Sean P. Chambers, General Manager

CHEROKEE METROPOLITAN DISTRICT

6250 Palmer Park Blvd, Colorado Springs, CO 80915-1721
Telephone: (719) 597-5080 FAX: (719) 597-5145

February 29, 2016

Mr. Kevin Reidy
State Water Conservation Technical Specialist
Colorado Department of Natural Resources
Colorado Water Conservation Board
1313 Sherman St., Rm. 721
Denver, CO 80203

RE: Cherokee Metropolitan District – Water Conservation Plan Update

Dear Mr. Reidy,

The Cherokee Metropolitan District Board of Directors has approved and adopted the final version of the Water Conservation Plan, which was prepared in accordance with guidelines set forth by the Colorado Water Conservation Board. The plan was prepared by Forsgren Associates, Inc.

The Plan was made available for public review on Monday, May 4, 2015 and comments were accepted through June 3, 2015, in accordance with CMD policy on public comment period duration. A public hearing was then held on Tuesday, June 10, 2015 at 5:30 PM at 6250 Palmer Park Blvd in Colorado Springs to allow any final comments prior to Water Conservation Plan submittal. No comments were received during the public comment period or at the public hearing.

The Cherokee Metropolitan District would like to thank the Colorado Water Conservation Board for providing funding for development of the Water Conservation Plan through the Water Efficiency Grant Program. The District is committed to joining the statewide effort to improve water usage efficiency. Our hope is that this Water Conservation Plan will lay the groundwork for district-wide water efficiency and protection of Colorado's water supply for years to come.

Sincerely,

Sean Chambers, District Manager

Cc: Board President, Jan Cederberg
Water Counsel, Peter Johnson
District Engineer, Zack Temple
Water Ops Supervisor, Art Sintas

CHEROKEE METROPOLITAN DISTRICT
WATER CONSERVATION PLAN

February 12, 2016

Submitted by:

FORSGREN Associates Inc.

56 Inverness Drive East, Suite 112
Englewood, CO 80112

Project No. 04-14-0063

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1.0 INTRODUCTION

1.1. Purpose

Cherokee Metropolitan District (CMD) is located in an area of anticipated growth on the eastern periphery of Colorado Springs. In order to meet growing demands and reduce reliance on limited renewable water resources in the region, CMD has been actively engaged in implementing programs promoting efficient water use. A formal conservation program began with the adoption of a conservation plan in 1998. In 2007, the conservation plan was updated to meet the then current state requirements and implement a more focused management strategy that placed a greater emphasis on responsible and efficient management of CMD's water resources.

The purpose of the 2015 Water Conservation Plan (WCP) plan is to accomplish two main goals. First and foremost, it evaluates the ongoing conservation efforts implemented following release of the 2007 conservation plan, and provides recommendations for other potential measures moving forward. Successful programs with potential for additional savings should be considered to remain in service. For those programs that have run their useful life, or have not yielded substantial water savings, discontinuing them may be in CMD's best interest. Other measures not considered in the 2007 conservation plan should be considered for future implementation.

The second objective of the WCP is to remain in compliance with current state requirements for water conservation planning. This WCP updates the 2007 Plan to meet current requirements under Colorado State Statutes, CRS 37-60-126, for "covered entities," including integration with the State's new HB10-1051 Database. This WCP is partially funded under the State's Water Efficiency Grant Program.

To meet the CMD efficiency goals and comply with State guidelines, the WCP update includes the following:

- Overview of the existing water supply system
- Examination of past water conservation program and measured success
- Proposed efficient water use measures
- Estimated financial and efficiency impacts of proposed measures
- Implementation and monitoring plan

Upon completion of the WCP, CMD will initiate an outreach program for public and stakeholder involvement in implementation of the proposed efficiency measures. A monitoring program will also be established by CMD to measure the success of each implemented water use program.

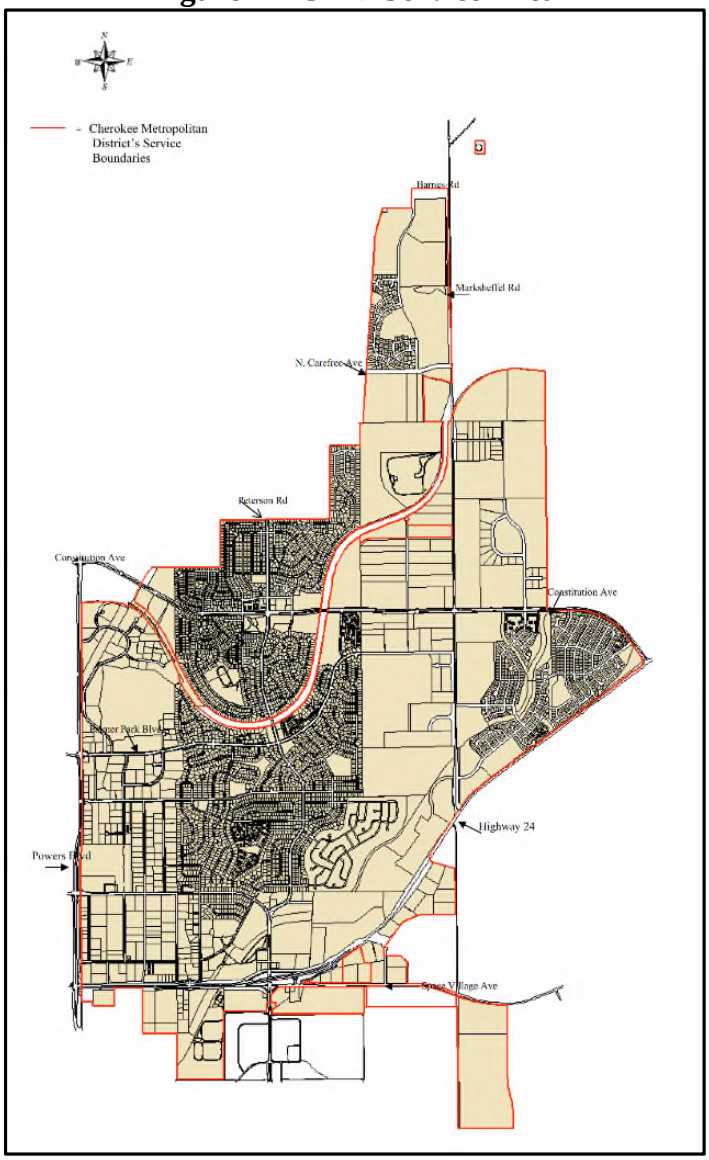
Through these efforts, CMD plans to improve on its already successful conservation efforts and has set a goal of three to five percent further reduction in potable water demand over the next five years.

1.2. Background

CMD is a quasi-municipal governmental entity located just outside the city limits of Colorado Springs, Colorado in El Paso County. CMD was established in 1957. The general boundaries of

CMD are Peterson Air Force Base on the south, Powers Blvd. on the west, a north boundary approximately 2 miles north of Constitution Ave. to Barnes Rd., and an eastern boundary that follows Highway 24 approximately one mile east of Marksheffel Road to Constitution Avenue. See **Figure 1** for a map showing the CMD service area boundaries.

Figure 1 – CMD Service Area



CMD relies primarily on alluvial groundwater supplies in the Upper Black Squirrel Basin, as shown in **Figure 2**. Since 2007, CMD has undertaken efforts to diversify its water supply portfolio and reduce reliance on delivery of water from Colorado Springs Utilities. This has included the development of a groundwater well field in the Black Forest area to access Denver Basin water owned by CMD, the construction of a new Water Reclamation Facility to treat its wastewater for use in recharge of the Upper Black Squirrel Creek aquifer, and development of non-potable wells for irrigation of its golf course.

Due to water supply limitations in recent years, CMD has been actively engaged in demand management and conservation efforts, and now has some of the lowest per capita demands in Colorado. These low demands were achieved through recommendations for implementation in the 2007 Conservation Plan. This included various water conservation measures such as implementation of water reuse, a revised water rate structure, implementation of water-efficient fixtures, and xeric landscaping. The 2015 WCP discusses the outcome of these measures, and recommends additional alternatives to further enhance CMD's water-use efficiency.

CMD System Overview

CMD currently serves approximately 18,000 customers and its service area encompasses approximately 6,300 acres. Water use is approximately 65 percent single-family residential, 10 percent multi-family residential, and 24 percent commercial, including irrigation. In addition to serving customers within the CMD boundaries, CMD also provides services to several other areas, including the Schriever Air Force Base and the Woodmen Hills/Meridian Ranch Development.

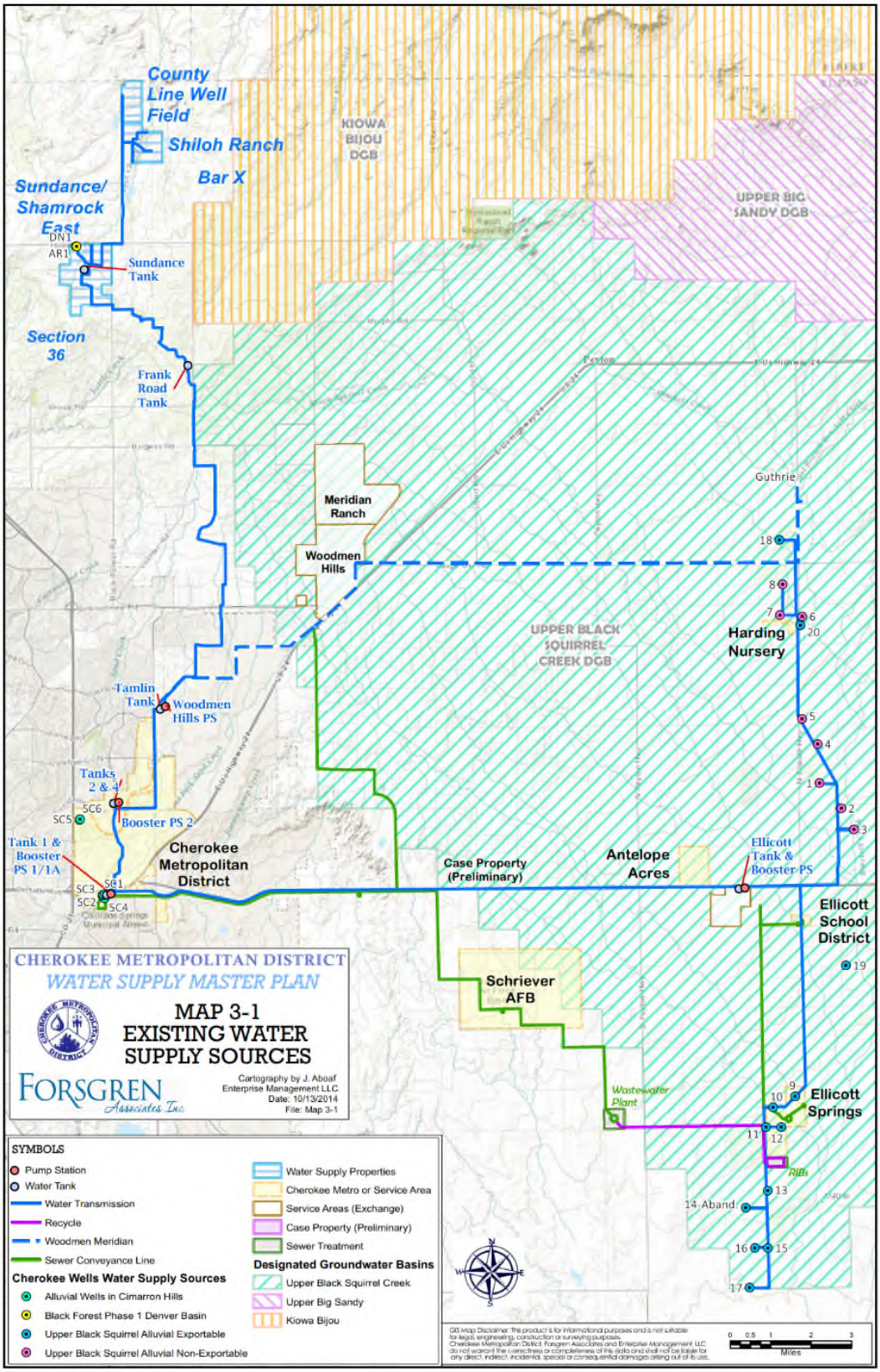
A steady population increase is expected to occur at an annual 2 percent rate through the 2040 planning period. This results in a 2040 expected population of approximately 28,140. Future demands include serving that increasing population, as well the potential addition of new service areas.

Efficient water use through conservation measures supports CMD's commitment to a sustainable approach to water resource management in the region's semi-arid climate. The WCP identifies and addresses a variety of water-efficiency measures, including water budgets and tiered rate schedules, new approaches to irrigation scheduling, residential and commercial audits for high users, rebates for efficient indoor and outdoor uses, and a review of local and state guidelines for efficient water use. Following completion of the WCP, CMD will begin an implementation and monitoring plan to develop a strategic approach to execute the plan, achieve public and stakeholder support, and develop a system to measure the success of the adopted WCP measures.

