Residential	22,795	19

Residential Annual Use	22,795	gallons/tap/yr
Total	22,795	gallons/tap/yr
People per Household	2.63	
Laundry loads per person per week	4.58	
Estimated savings per rebate	1,555	gallons/yr
Gallons Saved per Household per Year	1,555	gallons/yr
Annual Program Participants	19	/yr
Maximum No. of Participants over Planning Period	190	
Estimated Annual Water Savings	**0.03**	MG/yr
Estimated Savings over Planning Period	**1.62**	MG

Notes:

Estimated Water Use is based on the *following 2010 - 2014 average:*
Residential Indoor Use = 40,457 gal/tap

Saving based on participants' responses from previous years (2010 - 2014) rebates.
Average number of people per household = 2.63
Average loads per week = 4.58 (0.25 loads per person per day)
Some participants stated the age of the old washing machine. Others were estimated at 10 years old.

*Higher estimate for savings would occur if Amy Vicker's "Handbook for Water Use and Conservation" values were used. Vicker's savings based on 0.37 loads per person per day *.*

Estimated Savings over Planning Period is calculated by compounding the estimated annual water savings per the total number of participants for each given year. As more participants utilize the program, more savings is realized.

Costs

Total Cost to Water Provider

Labor Costs		
Staff Hours	19	/year
Hourly Cost	$60.00	/hour
Annual Staff Costs	$1,140.00	
Evaluation and Follow up Costs	$0.00	/year
Annual Labor	**$1,140.00**	/year
Rebates		
Rebate Cost	$100.00	
Number of Participants	19	/year
Annual Rebate Cost	**$1,900.00**	

Notes:

Estimated annual staff time is estimated at approximately 1 hours per participant. This time includes water savings tracking.

Rebates offered to customers: 1 per household for $100.

Water Efficient Washing Machine Rebates

Water Rates

Rate Category	Current Rates (per 1,000 gals)
Residential	$3.94

Notes:

Estimated Revenue assumes that the current rates will not change significantly over the planning period.

Estimated Average Annual Revenue without Water Savings	$9,388.95	/year
Estimated Average Annual Revenue with Water Savings	$8,748.47	/year
Annual Revenue Loss Related to Water Savings	**$640.48**	/year

Estimated Annual Cost	**$3,680.48**	/year
Estimated Cost over Planning Period not including Lost Revenue	**$30,400.00**	
Estimated Total Cost over Planning Period Including Lost Revenue	**$36,804.83**	
Cost per 1000 Gallons Saved	**$22.65**	

Indoor Residential Water Audits

Center for ReSource Conservation also offers indoor water audits (w/ low-flow shower-heads and faucet aerators) "Slow the Flow offers consultations on residential water use and suggests simple measures to increase water use efficiency in the home. During the session the consultant will measure outputs from faucets, toilets, and shower-heads, and perform a cost/benefit analysis on fixture replacement options. He/She may also install low-flow shower-heads and faucet aerators at no cost. The consultation will leave the home owner with a customized list of recommendations for increasing efficient water use."

Planning Period	2015 to 2024	
Years in Planning Period	10	
Program Length	10	years

Estimated Water Savings

Annual Estimated Savings Rate	3%

Customer Category	Indoor Water Use Per Tap gallons/tap	*Estimated Annual Water Savings gallons/yr/tap*	*Annual Program Participants (taps)*
Residential	22,795	684	10

Estimated Annual Water Savings	**0.007**	MG/yr
Estimated Savings over Planning Period	**0.38**	MG

The indoor use estimates are based on the following approximations for each customer category: Commercial = 84% and Residential = 60%.
Assumed a conservative estimate of 3% savings of projected indoor water usage . Customers have to put Auditor's advice and suggestions into practice. Shower heads and areators need to be installed (CRC will install them).
Program Participants based on other water providers' participation rates for similar number of people. Estimated Savings over Planning Period is calculated by compounding the estimated annual water savings per the total number of participants for each given year. As more participants utilize the program, more savings is realized.

