Regional Water Conservation Plan

Douglas County

May 2011

Acknowledgements:

Prepared by Nolte Associates, Inc.

NOLTE
BEYOND ENGINEERING

With Assistance from DiNatale Water Consultants and Leadership Beyond

DiNatale Water Consultants, Inc.

Leadership Beyond, LLC

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DOUGLAS COUNTY
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COLORADO WATER CONSERVATION BOARD
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acre-foot (AF)	Unit of volume to measure water, equivalent to an acre of area covered with one foot of water (325,850 gallons)
AFY	Acre-feet per year
AWWA	American Water Works Association
BMP	Best Management Practice
BP	Best Practice
CWCB	Colorado Water Conservation Board
CII	Commercial, Industrial, Institutional
ET	Evapotranspiration, a combination of water evaporation from soil and exposed surfaces and plant transpiration which is the loss of water from plants
EQR, ERU	Equivalent residential unit
FTE	Full time equivalent
GPM	Gallons per minute
GPCD	Gallons per capita per day
Gross Per Capita Water	Total treated water production divided by total service
HOA	Homeowners Association
LEED	Leadership in Energy and Environmental Design
LF	Low flow (toilets)
MD	Metropolitan District
MF	Multi-family
MG	Million gallons
MGD	Million gallons per day
MWC	Mutual Water Company
SMWSA	South Metro Water Supply Authority
SF	Single family
SFE	Single family equivalent
TBD	To be determined
TE	Tap Equivalent
ULFT	Ultra Low Flow Toilet
RWCP	Regional Water Conservation Plan
WD	Water District
WSD	Water and Sanitation District

Executive Summary

Of the 20 non-covered entity water providers invited to participate in the Douglas County Regional Water Conservation Planning Program (RWCPP), 16 are participating. This Regional Plan is a compilation of their individual water conservation plans into a single document for approval by both the Colorado Water Conservation Board (CWCB) and the Douglas County Board of County Commissioners. Douglas County generally has limited and unreliable surface water supplies. The region is heavily dependent on nonrenewable Denver Basin groundwater; water conservation is essential in helping the region achieve long-term sustainability.

The combined providers' customer base, as discussed in ***Section 3*** for the selected baseline year of 2008, consists of 42 percent residential water demand; 24 percent commercial, industrial, institutional (CII) demand; 33 percent irrigation-only use; and one percent for fire hydrant and pipeline flushing, construction water and other temporary uses. The 2008 water usage has some "drought shadow" from the post-2002 drought reductions for which long-term effects are unknown. When considered on the basis of water production, unaccounted-for water represented nearly 12 percent of the total or approximately 1,000 AF (with data unavailable from two of the participating providers). The average unit demand for all customer classes was 482 gpd/TE. Residential demand was 271 gpd/TE or 85 GPCD, and nonresidential demand for CII users averaged 646 gpd/TE.

As identified in ***Section 4***, the participating water providers have implemented various water conservation measures to manage water demands and conserve water, and have stepped up conservation efforts significantly in recent years. Their diverse range of programs and measures has generally targeted all customer classes. Many providers have implemented conservation-oriented water rate structures designed to encourage efficient use. Other measures include education and public information, rebates, water audits, and irrigation metering. Existing water conservation measures were evaluated and compared to the Best Practices Guidebook, and additional potential conservation measures were considered in ***Section 5***.

The Alliance for Water Efficiency (AWE) Conservation Tracking Tool was used to project water demands for the providers, and evaluate potential water savings and cost benefits of water conservation programs. ***Section 6*** shows demand forecasts for three scenarios: baseline; baseline + plumbing code savings; and baseline + plumbing code savings + existing and planned water conservation program savings. Build-out dates for providers vary, but the 2020 baseline demand for participating water providers is projected at 7,469 AFY (with one participating water provider excluded).

The baseline plus plumbing code savings demand forecast is approximately 7,263 AFY in 2020, a savings of 206 AFY. Existing and planned water conservation programs are forecast to save an additional 280 AFY by 2020 for a total savings of 486 AFY. This represents a 6.5 percent total savings over the projected baseline water demands. It is estimated that the providers' current conservation measures have already saved 465 AFY in demand based on 2010 development. Adding the savings to date with the projected savings through 2020, the 2020 demand is expected to be 951 AFY less than it would have been with no plumbing code or conservation savings; a savings of 12.7 percent. As discussed in ***Section 7***, the conservation savings to providers for avoided water supply and delivery infrastructure based on the potential savings in 2020 is $10.9 M. In addition, providers could also save $2.6M in annual O&M costs in 2010 dollars.

Ongoing water conservation programs will be needed to ensure that these savings are permanent. Providers plan to continue current water conservation programs, and evaluate others for implementation. Participating water providers may seek assistance funding from local, regional, state or federal sources to evaluate progress and refine their plans in the future. Water conservation will continue to be a key strategy for water supply sustainability in the region.

Section 1: Introduction

1.1 Purpose

Douglas County developed this Regional Water Conservation Plan (RWCP, the Plan) as part of the Douglas County Regional Water Conservation Planning Program (RWCPP). Through this program, the County offered assistance in the development of individual water conservation plans for the 20 non-covered entity water providers within Douglas County. Of the 20 non-covered entity water providers approached by the County, 16 are participating in this effort. This Regional Plan is a compilation of 15 individual water conservation plans and data from another participant into a single document for approval by both the Colorado Water Conservation Board (CWCB) and the Douglas County Board of County Commissioners.

This RWCP is consistent with the State's emphasis on regional planning in the Statewide Water Supply Initiative (SWSI) efforts, coupled with new developments in the field of water conservation. The Douglas County region is heavily dependent on nonrenewable Denver Basin groundwater; water conservation is essential in helping the region achieve long-term sustainability. To that end, the RWCP has been funded by a grant from the CWCB along with funding and staff support provided by the Douglas County Board of County Commissioners.

The purposes of the Plan are to:

- Collate data within the individual non-covered entity water provider plans into a single document
- Summarize the following information from the individual participating water provider plans:
    - Water Provider Location
    - Water Supply Sources
    - Water Supply vs. Demand
    - Water Use by Customer Class
    - Residential Gallons Per Capita Per Day
    - Non-Residential Gallons Per Day per Tap Equivalent
    - Peak Monthly Water Production for 2008
    - Unaccounted for Water Percentage of Total Produced Water Volume
    - Current Water Conservation Activities
    - Proposed Conservation Measures and Programs

Throughout the history of Douglas County, local water providers have delivered reliable potable water to their respective commercial, residential, and irrigation water users. Douglas County and its participating water providers are committed to sustainable and efficient use of water resources and will be implementing these regional and individual water conservation plans as key elements of an integrated water resources planning approach. That planning also includes investigating reuse where feasible and determining if development of new supplies of a renewable nature is necessary. The Plan is also warranted as water conservation technology has improved to the point that water use efficiency can be planned and implemented more reliably and predictably than at any time in the past.

This Plan identifies recommended water conservation measures and programs that will promote, support, and sustain efficient water use by the providers' customers. The Plan identifies the various stages of water conservation for the next five to ten years, and follows the scope of work agreed upon by the CWCB and Douglas County in establishing the Douglas County RWCP.

1.2 Organization

This plan reflects a summarization of information from the individual water provider conservation plans. In keeping with the program scope of work, the RWCP is organized into the following eight sections:

1. Introduction
2. Existing systems, water sources, and limitations
3. Current water use
4. Pricing structures and existing conservation efforts
5. Identification and screening of proposed conservation measures
6. Demand forecasts with different conservation programs
7. Impacts of conservation programs
8. Implementation and monitoring plan

Section 2: Existing Systems, Water Sources, and Limitations

2.1 Participating Water Providers

The water providers participating in the RWCP include one municipality, several quasi-governmental special districts created pursuant to Article 1 of Title 32 C.R.S., and some private mutual water companies (MWCs). The participating providers are listed in Table 2-1. Although participating in the program, Chatfield South WD customers have unmetered domestic wells in addition to centralized service, so an individual WCP was not prepared for that provider.

Water Providers (16 Total Participants)
Beverly Hills MWC
Castleton Center WSD
Chatfield South WD*
Cottonwood WSD
Inverness WSD
Louviers WSD
Meridian MD
Roxborough WSD
Sedalia WSD
Sierra Vista Douglas MWC
Silver Heights WSD
Stonegate Village MD
Thunderbird WSD
Titan Road Industrial Park Water Association, Inc.
Town of Larkspur
View Ridge MWC

***Does not have an individual Water Conservation Plan**

Table 2-1
Water Providers Included in Regional Water Conservation Plan

2.2 Geography and Demographics

All of the providers covered under the RWCP are located within Douglas County. The service area of one provider, Inverness WSD, extends into Arapahoe County. The service areas are shown in Figure 2-1.

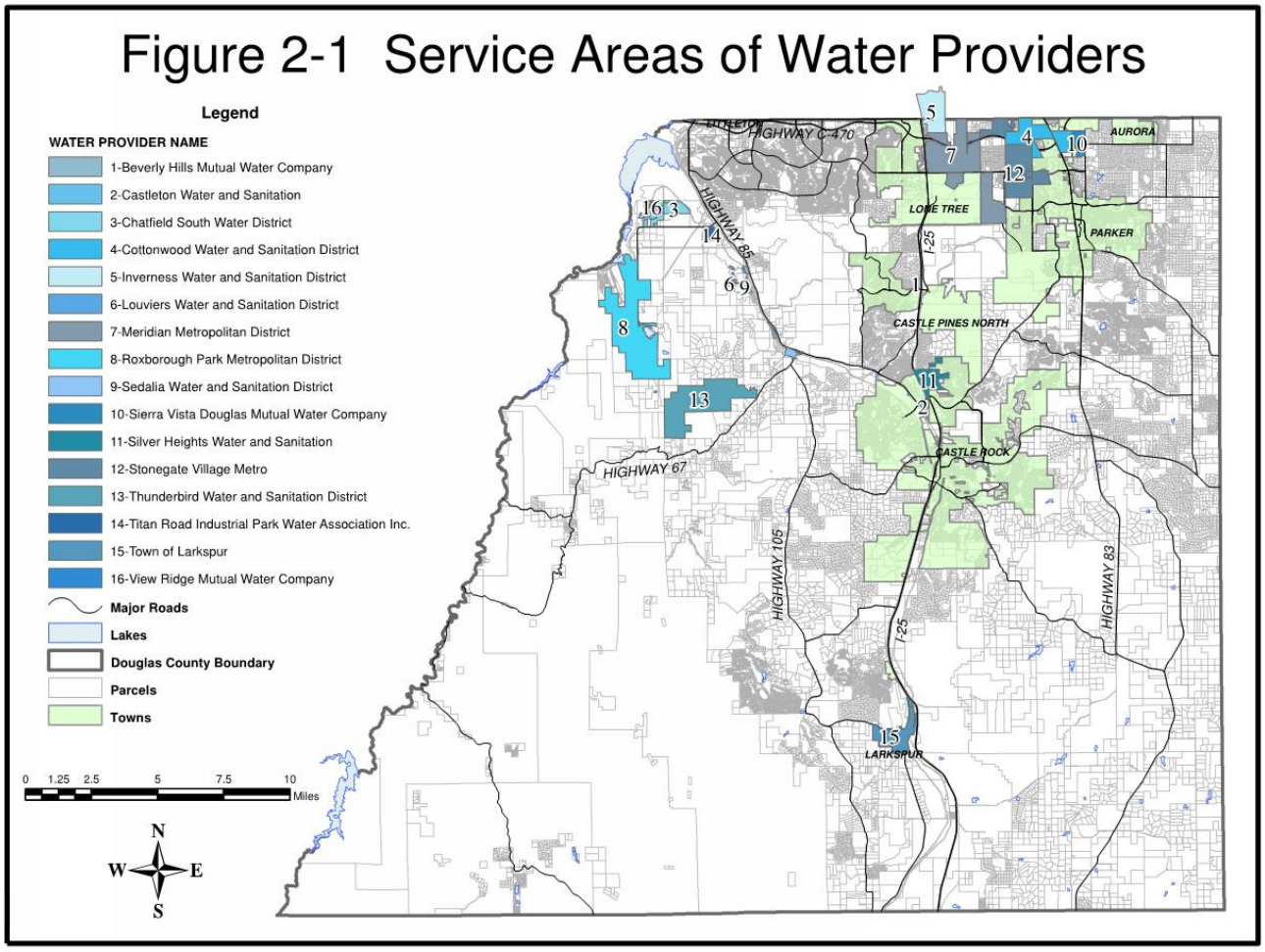

Figure 2-1
Service Areas of Water Providers

2.3 Historical Water System Development

The providers covered under this RWCP are located in an area of generally limited and unreliable surface water supplies. The South Platte River forms the western boundary of the County, and two South Platte tributaries, Plum Creek and Cherry Creek, flow from south to north through the County. Although the South Platte River is fairly sizable, it is the main supply for the Denver area and has long been over-appropriated. Both Plum Creek and Cherry Creek have intermittent and seasonal flows that have also been over-appropriated over time.

Each of the participating water providers serves a relatively small number of customers. It was more cost-effective for nearly all of the participating providers to develop their nontributary groundwater supplies over surface water supplies that are often costly and require additional infrastructure, storage, and treatment.

The notable exception is Roxborough WSD which purchased a nearby water treatment plant from the City of Aurora that was offline, and contracted for delivery of 3,100 AFY of Aurora's raw water supply for 50 years. Similar to the other providers, though, Roxborough developed on a finite supply. Aurora and the District executed an agreement in December 2010 that now secures a permanent, renewable water supply for the District.

2.3.1 Nontributary Groundwater

A majority of the County's water providers continue to rely solely on nontributary groundwater supplies derived from wells drilled within the Denver Basin Aquifer System. The Denver Basin formations underlying the service area include the Dawson, Denver, Arapahoe and Laramie Fox-Hills formations. Figure 2-2 is an illustrative cross-section of the Denver Basin.

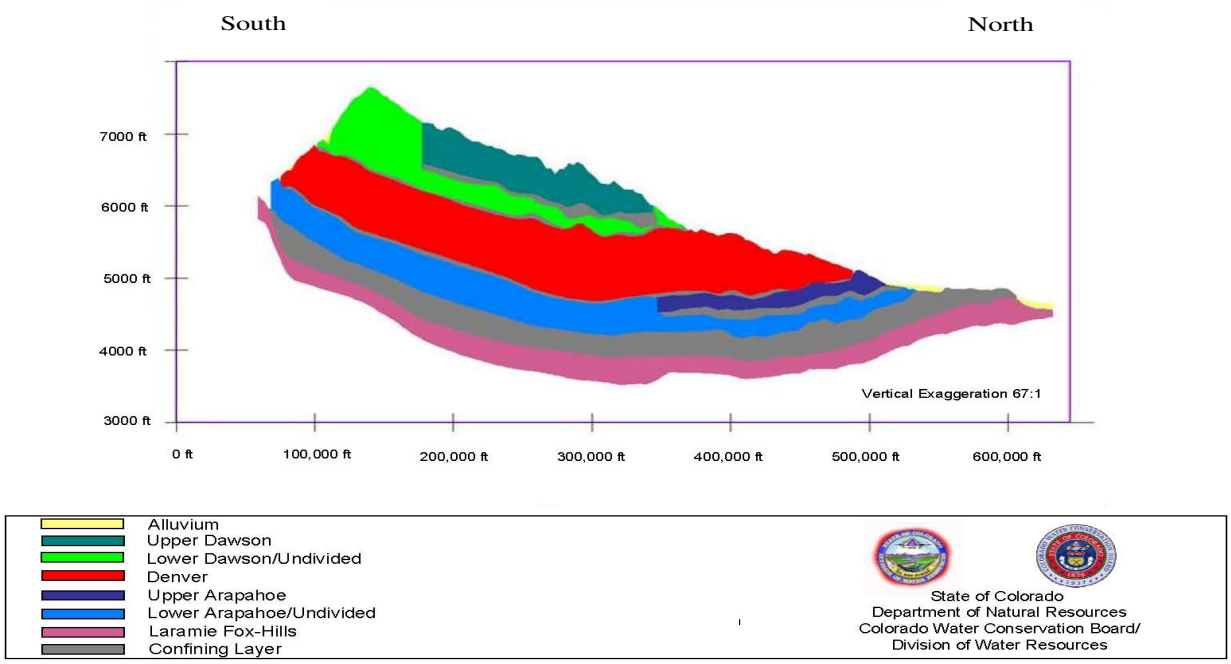

Figure 2-2
Denver Basin Aquifer South-North Cross Section
South Platte Basin
(Source: CWCB South Platte DSS)

Initial groundwater development to meet providers' water demands generally occurred within the respective providers boundaries. Wells were drilled incrementally as development occurred. The nontributary groundwater supplies generally require minimal treatment, but a few of the providers have centralized water treatment for iron removal and disinfection.