1.3 WCP Organization

The WCP was prepared following the steps in Colorado Water Conservation Board (CWCB) Water Conservation Planning Guidance Document, and is organized accordingly.

Figure 2 – Existing CMD Water Supply Sources



2.0 PROFILE OF EXISTING WATER SUPPLY SYSTEM

CMD's sources of supply are primarily groundwater, and the majority is alluvial groundwater in the Upper Black Squirrel Creek Designated Groundwater Basin (UBSC). CMD also has access to additional sources through contractual arrangements with Pueblo Board of Water Works and a water exchange for Guthrie Water, also an alluvial UBSC supply owned by two other districts.

CMD is completing construction of the Sundance Ranch water supply system. This is a new Denver Basin groundwater system within Black Forest. It includes facilities to produce, treat, and deliver these supplies.

2.1. Historical Development of CMD

CMD is a quasi-municipal corporation and a political subdivision of the State of Colorado. CMD was created in 1957 pursuant to Article 1 of Title 32, C.R.S., for the purpose of supplying water and sanitary sewer services to its service area. CMD was originally organized as the Cherokee Water District on April 19, 1957. In the mid-1960s, Cimarron Sanitation District began operations to treat wastewater from Cimarron Hills. A third District, formed in 1978, provided street lighting for this unincorporated area of El Paso County.

On April 14, 1981, the District's Board of Directors adopted a resolution to approve the proposed dissolution of the Cimarron Sanitation District, and to combine the functions of Cimarron into the Cherokee Water District. Cherokee Water and Sanitation District was established on October 23, 1981 following an election within the proposed district.

On May 5, 1992 a special election was held to obtain approval of the dissolution of Cimarron Hills Street Improvement District, the previous provider of certain street services within the district. Also in 1992, the El Paso County Commissioners transferred all of their park lands in the area to Cherokee. Cherokee Metropolitan District was established on May 11, 1992 to provide the services previously provided by Cimarron Hills, County Parks, and Cherokee Water and Sanitation District.

2.2. Overview of Existing Water Supply System

WATER SUPPLY SYSTEM

Raw Water Sources

CMD's water supply is provided through an alluvial well system in the UBSC groundwater basin, located approximately 19 miles east of the CMD service area near Ellicott. The UBSC well field consists of eight wells in the northern part of the Basin (wells 1 through 8) and nine wells in the southern part of the Basin (wells 9 through 17). **Figure 2** shows the approximate location of the supplies. New Denver Basin wells in Sundance Ranch (Black Forest area east of Monument) and appurtenant storage, conveyance, and treatment facilities will soon be in operation.

Table 1 presents a summary of CMD's groundwater wells. The planned production values represent what the source can actually produce at this time, rather than the decreed amount available. No water is shown for the Guthrie wells since this is an exchange of water from the non-exportable UBSC wells and therefore not an additional source.

Table 1 - Summary of Current CMD Water Supplies

Water Supply Source	Planned Production (AFY)	Notes
UBSC Wells In Basin (non-exportable)	2,897	
UBSC Wells Exportable	7,050	
Sand Creek Wells (Irrigation)	903	
Pueblo Lease		600 AF lease, expires Dec 2014 (option to extend to Dec 2015)
Guthrie Wells (Exchange)		289 AF exchanged for use out of UBSC basin
Total	**10,850**	

UBSC WELLS IN-BASIN (NON-EXPORTABLE)
The UBSC water comprises the majority of CMD's existing water supply. This source is divided between two distinctions: exportable and non-exportable. Exportable supplies are permitted to be used outside of the UBSC while non-exportable cannot. CMD's service area is not in the designated groundwater basin. All of these wells are alluvial.

UBSC WELLS EXPORTABLE
Water from exportable UBSC wells can be used both in and out of the UBSC.

SAND CREEK WELLS (IRRIGATION)
CMD owns several shallow wells located in the Cimarron Hill service area, referred to collectively as the Sand Creek Wells. These wells are shallow alluvial wells, and are used exclusively for irrigation purposes (primarily the World of Golf and Cherokee Ridge Golf Courses).

OTHER SUPPLIES
CMD recently ended its Pueblo lease, but has renewed its Guthrie exchange.

Guthrie Water
Guthrie Water refers to two alluvial water rights located in UBSC, for a total annual right of 289 AF. There are currently two permanent claims under these rights: GTL Development for 200 AF (GTL is the developer of Meridian Ranch), and Woodmen Hills Metropolitan District for 89 AF. Meridian Service Metropolitan District (serving Meridian Ranch) has a water use agreement with GTL for 200 AF. CMD currently has agreements with both GTL and Woodmen Hills MD for exchange of these supplies with in-basin water owned by CMD. Guthrie water is therefore not an additional source of water but rather an exchange of water that is accounted for in Wells 1-8, so no value is listed in the overall water supply accounting.

WATER CONVEYANCE, TREATMENT, AND STORAGE FACILITIES

CMD has a collection of wells, pump stations, conveyance pipelines, storage tanks, and treatment facilities to deliver potable water to its customers. **Figure 2** presents major infrastructure components within CMD's system.

The general delivery system begins with raw water produced from the north and south well fields in the UBSC. Raw water quality from the UBSC is good, and generally only requires chlorination at the wellhead. This water is first delivered to the Ellicott Tank (0.5 MG) located near Ellicott. A pump station at the Ellicott Tank conveys water along Highway 94 west to the CMD service are via a 30-inch pipeline. The 30-inch pipeline terminates at Tank 1 (3 MG) at the south end of Cimarron Hills. Two booster pump stations at Tank 1 can deliver water to Tank 2 (3 MG) and Tank 2a (4 MG), located centrally in Cimarron Hills. A booster pump station at this location delivers raw water to Tank 3 (5 MG), at the northern end of Cimarron Hills.

Transmission Pipelines

The transmission system currently includes four distinct segments (italicized facilities represent new facilities under the Sundance Ranch Project) that deliver water into CMD's main service area in Cimarron Hills. Smaller transmission pipelines provide connectivity from CMD's tanks to its retail customers. The four main delivery segments are:

- Ellicott Pipeline (30-inch): This is the main pipeline that conveys water from the UBSC wells to the main service area. It is a 30-inch steel pipeline that was constructed in the early 1960s. The pipeline is approximately 16 miles long and conveys water from the Ellicott Booster Station to Tank 1.

- UBSC North Wellfield Pipeline: The north pipeline consists of two parts, a 24-inch steel pipeline constructed in the early 1980s that goes to Well 1 (about 2.5 miles long), and a 20-inch ductile iron pipeline constructed in the 1990s that connects Well 1 to the northern well (about 6 miles long). Smaller piping spurs connect each well to the pipeline.

- UBSC South Wellfield Pipeline: The south pipeline consists primarily of 20-inch ductile iron pipe constructed in the early 1990s that conveys water from the southern wells to the Hwy 94 pipeline (about 9 miles long). Smaller piping spurs connect each well to the pipeline.

- *Black Forest Pipeline: This 15-mile pipeline consists of 24-inch ductile iron pipe, and conveys water from the Sundance pump station to Tank 3 off Tamlin Road. This system will soon be operable.*

Storage Tanks
CMD's storage facilities and associated volumes are shown in **Table 2** below.

Table 2 - Existing Water Storage Tanks

Tank Name	Volume (MGAL)
Ellicott Tank	0.5
Tank 1	3.0
Tank 2	1.0
Tank 3 (Tamlin)	5.0
Tank 4	3.0
Frank Road Tank	*2.0*
Sundance Tank	*0.5*
Total	**15.0**

Pump Stations
There are currently two primary pump stations that convey water from the source wells to the Cimarron Hills service area.

- Ellicott Booster Station: This pump station currently has four pumps, with space and piping provisions for three additional pumps. The pump station was constructed in the early 1990s.

- *Sundance Booster Station: This pump station will have two pumps when complete, with space for three additional pumps.*

CMD has additional booster pump stations located within the distribution system to move water to different pressure zones within its system. These booster pump stations are located adjacent to Tanks 1, 2, and 2a.

2.3. Water Supply Reliability

This section discusses the reliability of CMD's water supply system in the context of a safety factor. This safety factor is presented as a ratio between CMD's water supply production capabilities and CMD's commitments. Commitments are not actual water sales, rather agreed upon commitments to meet future build-out. Actual consumptive use is less than the commitments, so a level of conservatism above the safety factor is built into this analysis.

As discussed previously, CMD relies almost exclusively on alluvial groundwater in the UBSC to provide supply to its service area. In early 2015, new Denver Basin supplies acquired through the Sundance Ranch Project will be added to CMD's list of available water supply. The State Engineer's Office (SEO) allows Denver Basin groundwater supplies to be pumped at a rate such that the source will theoretically provide a water supply for 100 years; i.e., the total volume of the aquifer that will be influenced by the well must be divided by 100 years to determine the maximum annual withdrawal rate from the well. El Paso County has a more stringent requirement that groundwater supplies be planned on the basis of 300 years. This 300-year allowance is the basis for well yields presented herein.

CMD's alluvial groundwater supplies are separated into exportable and non-exportable supplies. Wells 1 through 8, north of Ellicott, represent the non-exportable supplies. CMD's in-district service area, Cimarron Hills, lies outside of the UBSC designated groundwater basin. Wells 9 through 17, south of Ellicott, represent exportable supplies.

In order to demonstrate reliability of CMD's supplies this section will present the commitments and supplies for the exportable and non-exportable well system, and the new Sundance Ranch well field that will be brought online in early 2015. Table 3 shows a summary of the current water supplies and commitments. (For more information, see the technical memorandum titled "Cherokee Metropolitan District Update of Commitments and Supplies for State Engineer's Office.")

Table 3 - Water Supply Summary

		Out of UBS Basin	In UBS Basin
Commitments	AFY	3,804	1,293
Supplies (Planned Production)			
UBS Alluvial Non-Export. Wells	AFY		2,082
UBS Alluvial Export. Wells	AFY	3,433	
UBS Alluvial Export. Wells (Future)	AFY	735	
Black Forest Phase 1 Wells	AFY	488	
Black Forest Phase 2 Wells	AFY	331	
Denver Basin Water under CMD	AFY	5	
Total Supplies	AFY	4,992	2,082
Surplus	AFY	1,188	789
Safety Factor		1.31	1.61

Also, CMD operates 5 wells that are collectively known as the Sand Creek wells. These wells have a planned production of 778 AFY, and are currently used exclusively for golf course irrigation. Average water use from these wells has been about 150 AFY over the past 5 years.

There is a sufficient water supply to meet CMD's commitments, as shown in **Table 3**. Some surplus allows full service in the event certain wells need to be temporarily taken out of service in the event of an emergency. Within the system, CMD has 12.5 MG of storage (15 MG by the end of the year) that provides sufficient operational storage to meet system demands if an upstream emergency temporarily prevents water deliveries.

2.4. Supply-Side Limitations and Future Needs

CMD's alluvial UBSC groundwater wells are connected to a surface hydraulic system and can be classified as a renewable resource. Alluvial groundwater rights are considered surface rights, and are therefore regulated by the prior appropriation system like other surface water rights. The maximum supply side limitations for CMD's alluvial sources are the decreed amounts. Decreed amounts exceed CMD's actual demands, so the decrees do not present a supply side limitation for this supply.

Denver Basin wells are a nonrenewable water source. CMD's supplemental Denver Basin supplies are not considered a primary sustainable supply beyond the 2050 planning. Denver Basin supplies are an important component in providing an interim supply until other, renewable supplies are implemented. They also provide functionality in providing an emergency or back-up supply in the event of drought or if other systems are interrupted.

CMD is taking a multi-faceted approach to meet future water supply needs under the assumption that Denver Basin supplies may not be available as a base-loaded supply beyond 2050. This includes increased water efficiency, water reuse, and securing new, renewable water supplies. See **Table 4** for an overview of the anticipated future needs and limitations of the CMD water supply.

Water Efficiency - CMD has been successful in implementing water efficient measures in its service area, resulting in one of the lowest per capita usages in the state. CMD intends to build on this success through the implementation of additional measures recommended in this WCP. CMD has set a goal of 3 to 5 percent reduction in per capita use with implementation of the recommended measures.

Water Reuse – CMD operates its Water Reclamation Facility (WRF) and Rapid Infiltration Basins (RIBs), which takes wastewater from CMD's and Meridian Service MD's service areas, treats, and discharges to the RIBs. From the RIBs, the water percolates into the ground, blends with native groundwater, and can be recaptured from CMD's south USBC well field.

New, Renewable Water Supplies – CMD is an active participant in the Pikes Peak Regional Water Authority (PPRWA), a group of water providers cooperating in the planning of a new regional water supply system.

Table 4 – Water Supply Limitations and Future Needs

Limitation and/or Future Need	Yes	No	Comments on limitation or future need	How is limitation or future need being addresses
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		
Experiencing high rates of population and demand growth		X		
Planning substantial improvements or additions		X		
Increases to wastewater system capacity anticipated		X		
Need additional drought reserves		X		
Drinking water quality issues	X		Elevated TDS in Well 13 downstream of the RIBs is minimizing use of this well. Well 13 is down gradient of the RIBs.	Possible modification to WRF to reduce effluent TDS levels. A facility planning study is currently underway to identify and recommend solutions to reduce groundwater TDS levels in the south well field.
Aging infrastructure in need of repair	X		The Ellicott Transmission line was constructed in 1964 and is ending its useful service life.	Condition assessment underway to determine rehabilitation options
Issues with water pressure in portions of distribution system		X		
Replacement of nonrenewable supplies with renewable	X		CMD's new Denver Basin groundwater supplies are a non-renewable resource.	CMD participating in the PPRWA regionalization study exploring alternatives to deliver renewable supplies, likely from the Arkansas River.