Costs

Total Cost to Water Provider

Labor Costs		
Staff Hours	5	/year
Hourly Cost	$60	/hour
Annual Staff Costs	$300	
Third Party Costs	$660	/year
Evaluation and Follow-up Costs	$480	/year
Annual Labor	**$1,440**	/year
Materials Costs		
Annual Materials Budget	$330	/year
Annual Materials	**$330**	/year

Notes:

Costs include staff time for implementing and evaluation.

Third Party Costs include CRC time.

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Indoor Residential Water Audits

Water Rates

Rate Category	Current Rates (per 1,000 gals)
Residential	*3.94*

Estimated Average Annual Revenue without Water Savings	$4,941.56	/year
Estimated Average Annual Revenue with Water Savings	$4,793.31	/year
Annual Revenue Loss Related to Water Savings	**$148.25**	/year

Notes:

The annual revenue loss was estimated based on current rates for the following District customer categories (Residential, Commercial, and Landscape).

Estimated Revenue assumes that the current rates will not change significantly over the planning period.

Estimated Annual Cost	**$1,918**	/year
Estimated Cost over Planning Period not including Lost Revenue	**$17,700.00**	
Estimated Total Cost over Planning Period Including Lost Revenue	**$19,182**	
Cost per 1000 Gallons Saved	**$51.00**	

Commercial Indoor Water Audits

Center for ReSource Conservation also offers indoor water audits. "Trained technicians from the Center for ReSource Conservation will test all a businesses' fixtures and appliances for flow rate efficiency and deliver recommendations for possible improvements in a customized Water Conservation Action Plan."

Planning Period	2015 to 2024	
Years in Planning Period	10	
Program Length	10	years

Estimated Water Savings

Annual Estimated Savings Rate	1.5%

Customer Category	Indoor Water Use Per Tap gallons/tap	*Estimated Annual Water Savings gallons/yr/tap*	*Annual Program Participants (taps)*
Commercial	372,073	5,581	5

Estimated Annual Water Savings	**0.028**	MG/yr
Estimated Savings over Planning Period	**1.5**	MG

The indoor use estimates are based on indoor use being approximately 84% of total Commercial water use.
Assumed a conservative estimate of 1.5% savings of projected indoor water usage . Customers have to put Auditor's advice and suggestions into practice. Pre-rinse nozels for dishwashers and areators need to be installed (CRC will install them).
Program Participants based on other water providers' participation rates for similar number of people. Estimated Savings over Planning Period is calculated by compounding the estimated annual water savings per the total number of participants for each given year. As more participants utilize the program, more savings is realized.

Costs

Total Cost to Water Provider

Labor Costs		
Staff Hours	5	/year
Hourly Cost	$60	/hour
Annual Staff Costs	$300	
Third Party Costs	$660	/year
Evaluation and Follow-up Costs	$150	/year
Annual Labor	**$1,110**	/year
Materials Costs		
Annual Materials Budget	$2,000	/year
Annual Materials	**$2,000**	/year

Notes:

Costs include staff time (approximately 1 hr/participant) for implementing and evaluation.

Third Party Costs include CRC time.

Commercial Indoor Water Audits

Water Rates

Rate Category	Current Rates (per 1,000 gals)
Commercial	4.50

Estimated Average Annual Revenue without Water Savings	$45,999.54	/year
Estimated Average Annual Revenue with Water Savings	$45,309.55	/year
Annual Revenue Loss Related to Water Savings	**$689.99**	/year

Notes:

The annual revenue loss was estimated based on current rates for the following District customer categories (Residential, Commercial, and Landscape).

Estimated Revenue assumes that the current rates will not change significantly over the planning period.

Estimated Annual Cost	**$3,799.99**	/year
Estimated Cost over Planning Period not including Lost Revenue	**$31,100.00**	
Estimated Total Cost over Planning Period Including Lost Revenue	**$37,999.93**	
Cost per 1000 Gallons Saved	**$24.76**	

Installation of Water Efficient Irrigation Controls on Large Commercial and Reg 84 Properties

ACWWA is proposing to use Irrigation System Efficiency Devices or ET (SMART) sprinkler system controllers on the HOAs, Open Spaces, Business Parks, and Community Parks irrigated within ACWWA's service area. These controllers are predominantly precipitation based sensors (e.g., Rain Master iCentral) to regulate irrigation systems.