2.3.2 Nonpotable Irrigation Systems

Most of the water providers rely on individual sewage disposal systems (septic systems) rather than wastewater treatment facilities, limiting their ability to reuse their wastewater return flows. A few providers can supply reuse water from a wastewater treatment plant as shown in Table 2-2.

Water Provider	Type of Nonpotable Use	Estimated 2008 Nonpotable Deliveries	
		Quantity (AFY)	Percentage of Use*
Inverness WSD	Reuse Irrigation	454.2	37.2%
Meridian MD	Reuse Irrigation	885.7	59.0%
Stonegate Village MD	Reuse Irrigation	376.7	17.9%
Total	3 Nonpotable Irrigation Systems	1,716.6	---

*** Percentage of District's Total Usage**

Table 2-2
Providers Implementing Nonpotable Water Reuse

The providers shown in Table 2-3 either own or partner in the use of wastewater treatment facilities. As a result, they may be able to use their wastewater return flows either directly or indirectly by exchange. As previously discussed, three of the providers (Table 2-2) have non-potable systems and use reuse water for irrigation. Five of the six other providers (except Roxborough WSD) have potential for future nonpotable use. Refer to Section 5 for future water conservation efforts.

Water Provider
Castleton Center WSD
Cottonwood WSD
Inverness WSD
Louviers WSD
Meridian MD
Roxborough WSD
Silver Heights WSD
Stonegate Village MD
Town of Larkspur

Table 2-3
Providers with Centralized Wastewater Treatment Facilities

2.3.3 Other Reuse of Consumable Return Flows

As noted in Section 2.3.2, just a few providers have the ability to directly use treated wastewater effluent for nonpotable irrigation. Many providers that rely on nontributary groundwater supplies can exchange their reusable return flows to draw water from a surface supply. A few providers also have quantified their lawn irrigation return flows (LIRFs) from consumable sources to get Colorado State Water Court decrees giving them credits for alluvial well pumping. The type of wastewater discharges and uses of reusable return flows for which information is available are shown in Table 2-4.

Water Provider	On Individual Sewage Disposal Systems (Septics)	Direct Reuse for Nonpotable Irrigation	Reuse of Consumable Wastewater Return Flows via Exchange or Augmentation	Notes
Beverly Hills MWC	YES	NO	NO	
Castleton Center WSD	NO	NO	NO	Wastewater is conveyed to Plum Creek Wastewater Authority (PCWA) for treatment, and PCWA retains reuse rights.
Chatfield South WD	YES	NO	NO	
Cottonwood WSD	NO	NO	Developing Ability	Wastewater is conveyed to the Arapahoe County Water & Wastewater Authority's Lone Tree Creek Water Reuse Facility for treatment.
Inverness WSD	NO	YES	NO	Wastewater is conveyed to the Arapahoe County Water & Wastewater Authority's Lone Tree Creek Water Reuse Facility for treatment.
Louviers WSD	1 Septic System	NO	NO	Most wastewater is collected & treated by the District.
Meridian MD	NO	YES	NO	Wastewater collected and treated by the District.
Roxborough WSD	NO	NO	NO	Wastewater is conveyed to Littleton-Englewood WWTP for treatment, and District has no return infrastructure. Future supplies may or may not be reusable, subject to agreement with Aurora.
Sedalia WSD	YES	NO	NO	
Sierra Vista Douglas MWC	YES	NO	NO	
Silver Heights WSD	NO	NO	NO	Wastewater is conveyed to Plum Creek Wastewater Authority (PCWA) for treatment, and PCWA retains reuse rights.
Stonegate Village MD	NO	YES	Developing Ability	District will convey available return flows, less direct reuse, to Rueter-Hess Reservoir.
Thunderbird WSD	YES	NO	NO	
Titan Road Industrial Park Water Association, Inc.	YES	NO	NO	
Town of Larkspur	NO	NO	NO	
View Ridge MWC	YES	NO	NO	

Table 2-4
Providers Reusing Wastewater Return Flows via Exchange or Augmentation

2.3.4 Major Water Sources

A summary of the major water sources for each provider are summarized in Table 2-5.

Water Provider	Nontributary or Not-nontributary Groundwater Sources	Surface Water Sources
Beverly Hills MWC	Well #1 - Arapahoe Well #2 - Denver	N/A
Castleton Center WSD	Well #1 - Dawson (unused) Well #2 - Denver	N/A
Chatfield South WD	Individual Domestic Wells- Laramie Fox Hills	Contract with Denver Water for up to 69 AFY
Cottonwood WSD	5 Wells - Arapahoe	Cherry Creek
Inverness WSD	1 Well - Dawson 4 Wells - Arapahoe	Inverness Reservoir Used for Effluent Return for Irrigation
Louviers WSD	1 Well - Arapahoe	N/A
Meridian MD	1 Well - Upper Dawson 1 Well - Lower Dawson 1 Well - Denver 1 Well - Arapahoe 1 Well - Laramie Fox Hills	Hock-Hawking Mine Portal Surface Water The District maintains a 500 AF reservoir for full reuse irrigation.
Roxborough WSD	N/A	Meadow Ditch, Contract water from City of Aurora
Sedalia WSD	1 Well - Arapahoe	2 Wells – Plum Creek
Sierra Vista Douglas MWC	1 Well - Upper Dawson	N/A
Silver Heights WSD	2 Wells - Arapahoe 1 Well - Denver Dawson	N/A
Stonegate Village MD	8 Wells - Arapahoe 3 Wells - Laramie Fox Hills 1 Well - Dawson 1 Well - Denver 1 Well - Cherry Creek	Rueter-Hess Reservoir Storage Rights
Thunderbird WSD	2 Wells - Arapahoe	N/A
Titan Road Industrial Park Water Association, Inc.	1 Well - Arapahoe 1 Well - Laramie Fox Hills	N/A
Town of Larkspur	1 Well - Denver 2 Wells - Arapahoe (1 unused) 1 Well - Laramie Fox Hills (unused)	N/A
View Ridge MWC	2 Wells - Arapahoe	N/A
TOTAL	**51 Wells, 3 Unused**	**Various**

Table 2-5
Summary of Major Water Sources

2.4 Supply vs. Demand

Many water providers currently rely on wells from the Denver Basin aquifers for their entire potable water supply. Others supplement supplies by using treated effluent for irrigation or using consumable return flows for exchange or augmentation.

The water providers have adequate water supplies for current needs. The estimated annual yields and current (2008) water demands for each provider are listed in Table 2-6. Demands as a percentage of supply are also listed and shown graphically in Figure 2-3. One provider, View Ridge MWC, has metered demand data that is indistinguishable from production data, thus demand as a percentage of supply could not be determined.

The baseline year of 2008 was selected because it was fairly recent, has readily available data, and was a relatively average year with regard to precipitation.

Water Provider	Estimated Annual Yield of Existing Supplies (AFY)	Current (2008) Water Demands (AFY)	Demands % of Current Supply
Beverly Hills MWC	52.0	46.3	89.0%
Castleton Center WSD	52.6	12.3	23.4%
Chatfield South WD	Data Unavailable		
Cottonwood WSD	1,444.0	845.9	58.6%
Inverness WSD	975.0	768.3	78.8%
Louviers WSD	30.0	22.8	76.1%
Meridian MD	2,274.0	614.5	27.0%
Roxborough WSD	2,230.0	994.1	44.6%
Sedalia WSD	28.1	26.1	92.9%
Sierra Vista Douglas MWC	60.0	42.3	70.6%
Silver Heights WSD	59.0	47.7	80.8%
Stonegate Village MD	2,339.0	1,730.4	74.0%
Thunderbird WSD	64.4	51.9	80.6%
Titan Road Industrial Park Water Association, Inc.	33.0	15.8	47.7%
Town of Larkspur	45.6	31.9	69.9%
View Ridge MWC*	6.7	6.7	Unknown

Does not include Nonpotable usage
***View Ridge MWC metered demands cannot be distinguished from production yield.**

Table 2-6
Estimated Current Yields and Demands

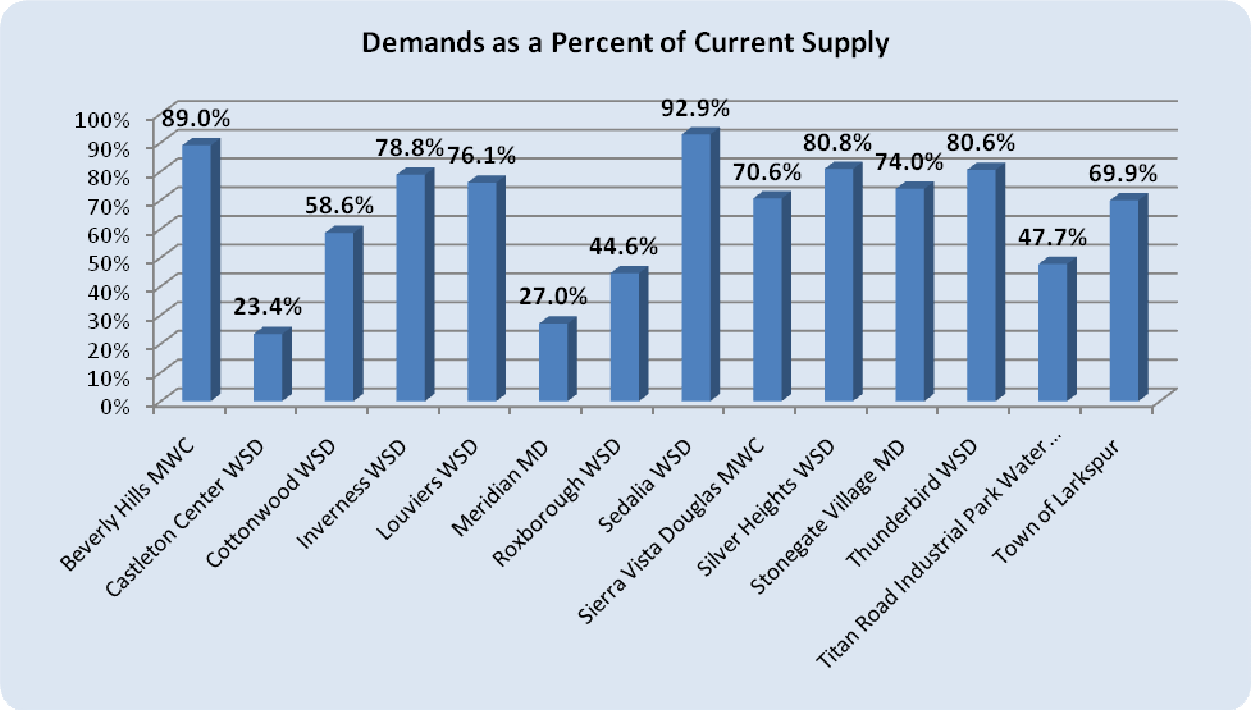

Figure 2-3
Demands as a Percent of Current Supply

Section 3: Current Water Use

3.1 Annual Water Use by Customer Class

The combined providers' customer base, as shown in Table 3-1 and Figure 3-1, consists of residential; commercial, industrial, institutional (CII); and irrigation-only accounts. Table 3-1 shows the total cumulative use in 2008, whereas Figure 3-1 shows production and estimates of unaccounted for water. The baseline of 2008 was selected because it was fairly recent, has complete data readily available, and was a relatively average year with regard to precipitation. Residential use represents 42 percent of the total water demand; CII represents 24 percent, and irrigation-only use is at 33 percent. The remaining one percent consists of water used for fire hydrant and pipeline flushing, construction water and other temporary uses.

It should be noted that data on the Chatfield South WD demands and View Ridge MWC losses were not available, thus are excluded from the information presented. It is also important to note that 2008 water usage has some effect from the post-2002 drought reductions in demand experienced throughout the Front Range. The long-term effects of the "drought shadow" are unknown. When considered on the basis of water production as shown in Figure 3-1, unaccounted-for water represented nearly 12 percent of the total or approximately 1,000 AF.

General Class	2008 Total (in MG)	% of Total (2008)	Service Taps								Total Taps	Total TEs	Unit Demand (gpd/TE)	GPCD
			5/8"	3/4"	1"	1.5"	2"	3"	4"	6"				
Single Family Residential	894.5	37.2%	206	8,630	69						8,905	8,905	275	76
Multi-Family Residential	121.0	5.0%		153	51	78	93	1	1		377	1,359	244	149
Residential Subtotal	***1,015.4***	***42.2%***	***206***	***8,783***	***120***	***78***	***93***	***1***	***1***	---	***9,282***	***10,264***	***271***	***85***
Commercial, Industrial, Institutional	572.6	23.8%	1	80	128	83	112	29			433	2,428	646	N/A
Irrigation (Potable)	66.1	2.8%		14	16	12	15	17	2		76	352	515	N/A
Irrigation (Nonpotable)	683.3	28.4%		4	16	10	29	5		2	66	526	3,559	N/A
Irrigation for Golf Course (Potable)	51.3	2.1%							1	1	2	94	1,494	N/A
Other[1]	15.6	0.6%									0	0	---	N/A
Non-Residential Subtotal	***1,388.9***	***57.8%***	***1***	***98***	***160***	***105***	***156***	***51***	***3***	***3***	***577***	***3,400***	***1,119***	***N/A***
Total	**2,404.3**	**100.0%**	**207**	**8,881**	**280**	**183**	**249**	**52**	**4**	**3**	**9,859**	**13,664**	**482**	---

[1] **"Other" represents water supplied through fire hydrants to flush pipelines, construction water & other temporary uses.**

Table 3-1
Annual Water Use in 2008 by Customer Class

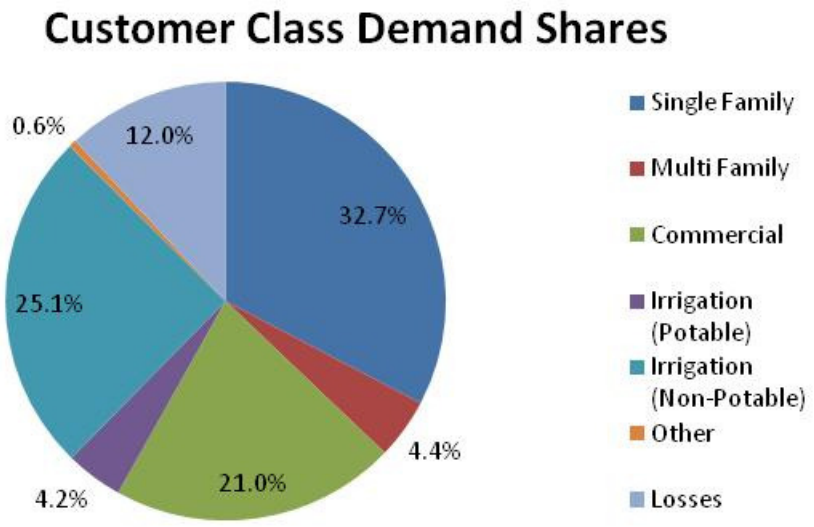

Figure 3-1
Percent of Annual Water Production in 2008 by Customer Class

3.2 Historical Water Demand

Total annual water production for 2006 through 2009 is shown in Figure 3-2. Nonpotable water usage is not included in the total water production shown in this figure. Due to data limitations in the reporting of annual water production, only four years of water production data was available for nearly all of the participating water providers as shown in Figure 3-2. (Production data from Chatfield South WD was not available for this study and is not included.) Production dropped off significantly throughout the region in 2009, likely due to above average precipitation during the irrigation season.

