Colorado Springs Utilities

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2008 – 2012
Water Conservation Plan

APPROVED BY COLORADO WATER CONSERVATION BOARD
JANUARY 30, 2008

Colorado Springs Utilities
Water Services Division
Water Supply Department
Water Conservation Section

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ACKNOWLEDGEMENTS

Colorado Springs Utilities acknowledges the citizens of Colorado Springs for their long-standing commitment to water conservation. Springs Utilities extends our appreciation to those citizens who took the time to attend public meetings and to respond to customer surveys. Comments and suggestions from the public were incorporated into the plan.

The Water Conservation Section wishes to acknowledge those within the Colorado Springs Utilities organization who contributed to the plan. Specifically, we extend our appreciation to those subject matter experts and core team members who lent their time and expertise to this effort. Without their commitment, this plan would not have been possible.

The 2008-2012 Water Conservation Plan will be reviewed annually, with a formal update every three to five years. Ideas and suggestions for future revisions should be submitted to:

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EXECUTIVE SUMMARY

Colorado Springs Utilities ("Springs Utilities") is a community-owned utility that provides electricity, natural gas, water and wastewater services to the citizens of Colorado Springs and surrounding communities. The water service area covers 184 square miles and includes Colorado Springs, Green Mountain Falls and Chipita Park.

The community has a strong military presence and Springs Utilities supplies water to Fort Carson Army Base, Peterson Air Force Base, the North American Air Defense Command and the United States Air Force Academy. Springs Utilities also provides water to Cascade Metropolitan District and supplemental water to Security Water District.

In 2006, Springs Utilities delivered 26 billion gallons of water to approximately 417,000 people through 129,000 meters. Ninety percent of the meters are single-family residential. Single-family residential use comprises almost half (44%) of annual use. The other half (56%) is comprised of commercial, military, multi-family, wholesale and other use.

From 1990 through 2006, system-wide water use averaged 186 gallons per capita per day. During the same period, single-family residential water use averaged 112 gallons per capita per day. From 2002 through 2005, water use declined due to mandatory water restrictions. Water use has remained relatively low since water restrictions were lifted in late 2005.

Given the demand forecast, Springs Utilities has adequate water supplies to meet projected needs through 2046. However, raw water delivery systems will be at capacity as early as 2012. As such, Springs Utilities is working with regional partners to develop an additional 76,000 acre-feet of raw water delivery capacity to the community.

A proposed delivery system, commonly referred to as the Southern Delivery System (SDS), is currently undergoing the National Environmental Policy Act (NEPA) Environmental Impact Statement (EIS) process. The EIS is evaluating seven alternatives for the SDS project. Water conservation is incorporated into each of the seven SDS alternatives.

Springs Utilities manages programs that address both supply-side and demand-side water conservation measures. Supply-side measures optimize water resources through water reuse systems and distribution system efficiency. Demand-side measures promote water conservation and efficient water use through education, rates, rebates, audits and regulations.

The water conservation goals established for the 2008-2012 Water Conservation Plan include maintaining low residential use per capita, already among the lowest in Colorado and the Southwest. For the commercial market, the primary goal is to gain a better understanding of how commercial customers use water in order to reduce commercial use per customer.

From an operational perspective, Springs Utilities has established a goal to reduce peak day demand, specifically in geographic areas with high residential use per capita and high peaking factors. Springs Utilities will develop and maintain collaborative relationships that encourage water conservation and efficient water use throughout the region.

Springs Utilities aims to establish a reputation as a *national* leader in water conservation and efficient water use by implementing programs that are sustainable. Using 1999 as the baseline year, Springs Utilities expects to save 30 billion gallons of water by 2017, which represents approximately 7.6 percent of the water demand forecast.

From 2005 through 2007, Springs Utilities went through the rigorous process of identifying and selecting water conservation programs for implementation. Springs Utilities evaluated conservation measures by category (i.e., education, rates, rebates, audits and regulations) and by market (i.e., indoor vs. outdoor, residential vs. commercial, new vs. existing construction).

Clearly, the historical emphasis on education has contributed to low residential use per capita. As such, implementation strategies include maintaining a strong focus on education. In addition, Springs Utilities will continue to encourage conservation through block rates for residential customers and seasonal rates for commercial customers.

To address public concerns and to address the needs of a growing community, Springs Utilities will introduce a residential new construction program that includes education, incentives and regulations. Springs Utilities will work with builders, developers and green industry professionals to develop the program specifications and procedures.

Springs Utilities will introduce a commercial and industrial program that includes indoor and outdoor water use audits and efficiency incentives plus access to automated meter reading (AMR) data. Springs Utilities will also partner with large water users (i.e., parks, schools, military) to improve water efficiency.

In summary, Springs Utilities plans to develop and manage a portfolio of twenty-three water conservation programs. Implementation of new programs will begin as early as 2008. For each individual program, a detailed implementation plan will be developed. Springs Utilities will continue to involve the public through customer surveys and working groups.

During the development of the 2008-2012 Water Conservation Plan, Springs Utilities made a concentrated effort to involve citizens, customers and other interested parties. Meetings were held beginning in September 2005. The draft plan was made available for public review and comment from November 15, 2007 through December 15, 2007.

The 2008-2012 Water Conservation Plan was authorized by the Chief Executive Officer on December 21, 2007 and approved by the Colorado Water Conservation Board (CWCB) Office of Water Conservation and Drought Planning on January 30, 2008. Springs Utilities will monitor the plan on an annual basis, with a formal update every three to five years.

INTRODUCTION

The Colorado Water Conservation Board (CWCB) through the Office of Water Conservation and Drought Planning requires that water providers with total demand of 2,000 acre-feet or more develop and implement plans that encourage customers to use water efficiently. This requirement was first established through the Water Conservation Act of 1991. In compliance with the Act, Springs Utilities submitted a Water Conservation Plan to the State of Colorado that was reviewed and accepted on March 23, 1998.

Around the same time, Springs Utilities was developing an integrated resource plan, commonly referred to as the 1996 Water Resource Plan. Development of the 1996 Water Resource Plan was a multi-year process, incorporating technical reports from 1989 through 1996. The 1996 Water Resource Plan identified four components for future development – a major raw water delivery system, existing system improvements, nonpotable water development and additional conservation. Conservation is the focus of this 2008-2012 Water Conservation Plan.