Planning Period	2015 to 2024	
Years in Planning Period	10	
Program Length	10	years

Estimated Water Savings

Annual Estimated Savings Rate	10%

Customer Category	Outdoor Water Use Per Tap gallons/tap	*Estimated Annual Water Savings gallons/yr/tap*	*Annual Program Participants (taps)*
Commercial Irrigation from Well Sources	915,666	91,567	4
Irrigation from Reg 84	3,381,087	338,109	3

Estimated Annual Water Savings	**1.38**	MG/yr
Estimated Savings over Planning Period	**76**	MG

The outdoor use estimates are based on the following for each customer category: Commercial Irrigation = 100%, Reg 84 = 100% Assumed a conservative estimate of 10% savings of projected outdoor water usage . Customers have set up controllers in a conservative mode.
Program Participants based on other water providers' participation rates for similar number of large properties. Estimated Savings over Planning Period is calculated by compounding the estimated annual water savings per the total number of participants for each given year. As more participants utilize the program, more savings is realized.

Costs

Total Cost to Water Provider

Labor Costs		
Staff Hours	35	/year
Hourly Cost	$60	/hour
Annual Staff Costs	$2,100	
Third Party Costs	$0	/year
Evaluation and Follow-up Costs	$0	/year
Annual Labor	**$2,100**	/year
Material Costs per Tap Converted		
iCentral Controller Material Cost	$4,700.00	/unit
Portion of iCentral Controller Cost Covered by Town	50%	
Cost of iController Covered by ACWWA	$2,350.00	
Estimated Number of Controllers	7	
Total Material Cost	**$16,450.00**	
Annual Materials	**$16,450**	/year

Notes:

Labor costs include staff time for processing documents and following-up to ensure controllers are installed and operating correctly. The Business Park, HOA, etc. will be covering the cost of installing and operating the controllers, but ACWWA proposes to cover 50% of the cost of the controllers (an iCentral controller costs approximately $4,700).

The annual revenue loss was estimated based on an irrigation rate per 1,000 gallons.

Estimated Revenue assumes that the current rates will not change significantly over the planning period.

Installation of Water Efficient Irrigation Controls on Large Commercial and Reg 84 Properties

Water Rates

Rate Category	Current Rates (per 1,000 gals)
Commercial Irrigation from Well Sources	*4.67*
Irrigation from Reg 84	*4.57*

Estimated Average Annual Revenue without Water Savings	$349,215.77	/year
Estimated Average Annual Revenue with Water Savings	$314,294.19	/year
Annual Revenue Loss Related to Water Savings	**$34,921.58**	/year

Estimated Annual Cost	**$53,471.58**	/year
Estimated Cost over Planning Period not including Lost Revenue	**$185,500.00**	
Estimated Total Cost over Planning Period Including Lost Revenue	**$534,715.77**	
Cost per 1000 Gallons Saved	**$7.04**	

Rebate for Rain Sensor for Irrigation System Controllers

ACWWA is committed to water conservation. ACWWA will rebate certain water account customers up to 50% of the purchase price (maximum $50) on the cost of a rain sensor (installation costs are not covered).

Planning Period	2015 to 2024	
Years in Planning Period	10	
Program Length	10	years

Estimated Water Savings

Annual Estimated Percent Savings	5%

Annual Estimated Water Use Per Tap without Savings

Customer Category	Outdoor Water Use Per Tap gallons/tap	*Estimated Annual Water Savings gallons/yr/tap*	Annual Program Participants/taps
Residential	15,176	759	3
Residential Irrigation from Well Sources	34,209	1,710	2

Estimated Annual Water Savings	**0.006**	MG/yr
Estimated Savings over Planning Period	**0.313**	MG

Notes:

Estimated Water Use is based on the *following 2010 - 2014 average:*
Residential = 32,000 gal/tap

Savings potential is higher, but multiple factors influence on how much saving is seen.