3.0 PROFILE OF WATER DEMANDS AND HISTORICAL DEMAND MANAGEMENT

3.1. Demographics and Key Characteristics of the Service Area

CMD is located in El Paso County, Colorado, on the eastern periphery of Colorado Springs. In addition to servicing customers within the CMD boundaries around Cimarron Hills, CMD also provides services to several outside areas. A brief description of CMD's service customers is described below.

- Cimarron Hills: This is the main service area of CMD and accounts for about 69 percent of CMD's total water usage. The majority of the Cimarron Hills service area consists of residential customers, with approximately 80 percent single-family housing and approximately 20 percent commercial customers. There are two golf courses within this service area.

- Schriever Air Force Base: CMD provides water for use at the base and at base housing, which together account for about 12 percent of CMD's total water usage (10 percent for the base and 2 percent for base housing).

- Antelope Acres: This small residential development currently accounts for about 1 percent of CMD's total water usage.

- Ellicott Springs: This small residential development also currently accounts for about 1 percent of CMD's total water usage.

- Ellicott School District: CMD provides water for the Ellicott School.

- Harding Nursery: CMD provides water for the main nursery operation for Harding Nursery.

- Woodmen Hills/Meridian Ranch: CMD currently supplies and exchanges water with these two districts due to limitations on the usage area of certain water owned by CMD. Water from the Guthrie right (owned by Woodmen Hills/Meridian Ranch) is used in CMD's system, and water from CMD is provided to Woodmen Hills/Meridian ranch in exchange. This exchange accounts for about 17 percent of the total water usage of CMD.

3.2. Historical Water Use Data

As described above, CMD's service area consists of single-family and multi-family residential users, commercial users, and industrial users. **Table 5** provides the breakdown of water usage by customer class. Schriever Air Force Base (SAFB) is presented as a separate customer class. SAFB may be considered a general commercial type usage, and SAFB Housing may be considered as a multi-family type customer class.

Table 5 – Water Use by Customer Type

Customer Class	Annual Consumption (AFY)					
	2009	2010	2011	2012	2013	2014
Single Family	1,326	1,417	1,373	1,461	1,205	1,219
Multi-Family	246	253	243	237	213	202
Commercial Irrigation	127	150	145	145	88	98
Commercial	480	511	420	387	332	335
Construction Meters (In District)	20	4	6	5	11	4
Construction Meters (Out of District)	12	12	15	10	43	10
SAFB	241	277	246	386	242	228
SAFB Housing		98	78	80	100	108
Total	**2,452**	**2,720**	**2,526**	**2,710**	**2,234**	**2,205**

This table does not include water used in exchange with Woodmen Hills or other internal uses. Therefore, the total annual consumption presented in this customer class table is less than total usage numbers presented below.

Total water sales, by customer, is presented in **Table 6** below.

Table 6 - "Water Sales" Water Usage Data

Customer	Units	Water Consumption					
		2009	2010	2011	2012	2013	2014
General Customers	AF/YR	2,195	2,330	2,197	2,272	1,940	1,933
Schriever AFB	AF/YR	241	277	249	310	242	228
SAFB Housing	AF/YR		98	78	80	100	108
Ellicott Springs	AF/YR	18	18	16	16	14	13
Antelope Acres	AF/YR	21	23	21	20	18	19
Woodman Hills	AF/YR	305	443	359	588	448	764
Harding	AF/YR	47	97	117	179	73	75
Golf Course (Potable)	AF/YR	30	47	55	62	26	0
Park	AF/YR	10	14	28	27	13	
Goss	AF/YR			310			196
Total		**2,867**	**3,346**	**3,431**	**3,554**	**2,874**	**3,336**

Calculation of System Losses

The values discussed previously do not take system losses into account, and are therefore not a true reflection of the actual supply sources needed. Losses include pump-to-waste water from the wells, water that escapes the distribution system through leaks at joints, and water that is lost through pipeline breaks. Table 8 presents information on the water loss between production and consumption.

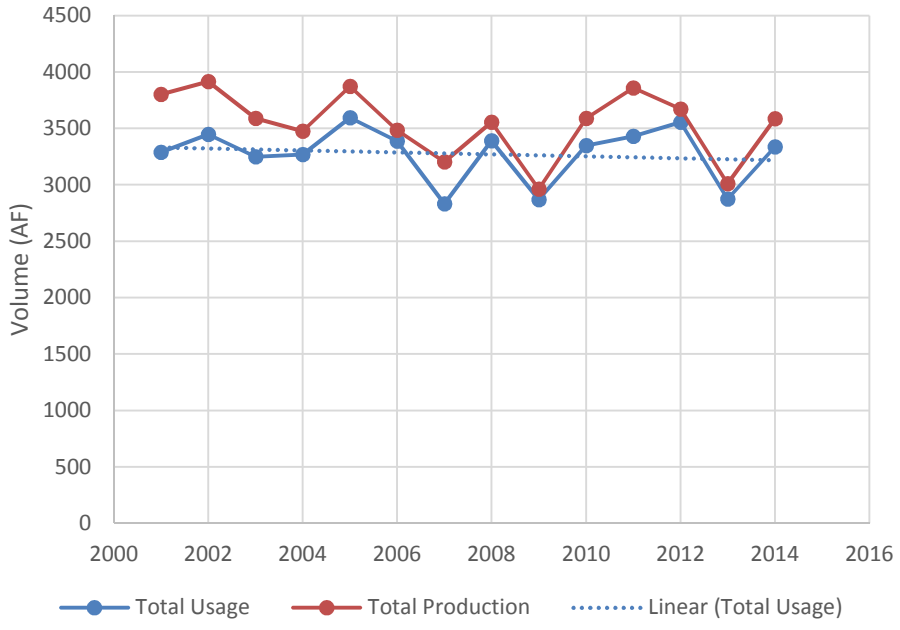
Table 7 - Water Loss and Unit Annual Demand

Item	Units	2009	2010	2011	2012	2013	2014
Total Well Production	AF/YR	2,953	3,577	3,845	3,659	3,011	3,586
Total Usage	AF/YR	2,867	3,346	3,431	3,554	2,874	3,336
Water Loss	AF/YR	86	231	414	105	137	250
Loss Percentage		**3%**	**6%**	**11%**	**3%**	**5%**	**7%**
SFEs		10,517	11,713	12,541	12,262	12,199	14,157
Avg. Unit Annual Demand	**AF/YR/SFE**	**0.28**	**0.31**	**0.31**	**0.30**	**0.25**	**0.25**
Avg. Unit Average Day Demand	GPD/SFE	251	273	274	266	220	226
Persons per Household	PER/SFE	2.5	2.5	2.5	2.5	2.5	2.5
Avg. Unit Average Day Demand	GPD/PER	100	109	109	107	88	90

The worst case year appears to be 2011, which has a corrected actual annual average unit demand per SFE of **274 GPD/SFE** or **0.31 AF/YR/SFE**; this value will be used for future demand projections. CMD has previously used 0.42 AF/YR/SFE for planning purposes. As a comparison, El Paso County Land Development Code advises the following values be used for planning annual water demands when data is not available: 0.26 AF per connection for inside residential use and 0.0566 AF per 1,000 square feet of landscaping. It should be noted that the El Paso County Land Development Code uses conservative values for planning purposes that are much greater than what is typically viewed as efficient indoor and outdoor water use.

Figure 3 below presents a graphical representation of total usage and total production for the CMD service area.

Figure 3 – CMD Water Usage and Production



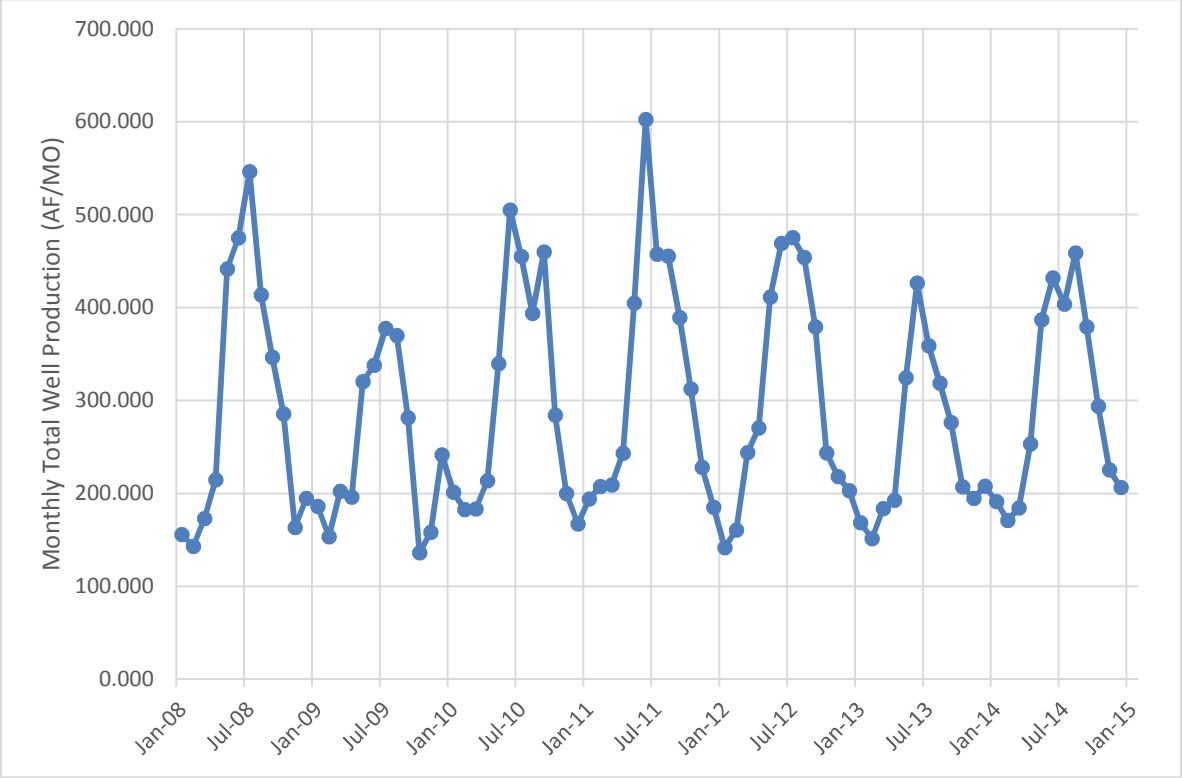
Peak Flows

Peak month and peak day flows for 2009-2014 are shown in **Table 8. Figure 4** shows the total monthly well production. The peak day flow of 6.89 MGD equates to 4,800 GPM.

Table 8 - Peak Month and Peak Day Flows and Factors

Year	Annual Average Day Flow (MGD)	Peak Month Average Day Flow (MGD)	Peak Month Factor	Peak Day Flow (MGD)	Peak Day Factor
2009	2.68	4.10	1.53	5.11	1.91
2010	3.25	5.49	1.69	6.89	2.12
2011	3.52	6.55	1.86	6.03	1.71
2012	3.32	5.10	1.53	5.73	1.72
2013	2.73	4.63	1.70	4.50	1.65
2014	3.25	4.98	1.54	5.24	1.61
Average			1.64		1.79

Figure 4 - Monthly Total Well Production 2009-2014



Nonpotable Irrigation

CMD also maintains two irrigation systems that utilize several nonpotable wells, known as the Sand Creek wells. Water from these wells is currently used to supply two golf courses as discussed below.

- World Golf and Sand Creek Golf Course (World Golf): Water from Sand Creek wells 1-4 is used at this course. CMD has agreed to provide up to 32.2 AFY, per the 2010 agreement with Fontana Enterprises. Water production from wells 1-3 (note that well 4 is currently not operating) has totaled 36 AFY for 2012 and 12 AFY for 2013. It is important to note that World Golf has its own primary water source, and that potable water from CMD's supply is not used.

- Cherokee Ridge Golf Course: CMD owns this course, and constructed Sand Creek wells 5-6 in 2008 to offset the use of potable water. **Table 9** shows the water use for the course. Note that the decreed volume for these two wells is 403 AFY. CMD plans to optimize use of the Sand Creek water to eliminate potable water usage at the Cherokee Ridge course.