One of the core values expressed during the 1996 Water Resource Plan public process was the importance of conservation. As a result, a Citizens Water Conservation Committee was formed to help refine Springs Utilities' water conservation programs. Ultimately, the committee helped Springs Utilities develop the 1999-2004 Water Conservation Master Plan.

The 1999-2004 Water Conservation Master Plan described existing programs and identified six programs for future expansion – evapotranspiration irrigation guidelines, landscape ordinance for commercial landscapes, large commercial landscape audits, retrofit of public buildings and landscapes, rate structures that encourage conservation, and a rain sensor program.

When the drought struck in 2002, efforts to implement many of the programs identified in the 1999-2004 Water Conservation Master Plan were halted due to the immediate need for mandatory water restrictions. Simultaneously, new programs were introduced that were not previously identified in the 1999-2004 Water Conservation Master Plan.

During the 2004 legislative session, the State of Colorado revised the minimum requirements of the Water Conservation Act of 1991. In March 2006, Springs Utilities was notified by the CWCB that Springs Utilities' plan was in need of revision to ensure compliance with the Water Conservation Act of 2004 and to include the following new plan elements:

- The steps the covered entity used to develop, and will use to implement, monitor, review and revise its water conservation plan;
- The time period, not to exceed seven years, after which the covered entity will review and update its adopted plan;
- Either as a percentage or in acre-foot increments, an estimate of the amount of water that has been saved through a previously implemented conservation plan and an estimate of the amount of water that will be saved through conservation when the plan is implemented.

In May 2005, the CWCB introduced the *Water Conservation Plan Development Guidance Document and Model Plan* for water providers interested in developing water conservation plans. Springs Utilities followed the general principles of the guidance document in updating the 2008-2012 Water Conservation Plan.

Although the 2008-2012 Water Conservation Plan is not an exact replica of the Model Plan, it does include the nine planning steps recommended by the CWCB. In addition, the 2008-2012 Water Conservation Plan is consistent with the minimum requirements of the Water Conservation Act of 2004, as detailed in *Appendix D, State Requirements.*

In addition to the CWCB requirements, other factors that drive the need for an updated Water Conservation Plan include:

- Increased public awareness of the need to conserve due to regional drought and four years of water restrictions
- Higher customer expectations regarding Springs Utilities' role in promoting water conservation
- Changes in water appliance standards and advancements in water-efficient technologies
- Continued population growth and increased competition for state and regional water resources

The scope of the 2008-2012 Water Conservation Plan includes a statement of water conservation goals, followed by an analysis and description of selected programs. In addition, the plan addresses the process by which Springs Utilities identified, screened and selected programs for implementation. The plan further describes how Springs Utilities will implement and monitor individual programs. Finally, the plan provides an overview of water use, the water demand forecast and the water system, including proposed system improvements.

The 2008-2012 Water Conservation Plan is not a fully integrated water resource plan. As such, the plan does not address long-range plans related to water supply, delivery, treatment or distribution. Instead, the plan focuses on customer-side or demand-side activities, such as education, rates, rebates, audits and regulations. Water supply plans, including drought response plans, are available upon request from Springs Utilities.

The 2008-2012 Water Conservation Plan is a high-level strategic plan, designed to satisfy the diverse interests of multiple stakeholders. The plan is also designed to provide a foundation for Springs Utilities to make sound business decisions related to water conservation. The plan is not intended to provide detail for any one program. Individual programs will be refined during the implementation phase. Many programs will be introduced as pilot projects during the first year of implementation in order to work through program details.

In summary, the 2008-2012 Water Conservation Plan reflects the unique characteristics and the core values of the Colorado Springs community. It further demonstrates Springs Utilities' long-standing and deep-rooted commitment to water conservation and efficient water use.

CONSERVATION GOALS

Colorado Springs has a long history of water conservation and efficient water use. In the 1940s, the city was fully metered, long before metering became a standard practice in the industry. In the 1960s, the city pioneered the use of treated wastewater for irrigation. In the 1990s, the award-winning Xeriscape™ Demonstration Garden opened on Mesa Road. Conservation has been an integral part of water resource planning and management for over sixty years.

The beauty of southern Colorado draws thousands of visitors and residents to Colorado Springs every year. Simultaneously, Colorado Springs is home to five military bases, over 40,000 military personnel and their families. Colorado Springs' economy is driven primarily by the military, the high-tech industry and tourism. With such a dynamic population, a lasting commitment to water conservation is imperative.

Role of Water Conservation

Water conservation plays a significant role in water supply planning. The 1996 Water Resource Plan identifies water conservation as one of four components to ensure a safe and reliable water supply to the community. The other components of the plan include a major raw water delivery system, existing system improvements and nonpotable water development. Water conservation is critical in Springs Utilities' ability to secure a major raw water delivery system to the region and to maximize the use of existing water resources.

Colorado Springs is a growing community. Approximately half of the growth will come from the children and grandchildren of those who live in the community now. Over the next ten years, residential customers are projected to grow at a rate of 2.3 percent per year and commercial customers are projected to grow at rate of 1.6 percent per year. Military expansion at Fort Carson is also expected to increase growth in the community. Water conservation is one strategy to meet the needs of a growing population.

The importance of water conservation and efficient water use cannot be overstated. Colorado Springs is "high and dry" with an average elevation of 6,035 feet and average precipitation of 17.4 inches per year. This semi-arid climate intensifies the need for water conservation, particularly given the uncertainties of drought and global climate change. With increased competition for state and regional water resources, water conservation offers an element of flexibility given changing conditions and system uncertainties.

Benefits of Water Conservation

Springs Utilities educates and encourages customers to save water because "it's the right thing to do" and because of resource, economic and community benefits.

Resource Conservation becomes increasingly important as the water system experiences a high rate of population and demand growth. For every gallon of water saved, one less gallon of water needs to be acquired, delivered, stored and treated.

Economic Conservation programs are analyzed for cost-effectiveness. If saving a gallon of water costs less than providing a gallon of water, Springs Utilities may choose to augment water supply plans with water conservation alternatives.

Community Customers have come to expect water conservation information from Springs Utilities. Conservation helps customers lower their utility bills and helps preserve water for future generations in the community.