Estimated Savings over Planning Period is calculated by compounding the estimated annual water savings per the total number of participants for each given year. Because of other Irrigation System Controller program being offered for HOA, Open Space, Business Parks, and Community Parks irrigated areas, other categories were not included. Some smaller business properties may be able to take advantage of this program.

Costs

Total Cost to Water Provider

Labor Costs		
Staff Hours	**5**	/year
Hourly Cost	$60.00	/hour
Annual Labor	$300.00	/year
Rebates		
Rebate Cost	$125.00	
Number of Participants	5	/year
Annual Rebate Cost	**$625.00**	

Notes:

Annual staff time is estimated at approximately 1 hours/participant

Rebate for Rain Sensor for Irrigation System Controllers

Water Rates

Rate Category	Current Rates (per 1,000 gals)
Residential	$3.94
Residential Irrigation from Well Sources	$4.18

Notes:

Revenue losses are only based on the water use and do not include the base rates.

Estimated revenue assumes that the current rates will not change significantly over the planning period.

Estimated Average Annual Revenue without Water Savings	$465.42	/year
Estimated Average Annual Revenue with Water Savings	$442.15	/year
Annual Revenue Loss Related to Water Savings	**$23.27**	/year

Estimated Annual Cost	**$948.27**	/year
Estimated Cost over Planning Period not including Lost Revenue	**$9,250.00**	
Estimated Total Cost over Planning Period Including Lost Revenue	**$9,482.71**	
Cost per 1000 Gallons Saved	**$30.26**	

Time of Day Watering Restrictions

Currently there are no specific restrictions on times during the day for watering. Customers are encouraged ("Conservation Tips") to irrigate landscaped areas before 10 a.m. and after 6 p.m. and to minimize or discontinue water use for non-essential purposes. Water supply is monitored throughout the year to determine what, if any, additional measures will be needed.

Planning Period	2015 to 2024	
Years in Planning Period	10	
Program Length	10	years

Estimated Water Savings

Annual Estimated Savings Rate	0.5%	

Customer Category	Outdoor Water Use Gal	*Estimated Annual Water Savings gallons/yr*
Commercial	51,668,268	258,341
Commercial Irrigation from Well Sources	400,767,792	2,003,839
Residential	81,546,483	407,732
Residential Irrigation from Well Sources	32,406,826	162,034
Irrigation from Reg 84	110,830,606	554,153

Notes:

Estimate that approximately 15% of Commercial, 100% of Commercial Irrigation, 40% of Residential, 100% of Residential Irrigation, and 100% of Reg 84 is outdoor use. Other categories were not include due to small percentage or lack of impact.

A conservative estimate of 0.5% savings of projected outdoor water usage was assumed.

Estimated Annual Water Savings	**3.4**	MG/yr
Estimated Savings over Planning Period	**34**	MG

Costs

Total Cost to Water Provider

Labor Costs

Staff Hours	24	/year
Hourly Cost	$60.00	/hour
Annual Staff Costs	$1,440.00	
Annual Labor	**$1,440.00**	/year

Notes:

Costs include staff time for implementing water restrictions for existing measure.

Water Rates

Rate Category	Current Rates (per 1,000 gals)
Commercial	4.50
Commercial Irrigation from Well Sources	4.67
Residential	3.94
Residential Irrigation from Well Sources	4.18
Irrigation from Reg 84	*4.57*

Notes:

The annual revenue loss was estimated based on current weighted rates for select customer categories

Estimated Revenue assumes that the current rates will not change significantly over the planning period.