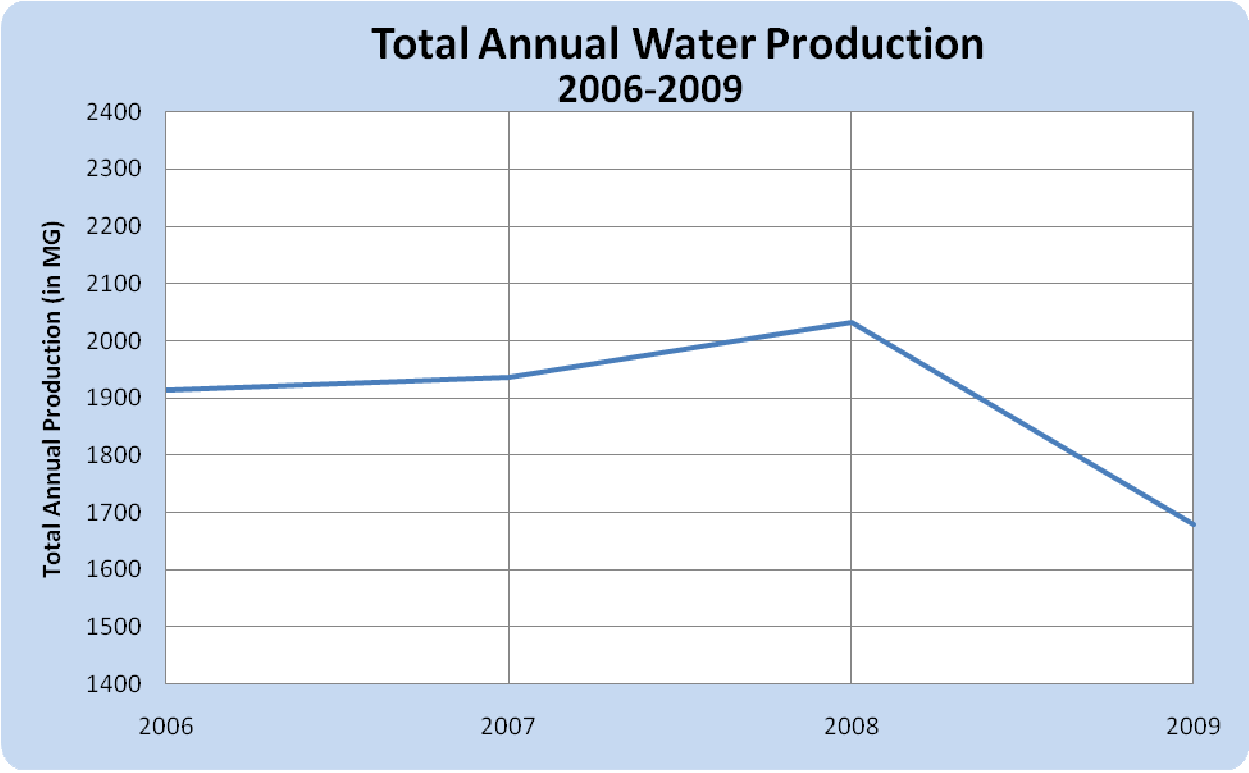

Figure 3-2
Total Annual Water Production

3.2.1 Unit Water Demands

An analysis of gallons per capita per day (GPCD) water demand is a common measurement of water use. For this Plan, metered water demands are analyzed on the basis of tap equivalents (TEs) as well as GPCD. Average daily water demand divided by the number of TEs (interchangeable with single family equivalents [SFEs] or equivalent residential units [EQRs, ERUs] for this Plan) served provides the unit demand in gallons per day per TE (gpd/TE). All of the participating water providers have full metering for their customers.

Unit water demands by customer class have been calculated for 2008 and are shown in Table 3-1. The average unit demand for all customer classes was 482 gpd/TE. Residential demand was 271 gpd/TE or 85 GPCD, and nonresidential demand for CII users averaged 646 gpd/TE. Nonresidential demands can vary significantly as shown in Table 3-2, depending on the specific customer characteristics for each provider. Some of the water providers listed serve only residential customers, while some others serve only nonresidential customers.

Water Provider	Non-Residential Unit Demands GPD/TE	GPCD (Residential Only)
Beverly Hills MWC	Commercial: 356	123
Castleton Center WSD	Commercial: 646	N/A
Chatfield South WD	unknown	unknown
Cottonwood WSD	Commercial: 766 Potable Irrigation: 450 Non-Pot. Irrigation: 3,050	88
Inverness WSD	Commercial: 541 Golf Course: 1,494 Irrigation: 1,403	91
Louviers WSD	Commercial: 205 Park Irrigation: 727	48
Meridian MD	Commercial: 367 Commercial Irrigation: 1,857 Golf Course Irrigation: 2,658	133
Roxborough WSD	Commercial: 396 Potable Irrigation: 926	84
Sedalia WSD	Commercial: 226 School: 143	78
Sierra Vista Douglas MWC	N/A	343
Silver Heights WSD	Commercial: 341	138
Stonegate Village MD	Commercial: 1,470 Potable Irrigation: 453	109
Thunderbird WSD	N/A	92
Titan Road Industrial Park Water Association, Inc.	Commercial: 879	N/A
Town of Larkspur	Commercial: 321 Potable Irrigation: 384	71
View Ridge MWC	N/A	86

Table 3-2
Provider 2008 Unit Water Demands

The 2008 residential unit water demands are graphically represented in Figure 3-3 below. Sierra Vista Douglas MWC has the highest GPCD usage, and is an outlier at nearly 150 percent higher than the second highest unit demand. That area is large-lot acreages with some livestock, and is unique in that each property owner is allocated an annual share of the MWC's yield by its charter. Chatfield South WD was not included in this analysis due to their use of unmetered domestic wells in addition to centralized water available by contract from Denver Water. For the remaining water providers, the average unit demand is 95 GPCD, with approximately 70 percent of customer demands ranging from 69 GPCD to 121 GPCD. Four of the providers exceed that range, while one provider's average demand is under that range.

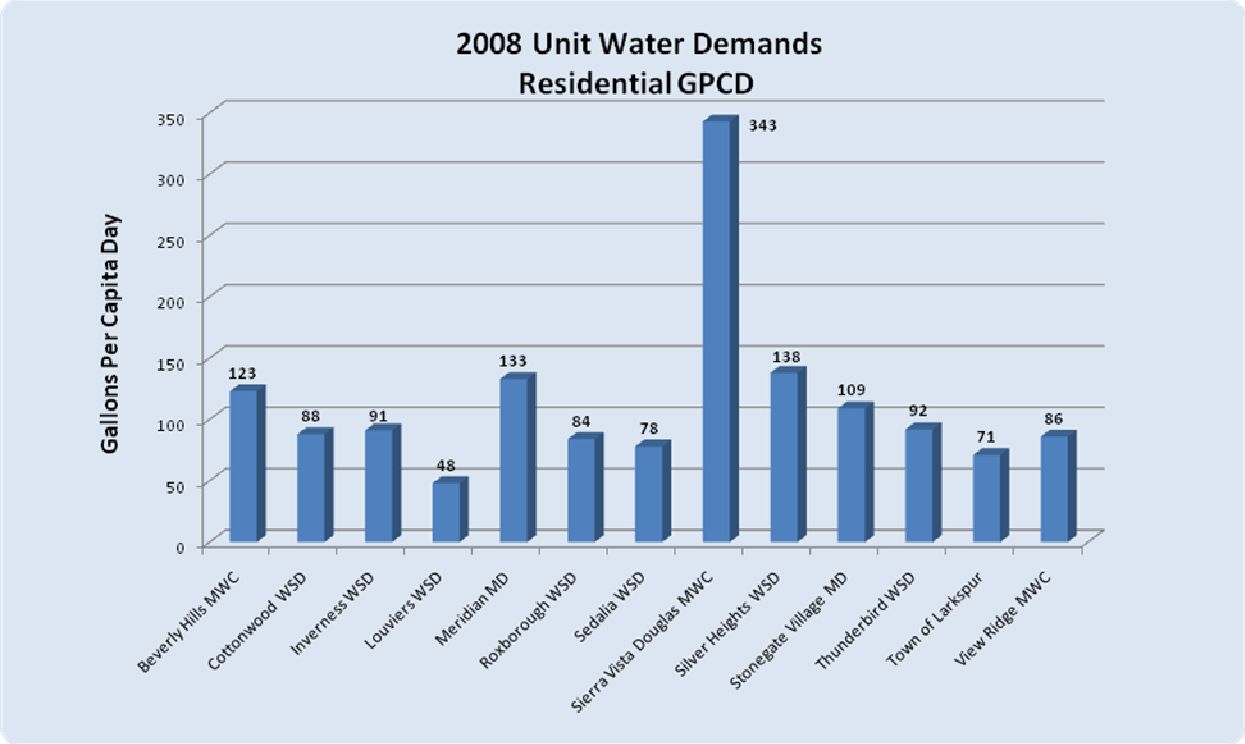

Figure 3-3
Provider 2008 Unit Water Demands
Residential Gallons per Capita Day Chart

The 2008 nonresidential (CII) unit water demands are graphically represented in Figure 3-4. Stonegate Village MD has the highest gpd/TE usage, and is an outlier at 67 percent higher than the second highest unit demand. The higher Stonegate Village MD demand is attributed to the fact that most of their commercial customers do not have separately metered irrigation. For the remaining water providers, the average unit demand is 513 gpd/TE, with approximately 70 percent of customer demands ranging from 152 gpd/TE and 874 gpd/TE. One provider exceeds that range, and one provider's average demand is under that range.

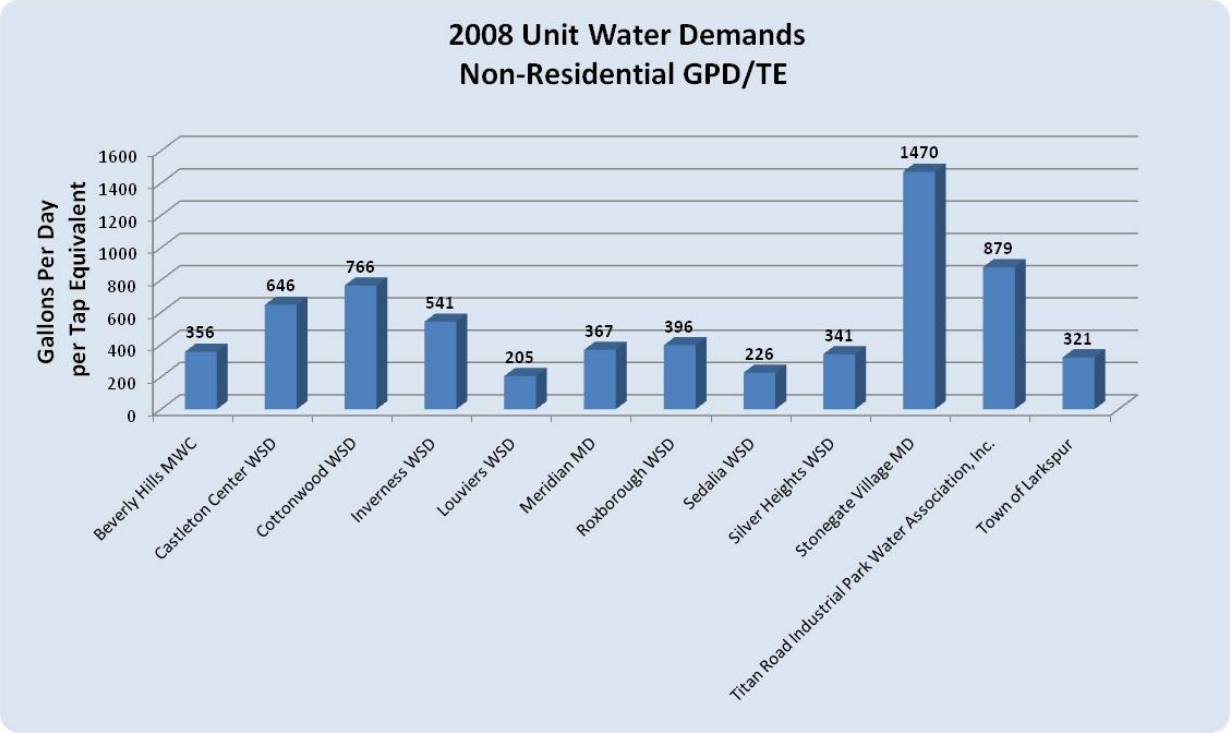

Figure 3-4
Provider 2008 Unit Water Demands
Non-Residential Gallons per Day per Tap Equivalent Chart

3.2.2 Peak Water Demands

Monthly treated water production for the 2008 baseline year is shown in Figure 3-5. Treated water production does not include reuse water for irrigation. The peak month production for 2008 occurred in July. That month's production of 1,273 MG was 100 percent higher than the average annual production of 636 MG per month, for a peak month to average month ratio of 2.0 to 1.

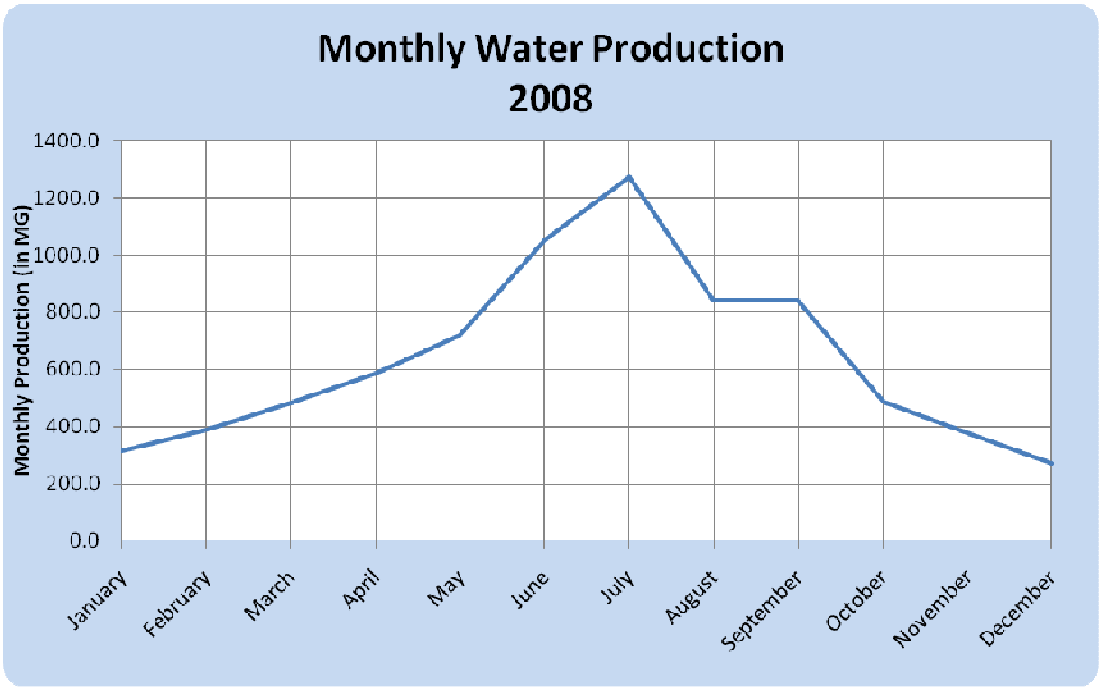

Figure 3-5
Monthly Water Production 2008

3.3 Water Loss Accounting

The description of current water use in this Regional Plan is meant to be consistent with the International Water Association (IWA) and American Water Works Association (AWWA) Water Balance approach, which was published in 2000 as part of the IWA publication Performance Indicators for Water Supply Services to provide utilities a consistent methodology for assessing water loss. Though the full assessment of a water balance is outside the realm of this report, the terminology is consistent. The main categories discussed are revenue (metered) and non-revenue (metered and unmetered) water, which are defined in Figure 3-6 below.