The U.S. Environmental Protection Agency (EPA) provides additional insight into the benefits of water conservation in terms of meeting the needs of existing and future populations:

> *In order to meet the needs of existing and future populations and ensure that habitats and ecosystems are protected, the nation's water must be sustainable and renewable. Sound water resource management, which emphasizes careful, efficient use of water, is essential in order to achieve these objectives. Water efficiency is one way of addressing water quality and quantity goals. The efficient use of water can also prevent pollution by reducing wastewater flows, recycling industrial process water, reclaiming wastewater and using less energy.*
>
> Source: EPA Office of Water, Statement of Principles on Efficient Water Use

Water Conservation Goals

The primary objective of the 2008-2012 Water Conservation Plan is help ensure the most effective and efficient use of water in the community. In order to fulfill this objective, Springs Utilities has established the following water conservation goals:

1. Maintain low residential use per capita, already among the lowest in Colorado and the Southwest
2. Gain a better understanding of how commercial customers use water in order to reduce commercial use per customer
3. Reduce peak day demand, specifically in geographic areas with high residential use per capita and high peaking factors
4. Develop and maintain collaborative relationships that encourage water conservation and efficient water use throughout the region
5. Establish a reputation as a *national* leader in water conservation and efficient water use by implementing programs that are sustainable

The goals established by Springs Utilities represent a blend of qualitative and quantitative outcomes. Goals will be monitored annually and refined every three to five years as the 2008-2012 Water Conservation Plan undergoes formal review.

PROGRAM SELECTION

Springs Utilities was systematic in its identification and selection of water conservation programs. Two years of information gathering went into the process of selecting programs for implementation. Final programs were selected based on water savings, cost-effectiveness, social acceptance, likelihood of success, and business and system impacts. The following stakeholders were considered throughout the process.

- Builders and developers
- City Council and Utilities Board
- Commercial and industrial customers
- Community organizations
- Environmental and regulatory agencies
- Landscape and irrigation professionals
- Neighboring water providers
- Plumbers and mechanical contractors
- Residential customers
- Trade associations

Water Savings

For each program, Springs Utilities conducted a water savings analysis based on the number of units to be installed, the estimated annual water savings per unit and the expected life span of the unit or measure. Where possible, programs were combined to avoid counting the estimated water savings more than once. Using 1999 as the baseline year, the following table ranks current and proposed programs by water savings.

Table 1: Top Programs Ranked by Water Savings

Rank	Program	2017 Water Savings (mgd)
1	Residential Block Rates	1.33
2	Commercial Seasonal Rates	1.15
3	Commercial Landscape Code and Policy	1.08
4	Conservation Education	.81
5	Water Waste Ordinance	.51
6	Commercial High-Efficiency Toilet Rebate	.33
7	Pre-Rinse Spray Nozzle Retrofit	.30
8	Commercial Outdoor Efficiency Incentives	.25
9	Commercial Indoor Efficiency Incentives	.21
10	Residential Clothes Washer Rebate	.20

Cost-Effectiveness

In water conservation planning, cost-effectiveness is calculated in terms of dollars per unit of water saved. Typically, the most cost-effective programs are selected for implementation. In addition, programs are often selected that address a gap or need in the marketplace, such as residential new construction. Other factors considered include the educational, environmental and societal benefits of the program.

Springs Utilities conducted a rigorous analysis of implementation costs, utilizing industry accepted standards and engineering estimates where possible. Costs related to incentives were established balancing utility costs and reasonable payback periods for customers. Marketing and advertising costs were estimated based on past experience. Labor costs were provided from across the organization for program development and management.

For the purposes of this analysis, implementation costs include both utility costs and customer costs. The cost of water saved is calculated using the ten-year savings and levelized ten-year costs for each program. Levelized costs take into account standard inflation and discount rates. The following table ranks current and proposed programs by cost-effectiveness.

Table 2: Top Programs Ranked by Cost-Effectiveness

Rank	Program	Cost of Water Saved ($/ac-ft)
1	Landscape Establishment Permits	$122
2	Residential Block Rates	$205
3	Commercial Seasonal Rates	$238
4	Pre-Rinse Spray Nozzle Retrofit	$479
5	Conservation Education	$1,348
6	Water Waste Ordinance	$2,121
7	Commercial High-Efficiency Toilet Rebate	$2,988
8	Commercial High-Efficiency Urinal Rebate	$5,095
9	Commercial Smart (ET) Controller Rebate	$5,130
10	Residential Smart Irrigation Rebates	$7,186

Description of Programs

The following section provides a brief description of the three new education programs and the thirteen new targeted programs planned for implementation. Springs Utilities has an established process for developing and implementing water conservation programs. The strategy, steps and schedule for how Springs Utilities plans to address the unique characteristics of each program are described in the *Implementation Plan* section.

Conservation Education

Residential New Construction Springs Utilities will enhance the education program with a campaign specifically targeted at residential new construction. Springs Utilities will develop landscape guidelines for distribution to home buyers, home builders and realtors. Springs Utilities will also develop a builder education series to increase the appeal of building water-efficient landscapes before a certificate of occupancy is issued.

Peak Day Program Springs Utilities will develop education programs designed to reduce peak day use, specifically in geographic areas with high residential use per capita and high peaking factors. Although details of the program are yet to be determined, the intent is to concentrate efforts in localized areas. Initiatives might include neighborhood meetings, direct mailings, youth involvement and community activities.

AMR Data Access Automated Meter Reading (AMR) will be fully deployed to all customers in 2010. Shortly thereafter, Springs Utilities will develop a service whereby large water users can access daily and weekly water consumption information. At the large water users meeting in October 2006, customers requested access to this information in order to more efficiently manage their irrigation systems.

Residential New Construction

Early in the process, it became clear that citizens are concerned with growth in the community. As a result, Springs Utilities will implement two new programs, targeted at residential new construction. First, Springs Utilities will introduce a builder incentive program, similar to the ENERGY STAR new homes program. The program will provide incentives for homebuilders to qualify their homes under the U.S. Environmental Protection Agency's (EPA) WaterSense New Homes program which encourages the design and construction of water-efficient homes.

Second, Springs Utilities will require landscape establishment permits for residential new construction. This program will require customers to install at least three cubic yards of organic material for every 1,000 square feet of planting area. This requirement was so well-received during water restrictions that the green industry encouraged Springs Utilities to continue the program. Springs Utilities will work with builders, developers and green industry professionals to develop the permit specifications and enforcement procedures.