Table 9 - Cherokee Ridge Golf Course Water Usage

Year	Potable Water Usage (AFY)	Sand Creek Wells Water Usage (AFY)	Annual Total Usage (AFY)	Water from Sand Creek Wells
2002	193.56		193.56	0%
2003	144.27		144.27	0%
2004	167.94		167.94	0%
2005	189.70		189.70	0%
2006	142.39		142.39	0%
2007	160.64		160.64	0%
2008	113.40	55.90	169.30	33%
2009	29.84	107.36	137.20	78%
2010	47.40	125.37	172.77	73%
2011	55.07	128.45	183.52	70%
2012	61.95	138.12	200.07	69%
2013	26.50	110.70	137.20	81%
2014	0.00	156.07	156.07	100%
Average (2009-2014)	36.79	127.68	164.47	78%

3.3. Historical SFEs

This section presents historical water use data from 2009 through 2014. The historical data discussed in this section includes:

- Average day demand per Single Family Equivalent (SFE)
- Total water usage and calculated total SFEs
- Peak flows

Presentation of historical water demand data is important in tracking success of prior conservation measures and for forecasting future demands, based on a unit usage rate expressed in AFY/SFE.

Unit Demand per Single Family Equivalent

In terms of water supply, demands can be based on population (capita) or, in terms of connections, Single Family Equivalents (SFE). While capita is the most popular method of discussing population, SFE is more applicable for water system planning. SFE is a better measurement tool of service population since CMD tracks SFE connections through their utility billing system. Therefore, the data presented herein will present capita information but will use SFE for all calculation of demands.

Table 10 - SFE Unit Demands Based on Single Family Customer Class (using Accounts)

Item	Units	2009	2010	2011	2012	2013	2014
Annual Usage (Residen. 3/4")	CCF	570,364	609,861	590,518	635,484	524,929	548,554
	MGAL	427	456	442	475	393	410
	AF	1,309	1,400	1,356	1,459	1,205	1,259
Number of Connections (SFEs)		5,283	5,391	5,452	5,537	5,626	5,890
Unit Demand (Annual Average)	AF/YR/SFE	0.25	0.26	0.25	0.26	0.21	0.21
Unit Demand (Average Month)	GAL/MO/SFE	6,730	7,052	6,752	7,155	5,816	5,805
Unit Demand (Average Day)	GPD/SFE	221	232	222	235	191	191

The most conservative of these values is 235 GPD/SFE (daily) and 0.26 AF/SFE (annual). Since the number of accounts may include inactive connections, an analysis was performed to determine the number of effective connections. Table 11 shows the results of this analysis. The unit demand per SFE is then calculated using the procedure listed below:

- CMD's billing structure contains four levels of usage within the single family category. All active connections will at least use the Level 1 category usage since this is the minimum usage possible. Therefore the average number of SFEs for the year is calculated by dividing the total annual Level 1 usage by the unit volume of Level 1 (5 CCF or 500 CF per month). Simply dividing the single family usage by the number of accounts in the accounting is not the preferred method as it does not account for unused accounts. Note that this value compares favorably with the number of accounts reported by the accounting system, with the difference between the two values being unoccupied or unused connections.

- The annual unit demand is then calculated by dividing the annual usage of the single family billing class (the sum of all four Levels) by the calculated number of SFEs (as determined above) to determine the unit usage.

Table 11 - Comparison of SFE Unit Demands by Reviewing Base Usage

Item	Units	2009	2010	2011	2012	2013	2014
Total Annual Base Usage (Level 1)	CCF	289,873	294,965	296,218	299,048	295,698	304,210
Annual Billing Units for Level 1	CCF/ Conn	60	60	60	60	60	60
Number of Connections (SFE)		4,831	4,916	4,937	4,984	4,928	5,070
Number of Accounts		5,283	5,391	5,452	5,537	5,626	5,890
Apparent Occupancy Rate		91%	91%	91%	90%	88%	86%

Therefore, the unit demand values calculated in Table 10 are increased by a safety factor of 10% to allow for vacant connections. This results in unit demand values of 0.30 AF/YR/SFE (annual) and 260 GPD/SFE (daily).

The total SFEs for CMD are shown in Table 7, and are calculated by dividing the total water usage from Table 6 by the unit demand shown in Table 10 (including 10% safety factor).

Table 12 - Calculation of Total SFEs

Item	Units	2009	2010	2011	2012	2013	2014
Avg. Unit Annual Demand	AF/YR/SFE	0.27	0.29	0.27	0.29	0.24	0.24
Total Water Demand	AF/YR	2,867	3,346	3,431	3,554	2,874	3,336
Total SFEs Calculated		10,517	11,713	12,541	12,262	12,199	14,157

Flows for the rest of the customer classes were converted to SFEs by dividing the customer class' total flow by the unit demand per SFE connection that was calculated previously. Table 13 summarizes CMD's historical SFEs. The values in this table do not give an exact accounting of SFEs (note the difference in total SFEs when compared to Table 12), but rather is included to provide an overview of the relative demand of various categories.

Table 13 - Approximate Historical SFEs per Category

Customer Class	Number of SFEs					
	2009	2010	2011	2012	2013	2014
Single Family	4,863	4,959	5,018	5,041	5,116	5,185
Multi-Family	902	885	887	816	905	861
Commercial Irrigation	465	525	530	500	372	416
Commercial	1,760	1,787	1,537	1,336	1,408	1,426
Construction Meters (In District)	74	13	23	18	46	18
Construction Meters (Out of Dist.)	44	43	54	35	184	42
SAFB	884	968	900	1,331	1,026	968
SAFB Housing		342	286	274	424	461
Ellicott Springs	67	63	60	54	60	54
Antelope Acres	77	80	77	70	78	81
Woodman Hills	1,117	1,551	1,312	2,030	1,901	3,249
Harding	174	340	428	617	309	318
Golf Course	109	166	201	214	112	0
Park	36	47	104	93	54	0
Goss			1,132			
Total	**10,572**	**11,770**	**12,548**	**12,428**	**11,996**	**13,078**

3.4. Historical Demand Management Activities and Impacts to Demands

CMD has a strong and effective ongoing conservation program. Significant savings have been realized through this program, resulting in CMD having one of the lowest per capita use rates in the state. As part of this plan, the ongoing conservation programs and measures were evaluated. This evaluation looked at the historic effectiveness of these programs, and the expected effectiveness moving forward. For those programs remaining effective, it is recommended to keep these programs active. For other programs, it may be prudent to discontinue the program as the primary effectiveness has already been realized. These discontinued programs can be replaced with new programs with higher potential water savings.

In its 2007 conservation plan, CMD set a goal of reducing water usage by 3 percent in each of the ensuing years. It is difficult to estimate the actual savings for each of the individual measures that were discussed in the 2007 Conservation Plan, as they were implemented concurrently. Through implementation of the measures presented below, the actual savings attributed to the implementation of all programs from the 2007 Conservation Plan through 2013 is estimated to be close to the goal of 3 percent per year.

Measures from 2007 Conservation Plan

1. *Water Efficient Fixtures and Plumbing Codes* – CMD is located within the Pikes Peak Regional Building Department area which adopted the 2005 Regional Building Code.

Outcome: Since the adoption of the 2005 Regional Building Code, no changes have been made to building requirements within CMD.

2. *Water Efficient Industrial and Commercial Water-using Processes* – CMD had an approved pretreatment program delegated by the Environmental Protection Agency and the Colorado Department of Public Health and Environment. The program intends to protect the quality of water entering the WRF.

Outcome: CMD's largest industrial user, a water purification process, decreased their water consumption by 25 percent by reusing water within their process system.

3. *Xeric Landscaping* – CMD is responsible for 11 medians within its service area. A demonstration median was installed for one of the medians. The 2007 Conservation Plan recommended converting the remaining medians to xeric landscaping. CMD also converted to xeric landscaping at its headquarters.

Outcome – Since the 2007 Conservation Plan was submitted, CMD has xeriscaped several of the medians mentioned. In addition, CMD has developed a xeriscape demonstration garden to display the large variety of xeric plants that are available.

4. *Cherokee Ridge Golf Course Landscaping* – The 2007 Conservation Plan discussed prior conversion to more efficient irrigation scheduling. The Plan recommended additional measures that included xeric landscaping and drilling new wells specifically for the golf course, and removing the course from the potable system.

Outcome – Sand Creek Wells 5 and 6 began full operation in 2009. Nonpotable water now accounts for 75 percent of water usage at the golf course, which has resulted in a 120 AFY reduction in potable water usage for irrigation.

5. *Distribution System Leak Repair* – The 2007 Plan indicated that water loss (invoiced water divided by total water produced) reduced from 13.5 percent in 2001 to 2.8 percent in 2006. The primary focus of that reduction in loss was inaccurate water meters. Outside of meter inaccuracies, CMD distribution system loss is low.

Outcome – CMD has an ongoing effort to replace remaining water meters and further reduce losses in the system.

6. *Water Reuse Systems* – The CMD and Meridian Service MD Replacement Plan involves importing and discharging fully consumable water into the UBSC. This is accomplished through the diversion and treatment of CMD and MSMD wastewater flows to the Cherokee WRF. At the WRF, the water is treated and conveyed to the RIBs where it is discharged and percolated into the alluvium. This supply can later be extracted and treated for potable use at the down gradient wells (13 through 17). This system became operational in 2010.

Outcome – The system has been in operation since 2010. There have been some complications related to elevated TDS and nitrate issues since the system was brought online, but no violations of safe drinking water requirements. The nitrate issue has been corrected, and the TDS issue is the subject of an ongoing evaluation. In the interim, discharge

continues to the RIBs but well 13, the most proximal well to the RIBs, has been taken out of service.

7. *Water Rate Structure* – CMD implemented a tiered rate structure in 2006 in an effort to take a financial approach to promote efficient water usage. This approach increases water rates based on increased water usage. The expectation is that increased water bills will influence ratepayers to use water more efficiently.

Outcome – While it is assumed that the program resulted in water savings, quantification of the effects on the 2006 tiered rate structure are unclear. This program was implemented during the same timeframe as the court decision related to the northern well fields, which triggered a mandated reduction in water use.

8. *Information Dissemination* – This effort focus on public outreach for promoting efficient water use as part of the 2007 Conservation Plan.

Outcome – CMD releases a newsletter to its customers on a regular basis that includes information on water restrictions and ways to reduce water usage and, as a result, customer's water bills. The CMD webpage is regularly updated and includes a comprehensive water conservation tab, with information on xeriscape gardening, watering restrictions, tips to reduce water waste and usage, and other educational information related to water efficiency. Semi-frequent workshops are held at the CMD office related to reducing water usage as well. These workshops are easy to enroll in and provide customers with valuable water conservation tools to reduce usage. CMD also provides informational documents to all new homeowners within the district related to water conservation, among other information.

9. *Regulatory Measures* – As part of the legal ruling under the north well field court ruling, mandatory restrictions were placed to manage the 40 percent reduction in supply. This was an abrupt and aggressive approach that is not consistent with a typical conservation plan, which would typically target a 5 percent reduction per year. To address the reduction, CMD implemented an aggressive irrigation reduction plan. This ultimately led to a full restriction on irrigation schedules. While the supply has been replaced and CMD has sufficient supplies to meet its demands, ongoing irrigation scheduling has remained in place.

Outcome – The immediate outcome was a large reduction in water use. Over the long-term, irrigation scheduling has been retained and resulted in a baseline reduction in use. The three-day watering schedule is prevalent the majority of the time, and information regarding watering restrictions are available on the CMD website.

10. *Incentives to Implement Water Conservation Techniques*

Outcome – Since the submittal of the 2007 Water Conservation Plan, CMD has not looked further into implementation of a comprehensive incentive program. Further analysis of the economic impacts, and other impacts related to an incentive program are required prior to implementation of this program.

3.5. Demand Forecasts

This section will outline CMD's future potential water demands. These demands are divided into two categories:

- Demand increase due to growth rate: This calculates future demands by applying a growth rate to the current SFEs served by CMD, and assumes a typical organic growth of the system. This category assumes a steady growth in demand over time.

- Potential new service areas: These potential future demands include service areas external to the current service area that could potentially be served through annexation into the CMD system. This includes neighboring districts CMD currently serves, such as Woodmen Hills Metro District and Meridian Service Metro District, and proposed developments that may, or may not be currently served by any districts, such as Sterling Ranch and Elkhorn Estates. Since service area expansion is speculative at this time and values unknown, these values are not included in CMD's demand forecast.

Demand Increase Due to Growth

Population projection information for El Paso County and Colorado Springs was referenced to estimate CMD's growth. **Table 14** presents the estimated population projection for the CMD in-district service area (Cimarron Hills).

Table 14 - Population Projections

Year	El Paso County		Cimarron Hills	
	Population	Calculated Annual Growth Rate	Population	Calculated Annual Growth Rate
Projections				
2015	675,169	1.65%	17,150	2.00%
2020	729,740	1.57%	18,935	2.00%
2025	789,038	1.57%	20,906	2.00%
2030	849,022	1.48%	23,082	2.00%
2035	907,435	1.34%	25,484	2.00%
2040	964,827	1.23%	28,137	2.00%

The average annual growth rates for Colorado Springs and El Paso County are calculated as 3.65 percent and 2.98 percent, respectively; while the average annual growth rate is projected at 1.50 percent for El Paso County. Taking all of these values into consideration, a **growth rate of 2.00 percent** will be used for the projections in this plan in order to account for the higher growth expected for CMD.