Time of Day Watering Restrictions

Estimated Average Annual Revenue without Water Savings	$2,458,655.98	/year
Estimated Average Annual Revenue with Water Savings	$2,446,362.70	/year
Annual Revenue Loss Related to Water Savings	**$12,293.28**	/year

Estimated Annual Cost	**$13,733.28**	/year
Estimated Cost over Planning Period not including Lost Revenue	**$14,400.00**	
Estimated Total Cost over Planning Period Including Lost Revenue	**$137,332.80**	
Cost per 1000 Gallons Saved	**$4.06**	

Educational Activities

Analysis of costs and benefits for educational activities are combined as shown below. Activities include Bill Stuffers, Newsletter, Newspaper Articles, Mass Mailings, and Water Efficiency Page on ACWWA's Website.

Planning Period	2015 to 2024	
Years in Planning Period	10	
Program Length	10	years

Estimated Water Savings

Customer Category	Avg. Annual Water Use over Planning Period (MG)	Estimated Annual Savings Rate	Estimated Annual Water Savings (MG/yr)
Commercial	332.33	0.25%	0.83
Commercial Irrigation from Well Sources	400.77	0.25%	1.00
Residential	204.04	1.5%	3.06
Residential Irrigation from Well Sources	32.41	1.5%	0.49
Irrigation from Reg 84	110.83	0.25%	0.28

Estimated Annual Water Savings	5.7	MG/yr
Estimated Savings over Planning Period	**57**	MG

Costs

Total Cost to Water Provider

Labor Costs		
Staff Hours	40	/year
Hourly Cost	$60.00	/hour
Annual Labor	**$2,400.00**	/year
Materials Costs		
Unit Cost (cost of Bill Stuffers)	$0.25	/participant
Avg. Number of Participants (receiving bill stuffers) over Planning Period	5,126	/year
Annual Materials	**$1,281.50**	/year

Notes:

Staff hours include time spent preparing newsletter, updating website, and preparing bill stuffers.

In 2014 there were over 4,200 active tap accounts, not including Construction Hydrant meters. The average affected number of taps during the planning period is projected to be 5,126.

The annual revenue loss was estimated based on current rates for all service area customers and assumes rates will not change significantly over the planning period.

Water Rates

Rate Category	Average Monthly Usage (gals/tap)	Current Rates (per 1,000 gals)
Commercial	94,606	$4.50
Commercial Irrigation from Well Sources	286,111	$4.67
Residential	37,971	$3.94
Residential Irrigation from Well Sources	34,209	$4.18
Irrigation from Reg 84	1,337,355	$4.57

Educational Activities

Estimated Average Annual Revenue without Water Savings	$4,844,159.30	/year
Estimated Average Annual Revenue with Water Savings	$4,820,379.36	/year
Estimated Annual Revenue Loss Related to Water Savings	**$23,779.94**	/year

Estimated Annual Cost	**$27,461.44**	/year
Estimated Cost over Planning Period not including Lost Revenue	**$36,815.00**	
Estimated Total Cost over Planning Period Including Lost Revenue	**$60,594.94**	
Cost per 1000 Gallons Saved	**$1.07**	

Landscape Design (Xeriscape) and Maintenance Classes

Although ACWWA does not offer any classes at this time, Tagawa Gardens (within service area) provides classes. ACWWA has a link on their website and is exploring options of partnering with Tagawa Gardens. ACWWA is also interested in potentially implementing a program involving something similar to "Garden in a Box" offered by CRC.

Planning Period	2015 to 2024	
Years in Planning Period	10	
Program Length	10	years

Estimated Water Savings

Annual Estimated Savings Rate*	2.5%

Customer Category	Outdoor Water Use Per Tap gallons/tap	Annual Program Participants (taps)	*Estimated Annual Water Savings gallons/yr*
Commercial Irrigation from Well Sources	915,666	4	91,567
Residential	15,176	10	3,794
Residential Irrigation from Well Sources	34,209	10	8,552
Irrigation from Reg 84	3,381,087	2	169,054

Estimated Annual Water Savings	**0.273**	MG/yr
Estimated Savings over Planning Period	**15.0**	MG

Notes:

This measure will mostly impact the following four customer categories: Commercial Irrigation. Residential, and Residential Irrigation, Irrigation from Reg 84. Other customer categories may participate, but the impact would be minimal. Estimated Savings over Planning Period is calculated by compounding the estimated annual water savings per the total number of participants for each given year. As more participants utilize the program, more savings is realized.