Residential Outdoor

In 2003, Springs Utilities introduced an irrigation equipment rebate for residential customers. Historically, the rebate has applied to equipment such as rain shut-off devices, irrigation controllers, spray heads with check valves and rotating multi-stream nozzles. In 2008, the rebate will be renamed the smart irrigation rebate. At the same time, the rebate will be restructured so customers may better understand the features and benefits of the available equipment with the intent of increasing penetration and overall program effectiveness. Qualifying weather-based irrigation controllers, which use actual weather data to adjust watering schedules according to plant need, will be eligible for a rebate. Many other types of irrigation equipment will also be evaluated for possible inclusion in the program.

In 2006, Springs Utilities piloted a residential sprinkler check program to audit irrigation system efficiency for residential customers. The program was offered to thirty-six customers, using the methodologies and templates established by the Colorado WaterWise Council (CWWC). Water use at each participating property is being monitored periodically to evaluate the effectiveness of the audits. When the value of the audits is better understood, the residential sprinkler check program will be introduced to a larger audience.

The residential sprinkler check program may provide partnership opportunities with Certified Landscape Irrigation Auditors. Springs Utilities may also consider a partnership with the Center for Resource Conservation's "Slow the Flow Colorado" program. The "Slow the Flow Colorado" program is designed to test irrigation systems for efficiency and to make recommendations for improvements.

Commercial Indoor

In 2008, Springs Utilities will introduce a pre-rinse spray nozzle retrofit program for restaurants, cafeterias and other commercial food service providers. A pre-rinse spray nozzle is a handheld device that uses a spray of water to remove food and grease from dishes prior to cleaning in a commercial dishwasher. The national standard requires all pre-rinse spray valves manufactured after January 1, 2006 to have flow rates of 1.6 gallons per minute (gpm) or less. Many existing pre-rinse spray valves have flow rates of 1.0 to 5.0 gpm so the pre-rinse spray nozzle program represents a significant water-savings opportunity. Increased water efficiency also correlates to direct savings in energy by reducing the amount of water that needs to be heated.

In 2009, Springs Utilities will introduce high-efficiency toilet and urinal rebates to the commercial segment. These programs are relatively simple to administer because they are equipment-based incentive programs. In addition, they are relatively cost-effective.

Springs Utilities also plans to introduce an indoor audit program and indoor efficiency incentives. The indoor audit program and the indoor efficiency incentives are relatively difficult to administer due to the diversity and complexity of commercial and industrial water use. As discussed in the *Implementation Plan* section, Springs Utilities will host specialized working groups to assist with program design. Program specifications and approvals will be refined during the implementation phase.

The intent of the indoor audit program is to help commercial and industrial customers locate water-saving opportunities in their processes and facilities. The intent of the indoor efficiency incentives is to provide financial incentives for water-efficiency improvements, such as water reuse and recycling, replacing plumbing fixtures and monitoring cooling towers. The indoor audit program and the indoor efficiency incentives will require annual measurement and verification in order to verify water savings and to refine assumptions.

Commercial Outdoor

Similar to the commercial indoor program, Springs Utilities plans to introduce an outdoor audit program and outdoor efficiency incentives. These two programs will focus on improvements in landscape and irrigation efficiency, particularly with large water users such as parks, schools and military. The audit program may provide partnership opportunities for Certified Landscape Irrigation Auditors. The program may also take advantage of the "Slow the Flow Colorado" program, which tests irrigation systems for efficiency and makes recommendations for improvements. Details will be determined during the implementation phase.

Outdoor efficiency incentives will provide financial incentives for landscape improvements such as converting landscapes to be more water-efficient and replacing high-water-use turf with low-water-use plants. The incentives will also enable large irrigators to replace aging irrigation systems with more efficient infrastructure and more advanced technology. Incentives will be based on the amount of water saved, not necessarily the infrastructure or the technology adopted. This provides the customer with maximum flexibility in determining individual water-saving needs. Similar to the indoor program, annual measurement and verification will be imperative in order to verify water savings and refine assumptions.

Springs Utilities will develop specifications for smart (ET) controller rebates. Smart controllers estimate or measure depletion of soil moisture in order to operate an irrigation system, replenishing water as needed while minimizing excess water use. A smart controller will make irrigation schedule adjustments throughout the irrigation season without human intervention.

Springs Utilities plans to introduce a commercial car wash certification program. Commercial car washes that have demonstrated efficient water use by meeting or exceeding industry efficiency standards or by demonstrating a thirty percent reduction in water use per vehicle will be certified. Details will be determined during the implementation phase.

All Outdoor

Similar to other utilities across the Front Range, Springs Utilities intends to introduce a water waste ordinance. A water waste ordinance would contain certain provisions that apply to all customers. Essentially, the ordinance would set limitations on water that pools or flows across the ground into the street. The ordinance would also set limitations on time-of-day watering, perhaps before 9:00am and after 6:00pm only. Because an ordinance of this type is of a regulatory nature, public involvement would be necessary to devise appropriate provisions.

Estimated Water Savings

The Colorado Water Conservation Board (CWCB) through the Office of Water Conservation and Drought Planning requires that water providers estimate the amount of water that *has been saved* and the amount of water that *will be saved* through conservation. Specifically, Colorado Revised Statute section 37-120-26 requires water providers to comply with the following:

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

Springs Utilities was rigorous in its analysis of estimated water savings. The model was developed using industry accepted practices and standards. Many of the inputs and assumptions were based on previous work conducted by Maddaus Water Management (*Evaluation of Water Conservation Program, Final Report, July 2003*).

In addition, Springs Utilities retained Great Western Institute (GWI) to review the model for appropriateness, effectiveness and reasonableness. GWI concluded that the model was "robust and comprehensive" and "does an excellent job of organizing and combining the various data into the backbone of a comprehensive water conservation plan." The model is covered in more detail in *Appendix C, Program Alternatives Analysis*.

Using 1999 as the baseline year, Springs Utilities estimates that the amount of water that has been saved through previously implemented conservation programs equals approximately 4.6% of the 2007 demand forecast. Springs Utilities further estimates that the amount of water that will be saved when the 2008-2012 Water Conservation Plan is implemented equals approximately 7.6% of the 2017 demand forecast.