An important component in forecasting demands and associated facility capacity needs is peaking factors. Peak month and peak day flows for 2009-2014 are shown in **Table 8.**

Table 15 presents the projection of SFE growth; note that the current total SFEs for CMD is 12,199 (for 2013).

Table 15 - SFE Projections

Year	Total SFEs
2015	12,691
2020	14,012
2025	15,470
2030	17,080
2035	18,858

Table 16 presents the future water demands for CMD based on a uniform growth rate beginning with the current SFEs served by CMD. This forecast is the baseline condition without implementation of the water efficiency programs recommended in this report.

Table 16 - Projected Water Demands

Year	Total SFEs	Average Day Demand (GPD)	Annual Demand (AFY)	Peak Day Demand (MGD)	Peak Day Demand (GPM)
2015	12,691	3,477,279	3,934	7.03	4,876
2020	14,012	3,839,197	4,344	7.76	5,384
2025	15,470	4,238,784	4,796	8.57	5,944
2030	17,080	4,679,960	5,295	9.46	6,563
2035	**18,858**	**5,167,054**	**5,846**	**10.44**	**7,246**
2040	20,821	5,704,845	6,454	11.53	8,000
2045	22,988	6,298,610	7,126	12.73	8,833
2050	**25,380**	**6,954,174**	**7,868**	**14.05**	**9,752**

The projections are based on the following criteria:

- Average day unit demand: 274 GPD/SFE
- Annual average unit demand: 0.31 AF/YR/SFE
- Peak day factor: 2.0 x average day demand

3.6. Identification and Screening of Potential Conservation Programs

Moving forward, CMD intends to build upon their ongoing successful conservation program. CMD has identified a goal of 3 to 5 percent reduction in water usage over the course of 7 years through implementation of an updated conservation program that combines enhanced existing water conservation measures along with new measures. As part of this plan, an evaluation of the effectiveness of the ongoing programs was conducted. Costs to continue each program, staff time to run the programs, and observed water savings were the main factors taken into consideration when selecting which programs would remain. The programs that were determined to still be effective will remain, and will be discussed further later in the Plan. In addition to the measures to remain in place, new programs will be implemented to achieve further water savings.

4.0 INTEGRATED PLANNING AND WATER EFFICIENCY BENEFITS AND GOALS

In August 2010, Colorado WaterWise released their Guidebook of Best Practices for Municipal Water Conservation in Colorado. The development of this guidebook was prompted by the statewide requirement for utilities of all sizes to plan and implement water conservation programs. Development of a water conservation plan was made mandatory for water providers in Colorado's Water Conservation Act of 2004. The guidebook is intended to be used as a planning tool for improving and enhancing water efficiency in Colorado. Various "Best Practices" described within the guidebook are meant to give water providers with a detailed description of the most effective water conservation measures, and how to implement them. This resource was deemed useful to determine the most effective water efficiency programs and help develop a recommended implementation plan.

This chapter discusses the importance of water conservation efforts in evaluating future needs. The previous section identified forecasted water demands based on present usage on a per SFE basis. That present usage is based on current conservation efforts. If additional conservation efforts are implemented, CMD can expect to further reductions in the per SFE usage rate.

An overview of all the proposed water efficiency measures considered feasible for CMD is presented in this section. From this comprehensive list, preferred alternatives were developed as part of CMD's updated water conservation program moving forward. Recommendations based on various factors were presented to CMD staff and the CMD Board. After extensive deliberation, the conservation measures to be implemented were selected based on a variety of factors including highest savings return on investment, CMD staffing capabilities to administer the program, and enhancements or replacement of ongoing programs.

A higher level initial screening process was conducted to select the preferred alternatives. For each preferred alternative, information is presented on how these programs can be incorporated into CMD's water supply planning, the potential water efficiency benefits, and the establishment of goals to ensure the benefits are achieved.

A recommended course of action to implement the preferred alternative is presented in this Plan to help achieve CMD's goal of reducing per SFE usage by 3 to 5 percent.

4.1. Water Efficiency Measures for Consideration

Conservation Coordinator

Any successful conservation program requires leadership and direction. The role of a conservation coordinator is to organize and implement the conservation measures described in this plan. A conservation coordinator would be responsible for effectively tracking, monitoring and evaluating all implemented water conservation programs. For CMD, designating a conservation coordinator who also has additional primary responsibilities (which may be reallocated as necessary) is a potential option.

Rules for New Construction

CMD anticipates an increase of approximately 6,500 SFEs over the next 20 years. Implementing rules for new construction embraces the concept of "smart from the start." For all new properties joining the current water system, water-efficient fixtures and appliances would be required to be installed by builders based on the WaterSense New Homes Specification. This water conservation measure is inexpensive to implement and ensures that all new customers use less water from the time they move into their new property. This reduces the bills of these new customers, reduces the growth in demand for CMD, and allows CMD to focus its efforts and funds on other conservation measures.

High-Efficiency Fixture and Appliance Replacement for Residential Sector

The overall goal of this water conservation measure is to reduce the number of wasteful water fixtures and devices and replace them with efficient, water saving fixtures and devices. This can be accomplished in a number of ways. CMD may elect to provide its customers with water efficient fixtures at no cost, provide vouchers or rebates for customers who proactively attempt to reduce their water usage by replacing their old devices with more efficient ones, or require retrofit of new appliances when properties within CMD's service area are sold. Requiring a "retrofit on reconnect" is a cost-effective and efficient way to reduce demands, as it requires new owners of properties within the service area to apply for water service and, essentially, reconnect to the CMD water system. With any reconnect, all wasteful fixtures and appliances must be replaced and meet current industry standards.

New Rules and Regulations for Landscape Design and Installation

This measure involves developing rules for new landscape and irrigation design that developers must adhere to for new construction. Due to the fact that landscape irrigation can account for upwards of 50 percent of the annual water usage for a customer, it is of utmost importance to develop methods to minimize water usage and waste from irrigation. Implementation of this measure through local ordinances and codes can greatly reduce the amount of water used for irrigation in new construction, and adheres to the concept of "water smart from the start." In addition to reductions in water usage for new construction, proper landscape design can also improve stormwater management and reduce maintenance costs on landscaping.

Distribution System Leak Repair (System Water Loss Control)

CMD has previously implemented measures in which they manage the losses experienced in their system. In general, this measure involves methods to track losses, maintain infrastructure, and detect and repair potential leaks. Another important, often overlooked, practice for measuring system water loss is through system auditing. Through a combination of some, or all methods for system water loss control defined by the M36 water audits and loss control methodology, real and apparent system losses can be reduced and system efficiency maximized.

Water Conservation Incentives

Water conservation incentives are used as a way to provide customers with discounts or rebates to their water services if certain criteria for water usage are met. Rebates range from covering a percentage of the costs for water saving equipment, providing free replacement of outdated and high water usage equipment, and simply providing cash rebates for customers who take extra measures to reduce their water usage. For outdoor use, incentives may include providing

discounts for xeriscape landscaping efforts, discounts for installation of more efficient sprinkler heads, or, in extreme water scarcity cases, replacement of lawn areas with xeric landscaping and/or artificial grass.

Water Rate Structure

CMD currently has a block rate structure in place for its customers. This rate structure generally charges in "Tiers," with higher charges per gallon for higher water usage tiers. This water conservation measure incentivizes customers to use less, as customers with medium to high water use pay a premium for excessive water use. Maintenance and additional evaluation of the system in place is essential to maintain a balance between conservation and revenue. An effective plan should be developed based on multiple objectives including fairness to customers, structure understandability, and demand reduction.

Water Budget

A water budget is typically set by the calculated amount of water the average household is expected to require based on family size, number of fixtures, landscape needs, etc. Limits on water use are set based on these factors and penalties are enforced for exceeding these limits. A general indoor water budget will be calculated, setting a limit on water usage based on family size, and a comprehensive water budget per household will be calculated based on a variety of features. Public outreach is of utmost importance when developing a new water budget. It is important for customers to know how much water they are using, and how much water they should be using based on the amount and type of fixtures and appliances in their homes. An indoor water budget can be combined with the current irrigation restrictions implemented by CMD, or an irrigation water budget may be integrated to provide a more complete and comprehensive water budget.

4-day Irrigation Pilot Study

CMD currently has an outdoor watering stage variance in place which adjusts the amount of days a customer can water their lawn based on water availability. Customers, generally, can water their lawns three days a week, either on Wednesday, Friday and Sunday or Tuesday, Thursday, and Saturday. This is an efficient way to manage water demands, but may not necessarily be effective for water conservation. Customers tend to use more water than needed prior to their two day "gap" in watering days in an attempt to compensate. It is has been discussed that implementation of a four-day irrigation schedule may help customers manage their irrigation usage more efficiently.

Irrigation Efficiency Evaluations

Inefficient irrigation systems can increase water usage for a customer dramatically. In order to identify issues with existing water systems and provide recommendations to improve water efficiency, irrigation efficiency evaluations can be provided to customers. Customers can seek out their own auditor to conduct an evaluation, or CMD could provide them at little or no cost to the customer. Programs that provide these comprehensive audits are already established in Colorado. One such program is Slow the Flow. Slow the Flow is a water efficiency program which provides comprehensive irrigation inspections to residences, HOAs, and commercial properties at no charge to the customer. A recent impact analysis study was performed to determine real savings realized from the Slow the Flow program. It was determined that the

average savings over a five-year period following a Slow the Flow audit was between 5,000 and 9,000 gallons per year per customer.

Garden in a Box

Traditional gardens often use a large amount of water and time to maintain and, in turn, are quite costly. Garden in a Box is a garden kit containing a variety of perennial and/or xeric plants that require little water and care to maintain once planted. These kits can be offered by CMD at a discounted price to encourage customers to purchase them, and reduce their overall outdoor water consumption. Customers purchasing these kits should be informed of how much water they can save by simply planting more water efficient plants in their yard.

Water Efficient Design, Installation and Maintenance Practices of New and Existing Landscapes

This is a non-regulatory approach to greatly improve outdoor water use efficiency and decrease costs to consumers. It involves a combination of design, installation and maintenance of landscaping. In addition, implementing a variety of xeric and/or perennial plants into a landscape is a necessary aspect for optimizing irrigation savings. Xeriscaping is the foundation of most water efficient landscapes. The xeric principles that make up the backbone for conservation-based landscapes are as follows: planning and design, soil improvement, grouping plants with similar water demands, practical turf areas, efficient irrigation, mulching, and appropriate maintenance. Informing customers of the benefits of efficient landscapes is key to the success of this program. Incentives may be implemented as well for customers who make an effort to redefine their landscapes and reduce irrigation usage. These may be in the form of low interest loans or rebates for new landscape projects adhering to the water efficient model.

Water Audits and Surveys

Water audits are an effective method of discussing water conservation one-on-one with customers. This preliminary step in water conservation provides information on water conservation methods as well as an in-depth analysis of the customer's current water usage, based on the existing fixtures and appliances in service. Water audits and surveys also serve to identify leaks in the customer's water system and other areas of water loss. A water audit can lead to a comprehensive overhaul of a customer's water system, and provide an estimated cost for implementation. When combined with other conservation methods, water audits and surveys can be an effective method for water conservation.

Public Information and Education

Public information and education is a very broad category for water conservation and can be approached in a variety of different ways. Information dissemination is utilized in an attempt to inform customers of water issues, water conservation methods, and tools to reduce water usage and save money and, ultimately, the environment. The key to successful public outreach is to know the customer, use a strategic communications approach, define campaign objectives, and carefully consider communications channels, among others. Public information and education comes in many forms including water-saving demonstrations, school programs, informative and understandable monthly water bills, water bill inserts, website information, local media outreach, social media, pamphlets, door hangers, flyers, etc.

Evapotranspiration/Rain Sensors for Large Irrigation Users
Advanced weather stations for detecting rainfall and evapotranspiration are becoming more commonplace among heavy irrigation water users. Although not required, these systems are often implemented by owners of lands requiring larger water demands as a way to significantly decrease water use and, ultimately, provide more economic water usage. Many large irrigation users within CMD have systems in place to reduce water usage due to overwatering and maximize efficiencies, but reaching out to all larger irrigation users may provide additional water savings.

4.2. Water Efficiency Benefits

This section identifies how each of the potential methods affects water efficiency.

Conservation Coordinator
The establishment of a conservation coordinator can have positive impacts on utility operations, help improve customer understanding of conservation, assist in the development and dissemination of information, and develop and provide additional support for conservation programs. Hiring a conservation coordinator can greatly improve the effectiveness of implementing water conservation programs, as it allows the coordinator to spend a sufficient amount of time with planning and analysis of such programs prior to implementation.

Rules for New Construction
Establishing rules for new construction can provide many positive benefits with relatively low effort and cost. Upon implementation, new customers will already have complete fixtures and appliances that are water efficient. This measure can also reduce the level of future conservation efforts by making conservation a standard for new customers. In addition, a reduction in energy usage and wastewater production is anticipated.

High-Efficiency Fixture and Appliance Replacement for Residential Sector
The level of water savings for this type of water conservation measure is primarily dependent on implementation strategies and customer participation. With adequate planning, substantial water savings can be realized by replacing inefficient appliances and fixtures for customers within CMD. By targeting the highest water users, the effort can be minimized and the amount of savings can be maximized. In addition, the reduction of water use can decrease energy usage as well. This is due to the fact that less water will need to be heated and pumped throughout the building. Wastewater production is likely to be decreased as well with decreased water use.