Costs

Total Cost to Water Provider

Labor Costs		
Staff Hours	26	/year
Hourly Cost	$60.00	/hour
Annual Staff Costs	$1,560.00	
Third Party Costs	$0.00	/year
Annual Labor	**$1,560.00**	/year

Notes:

Staff costs include communication and outreach. Estimated at approximately 1 hrs/participant. Actual class time is also included.

Landscape Design (Xeriscape) and Maintenance Classes

Materials Costs

Number of Participants	26	/year
Material Cost per Participant	$25.00	/ participant
Annual Materials Budget	$650.00	/year
Annual Materials	**$650.00**	/year

Water Rates

Rate Category	Current Rates (per 1,000 gals)
Commercial Irrigation from Well Sources	$4.67
Residential	$3.94
Residential Irrigation from Well Sources	$4.18
Irrigation from Reg 84	$4.57

Average rates are shown for planning purposes only.

Estimated Revenue assumes that the current avg rates will not change significantly over the planning period.

Estimated Average Annual Revenue without Water Savings	$252,904.16	/year
Estimated Average Annual Revenue with Water Savings	$246,581.56	/year
Estimated Annual Revenue Loss Related to Water Savings	**$6,322.60**	/year

Estimated Annual Cost	**$8,532.60**	/year
Estimated Cost over Planning Period not including Lost Revenue	**$22,100.00**	
Estimated Total Cost over Planning Period Including Lost Revenue	**$85,326.04**	
Cost per 1000 Gallons Saved	**$5.68**	

APPENDIX F

Public Comments and Response

Aurora Sentinel | Buckley Guardian | Aurora

12100 E. Iliff Ave. Suite 102 • Aurora, CO 80014 • 303-750-7555

RECEIVED
FEB 12 2016
By

Pre-Bill

Ad # 83512
Date: 1/20/2016
Terms: Net 30
Rep: KH

Bill to: Account ID: 11851

Rhonda Ruiter
Arapahoe County Water And Wastewater Authority
13031 East Caley Ave.
Englewood, CO 80111

Sold to: Account ID: 11851

Rhonda Ruiter
Arapahoe County Water And Wastewater Authority
13031 East Caley Ave.
Englewood, CO 80111

***Charges** from 1/21/16 to 1/21/16*

PO: public notice - plan update

Date	Pub	Type	Description	Pg	Lvl	Price	Discount	Applied	Due
1/21/16	AS	Ad	Legals: ARAPAHOE			$32.30			$32.30
1/21/16	AS	Clip Charge	Clip Charge			$1.00			$1.00

ARAPAHOE COUNTY WATER AND WASTEWATER AUTHORITY CENTENNIAL, COLORADO NOTICE OF MUNICIPAL WATER EFFICIENCY PLAN UPDATE

Arapahoe County Water and Wastewater Authority (ACWWA) has completed a draft Municipal Water Efficiency Plan (Plan). The Plan is designed to promote the efficient consumption of all water usage by residents, businesses, and local governments; the goal of the Plan is to encourage more beneficial use of our water resources and insure a future adequate water supply.

Prior to finalization of the Plan, ACWWA welcomes input from its customers. ACWWA shall have a 60-day public review period beginning the date of this notice through March 11, 2016. A complete copy is on file and available for public inspection in the main ACWWA Office (13031 E. Caley Avenue, Centennial, Colorado, 80111) during regular business hours. The plan is also posted on ACWWA's website at http://acwwa.com/.

All written comments are due to Katie Spahr, Water Resources Engineer, by the close of business March 11, 2016, at 13031 E. Caley Avenue, Centennial, Colorado, 80111.

Dated the 12th of January, 2016.