Table 3: Estimated Water Savings

	2007	2012	2017
Cumulative Acre-Feet Saved	21,799	51,025	89,911
Annual Acre-Feet Saved	4,240	6,817	8,508
Cumulative Billion Gallons Saved	7.1	16.5	29.6
Annual Billion Gallons Saved	1.4	2.3	3.0
Percent of Annual Production Saved	4.66%	6.70%	7.58%

Table 4: Program Selection – Annual Water Savings and Cost of Water Saved

Program	2012 Annual Savings (mgd)	2017 Annual Savings (mgd)	Cost of Water Saved ($/ac-ft)
Residential Block Rates	1.22	1.33	$205
Commercial Seasonal Rates	.97	1.15	$238
Commercial Landscape Code and Policy	.71	1.08	$12,784
Conservation Education	.74	.81	$1,348
Water Waste Ordinance	.42	.51	$2,121
Commercial High-Efficiency Toilet Rebate	.08	.33	$2,988
Pre-Rinse Spray Nozzle Retrofit	.30	.30	$479
Commercial Outdoor Efficiency Incentives	.12	.25	$7,518
Commercial Indoor Efficiency Incentives	.08	.21	$15,317
Residential Clothes Washer Rebate	.22	.20	$14,162
Commercial Outdoor Audit Program	.22	.19	$16,522
Commercial Smart (ET) Controller Rebate	.06	.18	$5,130
Commercial High-Efficiency Urinal Rebate	.03	.10	$5,095
Builder Incentive Program	.02	.10	$17,932
Residential High-Efficiency Toilet Rebate	.03	.09	$18,233
Landscape Establishment Permits	.00	.09	$122
Commercial Indoor Audit Program	.17	.03	$32,937
Residential Irrigation Equipment Rebate	.02	.03	$33,272
Residential Smart Irrigation Rebate	.01	.02	$7,186
Commercial Car Wash Certification	.00	.02	$13,073
Residential Sprinkler Check Program	.00	.01	$21,356
Online Water Efficiency Profiles	.00	.00	$22,240

Table 5: Program Selection – Total Penetration and GPCD Savings

Program	2017 Total Penetration	2017 SFR GPCD Savings	2017 System-Wide GPCD Savings
Residential Block Rates	147,361	2.54	2.54
Commercial Seasonal Rates	14,107	0.00	2.20
Commercial Landscape Code and Policy	4,065	0.00	2.05
Conservation Education	73,680	1.55	1.55
Water Waste Ordinance	161,467	0.63	0.98
Commercial High-Efficiency Toilet Rebate	2,300	0.00	0.62
Pre-Rinse Spray Nozzle Retrofit	2,000	0.00	0.57
Commercial Outdoor Efficiency Incentives	285	0.00	0.49
Commercial Indoor Efficiency Incentives	65	0.00	0.40
Residential Clothes Washer Rebate	19,415	0.38	0.38
Commercial Outdoor Audit Program	750	0.00	0.37
Commercial Smart (ET) Controller Rebate	790	0.00	0.06
Commercial High-Efficiency Urinal Rebate	1,999	0.00	0.31
Builder Incentive Program	1,977	0.19	0.19
Residential High-Efficiency Toilet Rebate	3,411	0.18	0.18
Landscape Establishment Permits	14,219	0.66	0.66
Commercial Indoor Audit Program	1,875	0.00	0.06
Residential Irrigation Equipment Rebate	1,062	0.05	0.05
Residential Smart Irrigation Rebate	1,435	0.05	0.05
Commercial Car Wash Certification	82	0.00	0.03
Residential Sprinkler Check Program	986	0.02	0.02
Online Water Efficiency Profiles	492	0.00	0.00

Figure 1: Current vs. Expanded Program Savings

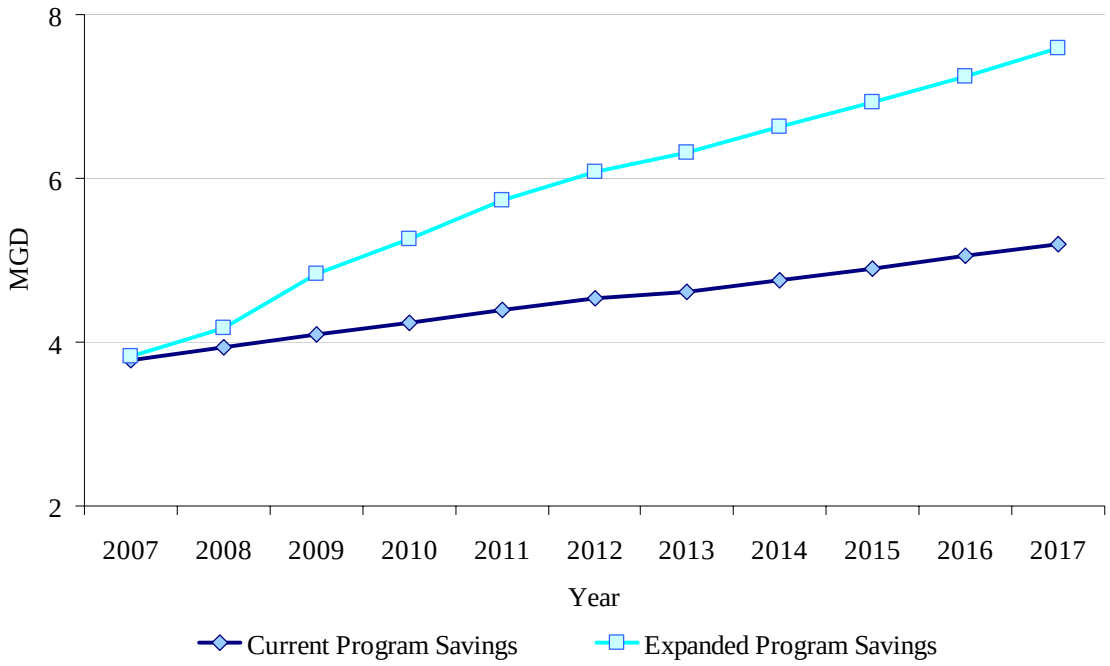
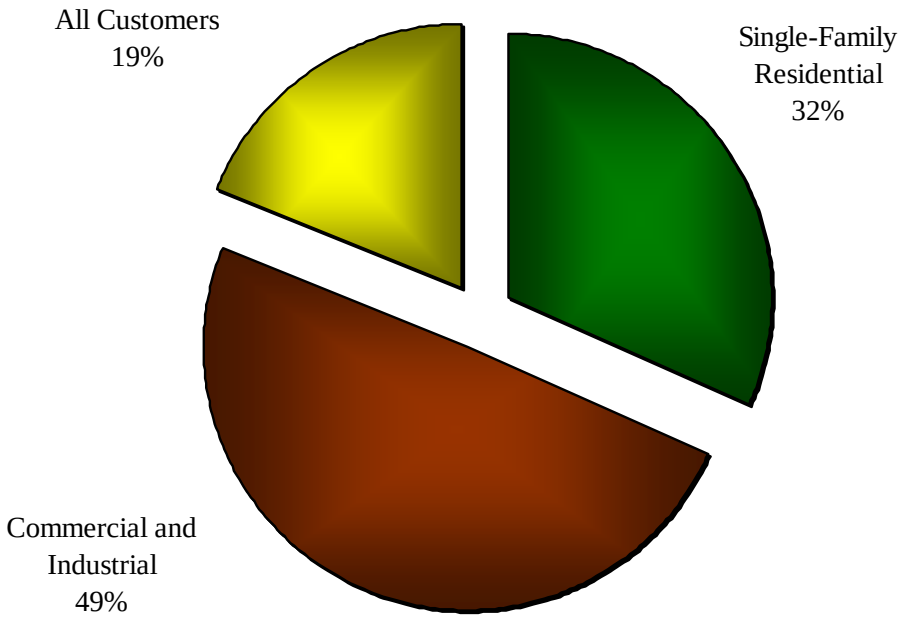