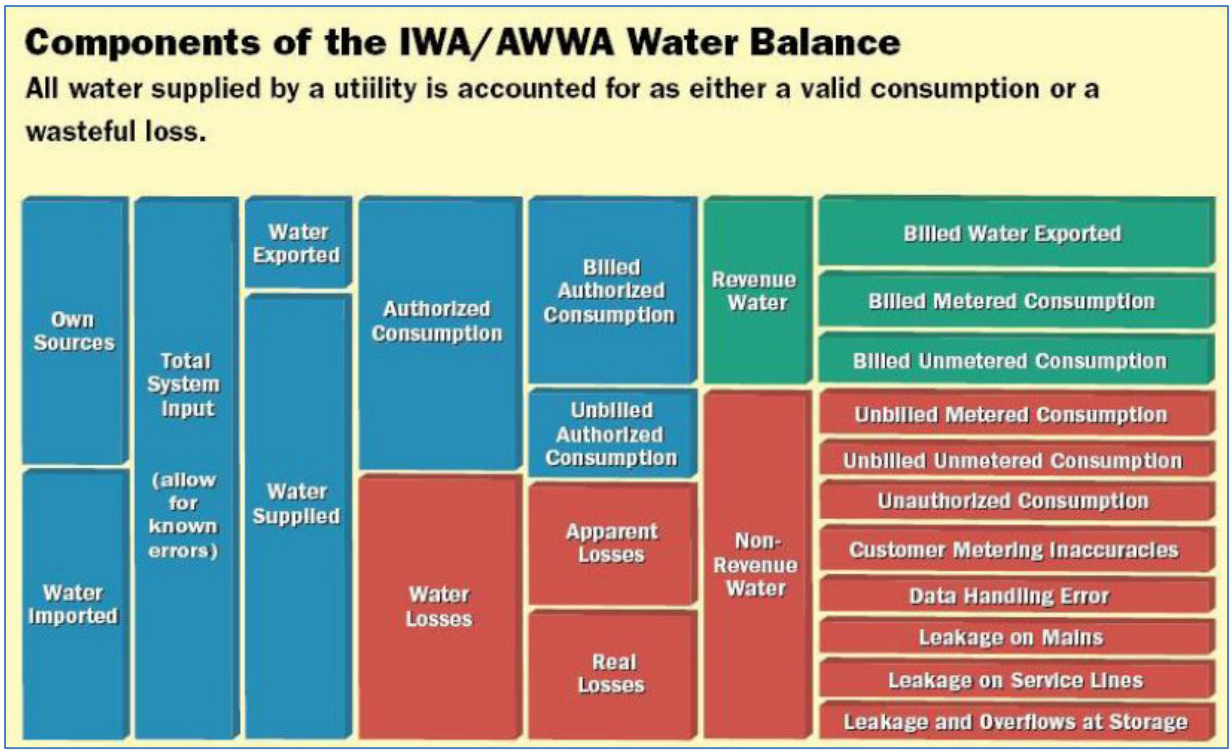

Figure 3-6
IWA/AWWA Water Balance Summary
(Source: AWWA Publication, Opflow, October 2007)

The non-revenue water use for the providers' systems includes:

- Unbilled, unmetered consumption (such uses as waterline and fire hydrant flushing conducted by the providers, as well as bulk water sales used for construction)
- Customer metering inaccuracies
- Data handling errors
- Leakage on mains
- Leakage on service lines
- Leakage and overflows at storage

An estimate of unaccounted for water by provider is shown in Table 3-3. Due to limited financial resources, a formal IWA/AWWA water audit is beyond the capabilities of most providers. As a result, Table 3-3 is only an estimate using best available data. Only a few providers currently have the financial capabilities to conduct a proactive leak detection program. As shown in Table 3-3, unaccounted for water varies significantly from approximately 7 percent to roughly 30 percent, with the average provider having 14.2 percent unaccounted for water. Some of the providers may work cooperatively with Douglas County and other local, state and federal agencies to develop funding sources for an audit of unaccounted for water

using the IWA/AWWA Water Audit procedure. Additional funding sources may then be investigated for implementation of a regional leak detection program if it is determined that leaks are the primary contributors to unaccounted for water. As shown in Figure 3-7, unaccounted-for water exceeds the average for five of the participating water providers. The Town of Larkspur had the highest percentage of unaccounted for water. However, the Town has a very linear configuration along the Larkspur Road corridor. As a result, their water system has a number of dead-end lines that must be flushed regularly to maintain water quality.

Water Provider	Estimated Unaccounted for Water (Percentage)
Beverly Hills MWC	11.6%
Castleton Center WSD	14.0%
Chatfield South WD	unknown
Cottonwood WSD	7.8%
Inverness WSD	17.6%
Louviers WSD	12.8%
Meridian MD	8.3%
Roxborough WSD	12.8%
Sedalia WSD	7.1%
Sierra Vista Douglas MWC	16.2%
Silver Heights WSD	19.1%
Stonegate Village MD	11.9%
Thunderbird WSD	21.3%
Titan Road Industrial Park Water Association, Inc.	8.4%
Town of Larkspur	30.1%
View Ridge MWC	unknown

Table 3-3
Estimated Unaccounted For Water

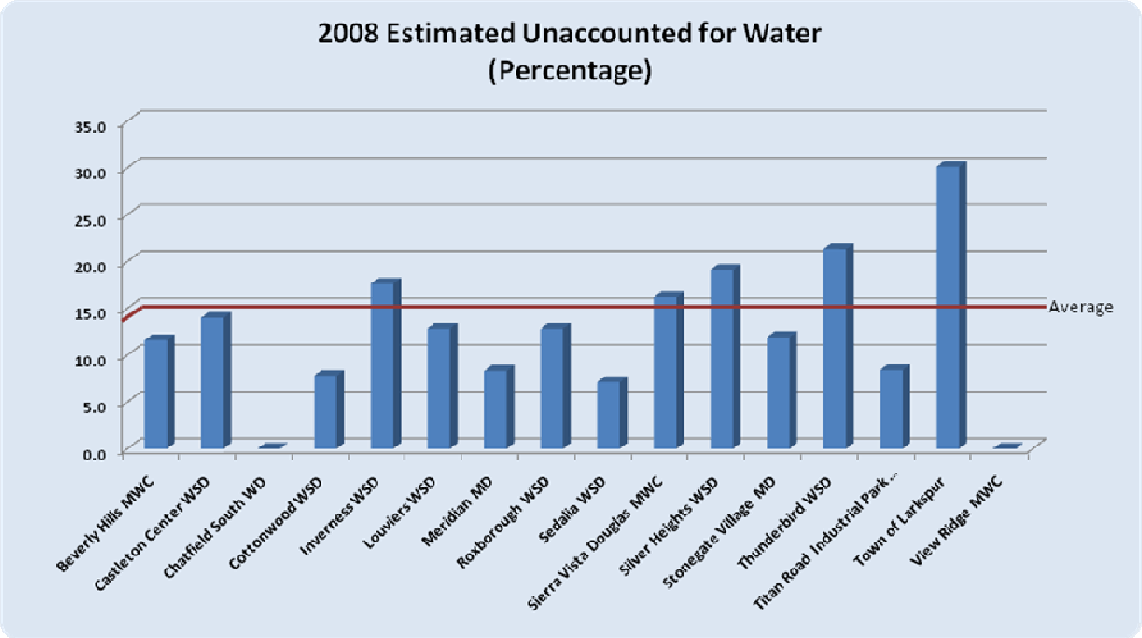

Figure 3-7
Estimated Unaccounted For Water

Section 4: Pricing Structures and Existing Conservation Efforts

The participating water providers have implemented various water conservation measures to manage water demands and conserve water, and have stepped up conservation efforts significantly in recent years. Their diverse range of programs and measures has generally targeted all customer classes. Demand management strategies have included conservation measures designed to manage peak day demands and also measures designed to reduce total annual demands.

Many providers have implemented conservation-oriented water rate structures designed to encourage efficient use. Other measures include education and public information, rebates, water audits, and irrigation metering. The current programs are described in this section and summarized in Table 4-4. It should be noted that many of the providers serve a small number of customers, and simply do not have the financial resources to expend on some types of water conservation measures. We realize that through educational efforts and passive water conservation retrofits, reductions in overall water use will be seen regardless of the amount of money spent by the district on water conservation activities.

4.1 Pricing Structures

Conservation-oriented water rate structures – Many providers have implemented conservation-oriented water rate structures including tiered, increasing block rate structures with or without water budgets. These rate structures promote water conservation through pricing. Tables 4-1a through Table 4-1d present a summary of the various water rate structures currently used by the providers, grouped by billing frequency. Enlarged copies of these tables can be found in Appendix A.

Table 4-1a Conservation Oriented Water Rate Structures (Monthly Billing)

Water Provider	Residential Use		Commercial, Industrial		Irrigation Use		Notes
	Base Fee	Increasing Block Rate (per 1k gallons)	Base Fee	Increasing Block Rate (per 1k gallons)	Base Fee	Increasing Block Rate	
Castleton Center WSD	N/A		$20.00 Monthly (up to 5k gallons)	5k - 10k $5.00 10k - 20k $6.00 20k+ $7.00	N/A		Rate Structure Established in 1997
Cottonwood WSD	$3.32 Monthly per 1k gallons (within Annual Allocation)	In Excess of Annual Allocation = $3.32 In Excess of 150% Annual Allocation = $9.96	*Same as Residential*		*Same as Residential*		Rate Structure Established in 2003
Inverness WSD	$2.75 Monthly per 1k gallons (within Annual Allocation)	In Excess of Annual Allocation = $5.50 In Excess of 150% Annual Allocation = $8.25	*Same as Residential*		*Same as Residential*		Rate Structure Established in 2003
Meridian MD	$25.00 Monthly Single Family Use (up to 4k gallons) $45.00 Monthly Multi-Family Use (up to 8k gallons)	In Excess of Monthly Allocation = $3.89 With additional overage fees if over 170k gallons/year (SF) or 95k gallons/year (MF Unit)	$25.00 for 1" (up to 4k gallons) $45.00 for 1.5" (up to 8k gallons) $65.00 for 2" (up to 12k gallons) $135 for 3" (up to 24k gallons) $265 for 4" (up to 48k gallons)	In Excess of Monthly Allocation = $3.89 With additional overage fees if over 20.5 gal/yr/SF Commercial Use or 153.3 gal/yr/SF Restaurant Use or 10.25 gal/yr/SF Office Warehouse Use	*Same as Commercial*		Rate Structure Established in 2003
Roxborough WSD	$31.14 Monthly (Base Fee)	0k-20k $4.77 20k - 40k $6.17 40k+ $11.18	$62.28 for 1" $124.56 for 1.5" $249.12 for 2" (Base Fees)	For 1" Service: 0k - 40k $4.77 40k - 80k $6.17 80k+ $11.18 For 1.5" & 2" Service: 0k - 80k $4.77 80k - 160k $6.17 160k+ $11.18	*Same as Commercial*		Rate Structure Established in 2003
Sierra Vista Douglas MWC	$85.00 Monthly (up to 400k gallons)	400k - 500k $2.00 500k - 600k $3.00 600k+ $4.00	N/A		N/A		
Stonegate Village MD	$21.44 Monthly (Base Fee)	For 3/4" Service: 0k - 6k $1.61 6k - 12k $2.95 12k - 18k $4.29 18k - 24k $5.36 24k+ $7.50	$42.88 for 1" $85.76 for 1.5" $171.52 for 2" $385.92 for 3" (Base Fees)	For 1" Service: 0k - 12k $1.61 12k - 24k $2.95 24k - 36k $4.29 36k - 48k $5.36 48k+ $7.50 For 1.5" Service: 0k - 24k $1.61 24k - 48k $2.95 48k - 72k $4.29 72k - 96k $5.36 96k+ $7.50	For 2" Service: 0k - 48k $1.61 48k - 96k $2.95 96k - 144k $4.29 144k - 192k $5.36 192k+ $7.50 For 3" Service: 0k - 108k $1.61 108k - 216k $2.95 216k - 324k $4.29 324k - 432k $5.36 432k+ $7.50		Rate Structure Established in 2003. Stonegate does not bill based on user class, but on size of service.
Titan Road Industrial Park Water Association, Inc.	N/A		$94.00 Monthly (up to 5k gallons)	5k - 20k $5.50 20k - 45k $6.00 45k - 70k $10.25 70k - 100k $10.75 100k - 150k $11.25 150k+ $11.88	N/A		Rate Structure Established in 2003
Town of Larkspur	$17.50 Monthly (up to 8k gallons) for each 3/4" TE	8k - 20k $2.50 20k - 40k $3.00 40k - 60k $3.50 60k - 80k $4.00 80k - 100k $4.50 100k+ $5.00	*Same as Residential*		N/A		Rate Structure Established in 1983. Service sizes that are larger than 3/4" are charged in 3/4" equivalencies

Table 4-1a
Conservation Oriented Water Rate Structures (Monthly Billing)

Table 4-1b Conservation Oriented Water Rate Structures (Bi-Monthly Billing)

Water Provider	Residential Use		Commercial, Industrial		Irrigation Use		Notes
	Base Fee	Increasing Block Rate (per 1k gallons)	Base Fee	Increasing Block Rate (per 1k gallons)	Base Fee	Increasing Block Rate	
Beverly Hills MWC	$120.00 Bimonthly (up to 12k gallons)	In Excess of Bimonthly Allocation = $2.00	*Same as Residential*		N/A		
Louviers WSD	$52.35 Bimonthly (up to 4k gallons)	4k - 12k $3.00 12k - 20k $4.50 20k - 60k $6.00 60k+ $7.50	*Same as Residential*		N/A		Rate Structure Established in 2009
Silver Heights WSD	$70.00 Bimonthly (up to 10k gallons)	10k - 30k $1.75 30k - 50k $3.50 50k - 66k $8.00 66k+ $12.00	$110 Bimonthly (Base Fee)	$3.00 All Usage	N/A		Rate Structure Established in 2003

Table 4-1b
Conservation Oriented Water Rate Structures (Bi-Monthly Billing)

Table 4-1c Conservation Oriented Water Rate Structures (Quarterly Billing)

Water Provider	Residential Use		Commercial, Industrial		Irrigation Use		Notes
	Base Fee	Increasing Block Rate (per 1k gallons)	Base Fee	Increasing Block Rate (per 1k gallons)	Base Fee	Increasing Block Rate	
Sedalia WSD (Within District)	$97.50 Quarterly (up to 15k gallons)	15k - 30k $2.75 30k - 40k $3.50 40k - 50k $4.25 50k - 70k $5.50 70k - 90k $6.25 90k+ $10.25 Bulk Water $10.25	*Same as Residential*		N/A		Rate Structure Established in 2003 A Renewable Water Resource Fee was added in 2006 as is accounted for in these fees.
Sedalia WSD (Outside of District)	$542 Quarterly (up to 15k gallons)	15k - 30k $4.20 30k - 40k $5.60 40k - 50k $7.00 50k - 70k $8.40 70k - 90k $10.75 90k+ $15.60 Bulk Water $50.00	*Same as Residential*		N/A		Rate Structure Established in 2003 A Renewable Water Resource Fee was added in 2006 as is accounted for in these fees.
View Ridge MWC	$75.00 Quarterly (Base Fee)	0k - 15k $3.15 15k - 30k $4.20 30k - 45k $7.35 45k - 60k $13.65 60k - 75k $30.80 75k+ $63.00	N/A		N/A		Rate Structure Established in 2008

Table 4-1c
Conservation Oriented Water Rate Structures (Quarterly Billing)

Table 4-1d Conservation Oriented Water Rate Structures (Miscellaneous Billing Cycles)

Water Provider	Residential Use		Commercial, Industrial		Irrigation Use		Notes
	Base Fee	Increasing Block Rate (per 1k gallons)	Base Fee	Increasing Block Rate (per 1k gallons)	Base Fee	Increasing Block Rate	
Chatfield South WD	None	0k - 10k $3.36 10k - 12.5k $6.72 12.5k - 17.5k $33.60 17.5k+ $67.20	N/A		N/A		
Thunderbird WSD	$65.00 Every Three Months (up to 10k gallons)	10k - 15k $1.00 15k - 20k $2.00 20k - 25k $3.00 25k - 30k $4.00 30k - 35k $6.00 35k - 45k $8.00 45k - 55k $10.00 55k - 65k $12.00 65k - 85k $15.00 85k - 95k $20.00 95k+ $21.00	N/A		N/A		Rate Structure Established in 2003

Table 4-1d
Conservation Oriented Water Rate Structures (Miscellaneous Billing Cycles)

Monthly billing – To promote customer awareness of water use, nine of the participating water providers bill their customers on a monthly basis. The smaller providers generally bill less frequently due largely to the additional expense of more frequent billing.