New Rules and Regulations for Landscape Design and Installation
Developing a mandatory set of rules for the design and installation of new landscaping projects adheres to the “water smart from the start” concept and can lead to considerable water savings. Water efficient landscapes typically reduce runoff, provide aesthetic benefits, and provide drought flexibility. In addition, maintenance costs for water-efficient landscapes are generally lower than traditional landscapes.

Distribution System Leak Repair (System Water Loss Control)

Benefits realized from a water loss management program in place can cover a wide range. Depending on the level of water loss that is ongoing within any system, water savings can be very high or minimal. Maintaining the integrity of a water system not only improves the efficiency of the overall system, but can also reduce the frequency of road repair efforts due to water main breaks and improve overall system water accounting and cost management.

Water Conservation Incentives

Water conservation incentives can be beneficial to a water utility in a number of ways. Incentives work by informing customers about overall water conservation, and providing them monetary rewards for adhering to the stipulations of the incentive program. This is beneficial to CMD in that it is effective in reducing water demands in the residential and commercial sectors. In addition, customers will receive preliminary knowledge on water conservation and may continue using less water, even if the water conservation incentives are suspended. Customers benefit from water conservation incentives by realizing reduced overall costs for water use.

Water Rate Structure

There are multiple benefits to defining a water rate structure within a district. With water utilities with an anticipated expanding service area, such as CMD, new supplies will ultimately be required. Utilizing a well-planned water rate structure, can help maintain a sufficient revenue stream to pay for continued water system costs, as well as help fund acquisition of new water supplies. A water rate structure also makes customers think about water conservation more thoroughly. Water bills based on a tiered water rate system encourage customers to use less to reduce costs of water service.

Water Budget

A water budget is a much more specific water rate structure than a simple increasing block rate structure that is currently in effect. Although both are effective methods in reducing water demands and encouraging water conservation, water budgets tend to more fairly weigh the acceptable water usage per customer. Water budgets take into account family size, irrigable area, and other factors to specifically define the amount of water that each customer should be using. This benefits CMD in that it can still balance its revenue stream with its conservation efforts by implementing a well-designed water budget. Customers benefit from this by being given a more equally weighted allowance of water usage.

4-day Irrigation Pilot Study

Conducting a 4-day irrigation pilot study will provide CMD with valuable information regarding their current irrigation restrictions. By effectively measuring the difference in outdoor water usage between the current 3-day irrigation schedule and the proposed 4-day irrigation schedule, CMD can determine which approach would be more water-efficient.

Irrigation Efficiency Evaluations

A major benefit of providing irrigation efficiency evaluations is the magnitude of potential water savings. It is anticipated that, for the average customer receiving an evaluation, the water savings could be between 5 and 40 percent. By targeting the highest water users, CMD could maximize these anticipated savings. In addition to water savings, successful implementation of an irrigation

efficiency evaluation program can also improve the appearance of existing landscapes, reduce runoff, and reduce the need for fertilizers and chemicals in residential landscapes.

Garden in a Box

Implementation of a Garden in a Box program to customers provides multiple benefits to both CMD and its customers. For customers purchasing a Garden in a Box kit, they will likely see an improvement in the appearance of their lawn by replacing their old garden with the xeric and/or perennial plants included in the kit. These kits can reduce water demand dramatically and increase irrigation efficiency for participants of the program. In addition, utilizing water-efficient plants and grasses can reduce runoff. Public perception of CMD can also be improved by providing information and solutions for outdoor water efficiency.

Water Efficient Design, Installation and Maintenance Practices of New and Existing Landscapes

This measure is a non-mandatory measure that would likely be performed following, or in conjunction with, other conservation measures. Substantial water savings can be realized when replacing an existing landscape with a completely water efficient landscape. Water efficient landscapes can also reduce runoff, provide aesthetic benefits, require less maintenance and extend the time necessary between landscape replacement projects.

Water Audits and Surveys

Targeting customers that have the highest usage within the CMD service area is essential in maximizing the effectiveness of water audits and surveys. When implemented effectively, water audits and surveys can have a variety of benefits. Reduction of water usage, identification and maintenance of existing leaks, and providing customers with information on water conservation are among these benefits.

Public Information and Education

Providing easy-to-follow information to customers can be a great way to improve the overall image of CMD. Although it is not likely that water savings will be realized from providing this information alone, when combined with other water efficiency programs, public information and education can have a great impact on water savings. In addition, this is a great way to provide customers with valuable knowledge about water conservation, and increase the level of participation in other conservation programs.

Evapotranspiration/Rain Sensors for Large Irrigation Users

Ensuring all large irrigation users within the system have methods for reducing water usage and waste can lead to a variety of benefits. Reduced water usage by large users is anticipated, and would have a positive economic impact on the large irrigation users within the system. In addition to direct water savings due to efficiency upgrades, a reduction of runoff may be realized in areas due to the elimination of overwatering.

4.3. Water Efficiency Goals

This section identifies the goals of each of the potential methods.

Conservation Coordinator
Hiring a conservation coordinator is intended to increase the effectiveness of all implemented water conservation measures. The goal is for the individual identified as the water conservation coordinator to maintain, develop and assist with water conservation programs, as well as provide support for customers.

Rules for New Construction
Ultimately, the goal of this water conservation measure is to ensure that new homes are "smart from the start." By implementing ordinances that require the installation of water efficient fixtures and appliances in new homes, water savings are automatically guaranteed over standard fixtures and appliances.

High-Efficiency Fixture and Appliance Replacement for Residential Sector
The main goal of this conservation measure is to reach out to the highest indoor water users in an attempt to convince them to install high-efficiency fixtures and appliances. In addition, establishing a "retrofit on reconnect" ordinance is essential in maximizing benefits realized from this water conservation measure. A reasonable goal for water savings per household is approximately a 30 percent reduction in water use, given all old fixtures and appliances are replaced with water efficient fixtures and appliances. With each new home, water usage is anticipated to be approximately 20 percent less with water efficient fixtures and appliances.

New Rules and Regulations for Landscape Design and Installation
The main goal is to have all new landscape and irrigation installations adhere to a strict set of efficiency standards. Certain codes of compliance would need to be enacted prior to implementation. For each new landscape and irrigation installation, savings of between 22 and 63 percent is anticipated over traditional landscapes.

Distribution System Leak Repair (System Water Loss Control)
Overall, the goal of effective system water loss control implementation is to minimize, as much as reasonably possible, any unaccounted for water within the system. For well-maintained and established water systems, the goal would be to improve upon existing methods for loss management and detection and improve accuracies in measurement of water loss. For water systems experiencing greater water losses within the system, identification and remediation of large leaks within the system is the primary goal to begin development of a more robust water loss control practice.

Water Conservation Incentives
The main goal for initiating a water conservation incentive program is to reduce water usage by providing rebates or vouchers to customers who are proactive in limiting their water use. In addition, implementation of an incentive program can bring water conservation information to customers and make them more aware of the amount of water they are using.

Water Rate Structure

One of the main goals for implementing an effective water rate structure is to reduce water usage by increasing the cost of water as usage increases. Anticipated water savings for implementing a new water rate structure is between 10 and 30 percent. In addition, it is important to maintain a balance between conservation and revenue. Implementing a water rate structure that reduces water use, while keeping costs at a level that provides a constant and sufficient revenue stream is essential.

Water Budget

The goals for developing a water budget are similar to those for any water rate structure. Overall, the main goals are to reduce water usage while maintaining a sufficient revenue stream to keep up with costs of new supply and distribution system improvements. Anticipated water savings for implementing a new water budget is between 10 and 30 percent. Providing a more individualized water allowance which is more fairly balanced for customers is another goal for developing a water budget.

4-day Irrigation Pilot Study

The main goal for conducting this 4-day irrigation pilot study is to determine whether or not changing the watering schedule for customers has a positive impact on water efficiency and conservation. It is believed that there will be a reduction in outdoor water usage, but this will not be determined until the pilot study has been completed.

Irrigation Efficiency Evaluations

Implementation of the recommendations provided in the irrigation efficiency evaluations is critical for water efficiency. Water efficiency goals for providing irrigation efficiency evaluations are to first target the top irrigators and, once evaluations have been performed, follow up to ensure implementation. Anticipated water savings for implementing an irrigation efficiency evaluation program is between 5 and 40 percent.

Garden in a Box

Public participation in this program is essential to this program's success. Using effective forms of public outreach, CMD would hope to achieve a level of participation in the Garden in a Box program of approximately 5 percent in the first year. As the number of Garden in a Box kits being installed increases, it is anticipated that customers will begin identifying the aesthetic value of these gardens, and customers who have previously purchased a kit will begin promoting this product. Public participation is anticipated to increase over multiple years with increased customer involvement, in conjunction with public outreach programs implemented by CMD.

Water Efficient Design, Installation and Maintenance Practices of New and Existing Landscapes

The main goal of this conservation measure is to inform high irrigation users of the potential water savings that could be realized by installing more water efficient irrigation systems and landscapes. A reasonable goal for overall water savings per water efficient landscape and irrigation installation is between 5 and 20 percent, although the most efficient systems may realize savings of up to 50 percent.

Water Audits and Surveys

To maximize water efficiency goals achieved through this water conservation measure, targeting customers with the highest water usage is essential. Depending on budgetary considerations, a majority of customers in the top 5 to 25 percent of water users would be contacted and asked to participate in this program. For each audit performed that is followed by implementation, it is anticipated that 10 to 20 percent water reduction will be realized, per customer.

Public Information and Education

The main goal for any type of public information and education program, is to ensure that the audience that is targeted is actually being reached. Proper implementation is essential in making sure the message reaches the intended customers. Information on water conservation and efficiency is intended to be targeted at all customers, and not just a specific demographic.

Evapotranspiration/Rain Sensors for Large Irrigation Users

The main goal of this conservation measure is to ensure customers with large irrigation water usage have systems in place that ensure water waste is kept to a minimum. Depending on the size and number of large irrigation users without evapotranspiration/rain sensors in place, the anticipated water savings can cover a wide range. However, it is anticipated that for each large irrigation user that implements new equipment to minimize their water usage, an average savings of approximately 20 percent per user can be realized.

Each of these water conservation measures has a unique set of goals and methods to accomplish these goals. By utilizing a combination of the water conservation measures described, CMD has established goals to be achieved through implementation of these measures. The overall water efficiency goals CMD would like to accomplish through this Water Conservation Plan are as follows:

1. Identify existing water conservation programs previously implemented by CMD that have been observed as effective and re-evaluate these programs, if deemed necessary.
2. Analyze the identified water conservation measures based on cost, effective water savings, and compatibility with CMD's water system. From this analysis, determine which measures should be selected for implementation.
3. From analysis of the water conservation measures identified, select water efficiency activities that are anticipated to reduce overall water demand by three to five percent.
4. Implement the selected water conservation measures as outlined. Ensure that high water users are targeted to maximize water savings.
5. Effectively measure the water savings that are realized following implementation, and evaluate the overall efficiency of the implemented programs.
6. Monitor the ongoing water conservation programs. Adjust programs as needed to maintain a positive impact.

4.4. Water Conservation Measures Summary

See **Table 17** for a summary of all efficiency measures identified and considered. See below for a description of the measurement parameters used for preliminary analysis. Anticipated total water savings are a measurement of the expected overall system savings relative to a specific water conservation measure. Opinion of probable avoidable costs is the cost savings for implementing water conservation measures versus purchasing new water supply.

It should be noted that continuation of a program for "water efficient industrial and commercial processes and incentive elements" was discussed between the CMD board and staff from Forsgren Associates and CMD. It was determined that, although implementation of water efficient processes shall be encouraged for new construction, there shall not be a specific regulation or assigned staff member to manage this conservation measure. Although this may be considered for future implementation, additional staffing and funds would be required to properly and effectively manage and regulate a program for water efficient industrial and commercial processes and incentive elements.