Figure 2: 2017 Savings by Customer Segment



PROGRAM SCREENING

In order to achieve the water conservation goals established for the 2008-2012 Water Conservation Plan, Springs Utilities went through the rigorous process of identifying and selecting water conservation programs for implementation. In January 2006, Springs Utilities created a broad inventory of measures and programs for consideration. The inventory was developed after reviewing best management practices, consultant reports, end use studies and internal planning documents. Springs Utilities evaluated conservation measures by category (i.e., education, rates, rebates, audits and regulations) and by market (i.e., indoor vs. outdoor, residential vs. commercial, new vs. existing construction).

Table 6: List of Potential Measures & Programs – Commercial (Existing)

Education and Awareness	
Facility manager education series	Restaurant and lodging education series
Rebates and Incentives	
Indoor	**Outdoor**
Ultra-low-flush toilet rebate	ET controller rebate
Dual-flush toilet rebate	Irrigation equipment rebate
High-efficiency toilet rebate	Rain sensor rebate
Low-flow showerhead rebate	Soil moisture sensor rebate
Low flow urinal rebate	Strip turf retrofit rebate
Pre-rinse spray nozzle rebate	Turf reduction rebate
Custom	Xeriscape rebate
Cooling system incentive	**Targeted**
Flexible efficiency incentives	Commercial car wash efficiency equipment
Irrigation system incentive	Commercial laundry efficiency incentive
Process water incentive	Pressure washing efficiency incentive
Water efficiency study grants	
Audits and Retrofits	
Cooling tower monitoring	Public building audit and retrofit
Large facility audits	Utility building audit and retrofit
Large landscape audits	Sprinkler check program
Low-income housing audit and retrofit	
Rates and Metering	
Automated meter reading /smart metering	Surcharges
Critical peak pricing	Time-of-use rates
Dual water meter requirement	Water budgets
Sub-metering requirement	
Market Transformation	
ET irrigation scheduling network	Turf-to-native conversion program
Leadership in Energy & Environmental Design (LEED) certification	

Table 7: List of Potential Measures & Programs – Commercial (New Construction)

Rebates and Incentives	
Indoor	**Outdoor**
High-efficiency toilet rebate	Irrigation equipment rebate
Low flow urinal rebate	
Ordinances and Regulations	
Indoor	**Outdoor**
Dual-flush toilet requirement	Decorative water feature limitation
High-efficiency toilet requirement	ET controller standards
Low-flow faucet requirement	Irrigation efficiency standards
Single-pass cooling system prohibition	Landscape code and policy review
	Targeted
	Commercial car wash efficiency standards
	Commercial laundry efficiency standards
	Pressure washing efficiency standards

Table 8: List of Potential Measures & Programs – Multi-family (Existing)

Education and Awareness	
Property manager education series	
Rebates and Incentives	
Dual-flush toilet rebate	High-efficiency toilet rebate
Energy Star dishwasher rebate	Hot water recirculation rebate
Energy Star industrial clothes washer rebate	Ultra-low-flush toilet rebate
Audits and Retrofits	
Indoor efficiency kits/components distribution	Low-flow faucet aerator distribution
Indoor water use audits/kits	Low-flow showerhead distribution
Ordinances and Regulations	
Ultra-low-flush toilet retrofit on resale	Low-flow faucet aerator retrofit on resale
Dual-flush toilet retrofit on resale	Low-flow showerhead retrofit on resale
High-efficiency toilet retrofit on resale	Whole-unit retrofit on resale
Leak detection and repair on resale	
Rates and Metering	
Individual unit meter retrofits	

Table 9: List of Potential Measures & Programs – Multi-family (New Construction)

Rebates and Incentives	
Dual-flush toilet rebate	High-efficiency toilet rebate
Energy Star dishwasher rebate	Hot water recirculation rebate
Energy Star industrial clothes washer rebate	
Ordinances and Regulations	
1.0 gpf toilet requirement	Dual-flush toilet requirement
Rates and Metering	
Individual unit meter requirements	

Table 10: List of Potential Measures & Programs – Residential (Existing)