Renewable water resource fee – A few of the water providers, Sedalia WSD and Stonegate Village MD, have implemented a renewable water resource fee to start building reserves to help fund their transition to develop renewable water, or a greater share of renewable water.

Water budgets – Six of the water providers have developed water budgets to allocate water to their customers, and these allocations are based on average need by customer type in some cases. Customers exceeding those budgets are charged at increasing tiers to discourage high use.

4.2 Operational Utility Side Measures

Integrated Resources Planning – A least-cost analysis of demand and supply options indicates that water conservation and demand management are cost-effective tools to incorporate into future supply planning. As implemented by the providers, integrated resources planning incorporates water conservation as a key component for meeting future needs.

Full metering – All participating providers meter and bill all of their customers, however, customers in some areas such as Chatfield South WD and View Ridge MWC have unmetered individual wells to supplement the water received from the providers. Some water providers acknowledge metering inaccuracies in their areas and are working to replace meters as they can.

Conservation coordinator – All participating water providers have designated a conservation coordinator. For the smaller water providers, a board member often serves this function.

Watering restrictions – Roxborough WSD requires twice a week watering, and some of the other water providers have voluntary participation in three-day per week watering schedules.

4.3 Water Loss Control Program

Water Loss Control Program – As described in Section 3.3, most of the providers compare total water production to total water billed to determine water losses. Additional financial resources would be required for providers to perform a full IWA/AWWA Water Audit and implement a leak detection program, if warranted. This is an area where implementation might be achievable on a county-wide basis.

4.4 Education and Public Information

Conservation Public Information Campaign – Many of the water providers disseminate water conservation information via bill inserts, brochures and, in some cases, by website. Water conservation topics include information on turf removal and low-flow fixture rebate programs, irrigation management, xeriscaping and other water saving tips. Many of the providers are members, or are considering membership, in the Douglas County Water Resource Authority (DCWRA), and the information resources of DCWRA are available to those providers. DCWRA distributed a DVD on xeriscaping to households throughout the County in recent years.

School Education Programs – By virtue of their DCWRA membership, some of the providers participate in a proactive education program to visit schools to present water conservation messaging.

4.5 Indoor Efficiency

High use customers – Many of the water providers monitor customer usage, and will contact customers that have very high usage. A few providers will help those customers better control their water use through metering improvements or other measures.

Low-flow fixtures – Some providers offer rebates of a percentage of the fixture cost for low-flow plumbing fixtures. Typically, there is an annual monetary limit of total rebates per customer.

4.6 Outdoor Efficiency - Landscapes and Irrigation

Water budgets for irrigation accounts – As shown in Table 4-1, some providers use water budgets to encourage efficient water use.

Turf replacement rebates – A few providers offer rebates for replacing turf with approved low-water-use landscape (such as native grasses and ornamental trees). Typically, there is an annual monetary limit of total rebates per customer. A few providers are also systematically replacing turf with native grasses and ornamental trees throughout common areas.

Irrigation system water conservation requirements and restrictions – A few providers have established irrigation design and water use requirements as performance standards. This can include requirements that irrigation system designs be submitted for review and approval prior to the issuance of an irrigation tap and irrigation system inspections.

Irrigation meters – Through monitoring performance with respect to average water use, some providers will identify those customers that use more water than allocated or expected.

ET controllers – A few water providers are replacing irrigation controllers in parks and common areas with ET controllers for improved irrigation efficiency.

Efficient Irrigation Systems – Some providers are using subsurface irrigation methods to reduce evaporation losses and increase overall irrigation efficiency as they remove turf from common areas. By virtue of membership in the DCWRA, some of the water providers are participating in a State grant program to retrofit up to 1,000 customer sprinkler systems with more efficient nozzles.

4.7 Water Reuse Systems

Nonpotable irrigation system – As described in Section 3.2, the reuse of legally reusable return flows is part of many providers' overall water management and conservation program.

4.8 Summary of Current Water Conservation Measures

A summary of the key components of the providers' water conservation measures are included in Tables 4-3a through 4-3c. An enlarged copy of each table is included in the Appendix B.

	Pricing Structure			Operational Utility Side Measures					
Water Provider	Tiered Rates, Modifications to Increasing Block Rate Structure	Renewable Water Resource Fee	Water Budgets	Integrated Resources Planning	Full Metering	Conservation Coordinator	Water Use Based Irrigation Tap Fees	Watering Restrictions	Water Use Evaluations
Beverly Hills MWC	X		X	X	X	X			
Castleton Center WSD	X			X	X	X			
Chatfield South WD*	X		X	X	X	X			
Cottonwood WSD	X		X	X	X	X			
Inverness WSD	X		X	X	X	X			
Louviers WSD	X			X	X	X			
Meridian MD	X		X	X	X	X	X		
Roxborough WSD	X			X	X	X		X	X
Sedalia WSD	X	X		X	X	X			
Sierra Vista Douglas MWC			X	X	X	X			
Silver Heights WSD	X			X	X	X			
Stonegate Village MD	X	X		X	X	X		X	X
Thunderbird WSD	X			X	X	X			
Titan Road Industrial Park Water Association, Inc.	X			X	X	X			
Town of Larkspur	X			X	X	X			
View Ridge MWC	X			X	X	X			

*Chatfield South WD customers are fully metered on District system, but domestic wells are unmetered.

Table 4-3a
Current Water Conservation Programs

	Education & Public Information				Water Loss Control Program			Water Reuse Systems
Water Provider	Conservation Public Information Campaign	School Education Programs (via DCWRA)	Water Conservation Classes	Real-Time Usage	Tracking of Water Losses	Waterline Replacements	Meter Retrofits	Nonpotable Irrigation System
Beverly Hills MWC	X							
Castleton Center WSD	X	X			X			
Chatfield South WD								
Cottonwood WSD	X	X			X			
Inverness WSD	X	X			X			X
Louviers WSD	X				X			
Meridian MD	X	X			X			X
Roxborough WSD	X	X	X	X	X	X	X	
Sedalia WSD					X			
Sierra Vista Douglas MWC					X			
Silver Heights WSD					X			
Stonegate Village MD	X	X			X			X
Thunderbird WSD	X				X			
Titan Road Industrial Park Water Association, Inc.								
Town of Larkspur					X			
View Ridge MWC								

Table 4-3b
Current Water Conservation Programs (Continued)

	Indoor Efficiency		Outdoor Efficiency - Landscapes & Irrigation					
Water Provider	High Use Customers	Low Flow Fixture Rebates	Water Budgets for Irrigation Accounts	Turf Replacement Rebates	Irrigation System Water Conservation Requirements/ Restrictions	Irrigation Meters	ET Controllers	Efficient Irrigation Systems
Beverly Hills MWC								
Castleton Center WSD								
Chatfield South WD								
Cottonwood WSD		X						
Inverness WSD	X	X	X	X	X	X		X
Louviers WSD								
Meridian MD	X		X		X		X	
Roxborough WSD		X						
Sedalia WSD								
Sierra Vista Douglas MWC								
Silver Heights WSD								
Stonegate Village MD		X	X	X			X	X
Thunderbird WSD								
Titan Road Industrial Park Water Association, Inc.					X			
Town of Larkspur								
View Ridge MWC								

Table 4-3c
Current Water Conservation Programs (Continued)

Section 5: Identification and Screening of Proposed Conservation Measures

The providers have implemented comprehensive water conservation measures as described in Section 4. Significant water use savings have been realized. As part of the individual water providers' conservation plans, existing water conservation measures and additional water conservation programs and measures were evaluated. It is important to note that only one of the water providers has land use or building permit regulatory authority. As a result, most do not have the authority to require certain water conservation measures derived from such authority.

In July, 2008, the CWCB awarded an efficiency grant to Colorado WaterWise, a water conservation non-profit group, to create a best management practices guidebook specific to Colorado. The resultant Colorado WaterWise Guidebook of Best Practices for Municipal Water Conservation in Colorado (Best Practices Guidebook) (Colorado WaterWise, 2010) is a planning tool prepared for the purpose of improving and enhancing water efficiency in Colorado. The Best Practices Guidebook offers a detailed description of specific water conservation measures, program elements, regulations, policies, and procedures that can be implemented by Colorado water providers to help ensure reliable and sustainable water supplies for future generations.

Within the individual conservation plans, existing water conservation measures were evaluated and compared to the Best Practices Guidebook to determine if there was the potential for best practices to be considered that were not part of the providers' current conservation programs. The Best Practices are shown in Table 5-1. The Best Practices Guidebook was also used to evaluate additional potential conservation measures. Given that most of the water providers serve a small number of customers and have very limited financial resources, most of the measures that they can easily implement are relatively low in cost.

Descriptions of the existing and proposed conservation measures that were evaluated are included below. A summary of the water conservation measures by provider is shown in Table 5-2.

Measure	Best Practice	Category or Sector Impacted
Full metering	BP 1	ALL
Conservation oriented rates	BP 1	ALL
Conservation oriented tap fees	BP 1	ALL
Integrated resource planning, goal setting and monitoring	BP 2	Utility
Water loss control	BP 3	Utility
Conservation coordinator	BP 4	ALL
Water waste ordinance	BP 5	ALL
Public information and education	BP 6	ALL
Landscape water budgets	BP 7	Outdoor irrigation
Rules and regulations for landscape design and installation	BP 8	Outdoor irrigation
Certification of landscape professionals	BP 8	Outdoor irrigation
Water efficient design, installation and maintenance practices for new and existing landscapes	BP 9	Outdoor irrigation
Irrigation efficiency evaluations	BP 10	Outdoor irrigation
Rules for new construction (residential and non-residential)	BP 11	ALL
High efficiency fixtures and appliances-Residential	BP 12	Residential
High efficiency fixtures and appliances-Non Residential	BP 12	CII
Residential water surveys and evaluations, targeted at high demand customers	BP 13	Residential
Specialized non-residential surveys, audits, and equipment efficiency improvements	BP 14	CII

[1] Each item and corresponding BP# is from the Best Practices Guidebook (Colorado WaterWise, 2010)

Table 5-1
Water Conservation Best Practices from Guidebook

5.1 Pricing Structures

Modifications to increasing block rate structure – Providers will continue to refine their water rate structures to promote water conservation. **(BP #1)**

Renewable water supply charge – Several providers are instituting a program to develop renewable water supplies and reduce dependence on nontributary groundwater. The current monthly charges for each customer vary for each District. **(BP #1)**

Monthly billing – Providers that use monthly billing will continue it for all customers. A few providers will consider increasing their billing frequency to a monthly basis, but must weigh the associated costs. **(BP #1)**

Water budgets – One water provider will consider allocating usage to its customers as a basis for its rate structure. **(BP #1)**

5.2 Operational Utility Side Measures

Integrated resources planning – This is an existing measure and will continue to be the foundation of most providers' water supply and demand management strategy. **(BP #2)**

Full metering – All customers and associated water use will continue to be metered on a regular basis**. (BP #1)**

Mandatory watering days – A few water providers will consider mandatory watering schedules as needed, although few have the resources to enforce such restrictions. **(BP #1)**

Renewable water charge – Some water providers will consider implementing a renewable water charge to help fund renewable water development. **(BP #1)**

Conservation coordinator – All of the participating providers will continue to designate a water conservation coordinator. **(BP #4)**

Water surveys and evaluations, targeted at high demand customers – Many providers have aggressive increasing water block rates that limit water use and discourage high water users. Several of the providers contact high water users and assist them with better management of demands. **(BP #13)**

5.3 Water Loss Control Program

Water loss control program – Most providers will continue to compare production to metered demands to track their unaccounted for water. Many have an interest in systematic leak detection or will consider that if their unaccounted for water warrants such a program, but financial resources may constrain their ability to implement such a program. **(BP #3)**

5.4 Education and Public Information

Conservation public information campaign – In addition to existing in-house public education programs, many providers will use the services of Douglas County, DCWRA or other resources of water conservation information. **(BP #6)**

School education programs – Through membership in DCWRA, some providers will support school education programs. **(BP #6)**

Xeriscape design clinics – Some providers will work through DCWRA to participate in Xeriscape design clinics. **(BP #6)**

Annual large irrigators conservation meetings with HOAs. – Some providers will work through DCWRA to participate in conservation meetings for large irrigators or HOAs. **(BP #6)**

5.5 Indoor – Residential

Low-flow fixture rebates – Providers that have existing programs will consider extending the programs after evaluating their effectiveness. The annual budgets allocated for rebates are evaluated annually. **(BP #12)**

Rules for new construction – As noted, most providers do not have the regulatory authority to require high efficiency plumbing fixtures or other conservation measures for new residential construction. These providers may work through DCWRA or the Douglas County Board of County Commissioners on the development of county-wide residential building regulations. **(BP #11)**

5.6 Indoor – Commercial, Industrial, Institutional (CII)

Rules for new construction - building codes requiring high efficiency fixtures and process equipment – Most providers do not have the regulatory authority to require high efficiency plumbing fixtures or other conservation measures for new Commercial, Industrial or Institutional construction. The providers may work through the DCWRA or Douglas County Board of Commissioners on the development of county-wide CII building regulations. **(BP #11)**

Specialized non-residential surveys, audits and equipment efficiency improvements – Some providers will continue water billing reviews and support for reducing demands of high-use customers. Providers may consider greater use of non-residential surveys, audits and equipment efficiency improvements. **(BP #14)**

5.7 Outdoor Efficiency - Landscapes and Irrigation

Residential irrigation efficiency evaluations – Some water providers will consider the need and cost-effectiveness of evaluating residential irrigation use for high-end customers. (**BP #10)**

Irrigation efficiency improvements – The results of a DCWRA program to replace sprinkler nozzles in 1,000 yards throughout Douglas County will be evaluated to determine the effectiveness. After review, providers, working through DCWRA may determine to extend the program. **(BP #10)**

Limits on turf landscaping for new construction – Some water providers will consider limiting turf installation for new construction.

Water budgets for irrigation accounts – Some water providers will consider allocating water for irrigation use. (**BP #7)**

Irrigation system water conservation requirements and certification of landscape professionals – Some water providers will consider requiring water conservation measures with irrigation systems, and certification of landscape professionals. (**BP #8)**

ET irrigation controllers – If irrigation customers request financial assistance for the replacement of ET irrigation controllers, some providers will evaluate the requests on a case specific basis to determine if there is potential for significant water savings from replacement of controllers. Providers will evaluate the effectiveness of such programs. **(BP #9)**

Efficient irrigation systems program – If irrigation customers request financial assistance for the replacement of existing irrigation systems with highly efficient irrigation systems or installation of new systems, some providers may evaluate the requests on a case specific basis to determine if there is potential for significant water savings. Providers will evaluate the effectiveness of such programs. **(BP #9)**

Rebates for turf replacement – Some providers will extend current rebate programs or consider whether to implement such a program.

Covenant restrictions on irrigation – One water provider will likely continue its covenant restriction on irrigation.

5.8 Water Reuse Systems

Nonpotable system augmented by reusable return flow credits – As identified in Section 2, many of the water providers are able to use return flows generated from nonrenewable water sources in exchange for the ability to draw on renewable water sources.

Recapture and reuse of reusable effluent – A few water providers that have access to centralized wastewater treatment are able to directly reuse treated wastewater for nonpotable irrigation.

5.9 Summary of Proposed Conservation Measures

A summary of the major conservation measures currently implemented or considered for implementation are shown in Table 5-2. Additional detail on individual provider's conservation measures can be found in the provider water conservation plans.