Table 17 – Water Conservation Measures

Priority Number	Water Conservation Measure	Description	Anticipated Yearly Water Savings/Outcome (2022)	Probable Implementation Cost	Opinion of Probable Yearly Cost	Probable Avoided Costs	Implementation Cost Description	Yearly Cost Description
1	Water Rate Structure	CMD has an increasing block rate structure in place. Evaluate existing rates and determine if changes should be made to system in place. Formulate plan based on multiple objectives including revenue adequacy, fairness to customers, bill understandability, and demand reduction.	25 AFY (After Restructure of Rates) (Anticipated 2016)	$10,000	$5,000	$455,000	Cost for service study, Customer education about changes	Billing Software Costs, Customer Service
2	Distribution System Leak Repair (System Water Loss Control)	Involves system auditing, loss tracking, infrastructure maintenance, leak detection and leak repair. Auditing a water system for real and apparent losses is a key component for water loss control.	90 AFY (Assume 5% system loss)	N/A	$50,000	$1,450,000	None	Employee cost to analyze system and identify losses in system on yearly basis. Potential costs for fixing leaks.
3	Rules for New Construction	Build high efficiency/water conservation measures into new building construction.	70 AF (Total w/ 2100 Additional SFEs)	$12,000	$20,000	$1,248,000	Staff time for research, plan development and political "convincing" to implement.	Enforcement costs
4	New Rules and Regulations for Landscape Design and Installation	Rules for new landscape and irrigation system design. Installation is inexpensive and, with proper installation and maintenance, can dramatically reduce water usage.	35 AF (Total w/ 2100 Additional SFEs)	$12,000	$20,000	$548,000	Staff time for research, plan development and political "convincing" to implement.	Enforcement costs
5	Public Information and Education	Any method of public outreach which is intended to provide information to customers. Examples of this are water-saving demonstrations, water bill inserts, school programs and a variety of other strategies.	No direct savings, enhance effectiveness of other programs	$22,000	$10,000	N/A	Develop plan, cost of materials for bill stuffer campaign or other. Cost for employee time for education.	Yearly costs of continued outreach program/programs.
6	4-Day Irrigation Pilot Study	Investigate effects on water use by changing the amount of days customers can water their lawns.	No direct savings from pilot study	$10,000	N/A	N/A	Cost to update website, customer education and service study	None
7	Irrigation Efficiency Evaluations	Water efficiency program which provides free irrigation inspections to residences, HOAs and commercial properties. Recommendations are provided to reduce outdoor usage.	12 AF	$5,000	$10,000	$165,000	Staff time for customer selection, targeting. Staff time to create program. Public information	Yearly cost for rebates associated with discounted evaluations. (Not required) Customer outreach
8	Commercial and Residential Water Audits and Surveys	In home water audits to investigate individual customer's homes for leaks, analyze existing fixtures and appliances and provide recommendations for reducing water use.	10 AF	$10,000	$15,000	$85,000	Staff time to develop the audit program and perform initial customer audits	Staff time to monitor implementation of program recommendations.
9	Water Conservation Incentives	Provide rebates, discounts to service, and other incentives for meeting set criteria to encourage customers to lessen water use.	5 AF	$20,000	$16,000	-$32,000	Cost to develop incentive program, customer education	Staff time for program administration and direct costs related to incentives and rebates
10	Conservation Coordinator	Successful conservation programs require leadership. Conservation coordinator would organize and implement conservation plan measures and track, monitor and evaluate water conservation programs.	No direct savings, enhance effectiveness of other programs	$2,500	$50,000	N/A	Initial cost to conduct interviews and hire employee	Salary for employee
11	High-Efficiency Fixture and Appliance Replacement for Residential Sector	Removal of inefficient and wasteful devices in favor of water efficient products. Can either be provided by district, incentivized with rebates or vouchers, or establishing requirement to retrofit/upgrade to high efficiency fixtures and appliances after real estate transactions.	5 AF	$15,000	$20,000	-$55,000	Initial development of plan and customer outreach	Costs for audits, processing costs for associated rebate program
12	Water Budget	The calculated amount of water the average household is expected to require based on numerous factors. Places a rate structure for water use based on these factors and enforces penalties for exceeding these limits. Similar to block rate structure, but individualized.	40 AF	$60,000	$15,000	$635,000	Cost for service study, Customer education, Data acquistion, conduct audits	Billing Software Costs, Customer Service
13	Garden in a Box	Provides garden kits sent to customers at a discounted rate which include perennial and/or xeric plants that require little water and care to maintain.	5 AF	$2,500	$1,500	$87,000	Staff time to coordinate with garden in a box and become a partner in program.	Public outreach, rebates for garden in a box, if applicable
14	Evapotranspiration/Rain Sensors for Large Irrigation Users	Program set to assist irrigators in replacing outdated equipment to improve overall irrigation efficiency. Cherokee Ridge Golf Course updated their system with a weather station for Rain detection and ET calculation in 1999 and was required to further decrease water usage by 25% in 2007.	8 AF	$10,000	$5,000	$115,000	Develop plan and identify and meet with the large District irrigators.	Staff time to monitor implementation of program recommendations.
15	Water Efficient Design, Installation and Maintenance Practices for New and Existing Landscapes	Non-regulatory approach to greatly improve outdoor water use efficiency and decrease costs to consumers.	6 AF	N/A	$5,000	$85,000	No initial costs	Yearly costs for customer outreach

*For calculating avoided costs, a unit cost of $20,000 per acre foot for new supply was used.

5.0 SELECTION OF WATER EFFICIENCY ACTIVITIES

Based on the list of the feasible water conservation measures, discussions were held with CMD staff to discuss each of the conservation measures and determine which measures would be a good fit for CMD to implement. CMD is located near the Colorado Springs Utilities service area, and is interested in eventually developing a plan for water conservation that contains many similar elements as Colorado Springs Utilities. Colorado Springs Utilities already has a robust Plan in place, making it a longer-term goal of CMD to implement all desirable water efficiency measures. Following this meeting, further discussions were held with CMD staff and the CMD Board to discuss the options. CMD staff and board members were then asked to rank their preferred conservation measures from most to least favored. The averages of the ratings received from each individual were then calculated and the most favorable programs were identified.

Recommendations based on various factors including highest savings return on investment, CMD staffing capabilities, costs to implement each program, and potential water savings were presented to CMD staff and board members. After extensive deliberation, the conservation measures to be implemented were selected based on the above factors.

5.1. Measure and Program Selection

Of the 15 new programs identified as potential conservation measures, the top 5 programs that were deemed most efficient and feasible by CMD staff and board members were selected for near-term implementation and/or re-evaluation. The top 5 programs are as follows:

- Water Rate Structure
- Distribution System Leak Repair
- Rules for New Construction
- New Rules and Regulations for Landscape Design and Installation
- Public Information and Education

Measures Selected for Implementation or Improvement Near-Term

Water Rate Structure

CMD has had a block-rate structure in place since 2006. Although the actual water savings attributed to this measure cannot be accurately quantified, it is believed that this has led to fairly substantial water savings since implementation. **Figure 5** below shows the current water and sewer rates charged by CMD. Every year, these rates are adjusted as necessary to provide revenue adequacy for the development of new water supply and delivery resources.

Figure 5 – 2015 CMD Water/Sewer Rates

Water Meter Size (inches)	Service Charge (per month)
5/8" & 3/4"	$14.65
1"	$14.65
1 1/2"	$14.65
2"	$14.65
3"	$14.65
4"	$14.65
6"	$14.65

Customer Class	Water charge (per unit)	Sewer charge (per month)
Residential		$28.75
First 5	$3.95	Plus $1.45/wua or
Next 15	$5.55	current month of
Next 15	$8.65	consumption
Over 35	$13.60	(whichever is lower)
Commercial		Base charge $34.00
Non Lift Station	$5.00	Plus # units x $2.85
		Base charge $40.50
Lift Station	$5.00	Plus # units x $2.95
Multi-Family		If individually metered
First 5	$3.95	$28.75 Plus $1.45/wua
Next 15	$5.55	If one meter for entire
Next 15	$8.65	building: # apt units x
Over 35	$13.60	$33.25, i.e., 4=$133.00
Housing		
First 1210	$4.95	$5.35 per 1,000 gallons
Next 3630	$5.95	
Next 3630	$7.44	
Remainder	$13.60	
SAFB		
First 5000	$4.96	$4.15 per 1,000 gallons
Next 5000	$5.95	
Next 5000	$7.44	
Remainder	$13.60	
Construction Meters		Street Light Fee: $1.27
In District	$8.20	Parks Fee: $1.75
Out of District	$15.00	

Daily charge commercial sewer NL: $1.13 Sewer L: $1.35

One unit = 748 gallons
748 gallons = 100 cubic feet
7.48 gallons = 1 cubic foot

Commercial Irrigation
3/4" & 1" Meter

First 5	$3.95
Next 15	$5.55
Next 15	$8.65
Over 35	$13.60

1 1/2" Meter

First 20	$3.95
Next 60	$5.55
Next 60	$8.65
Over 140	$13.60

2" Meter

First 30	$3.95
Next 90	$5.55
Next 90	$8.65
Over 210	$13.60

Daily charge	Residential and Multi
Availability:	0.49
Sewer:	0.96

Sewer Multi: $1.11

Rates charged to out-of-District customers will be calculated at 187% of the in-District rates.

CMD has expressed its desire to re-evaluate its current water rates and possibly restructure how customers are charged. Current rates and effects of raising rates for heavy water users will be evaluated in an attempt to balance revenue with capital costs of upcoming projects. By increasing rates for heavy water users, it is anticipated that some will use less water in an attempt to lower their monthly water bills, while some will continue to use large amounts of water and

increase CMD revenue. Overall, it is anticipated that a restructuring of the block rate structure in place will lead to lower water demands, without compromising revenue adequacy. With implementation of new rates, water savings are anticipated to decrease gradually over the years following implementation. Once an optimal balance has been achieved, savings are predicted to level off. Since most of the potential water savings have been captured through initial implementation of the current CMD block rate structure, it is uncertain the amount of savings that can be realized by restructuring of the current rate structure. It is more likely that there will be greater financial benefits, allowing CMD to invest revenue to new water supply efforts.

Distribution System Leak Repair (System Water Loss Control)

CMD previously implemented a comprehensive distribution system leak repair and audit system that is ongoing. Between 2009 and 2013, the range of water loss experienced within the CMD system was between 3 and 11 percent. CMD will continue testing water meters within the system and replace meters as required to more accurately measure water loss. Although losses have significantly decreased due to prior leak repair and auditing efforts, additional savings are anticipated with improved leak detection methods and system-wide auditing. By continuing to be proactive with leak detection, meter testing and replacement, and water system auditing, CMD anticipates it will maintain a system water loss of three percent or lower for each year through 2022.

Rules for New Construction

Although some developers provide water efficient appliances and fixtures in new buildings, the inclusion of these in new construction has not yet been made mandatory within the CMD service area. Any new building construction in the CMD is reviewed by the Pikes Peak Regional Building Department. CMD has the capability to develop its own set of rules for developers to adhere to, as long as the codes implemented meet the standards set by the Pikes Peak Regional Building Department. It is important that all rules implemented are mandatory in order to ensure participation in the program. Since CMD anticipates substantial future growth, there will be greater benefit with early implementation of new rules for construction.

CMD will seek to coordinate that all new homes joining the CMD water system meet or exceed the indoor efficiency criteria defined by the EPA WaterSense specification. The EPA WaterSense specification is a developed set of requirements and criteria for both outdoor and indoor construction that aim to adhere to the concept of “water smart from the start” construction. CMD will enact methods to ensure inspection of all new buildings adhere to these requirements. Since CMD anticipates substantial future growth, there will be greater benefit with early implementation of new rules for construction. Based on population projections through 2022, approximately 1,500 additional SFE’s are anticipated in the CMD service area by 2022. This number represents around a 10 percent increase in the number of SFE’s served. Taking into account population projections over the next seven years and an estimated water savings of 20 percent per new household, based on estimated savings identified in the Colorado WaterWise Guidebook of Best Practices for Municipal Water Conservation in Colorado, an annual water savings of as much as 2 percent through 2022 is anticipated.

New Rules and Regulations for Landscape Design and Installation

Currently, there are no requirements on landscaping for new residential and commercial construction set by CMD. CMD will evaluate various options to ensure all new landscaping is "water sm art from the start." CMD has identified two potential methods to regulate new landscaping design and installation for residential and commercial construction.

CMD has the capability to implement local ordinances and codes to ensure landscaping adheres to certain model landscape codes set by CMD, and that landscaping professionals must have a WaterSense Certification or certification from another accredited landscape certification program. Codes implemented can range from requiring full or partial xeriscape coverage, installation of water efficient sprinklers, and others to reduce outdoor water usage.

CMD also can develop a system which does not require landscaping to adhere to implemented codes or ordinances, but provides developers with incentives to install "water smart from the start" landscapes. The nearby City of Fountain has a program set in place that doesn't require the installation of water efficient landscapes, but incentivizes developers to adhere to various landscaping standards. Developers are given a discount on the required tap fee to connect to the system if certain landscaping requirements are met. This is a viable option that CMD will consider and evaluate further.

CMD will evaluate the various options for implementation of new rules and regulations for landscape design and implementation. Water efficient landscapes are estimated to have water savings of between 22 and 63 percent compared to traditional landscapes, according to a 2002 study performed in northeastern Colorado Springs. It is anticipated that there will be an additional 1,500 SFE's added to the CMD service area by 2022. If each additional SFE added to the service area experiences a savings of 22 percent as a result of this measure, an overall savings through 2022 of as much as 2 percent is anticipated.

Public Information and Education

CMD continues to be proactive in providing information to its customers. In the Water Conservation Plan submitted in 2007, CMD re-evaluated its level of communication with residents and business owners. CMD conducted a major effort to develop a multi-media approach to public outreach and information dissemination. Many of the programs implemented by this effort are currently active. In order to ensure all customers are being reached and sufficiently informed about water conservation, CMD will begin an effort to re-evaluate their current information and education program. Elements to be considered for implementation or modification include, but are not limited to, the following:

- Bill stuffers
- Newsletters
- Advertising campaigns
- Website updating
- Social media outlets
- Public events
- Seminars and classes

Although direct savings are not anticipated from a successful public information and education program, CMD expects other programs to be more effective. Participation in other optional programs and conservation practices are expected to increase as a result of this effort.