Education and Awareness	
Advertising & collateral materials	Water makeover contests
Colorado Master Gardener partnership	Xeriscape classes, workshops and seminars
Landscape symposium	Xeriscape demonstrations
Lawn watering guidelines	Xeriscape recognition contests
School program	Xeriscape web site/plant database
Rebates and Incentives	
Indoor	**Outdoor**
Ultra-low-flush toilet rebate	ET controller rebate
Dual-flush toilet rebate	Irrigation efficiency rebate
High-efficiency toilet rebate	Irrigation equipment rebate
Energy Star clothes washer rebate	Mulch rebate
Energy Star dishwasher rebate	Rain sensor rebate
Hot water recirculation rebate	Soil amendment rebate
	Soil moisture sensor rebate
	Strip turf retrofit rebate
	Turf reduction rebate
	Xeriscape rebate
Audits and Retrofits	
Indoor	**Outdoor**
High-bill complaints & leak identification	Automatic sprinkler timer distribution
Indoor efficiency kits/components	Positive shut-off nozzle distribution
Indoor water use audit	Sprinkler check program
Low-income water use audit	
Ultra-low-flow faucet aerator distribution	
Ultra-low-flow showerhead distribution	
Water efficiency profile	
Ordinances and Regulations	
Indoor	**Outdoor**
Ultra-low-flow faucet aerator retrofit on resale	Rain sensor requirement
Ultra-low-flow showerhead retrofit on resale	Soil amendment requirement
Whole-house retrofit on resale	Strip turf removal
High-efficiency toilet retrofit on resale	Water waste ordinance
Ultra-low-flush toilet retrofit on resale	
Dual-flush toilet retrofit on resale	
Leak detection and repair on resale	
Rates and Metering	
Increasing block rates	Water budgets
Surcharges	
Market Transformation	
BMP training for green industry	Irrigation Association training
EPA's WaterSense program	Plumbing contractors & suppliers

Table 11: List of Potential Measures & Programs – Residential (New Construction)

Education and Awareness	
Builder/developer symposium	New homeowner packets
Builder education series	Realtor education series
Model home Xeriscape demonstrations	
Rebates and Incentives	
Indoor	**Outdoor**
Development fee efficiency incentive	Development fee efficiency incentive
Dual-flush toilet rebate	ET controller rebate
High-efficiency toilet rebate	Irrigation efficiency rebate
Hot water recirculation rebate	Irrigation equipment rebate
Rating system efficiency incentive	Rain sensor rebate
	Rating system efficiency incentive
	Soil amendment rebate
	Soil moisture sensor rebate
	Strip turf rebate
	Xeriscape rebate
Ordinances and Regulations	
Indoor	**Outdoor**
Dual-flush toilet requirement	Decorative water feature limitation
High-efficiency toilet requirement	ET controller standards
	High-water-use turf limitation
	Irrigation efficiency standards
	Irrigation equipment standards
	Landscape design standards
	Landscape inspection requirement
	Low-water-use plant requirement
	Rain sensor requirement
	Residential landscape ordinance
	Soil amendment requirement
	Strip turf standards
Rates and Metering	
AMR/smart metering	Smart water readers
Critical peak pricing	Time-of-use rates
Indoor/outdoor metering	
Market Transformation	
EPA's WaterSense new homes initiative	

An internal team of subject matter experts reviewed the inventory and discussed each program in detail. Upon completion, a smaller group was assigned to rate each program on the basis of four criteria – water savings potential, social acceptance, likelihood of success, and business and system impacts. The following is a brief description of the program screening criteria.

Program Screening Criteria

Water Savings Potential

Is the water savings potential significant? For example, clothes washers account for approximately 21.7% of annual indoor use and dishwashers account for approximately 1.4% of annual indoor use. Hence, a clothes washer rebate provides more water savings potential than a dishwasher rebate. Regarding outdoor use, more customers have lawns than water features. Therefore, restricting lawn watering has more potential than limiting water features. Water savings can be influenced by a number of variables including individual unit savings, program length, measure life, annual participation and market penetration.

Social Acceptance

Will customers and stakeholders accept the program? Consideration must be given to customer and community preferences. Springs Utilities learns about preferences through the strategic account management program, individual customer meetings, customer research, customer feedback and public meetings. A program that is a basic expectation or industry standard received a higher rating than a program that is controversial or unproven. For example, water conservation education is a basic expectation of the community. However, if Springs Utilities were to implement an ordinance that required homeowners to retrofit inefficient toilets and fixtures prior to resale, chances are the program would be met with much controversy. As a result, education received a higher rating than the retrofit on resale program.

Likelihood of Success

Are there significant barriers to prevent program success? A good example is the high-efficiency toilet rebate. High-efficiency toilets are not readily available in the marketplace so the rebates have seen low participation to date. Significant resources – time, effort and money – are necessary to make this program successful and to bring high-efficiency toilets into the mainstream. Conversely, the clothes washer rebate has seen continued success, in part because ENERGY STAR washers are readily available in the marketplace and the ENERGY STAR brand has high recognition. Other barriers to success include programs with high upfront costs and long payback periods, particularly in the commercial and industrial segment.

Business and System Impacts

What are the business and system impacts to Springs Utilities? For example, expanding an education program would have minimal business and system impacts. Conversely, introducing a program that requires modifications to the Customer Care & Billing system would have significant business and system impacts. One such program that arose during public process was the suggestion that Springs Utilities present the customer bill in gallons instead of cubic feet. This initiative would require Springs Utilities to convert over 132,000 meters or reconfigure the bill. This would require a significant investment in human resources to fully understand the impacts to billing processes and system functionality. Other programs that would receive a low score for business and system impacts are those that require significant increases in staff.

Identification and Screening Process

In 2006, Springs Utilities went through a number of iterations to reduce the list of potential measures and programs. Springs Utilities considered several perspectives – indoor versus outdoor, residential versus commercial and new versus existing construction. In addition, Springs Utilities evaluated each conservation measure by program category. For example, a conservation measure may be technically feasible and socially acceptable as a rebate, but not as a regulation. What follows is a brief description of each program category.

Education and Partnerships

Customer education provides the foundation for all of Springs Utilities' water conservation programs. Education may take on many forms, including advertising, classes, demonstrations, events, newsletters, speakers, tours and the web. Local, regional and national partners also play a key role in the success of Springs Utilities' education program.

Rates and Metering

Rates can be used to send price signals to customers to use water efficiently. The residential rates provide an affordable rate for essential indoor use, a moderate rate for typical outdoor use and an aggressive rate for excess use. The commercial rates encourage conservation during the summer months when the greatest demand is placed on the water system.

Rebates and Incentives

Financial incentives are used to encourage customers to upgrade their appliances and equipment to more water-efficient models. Rebates help capture the attention of uninformed consumers and help offset the added costs of water-efficient technologies. In 2007, rebates were available for high-efficiency toilets, clothes washers and water-saving irrigation equipment.