Publication: January 21, 2016
Aurora Sentinel

$33.30			$33.30

PAID

Please return this portion with your payment

Remit Payment to:
Aurora Media Group
12100 E. Iliff Ave. Suite 102
Aurora, CO 80014
Fax: 720-324-4965

Display Pre-Bill

Amount Due **$33.30**

Amount Enclosed _____

Issue Date: 1/21/2016
Pre-Bill Date: 1/20/2016
Ad # 83512
Account # 11851

Rhonda Ruiter
Arapahoe County Water And Wastewater Authority
13031 East Caley Ave.
Englewood, CO 80111

AURORA SENTINEL
PROOF OF PUBLICATION

STATE OF COLORADO
COUNTY OF ARAPAHOE }ss.

I JAMES S. GOLD, do solemnly swear that I am the PUBLISHER of the AURORA SENTINEL; that the same is a weekly newspaper published in the County of Arapahoe, State of Colorado and has a general circulation therein; that said newspaper has been published continuously and uninterruptedly in said County of Arapahoe for a period of more than fifty-two consecutive weeks prior to the first publication of the annexed legal notice or advertisement; that said newspaper has been admitted to the United States mails as second-class matter under the provisions of the Act of March 30, 1923, entitled "Legal Notices and Advertisements," or any amendments thereof, and that said newspaper is a weekly newspaper duly qualified for publishing legal notices and advertisements within the meaning of the laws of the State of Colorado.
That the annexed legal notice or advertisement was published in the regular and entire issue of every number of said weekly newspaper for the period of 1 consecutive insertion; and that the first publication of said notice was in the issue of said newspaper dated January 21 A.D. 2016 and that the last publication of said notice was in the issue of said newspaper dated January 21 A.D. 2016.

I witness whereof I have hereunto set my hand this 21 day of January.

Subscribed and sworn to before me, a notary public in the County of Arapahoe, State of Colorado, this 21 day of January A.D. 2016.

Notary Public

LINDSAY L. NICOLETTI
NOTARY PUBLIC
STATE OF COLORADO
NOTARY ID 20134073610
MY COMMISSION EXPIRES DECEMBER 16, 2017

ARAPAHOE COUNTY WATER AND WASTEWATER AUTHORITY CENTENNIAL, COLORADO
NOTICE OF MUNICIPAL WATER EFFICIENCY PLAN UPDATE

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Dated the 12th of January, 2016.

Publication: January 21, 2016
Aurora Sentinel

Colorado Community Media

AFFIDAVIT OF PUBLICATION

State of Colorado)ss
County of Douglas

This Affidavit of Publication for the Douglas County News Press, a weekly newspaper, printed and published for the County of Douglas, State of Colorado, hereby certifies that the attached legal notice was published in said newspaper once in each week, for 1 successive week(s), the last of which publication was made the 21st day of January A.D., 2016, and that copies of each number of said paper in which said Public Notice was published were delivered by carriers or transmitted by mail to each of the subscribers of said paper, according to their accustomed mode of business in this office.

for the Douglas County News Press
State of Colorado)
County of Douglas)ss

The above Affidavit and Certificate of Publication was subscribed and sworn to before me by the above named Gerard Healey, publisher of said newspaper, who is personally known to me to be the identical person in the above certificate on this 21st day of January A.D., 2016.

BARBARA KAY STOLTE
NOTARY PUBLIC
STATE OF COLORADO
NOTARY ID 19874196221
MY COMMISSION EXPIRES 10/12/2016

My Commission Expires 10/12/16

Notary Public,

PUBLIC NOTICE

ARAPAHOE COUNTY WATER
AND WASTEWATER AUTHORITY
CENTENNIAL, COLORADO
NOTICE OF MUNICIPAL WATER
EFFICIENCY PLAN UPDATE

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Dated the 12th of January, 2016.

Legal Notice No.: 928440
First Publication: January 21, 2016
Last Publication: January 21, 2016
Publisher: Douglas County News-Press

Page as place holder.

Official signed ACWWA Board Minutes to be inserted into Appendix F after Board Meeting on May 11th, 2016.

APPENDIX G

Colorado Water Conservation Board Cover Letter and Approval