5.2. Projected Demand Forecasts with Conservation

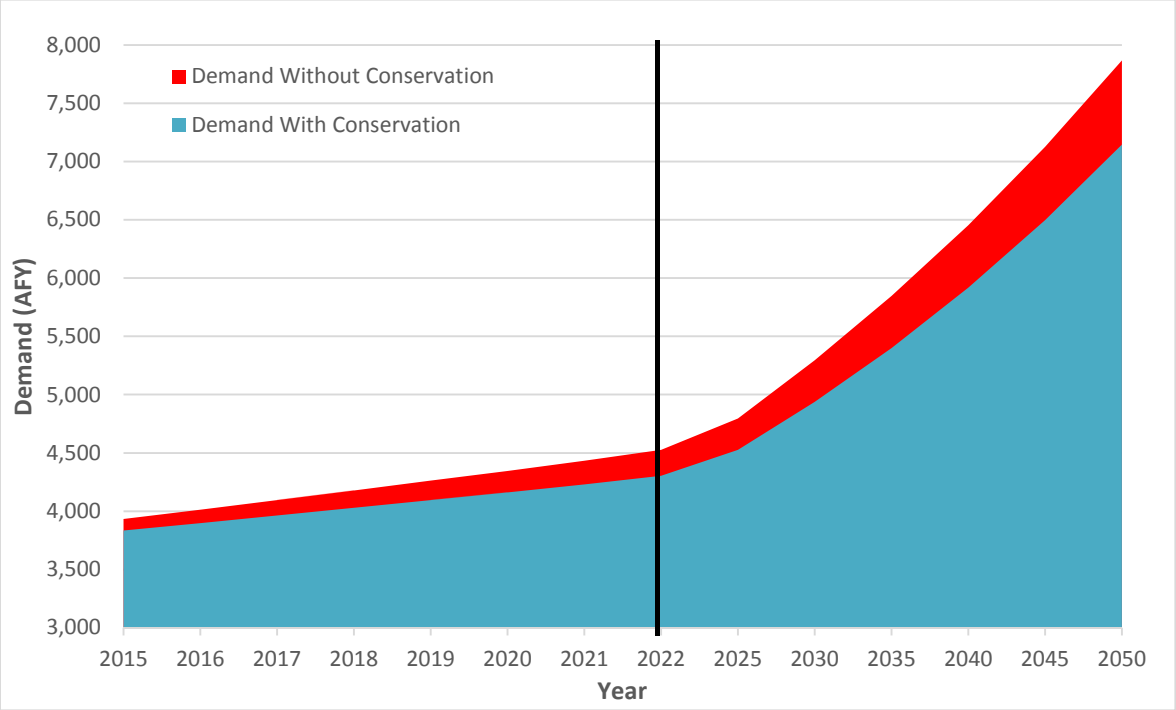
Conservation plans are an ever-evolving set of rules to minimize water waste and aid in water supply adequacy over time. CMD anticipates that with this update to its already successful conservation program, system water efficiency can be further improved. By implementing various rules to ensure all new development is "smart from the start," automatic water savings will be realized for as long as expansion continues. With implementation of new conservation measures, along with modification to existing conservation measures, CMD predicts that projected demand forecasts will decrease by between 3 and 5 percent by 2022 (See Table 17 for anticipated demand with and without additional conservation measures in place; see Figure 6 for illustration of demand reduction with and without conservation).

Table 18 – Annual Anticipated Demand With and Without Additional Conservation Measures

Year	Total SFEs	Annual Anticipated Demand Without Conservation (AFY)	Annual Anticipated Demand With Selected Conservation Measures Through 2050 (AFY)
2015	12,691	3,934	3,836
2016	12,947	4,014	3,898
2017	13,209	4,095	3,962
2018	13,476	4,177	4,028
2019	13,748	4,262	4,095
2020	14,012	4,344	4,160
2021	14,295	4,431	4,231
2022	**14,595**	**4,525**	**4,305**
2025	15,470	4,796	4,526
2030	17,080	5,295	4,938
2035	**18,858**	**5,846**	**5,400**
2040	20,821	6,454	5,918
2045	22,988	7,126	6,498
2050	**25,380**	**7,868**	**7,146**

*Assume 2% annual population growth

Figure 6 – Demand Reduction with Conservation



6.0 IMPLEMENTATION AND MONITORING PLAN

This section includes a general description of the anticipated implementation process for the water efficiency activities previously selected. The dates of anticipated implementation and adoption of new conservation measures are included with the implementation plan. In addition, a monitoring plan which includes methods of data collection and documentation requirements to evaluate the effectiveness of selected water efficiency activities is included in this section.

6.1. Implementation Plan

The following table shows a list of the water conservation measures that are currently in place, as well as the additional proposed water conservation measures. For ongoing programs, re-evaluation is necessary to identify any changes that could be made to the current system to maximize efficiency. The process for implementation of new programs or re-evaluation of ongoing programs is shown in **Table 18** below. It is important to note that the programs listed, as well as the anticipated dates of implementation, are subject to change. Programs can be added or removed from this water conservation plan without notice if it is deemed necessary by CMD.

Table 19 – Implementation Schedule Summary

Water Conservation Measure	Implementation Process	Date of Implementation If New Measure
Conservation Coordinator	CMD would hold interviews and hire qualified person to act as conservation coordinator. Newly appointed conservation coordinator would lead charge on implementation of conservation efforts.	Potential Future Implementation
Rules for New Construction	CMD to update regulations placed on new construction , and ensure it meets Pikes Peak Regional Building Department regulations . Require mandatory compliance with all rules and regulations implemented.	Begin 2015/2016
High-Efficiency Fixture and Appliance Replacement for Residential Sector	Identify customers with high in home water usage. Develop marketing and outreach programs to convey information on efficiency. Implement rebate program for customers who are proactive in replacing their standard fixtures and appliances.	Potential Future Implementation
New Rules and Regulations for Landscape Design and Installation	Develop new landscape regulations that are reasonable and have low cost and high savings on water usage. Enact rules through local ordinances. Utilize public outreach methods to explain benefits of Xeriscape landscaping.	Begin 2015/2016
Distribution System Leak Repair (System Water Loss Control)	Evaluate the cost and benefit of a water distribution audit and conduct audit if viable. Continue current leak detection measures.	Ongoing
Water Rate Structure	Increasing block rate structure in place. Evaluate existing rates and determine if changes should be made to system in place. Formulate plan based on multiple objectives including revenue adequacy, fairness to customers, bill understandability, and demand reduction.	Ongoing
Water Conservation Incentives	Identify incentives to be implemented. Send informative monthly water bills with water bill inserts and/or emails to inform customers of these incentives and water conservation effort.	Potential Future Implementation
Water Budget	Assess overall water budget for customers within CMD service area. Conduct extensive public outreach to ensure customers are aware of upcoming change to water billing. Implement water budget in place of water rate structure at start of 2016. Ensure there is a balance between fixed service charges, utility revenue and conservation effects.	N/A
4-Day Irrigation Pilot Study	Adjust watering days from 3 days a week to 4 days a week starting next irrigation season and record effects on water usage.	Potential Future Implementation
Irrigation Efficiency Evaluations	Contact the Center for Resource Conservation to discuss becoming a partner in the Slow the Flow program. Before the start of the 2015 irrigation season, conduct public outreach to inform customers of free irrigation efficiency evaluations being offered. Follow up to promote implementation of recommendations provided with evaluations.	Potential Future Implementation
Garden in a Box	Contact the Center for Resource Conservation to discuss becoming a partner in the Garden in a Box program. Update website to provide information on how to obtain a Garden in a Box kits. Determine rebate system or provide discounts for customers purchasing a kit.	Potential Future Implementation
Water Efficient Design, Installation and Maintenance Practices for New and Existing Landscapes	Identify highest outdoor water users and provide useful water efficiency information in bill stuffers and other methods. Update website to provide examples of "Water Wise" landscaping. Provide information on how to accomplish this.	Potential Future Implementation
Water Audits and Surveys	Public outreach to inform customers of free or discounted home water audits. Provide recommendations on replacement of out of date and high water usage applications and faucets.	Potential Future Implementation
Information Dissemination, or Public Information and Education	Identify success of any past methods of information dissemination. Prepare a plan on which methods to implement and at strategic times.	Ongoing
ET/Rain Sensors for Large Irrigation	Identify additional large irrigators in CMD service area. Conduct water audits on said irrigators to determine what equipment upgrades are required and/or recommended to reduce water usage.	Potential Future Implementation

6.2. Monitoring Plan

In order to maintain the efficiency of any implemented water efficiency activities, effective monitoring is of utmost importance to accurately measure the effectiveness of such programs and activities. At this time, all customers served by CMD are metered. Accurate metering of water usage is essential in monitoring the effect of the water conservation measures implemented. Monitoring must be a continuous process and will be required to ensure that the measures implemented maintain a reduction in water usage.

Data collection is the key to development of an effective monitoring plan. The following data will be collected and analyzed as a basis for quantifying the effectiveness of selected water conservation measures:

- Total treated water produced
- Total treated water delivered
- Raw nonpotable deliveries
- Per capita water use
- Indoor and outdoor treated water deliveries
- Non-revenue water
- Treated water delivered by customer type
- Raw non-potable deliveries by customer type
- Unit water use by customer type
- Indoor and outdoor treated water deliveries by customer type
- Large users
- Irrigated Landscape
- Precipitation
- Evapotranspiration
- Population
- Other pertinent data

From data collected, conclusions can be drawn regarding the effectiveness of these programs. Data will be collected monthly and evaluated annually to determine if some programs should be altered, phased out, or remain the same.

7.0 ADOPTION OF NEW POLICY, PUBLIC REVIEW, AND FORMAL APPROVAL

Following the development of the draft Cherokee Metropolitan District Water Conservation Plan, an announcement was prepared and posted on the CMD website to allow customers to read the Plan and provide feedback. The Plan was made available for public review on Monday, May 4, 2015 and comments were accepted through June 3, 2015, in accordance with CMD policy on public comment period duration. During this time, no comments were received. See Appendix A for a copy of the public comment announcement.

After the public comment period ended, a public hearing was held at the CMD office. The hearing was held on Tuesday, June 10, 2015 at 5:30 P.M. and allowed for any interested parties to ask questions or provide comments regarding the plan. No comments were received at this hearing.

APPENDIX A

Cherokee Metropolitan District has just completed an update to its 2007 Water Conservation Plan. The draft of the updated Water Conservation Plan is now available online for public review and comment. Please visit:

http://www.cherokeemetro.org/water-conservation-2/conservplan

to access a draft of this report.

Please submit any comments or questions regarding the 2015 Water Conservation Plan by email to **Conservation Plan@cherokeemetro.org** or send written comments to **Mr. Manny Ortega at 6250 Palmer Park Blvd. Colorado Springs, CO 80915. Comments will be accepted through June 3, 2015**. Taking steps toward preserving water for the future is an important goal of the Cherokee Metropolitan District, and your feedback is appreciated.

Anyone interested may present their comments at a public hearing on the 2015 Water Conservation Plan, to be held on:

Tuesday, June 10, 2015 at 5:30 P.M.
6250 Palmer Park Blvd. Colorado Springs

Following the public hearing, the 2015 Water Conservation Plan will be revised at the District Board's direction, and adopted at a subsequent Board meeting.

APPENDIX B

RESOLUTION 16-07

RESOLUTION TO ACCEPT THE "CHEROKEE METROPOLITAN DISTRICT WATER CONSERVATION PLAN," AS PREPARED BY FORSGREN ASSOCIATES, INC., AND APPROVED BY THE STATE OF COLORADO.

WHEREAS, water is one of the most precious resources in the State of Colorado, and demands for this resource are growing every year, this Conservation Plan will help the Cherokee Metropolitan District be good stewards of that resource. This plan follows the steps in the Colorado Water Conservation Board (CWCB) "Water Conservation Planning Guidance Document."

WHEREAS, this plan provides recommendations for other potential water conservation measures beyond those implemented from the 2007 plan. Also, this plan will keep the District in compliance with current State requirements for water conservation planning.

WHEREAS, this plan outlines integrated planning, water efficiency benefits and goals for both the District and the water user. Measures include efficient irrigation, household fixtures, reuse as a renewable water source, industrial and commercial water-using processes, landscaping, distribution system leak repairs, water audits and surveys, public information and education, and a water rate structure.

THEREFORE, be it resolved that on this 9 day of February, 2016, the District's Board of Directors, having duly noticed the topic for board discussion and made the Conservation Plan available for public comment, hereby accepts the Cherokee Metropolitan District Water Conservation Plan, as prepared by Forsgren Associates, Inc., and approved by the State of Colorado.

Adopted by the Board of Directors of Cherokee Metropolitan District.

CHEROKEE METROPOLITAN DISTRICT

By: _____
Janet L. Cederberg, President

_____
Dave Mattes, Vice President

_____
Melody Helton, Secretary