Water Conservation Measure (Best Practices Guidebook BP #)	Beverly Hills MWC	Castleton Center WSD	Chatfield South WD	Cottonwood WSD	Inverness WSD	Louviers WSD	Meridian MD	Roxborough WSD	Sedalia WSD	Sierra Vista Douglas MWC	Silver Heights WSD	Stonegate Village MD	Thunderbird WSD	Titan Road Industrial Park Water Association	Town of Larkspur	View Ridge MWC
	Retained for Continued and/or Future Implementation?															
Pricing Structure																
Modifications to increasing block rate structure (1)	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	TBD	Yes	Yes	Yes	Yes	Yes	Yes
Renewable Water Charge (1)		TBD		TBD	TBD			TBD	Yes		TBD	Yes	TBD			
Monthly Billing (1)		Yes			Yes	TBD	Yes	Yes	TBD	Yes	TBD	Yes		TBD	Yes	
Water budgets (1)							Yes			Yes				TBD		
Operational Utility Side Measures																
Integrated Resources Planning (2)	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Full Metering (1)	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Mandatory Watering Days/Restrictions (1)	TBD			TBD	TBD		Yes	Yes				Yes	TBD			
Conservation Coordinator (4)	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Residential water surveys and evaluations, targeted at high demand customers (13)	TBD			TBD	Yes		TBD	Yes	TBD		TBD	Yes	TBD		TBD	

Table 5-2
Provider Water Conservation Program Activities

Water Conservation Measure (Best Practices Guidebook BP #)	Beverly Hills MWC	Castleton Center WSD	Chatfield South WD	Cottonwood WSD	Inverness WSD	Louviers WSD	Meridian MD	Roxborough WSD	Sedalia WSD	Sierra Vista Douglas MWC	Silver Heights WSD	Stonegate Village MD	Thunderbird WSD	Titan Road Industrial Park Water Association	Town of Larkspur	View Ridge MWC
	Retained for Continued and/or Future Implementation?															
Water Loss Control Program																
Water Loss Control Program (3)	TBD	TBD		TBD	TBD	TBD	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Education and Public Information																
Conservation Public Information Campaign (6)	Yes	Yes		Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
School Education Programs (via DCWRA) (6)	TBD	Yes		Yes	Yes		Yes	Yes	TBD			Yes				
Xeriscape design clinics (6)				TBD							TBD	TBD	TBD			
Indoor - Residential																
Low Flow/High Efficiency Fixture Rebates (12)	TBD			Yes	Yes			Yes	TBD		TBD	TBD	TBD		TBD	
Rules for New Construction (Building Codes requiring high efficiency fixtures) (11)				Will work through DCWRA	Will work through DCWRA			Will work through DCWRA			Will work through DCWRA	Will work through DCWRA			TBD	
Indoor - CII																
Rules for new construction - building codes requiring high efficiency fixtures and process equipment (12)		Will work through DCWRA		Will work through DCWRA	Will work through DCWRA			Will work through DCWRA	Will work through Douglas County			Will work through DCWRA		Will work through Douglas County	TBD	
Specialized non-residential surveys, audits and equipment efficiency improvements (14)		TBD		TBD	Yes		Yes	Yes	TBD			TBD		TBD		

Table 5-2 (continued)
Provider Water Conservation Program Activities

Water Conservation Measure (Best Practices Guidebook BP #)	Beverly Hills MWC	Castleton Center WSD	Chatfield South WD	Cottonwood WSD	Inverness WSD	Louviers WSD	Meridian MD	Roxborough WSD	Sedalia WSD	Sierra Vista Douglas MWC	Silver Heights WSD	Stonegate Village MD	Thunderbird WSD	Titan Road Industrial Park Water Association	Town of Larkspur	View Ridge MWC
	Retained for Continued and/or Future Implementation?															
Outdoor Efficiency - Landscapes and Irrigation																
Residential Irrigation Efficiency Evaluations (10)	TBD			TBD							TBD		TBD			
Irrigation Efficiency Improvements (9, 10)	TBD	TBD		TBD	TBD			TBD		TBD		TBD			TBD	
Limits on turf landscaping for new construction				Will work through DCWRA				TBD								
Water budgets for Irrigation Accounts (7)				Yes	Yes		Yes	TBD				Yes				
Irrigation System Water Conservation Requirements and Certification of Landscape Professionals (8)				TBD	TBD		Yes	TBD				TBD				
Water Efficient Maintenance Practices for New and Existing Landscapes (9)				Yes	TBD							Yes				
E-T Irrigation controllers (9)				TBD	TBD		Yes	TBD				Yes				
Rebates for turf replacement				TBD	Yes			TBD								
Covenant Restrictions on Irrigation							Yes							Yes		
Water Reuse Systems																
Nonpotable system augmented by reusable return flow credits				Yes	Yes		Yes		TBD							
Recapture and reuse of reusable effluent				Yes	Yes		Yes	TBD	TBD		No	Yes	TBD			

Table 5-2 (continued)
Provider Water Conservation Program Activities

Section 6: Demand Forecasts

The Alliance for Water Efficiency (AWE) Conservation Tracking Tool was used to project water demands in the individual conservation plans. The Water Conservation Tracking Tool is an Excel-based spreadsheet tool for evaluating the water savings, costs, and benefits of urban water conservation programs. In addition to providing users a standardized methodology for water savings and benefit-cost accounting, the tool includes a library of pre-defined, fully parameterized conservation activities from which users can construct conservation programs. Detailed information on the inputs, assumptions and methods used in the Water Conservation Tracking Tool can be found in the User Guide.

Three demand forecasts were made using the Water Conservation Tracking Tool:

1. Baseline
2. Baseline + plumbing code savings
3. Baseline + plumbing code savings + existing and planned water conservation program savings

Water conservation activities per District can be found in Appendix C, as well as a table displaying the projected savings per district. Tables 6-1 and 6-2 summarize these findings.

6.1 Baseline Demand Forecast

The baseline forecast represents the combined demand forecast for the providers based on projecting the 2008 demands shown in Section 3, including unaccounted-for water. (Water demand data for Chatfield South WD is not available, so that provider is not included in these projections.) Build-out dates for providers vary, but the 2020 demand for participating water providers is projected at 7,469 AFY.

This demand forecast includes estimated water losses, but does not include raw water supply planning safety factors. For the purposes of this plan, demand forecasts will be treated water forecasts, understanding that firm yield raw water supply requirements could be approximately 10 percent greater.

6.2 Baseline + Plumbing Code Savings Forecast

The Baseline + Plumbing Code Savings forecast includes forecasted reductions in demand that have or will occur as a result of National Plumbing Code efficiency standards. For example, ULFT toilet requirements included in the National Energy Policy Act took effect in 1994. New efficiency requirements for clothes washers will take effect in 2011.

The Baseline + Plumbing Code Savings demand forecast is approximately 7,263 AFY in 2020, a savings of 206 AFY.

6.3 Baseline + Plumbing Code Savings + Program Savings Forecast

The Baseline + Plumbing Code Savings + Program Savings forecast includes forecasted reductions in demand from the existing and planned water conservation program in addition to the savings projected to occur as a result of National Plumbing Code efficiency standards.

The existing and planned water conservation programs for individual providers were included as inputs into the AWE Water Tracking Tool to estimate and forecast the water savings from the existing and planned programs for that specific provider. Water savings were estimated for the major existing programs listed in Table 6.1. The results of the individual water provider forecasts are summarized in this section. These programs are forecast to save an additional 280 AFY by 2020 for a total savings of 486 AFY. This represents a

6.5 percent total savings over the projected baseline water demands. It is estimated that the providers' current conservation measures have already saved 465 AFY in demand based on 2010 development. Adding the savings to date with the projected savings through 2020, the 2020 demand is expected to be 951 AFY less than it would have been with no plumbing code or conservation savings; a savings of 12.7 percent.

Customer Class	Water Conservation Activity Name
Residential	Residential LF Toilet, SF
	Residential LF Toilet, MF
	Residential LF Washer, SF
	Residential LF Washer, MF
	Residential Increasing Tiered Rates, SF
	Residential Increasing Tiered Rates, MF
	Full & Accurate Metering
	Drip system Incentives
	Irrigation System Restrictions/Review/Approval
	Leak Detection Monitoring & Touch Read Meters
	Reduce Line Flushing by Looping Waterlines
	Rebate Program for LF Toilets & HE Washers
	Drought Surcharges
Commercial	In-Building Water Budgets
	Large Landscape Water Budgets
	Irrigation Efficiency
	Increasing Tiered/Block Rates
	LEED Certified Development
	Full & Accurate Metering
	Drip System Incentives
	Irrigation System Restrictions/Review/Approval
	Leak Detection Monitoring & Touch Read Meters
	Install Additional Meters
	Reduce Line Flushing by Looping Waterlines
	Large Landscape Irrigation Controllers
Irrigation (Potable)	Large Landscape Water Budgets
	Irrigation Increasing Tiered Rates
	Large Landscape Irrigation Controllers
	Full & Accurate Metering
	High Efficiency Sprinkler Nozzles
Irrigation (Non-Potable)	Installing Separate Meters for High End Users
	Large Landscape Turf Replacement
	Install Efficient Irrigation Nozzle
	Increasing Tiered Rates

Table 6-1
Water Conservation Activities

The average projected total water savings per water provider through 2020 compared to 2010 is approximately 32.4 AF. In terms of percentage, the average projected savings as a percent of baseline demands is 6.0 percent, with a majority of providers expected to realize between 3.6 and 8.4 percent savings. Table 6-2 below shows the summarized savings by water provider. The annual percentage of baseline savings is also shown in Figure 6-1.

Water Provider	Average Annual Savings in 2020			
	Overall Plumbing Code Water Savings	Overall Program Water Savings	Total Water Savings	% of Baseline Demands
	AF	AF	AF	%
Beverly Hills MWC	2.5	0.4	2.9	5.5%
Castleton Center WSD	N/A	1.4	1.4	7.7%
Chatfield South WD	N/A	N/A	N/A	N/A
Cottonwood WSD	34	51	85	7.1%
Inverness WSD	1.1	50.5	51.6	4.7%
Louviers WSD	0.2	1.2	1.4	6.1%
Meridian MD	53	82	135	11.8%
Roxborough WSD	48.6	5.7	54.3	4.6%
Sedalia WSD	1.6	0.9	2.5	6.1%
Sierra Vista Douglas MWC	1.3	0	1.3	2.9%
Silver Heights WSD	2.3	2.3	4.6	9.6%
Stonegate Village MD	56	81.8	137.8	5.6%
Thunderbird WSD	3.5	0.6	4.1	6.0%
Titan Road Industrial Park Water Association, Inc.	N/A	0.6	0.6	3.2%
Town of Larkspur	2	1.1	3.1	6.1%
View Ridge MWC	0.2	0	0.2	3.2%
TOTAL SAVINGS PER ACTIVITY	206.3	279.5	485.8	---

Table 6-2
Projected Water Conservation Savings

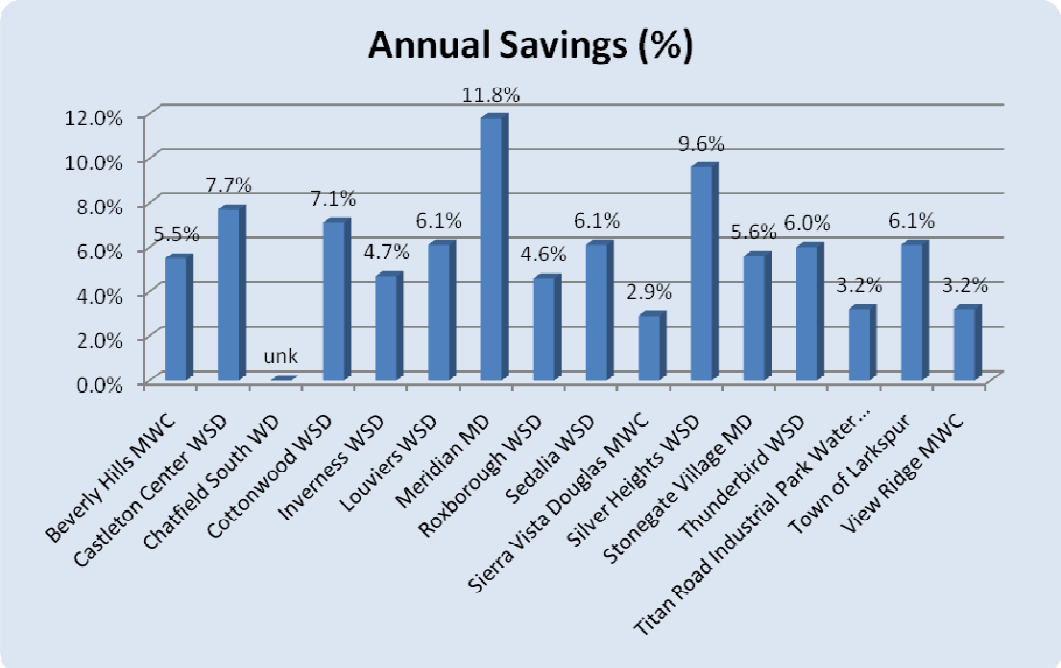

Figure 6-1
Projected Water Conservation Savings in 2020 (by Percentage)

Section 7: Impacts of Conservation Programs

Most of the participating water providers have been implementing aggressive water conservation programs for many years and plan to continue these programs for future savings. The programs have been very effective as noted in Section 6.3 and detailed in the individual water conservation plans.

The forecast total water savings of 951 AFY through 2020 represents significant benefits. Figure 7-1 shows the projected annual water production to meet demands based on the baseline, baseline + code savings and baseline + code savings + program savings beyond 2010. The continued successful implementation of these measures can delay the need to add capacity.

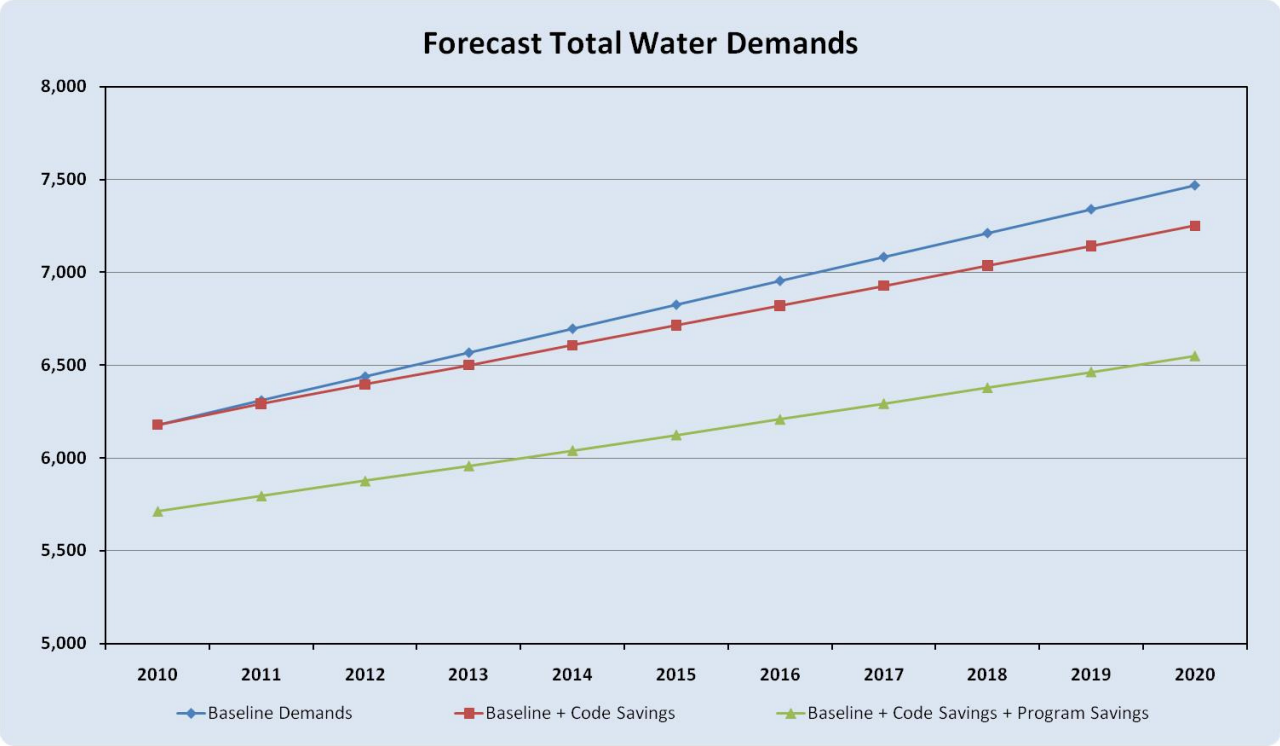

Figure 7-1
Forecast Total Water Demands

7.1 Benefits and Financial Savings

The following benefits and potential financial savings in capital improvements have been identified based on the projected water savings. Ongoing conservation efforts will be required to ensure the identified water savings can be made permanent:

Water Supply and Delivery – As providers save on water demands, the cost savings can be categorized as savings in operation and maintenance (O&M) or capital costs. Marginal savings in water demands will save on O&M of existing equipment and facilities; typically considered the volume charge component. This would include such costs as electrical demands for well pumping or chemical costs for chlorination.

More substantial demand savings over time will save not only on O&M, but could defer the need for some capital improvements. Depending on the increment of conservation savings, providers may not need to drill as many wells or may not need to acquire as much renewable water in the years ahead. The costs of more wells vs. renewable water development will bracket the potential cost savings associated with conservation.

The high-end capital savings is based on the plans of many providers to acquire renewable water supplies to meet a portion of build-out water demand. Some providers are members of the SMWSA, while many other providers are relatively close to the regional water supply system envisioned by SMWSA. The renewable supply for that system could be based on an interruptible supply contract with Denver and Aurora to obtain renewable water that would be available in average to wet years and stored in local reservoirs for retreatment and delivery during drier years, when less or no supply would be available from Denver and Aurora. The regional infrastructure to deliver that water is estimated at $460 M (Baysinger, et al. 2010), and SMWSA members expect that system to deliver 40,670 AFY throughout the region at build-out (Strother, 2010). Approximating the cost on a unit basis, the infrastructure will then cost $11,300 per AFY in 2010 dollars.

In addition, annual costs payable to Denver and Aurora are expected to range from $4.00 to $6.00 per 1,000 gallons. We will assume an average cost of $5.00 per 1,000 gallons. To this, the operating, maintenance, and replacement cost of the regional system must be added. That annual cost was estimated at $34.6 M to operate the system for 35,000 AFY (Baysinger, et al. 2010) or approximately $3.00 per 1,000 gal. The total then would be approximately $8.00 per 1,000 gal. or $2,600 per AF in 2010 dollars.

Some providers will likely have an interest in purchasing renewable water via the SMWSA agreement to offset the escalating costs of continued use of Denver Basin groundwater and provide long-term sustainability, regardless of how much water is saved through conservation. Other providers are evaluating other potential sources of renewable water. For the purposes of this analysis, the comparison is based on the assumed Aurora and Denver renewable supply option.

A few of the water providers are a considerable distance away from the planned SMWSA regional system, or do not expect to participate in such a system due to their relatively low demands or financial constraints. For those water providers, the projected savings were determined on the basis of their current well systems.

Projected Savings - The conservation savings to providers for capital expenditures is summarized in Table 7-1a. The total savings in avoided capital expenditures for water supply and delivery infrastructure based on potential savings in 2020 of 951 AFY is $10.9 M. Because Chatfield South WD is also served by unmetered domestic wells, total demands and potential conservation savings cannot be determined. For Sierra Vista MWC, potential conservation savings will have essentially no effect on capital outlays because the MWC is served by a single well.

In addition to capital savings, the water providers could save $2.6M in annual O&M costs in 2010 dollars. This is comprised primarily of savings on water system O&M as listed in Table 7-1b, but includes some wastewater O&M savings for a few providers as listed in Table 7-1c. Ongoing water conservation programs will be needed to ensure that these savings are permanent.

Capital - Water Supply, Delivery, and Treatment (AFY)		
Water Service Provider	Total Water Conservation Program Forecast Demand Reductions (in AF)	Total Savings if Demand Reductions are Permanent ($)
Beverly Hills MWC	7.8	$84,800
Castleton Center WSD	2.1	$24,000
Chatfield South WD	unknown	---
Cottonwood WSD	133	$1,500,000
Inverness WSD	199	$2,250,000
Louviers WSD	2.3	$26,000
Meridian MD	135	$1,530,000
Roxborough WSD	106	$1,780,000
Sedalia WSD	4.9	$55,400
Sierra Vista Douglas MWC	N/A	---
Silver Heights WSD	6.8	$77,000
Stonegate Village MD	286	$3,230,000
Thunderbird WSD	11	$124,000
Titan Road Industrial Park Water Association, Inc.	2.4	$27,100
Town of Larkspur	6.5	$142,000
View Ridge MWC	0.2	$2,500
Total Annual Capital Savings		$10,852,800

Estimated Unit Cost $11,300/AFY for most Districts

Estimated Unit Cost $16,800/AFY Roxborough

Estimated Unit Cost $21,900/AFY Town of Larkspur

Table 7-1a
Projected Capital Savings

Annual O&M Water System (AFY)		
Water Service Provider	Total Water Conservation Program Forecast Demand Reductions (in AF)	Total Savings if Demand Reductions are Permanent ($)
Beverly Hills MWC	N/A	---
Castleton Center WSD	2.1	$5,500
Chatfield South WD	unknown	---
Cottonwood WSD	133	$350,000
Inverness WSD	199	$520,000
Louviers WSD	2.3	$6,000
Meridian MD	135	$350,000
Roxborough WSD	106	$190,000
Sedalia WSD	4.9	$12,700
Sierra Vista Douglas MWC	1.3	$1,300
Silver Heights WSD	6.8	$17,700
Stonegate Village MD	286	$740,000
Thunderbird WSD	11	$28,600
Titan Road Industrial Park Water Association, Inc.	2.4	$6,200
Town of Larkspur	6.5	$6,300
View Ridge MWC	0.2	$500
Total Annual O&M Water System Savings		$2,234,800

Estimated Unit Cost $2,600/AFY for most districts

Estimated Unit Cost $1,800/AFY Roxborough

Estimated Unit Cost $990/AFY Sierra Vista

Estimated Unit Cost $965/AFY Sierra Vista

Table 7-1b
Projected O&M Water Savings

Annual O&M Wastewater System (AFY)		
Water Service Provider	Total Water Conservation Program Forecast Demand Reductions (in AF)	Total Savings if Demand Reductions are Permanent ($)
Beverly Hills MWC	N/A	---
Castleton Center WSD	2.1	$1,000
Chatfield South WD	unknown	---
Cottonwood WSD	67	$13,000
Inverness WSD	73	$14,000
Louviers WSD	N/A	---
Meridian MD	126	unknown
Roxborough WSD	N/A	---
Sedalia WSD	N/A	---
Sierra Vista Douglas MWC	N/A	---
Silver Heights WSD	6.8	$3,200
Stonegate Village MD	143	$280,000
Thunderbird WSD	N/A	---
Titan Road Industrial Park Water Association, Inc.	N/A	---
Town of Larkspur	3.25	$10,300
View Ridge MWC	N/A	---
Total Annual O&M Water System Savings		$321,500

Estimated Unit Cost varies per district

Table 7-1c
Projected O&M Wastewater Savings

7.2 Other Considerations

There are other considerations in addition to reduced capital project expenditures when evaluating the impacts of the water conservation program.

Reduced Nonpotable Irrigation Supply – As irrigation demands are reduced, the lawn irrigation return flow credits generated from irrigation are also reduced. This results in less augmentation supply available to offset well pumping. The impacts on the nonpotable system have not been quantified for this analysis, but will be monitored on an ongoing basis as part of the nonpotable irrigation accounting.

Section 8: Implementation and Monitoring Plan

8.1 Implementation

Providers will continue current water conservation programs. In addition the proposed programs described in Section 5 will be evaluated for future implementation. The evaluations will consider the estimated water savings, cost-effectiveness of the proposed measure and the financial and staffing resources to implement each measure. Refer to Table 8-1 in the Appendix for the implementation plan for each measure by District.

8.2 Ongoing Monitoring

Many providers do not have the staff or financial resources to regularly track the impacts of their respective conservation plans. Monitoring of total and billed water usage will provide information on water use and progress toward the water conservation goals. In the past, the State has been able to provide some financial support to implement conservation plans. Providers may seek assistance funding from local, regional, state or federal sources to produce a periodic progress report on the combined conservation programs that includes a detailed description of plan implementation as well as the measured impacts on usage.

8.3 Plan Refinement

Individual providers may periodically evaluate their programs and implementation. The providers may adjust the programs identified in this Plan as warranted due to new technology or analysis of the effectiveness of individual programs.

8.4 Compliance with State Planning Requirements

Colorado Revised Statutes, Title 37: Water and Irrigation, Article 37-60-126 requires a State-approved water conservation plan for covered entities as a condition of seeking financial assistance from the CWCB. Because the providers covered under this RWCP are not categorized as covered entities, those provisions are not applicable to this Plan, although it is largely based on the key planning requirements of that statute.

8.5 Conclusion

Douglas County developed this Regional Water Conservation Plan (RWCP, the Plan) as part of the Douglas County Regional Water Conservation Planning Program (RWCPP). Through this program, the County offered assistance in the development of individual water conservation plans for the 20 non-covered entity water providers within Douglas County. This Regional Plan is a compilation of 15 individual water conservation plans and data from another participant into a single document for approval by both the CWCB and the Douglas County Board of County Commissioners. The Douglas County region is heavily dependent on nonrenewable Denver Basin groundwater; water conservation is essential in helping the region achieve long-term sustainability, and will continue to be a key strategy for foreseeable future.

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Appendix

Table of Appendices

Appendix A

Conservation Oriented Water Rate Structures

Appendix A – Conservation Oriented Water Rate Structures

Table 4-1a Conservation Oriented Water Rate Structures (Monthly Billing)

Water Provider	Residential Use		Commercial, Industrial		Irrigation Use		Notes
	Base Fee	Increasing Block Rate (per 1k gallons)	Base Fee	Increasing Block Rate (per 1k gallons)	Base Fee	Increasing Block Rate	
Castleton Center WSD	N/A		$20.00 Monthly (up to 5k gallons)	5k - 10k $5.00 10k - 20k $6.00 20k+ $7.00	N/A		Rate Structure Established in 1997
Cottonwood WSD	$3.32 Monthly per 1k gallons (within Annual Allocation)	In Excess of Annual Allocation = $3.32 In Excess of 150% Annual Allocation = $9.96	*Same as Residential*		*Same as Residential*		Rate Structure Established in 2003
Inverness WSD	$2.75 Monthly per 1k gallons (within Annual Allocation)	In Excess of Annual Allocation = $5.50 In Excess of 150% Annual Allocation = $8.25	*Same as Residential*		*Same as Residential*		Rate Structure Established in 2003
Meridian MD	$25.00 Monthly Single Family Use (up to 4k gallons) $45.00 Monthly Multi-Family Use (up to 8k gallons)	In Excess of Monthly Allocation = $3.89 With additional overage fees if over 170k gallons/year (SF) or 95k gallons/year (MF Unit)	$25.00 for 1" (up to 4k gallons) $45.00 for 1.5" (up to 8k gallons) $65.00 for 2" (up to 12k gallons) $135 for 3" (up to 24k gallons) $265 for 4" (up to 48k gallons)	In Excess of Monthly Allocation = $3.89 With additional overage fees if over 20.5 gal/yr/SF Commercial Use or 153.3 gal/yr/SF Restaurant Use or 10.25 gal/yr/SF Office Warehouse Use	*Same as Commercial*		Rate Structure Established in 2003
Roxborough WSD	$31.14 Monthly (Base Fee)	0k-20k $4.77 20k - 40k $6.17 40k+ $11.18	$62.28 for 1" $124.56 for 1.5" $249.12 for 2" (Base Fees)	For 1" Service: 0k - 40k $4.77 40k - 80k $6.17 80k+ $11.18 For 1.5" & 2" Service: 0k - 80k $4.77 80k - 160k $6.17 160k+ $11.18	*Same as Commercial*		Rate Structure Established in 2003

Sierra Vista Douglas MWC	$85.00 Monthly (up to 400k gallons)	400k - 500k $2.00 500k - 600k $3.00 600k+ $4.00	N/A		N/A	
Stonegate Village MD	$21.44 Monthly (Base Fee)	For 3/4" Service: 0k - 6k $1.61 6k - 12k $2.95 12k - 18k $4.29 18k - 24k $5.36 24k+ $7.50	$42.88 for 1" $85.76 for 1.5" $171.52 for 2" $385.92 for 3" (Base Fees)	For 1" Service: 0k - 12k $1.61 12k - 24k $2.95 24k - 36k $4.29 36k - 48k $5.36 48k+ $7.50 For 1.5" Service: 0k - 24k $1.61 24k - 48k $2.95 48k - 72k $4.29 72k - 96k $5.36 96k+ $7.50	For 2" Service: 0k - 48k $1.61 48k - 96k $2.95 96k - 144k $4.29 144k - 192k $5.36 192k+ $7.50 For 3" Service: 0k - 108k $1.61 108k - 216k $2.95 216k - 324k $4.29 324k - 432k $5.36 432k+ $7.50	Rate Structure Established in 2003. Stonegate does not bill based on user class, but on size of service.
Titan Road Industrial Park Water Association, Inc.	N/A		$94.00 Monthly (up to 5k gallons)	5k - 20k $5.50 20k - 45k $6.00 45k - 70k $10.25 70k - 100k $10.75 100k - 150k $11.25 150k+ $11.88	N/A	Rate Structure Established in 2003
Town of Larkspur	$17.50 Monthly (up to 8k gallons) for each 3/4" TE	8k - 20k $2.50 20k - 40k $3.00 40k - 60k $3.50 60k - 80k $4.00 80k - 100k $4.50 100k+ $5.00	*Same as Residential*		N/A	Rate Structure Established in 1983. Service sizes that are larger than 3/4" are charged in 3/4" equivalencies

Table 4-1b Conservation Oriented Water Rate Structures (Bi-Monthly Billing)

Water Provider	Residential Use		Commercial, Industrial		Irrigation Use		Notes
	Base Fee	Increasing Block Rate (per 1k gallons)	Base Fee	Increasing Block Rate (per 1k gallons)	Base Fee	Increasing Block Rate	
Beverly Hills MWC	$120.00 Bimonthly (up to 12k gallons)	In Excess of Bimonthly Allocation = $2.00	*Same as Residential*		N/A		
Louviers WSD	$52.35 Bimonthly (up to 4k gallons)	4k - 12k $3.00 12k - 20k $4.50 20k - 60k $6.00 60k+ $7.50	*Same as Residential*		N/A		Rate Structure Established in 2009
Silver Heights WSD	$70.00 Bimonthly (up to 10k gallons)	10k - 30k $1.75 30k - 50k $3.50 50k - 66k $8.00 66k+ $12.00	$110 Bimonthly (Base Fee)	$3.00 All Usage	N/A		Rate Structure Established in 2003

Table 4-1c Conservation Oriented Water Rate Structures (Quarterly Billing)

Water Provider	Residential Use		Commercial, Industrial		Irrigation Use		Notes
	Base Fee	Increasing Block Rate (per 1k gallons)	Base Fee	Increasing Block Rate (per 1k gallons)	Base Fee	Increasing Block Rate	
Sedalia WSD (Within District)	$97.50 Quarterly (up to 15k gallons)	15k - 30k $2.75 30k - 40k $3.50 40k - 50k $4.25 50k - 70k $5.50 70k - 90k $6.25 90k+ $10.25 Bulk Water $10.25	*Same as Residential*		N/A		Rate Structure Established in 2003 A Renewable Water Resource Fee was added in 2006 as is accounted for in these fees.
Sedalia WSD (Outside of District)	$542 Quarterly (up to 15k gallons)	15k - 30k $4.20 30k - 40k $5.60 40k - 50k $7.00 50k - 70k $8.40 70k - 90k $10.75 90k+ $15.60 Bulk Water $50.00	*Same as Residential*		N/A		Rate Structure Established in 2003 A Renewable Water Resource Fee was added in 2006 as is accounted for in these fees.
View Ridge MWC	$75.00 Quarterly (Base Fee)	0k - 15k $3.15 15k - 30k $4.20 30k - 45k $7.35 45k - 60k $13.65 60k - 75k $30.80 75k+ $63.00	N/A		N/A		Rate Structure Established in 2008

Table 4-1d Conservation Oriented Water Rate Structures (Miscellaneous Billing Cycles)

Water Provider	Residential Use		Commercial, Industrial		Irrigation Use		Notes
	Base Fee	Increasing Block Rate (per 1k gallons)	Base Fee	Increasing Block Rate (per 1k gallons)	Base Fee	Increasing Block Rate	
Chatfield South WD	None	0k - 10k $3.36 10k - 12.5k $6.72 12.5k - 17.5k $33.60 17.5k+ $67.20	N/A		N/A		
Thunderbird WSD	$65.00 Every Three Months (up to 10k gallons)	10k - 15k $1.00 15k - 20k $2.00 20k - 25k $3.00 25k - 30k $4.00 30k - 35k $6.00 35k - 45k $8.00 45k - 55k $10.00 55k - 65k $12.00 65k - 85k $15.00 85k - 95k $20.00 95k+ $21.00	N/A		N/A		Rate Structure Established in 2003

Appendix B

Current Water Conservation Programs

Appendix B – Current Water Conservation Programs

	Pricing Structure			Operational Utility Side Measures					
Water Provider	Tiered Rates, Modifications to Increasing Block Rate Structure	Renewable Water Resource Fee	Water Budgets	Integrated Resources Planning	Full Metering	Conservation Coordinator	Water Use Based Irrigation Tap Fees	Watering Restrictions	Water Use Evaluations
Beverly Hills MWC	X		X	X	X	X			
Castleton Center WSD	X			X	X	X			
Chatfield South WD*	X		X	X	X	X			
Cottonwood WSD	X		X	X	X	X			
Inverness WSD	X		X	X	X	X			
Louviers WSD	X			X	X	X			
Meridian MD	X		X	X	X	X	X		
Roxborough WSD	X			X	X	X		X	X
Sedalia WSD	X	X		X	X	X			
Sierra Vista Douglas MWC			X	X	X	X			
Silver Heights WSD	X			X	X	X			
Stonegate Village MD	X	X		X	X	X		X	X
Thunderbird WSD	X			X	X	X			
Titan Road Industrial Park Water Association, Inc.	X			X	X	X			
Town of Larkspur	X			X	X	X			
View Ridge MWC	X			X	X	X			

*Chatfield South WD customers are fully metered on District system, but domestic wells are unmetered.

	Education & Public Information				Water Loss Control Program			Water Reuse Systems
Water Provider	Conservation Public Information Campaign	School Education Programs (via DCWRA)	Water Conservation Classes	Real-Time Usage	Tracking of Water Losses	Waterline Replacements	Meter Retrofits	Nonpotable Irrigation System
Beverly Hills MWC	X							
Castleton Center WSD	X	X			X			
Chatfield South WD								
Cottonwood WSD	X	X			X			
Inverness WSD	X	X			X			X
Louviers WSD	X				X			
Meridian MD	X	X			X			X
Roxborough WSD	X	X	X	X	X	X	X	
Sedalia WSD					X			
Sierra Vista Douglas MWC					X			
Silver Heights WSD					X			
Stonegate Village MD	X	X			X			X
Thunderbird WSD	X				X			
Titan Road Industrial Park Water Association, Inc.								
Town of Larkspur					X			
View Ridge MWC								

	Indoor Efficiency		Outdoor Efficiency - Landscapes & Irrigation					
Water Provider	High Use Customers	Low Flow Fixture Rebates	Water Budgets for Irrigation Accounts	Turf Replacement Rebates	Irrigation System Water Conservation Requirements/ Restrictions	Irrigation Meters	ET Controllers	Efficient Irrigation Systems
Beverly Hills MWC								
Castleton Center WSD								
Chatfield South WD								
Cottonwood WSD		X						
Inverness WSD	X	X	X	X	X	X		X
Louviers WSD								
Meridian MD	X		X		X		X	
Roxborough WSD		X						
Sedalia WSD								
Sierra Vista Douglas MWC								
Silver Heights WSD								
Stonegate Village MD		X	X	X			X	X
Thunderbird WSD								
Titan Road Industrial Park Water Association, Inc.					X			
Town of Larkspur								
View Ridge MWC								

Appendix C

Water Conservation Activities

Appendix C – Water Conservation Activities

Customer Class	Water Conservation Activity Name	Beverly Hills MWC	Castleton Center WSD	Chatfield South WD	Cottonwood WSD	Inverness WSD	Louviers WSD	Meridian MD	Roxborough WSD	Sedalia WSD	Sierra Vista Douglas MWC	Silver Heights WSD	Stonegate Village MD	Thunderbird WSD	Titan Road Industrial Park Water Association, Inc.	Town of Larkspur	View Ridge MWC
		Water Provider															
Residential	Residential LF Toilet, SF	X			X	X	X		X	X	X	X	X	X		X	X
	Residential LF Toilet, MF				X	X							X				
	Residential LF Washer, SF	X			X	X	X	X	X	X	X	X	X	X		X	X
	Residential LF Washer, MF					X							X				
	Residential Increasing Tiered Rates, SF	X				X	X		X	X		X	X	X		X	X
	Residential Increasing Tiered Rates, MF					X							X				
	Full & Accurate Metering						X										X
	Drip system Incentives																
	Irrigation System Restrictions/Review/Approval																
	Leak Detection Monitoring & Touch Read Meters																X
	Reduce Line Flushing by Looping Waterlines																
	Rebate Program for LF Toilets & HE Washers								X								
	Drought Surcharges								X								
Commercial	In-Building Water Budgets							X							X		
	Large Landscape Water Budgets				X			X	X			X					
	Irrigation Efficiency		X														
	Increasing Tiered/Block Rates		X		X	X			X	X			X		X	X	

	LEED Certified Development					X											
	Full & Accurate Metering																
	Drip System Incentives																
	Irrigation System Restrictions/Review/Approval																
	Leak Detection Monitoring & Touch Read Meters																
	Install Additional Meters																
	Reduce Line Flushing by Looping Waterlines																
	Large Landscape Irrigation Controllers											X					
Irrigation (Potable)	Large Landscape Water Budgets				X				X				X				
	Irrigation Increasing Tiered Rates												X				
	Large Landscape Irrigation Controllers				X			X									
	Full & Accurate Metering																
	High Efficiency Sprinkler Nozzles								X								
Irrigation (Non-Potable)	Installing Separate Meters for High End Users					X											
	Large Landscape Turf Replacement					X											
	Install Efficient Irrigation Nozzle					X											
	Increasing Tiered Rates					X											

Appendix D

Projected Water Conservation Savings

Appendix D – Projected Water Conservation Savings

Expanded Table 6-2 Projected Water Conservation Savings

Customer Class	Service Area Water Savings	Units	Beverly Hills MWC	Castleton Center WSD	Chatfield South WD	Cottonwood WSD	Inverness WSD	Louviers WSD	Meridian MD	Roxborough WSD	Sedalia WSD	Sierra Vista Douglas MWC	Silver Heights WSD	Stonegate Village MD	Thunderbird WSD	Titan Road Industrial Park Water	Town of Larkspur	View Ridge MWC	TOTAL SAVINGS PER ACTIVITY
			Average Annual Savings in 2020																
Residential	Residential LF Toilet, SF	AF	2			17	0.2	0		29.9	0.6	0.6	1.5	17.4	2.7		0.5	0.1	**72.5**
	Residential LF Toilet, MF	AF				9	0.1							15.6					**24.7**
	Residential LF Washer, SF	AF	0.5			8	0.4	0.2	53	18.7	1	0.7	0.8	10.9	0.8		1.5	0.1	**96.6**
	Residential LF Washer, MF	AF					0.4							12.1					**12.5**
	Overall Plumbing Code Water Savings	**AF**	**2.5**	**N/A**	**N/A**	**34**	**1.1**	**0.2**	**53**	**48.6**	**1.6**	**1.3**	**2.3**	**56**	**3.5**	**N/A**	**2**	**0.2**	**206.3**
Residential	Residential Increasing Tiered Rates, SF	AF	0.4				1	0.9		2.2	0.9		1	33.5	0.6		0.7	0	**41.2**
	Residential Increasing Tiered Rates, MF	AF					1							22.1					**23.1**
	Full & Accurate Metering	AF						0.3										0	**0.3**
	Drip system Incentives	AF																	**0**
	Irrigation System Restrictions/Review/Approval	AF																	**0**
	Leak Detection Monitoring & Touch Read Meters	AF																0	**0**
	Reduce Line Flushing bu Looping Waterlines	AF																	**0**
	Rebate Program for LF Toilets & HE Washers	AF								0.3									**0.3**
	Drought Surcharges	AF								1.4									**1.4**
Commercial	In-Building Water Budgets	AF							73							0.1			**73.1**
	Large Landscape Water Budgets	AF				15			8	0.6									**23.6**
	Irrigation Efficiency	AF		0.7															**0.7**
	Increasing Tiered/Block Rates	AF		0.7		10	1.9			0.6				14.1		0.5	0.4		**28.2**
	LEED Certified Development	AF					34.6												**34.6**
	Drip System Incentives	AF																	**0**
	Irrigation System Restrictions/Review/Approval	AF																	**0**
	Leak Detection Monitoring & Touch Read Meters	AF																	**0**
	Install Additional Meters	AF																	**0**
	Reduce Line Flushing bu Looping Waterlines	AF																	**0**
	Large Landscape Irrigation Controllers	AF											1.3						**1.3**
Irrigation (Potable)	Large Landscape Water Budgets	AF				15				0.4				10					**25.4**
	Irrigation Increasing Tiered Rates	AF												2.1					**2.1**
	Large Landscape Irrigation Controllers	AF				11			1										**12**
	High Efficiency Sprinkler Nozzles	AF								0.2									**0.2**
Irrigation (Non-Potable)	Installing Separate Meters for High End Users	AF					1												**1**
	Large Landscape Turf Replacement	AF					10.1												**10.1**
	Install Efficient Irrigation Nozzle	AF					0.3												**0.3**
	Increasing Tiered Rates	AF					0.6												**0.6**
	Overall Program Water Savings	**AF**	**0.4**	**1.4**	**N/A**	**51**	**50.5**	**1.2**	**82**	**5.7**	**0.9**	**0**	**2.3**	**81.8**	**0.6**	**0.6**	**1.1**	**0**	**279.5**
	Total Water Savings	**AF**	**2.9**	**1.4**	**N/A**	**85**	**51.6**	**1.4**	**135**	**54.3**	**2.5**	**1.3**	**4.6**	**137.8**	**4.1**	**0.6**	**3.1**	**0.2**	**485.8**
	% of Baseline Demands	**%**	**5.5%**	**7.7%**	**N/A**	**7.1%**	**4.7%**	**6.1%**	**11.8%**	**4.6%**	**6.1%**	**2.9%**	**9.6%**	**5.6%**	**6.0%**	**3.2%**	**6.1%**	**3.2%**	

Appendix E

Water Conservation Measure Implementation by District

Appendix E – Water Conservation Measure Implementation by District

Water Conservation Measure	Beverly Hills MWC	Castleton Center WSD	Chatfield South WD	Cottonwood WSD	Inverness WSD	Louviers WSD	Meridian MD	Roxborough WSD	Sedalia WSD	Sierra Vista Douglas MWC	Silver Heights WSD	Stonegate Village MD	Thunderbird WSD	Titan Road Industrial Park Water Association, Inc.	Town of Larkspur	View Ridge MWC
	Date of Implementation if New Measure															
Pricing Structure																
Modifications to increasing block rate structure (1)	Ongoing				Ongoing	Ongoing			Ongoing			Ongoing		Ongoing	Ongoing	Ongoing
Renewable Water Charge (1)					Ongoing				Ongoing			Ongoing				
Monthly Billing (1)					Ongoing	TBD				Ongoing		Ongoing				
Water budgets (1)																
Operational Utility Side Measures																
Integrated Resources Planning (2)	Ongoing	Ongoing		Ongoing	Ongoing	Ongoing	Ongoing	Ongoing	Ongoing	Ongoing	Ongoing	Ongoing	Ongoing	Ongoing	Ongoing	Ongoing
Full Metering (1)	Ongoing	Ongoing		Ongoing	Ongoing	Ongoing	Ongoing	Ongoing	Ongoing	Ongoing	Ongoing	Ongoing	Ongoing	Ongoing	Ongoing	Ongoing
Modifications to increasing block rate structure (1)		Ongoing		TBD			Ongoing	Ongoing			Ongoing		Ongoing			
Mandatory Watering Days/Restrictions (1)	TBD			TBD	TBD		Ongoing	Ongoing				Ongoing	TBD			
Renewable Water Charge (1)		TBD		Ongoing			Ongoing	Ongoing			TBD		TBD			
Conservation Coordinator (4)	Ongoing	Ongoing			Ongoing	Ongoing	Ongoing	Ongoing	Ongoing	Ongoing	Ongoing	Ongoing	Ongoing	Ongoing	Ongoing	Ongoing
Residential water surveys and evaluations, targeted at high demand customers (13)	TBD			TBD	Ongoing		TBD	Ongoing	TBD		TBD	TBD	TBD		TBD	TBD
Water Waste Ordinance				TBD			TBD	Ongoing								
Seasonal Planting Limits for Turf							TBD	Ongoing								
Water Loss Control Program																
Water Loss Control Program (3)	TBD	TBD			TBD	TBD	Ongoing	Ongoing	Ongoing	Ongoing	TBD	Ongoing	Ongoing	Ongoing	TBD	Ongoing
Education and Public Information																
Conservation Public Information Campaign (6)	Ongoing			Ongoing	Ongoing	TBD	Ongoing	Ongoing	TBD	TBD	TBD	Ongoing	Ongoing		TBD	TBD
School Education Programs (via DCWRA) (6)	TBD			Ongoing	TBD		Ongoing	Ongoing	TBD			Ongoing				TBD
Water Conservation Classes								TBD[2]								
Xeriscape design clinics (6)				TBD			TBD				TBD	TBD	TBD			
Annual Large Irrigators Conservation Meetings with HOAs (6)				TBD	TBD		TBD									
Customer on-line access to water use history				TBD			TBD	YES[3]								
Indoor - Residential																
Low Flow/High Efficiency Fixture Rebates (12)	TBD				Ongoing		TBD	Ongoing	TBD[1]		TBD	2012	TBD		TBD[1]	TBD[1]
Rules for New Construction (Building Codes requiring high efficiency fixtures) (11)															Ongoing	

Water Conservation Measure	Beverly Hills MWC	Castleton Center WSD	Chatfield South WD	Cottonwood WSD	Inverness WSD	Louviers WSD	Meridian MD	Roxborough WSD	Sedalia WSD	Sierra Vista Douglas MWC	Silver Heights WSD	Stonegate Village MD	Thunderbird WSD	Titan Road Industrial Park Water Association, Inc.	Town of Larkspur	View Ridge MWC
	Date of Implementation if New Measure															
Indoor - CII																
Rules for new construction - building codes requiring high efficiency fixtures and process equipment (12)		TBD													TBD	
Specialized non-residential surveys, audits and equipment efficiency improvements (14)		TBD					TBD					Ongoing				
CII high efficiency toilet and urinal rebates				TBD			TBD					2012			TBD[1]	
Non-residential water surveys and evaluations, targeted at high demand customers									TBD							
Outdoor Efficiency - Landscapes and Irrigation																
Residential Irrigation Efficiency Evaluations (10)	TBD			TBD				TBD[2]			TBD	TBD	TBD			
Irrigation Efficiency Improvements (10)										TBD					TBD	
Irrigation Efficiency for New and Existing Landscapes (9)																
Limits on turf landscaping for new construction														Ongoing		
Water budgets for Irrigation Accounts (7)	Ongoing			Ongoing	Ongoing		Ongoing					TBD				
Irrigation System Water Conservation Requirements and Certification of Landscape Professionals (8)				TBD	TBD		Ongoing	TBD[2]				TBD				
Water Efficient Maintenance Practices for New and Existing Landscapes (9)				TBD	TBD		Ongoing	TBD[2]				TBD				
E-T Irrigation controllers (9)				TBD	TBD		Ongoing	TBD[2]				TBD				
Efficient Irrigation Systems Program (9)	TBD	TBD		TBD				TBD[2]				TBD				
Rebates for turf replacement					Ongoing		TBD									
Covenant Restrictions on Irrigation														Ongoing		
Water Reuse Systems																
Nonpotable system augmented by reusable return flow credits				TBD	Ongoing		Ongoing					Ongoing				
Supply augmented by consumable return flow credits																
Recapture and reuse of reusable effluent				Ongoing	Ongoing		Ongoing		TBD			TBD				TBD

1 Dependant on Funding

2 Evaluate

3Currently Being Implemented