Audits and Retrofits

Audits can serve as an important first step in understanding water use in the home and landscape. Historically, Springs Utilities has provided on-line and walk-through audits for residential customers. However, audits for commercial properties have been limited. An opportunity may exist to provide indoor and outdoor water audits for commercial, public and military customers.

Ordinances and Regulations

Springs Utilities has the ability to champion and shape various regulatory changes at the local, state and national level. Regulations might include changes to appliance, building or landscape codes. Regulations are typically the most cost-effective way to change technology and behavior. However, regulations can be controversial and time-consuming to implement.

What started as a broad inventory of 178 programs and measures soon became a manageable list of 48 alternatives well-suited for the community. Springs Utilities presented the list at a series of public, stakeholder and customer meetings. The question was asked, "Where should Springs Utilities invest resources in the next ten years in order to achieve the strategic objectives established for the water conservation plan?" The results follow in rank order.

Table 12: Results of Public Meeting Exercise

Rank	Program
1	Xeriscape program
2	Residential landscape ordinance
3	Landscape establishment permits
4	Outdoor water use audits (commercial)
5	Turf-to-native conversion program (commercial)
6	Green industry program
7	Increasing block rates (residential)
8	EPA's WaterSense program
9	Builder incentive program (residential)
10	Sprinkler check program (residential)
11	Irrigation equipment rebate (commercial)
12	Water smart reader (residential)
13	Irrigation equipment rebate (residential)
14	Flexible efficiency incentives (commercial)
15	CSU / El Paso County Extension partnership
16	Turf removal rebate (commercial)
17	ET controller standards
18	School education program
19	Indoor water use audits (military)
20	Commercial landscape ordinance
21	High-efficiency toilet rebate (commercial)
22	New homes program
23	Water waste ordinance
24	ET subscriber network
25	Seasonal rates (commercial)
26	Outdoor water use audits (military)
27	Lawn watering guidelines
28	High-efficiency clothes washer rebate (residential)
29	Individual unit meter requirements (multi-family)
30	Daily peak pricing (commercial)
31	High-efficiency clothes washer rebate (multi-family)
32	Turf removal rebate (residential)
33	Ultra-low-flush toilet rebate (residential)
34	Development fee credit program (residential)
35	Outdoor water use audits (public)
36	Low-flow urinal rebate (commercial)
37	Commercial car wash efficiency standards
38	Home Efficiency Assistance Program
39	Pre-rinse spray nozzle (commercial)
40	Indoor efficiency kits/components (multi-family)
41	Indoor efficiency kits/components (residential)
42	Water efficiency profile (residential)
43	High-efficiency toilet rebate (multi-family)
44	Ultra-low-flush toilet rebate (multi-family)
45	Indoor water use audits (commercial)
46	High-efficiency toilet requirement
47	High efficiency toilet rebate (residential)
48	Indoor water use audits (public)

State Requirements

Colorado Revised Statute section 37-120-26 requires that Springs Utilities consider nine specific measures and programs in the 2008-2012 Water Conservation Plan. What follows is the list of plan elements and a brief description of Springs Utilities' compliance with this requirement.

1. Water-efficient fixtures and appliances, including toilets, urinals, showerheads and faucets

Springs Utilities offers rebates to residential customers for high-efficiency toilets and high-efficiency clothes washers. The ENERGY STAR clothes washer rebates have been very successful with over 10,045 rebates issued from 2002 through 2006. In the context of the 2008-2012 Water Conservation Plan, Springs Utilities will evaluate opportunities to market rebates for high-efficiency toilets and high-efficiency urinals to commercial customers.

From 2002 through 2004, Springs Utilities offered rebates for ultra-low-flush toilets. This program was discontinued because the design of the program did not prevent participation by "free riders" – residents who were going to replace their toilets anyway because of natural causes. In 2003, Springs Utilities also offered low-flow urinal rebates to commercial customers. This program was discontinued due to low participation rates.

Springs Utilities began distributing free low-flow showerheads and faucet aerators in 2003. Over the years, the distribution program included leak detection dye tabs, metal hose adaptors, lawn sprinkler timers and other water-saving components. Due to saturation levels, Springs Utilities plans to discontinue this program in 2008. Instead, Springs Utilities will evaluate a pre-rinse spray nozzle program for restaurants, cafeterias and other food service providers.

2. Low-water-use landscapes, drought-resistant vegetation, removal of phreatophytes and efficient irrigation

Springs Utilities has encouraged low-water-use landscapes since the 1970s, when the landscape surrounding the Conservation and Environmental Center was converted to a showplace of plants that grow well in this semiarid region. The Xeriscape Demonstration Garden was officially dedicated in 1981. Since that time, tens of thousands of visitors have been to the garden to learn about low-water-use landscapes. In recent years, all *phreatophytes*, defined as deep-rooted plants that obtain water from a permanent ground supply, have been removed from the garden.

Springs Utilities will evaluate landscape establishment permits in which proper soil preparation is required for new landscape installations. Regarding efficient irrigation, Springs Utilities offers rebates to residential customers for installing efficient irrigation equipment, including irrigation controllers, rain sensors, spray heads with check valves and rotating multi-stream nozzles. Springs Utilities will also evaluate outdoor efficiency incentives and smart (ET) controller rebates for commercial customers, particularly large irrigators.

3. Water-efficient commercial and industrial water-using processes

Unlike the residential market, water use in the commercial and industrial market differs dramatically between segments and customers. Springs Utilities categorizes the commercial and industrial market into twelve segments – education, grocery, health care, manufacturing,

multifamily, office, lodging, non-profit, restaurant, retail, national and other. Each segment shares similar characteristics, although water use within a segment may differ dramatically.

Commercial and industrial use represent approximately 25 percent of total annual use in the water service area. As such, Springs Utilities screened over fifty measures and programs for the commercial and industrial market and selected ten programs for implementation. The programs specifically related to water-efficient processes include indoor and outdoor water use audits as well as indoor and outdoor efficiency incentives.

Essentially, the programs will allow for flexibility so that customers can decide what end-use technologies and processes are changed in their facilities and landscapes. The audits will be customized for each facility and the efficiency incentives will pay "per gallon" of water saved. Improvements might include water reuse and recycling, replacing plumbing fixtures and converting high-water-use turf. Currently, Springs Utilities does not offer any programs of this type for the commercial and industrial market so this represents a significant opportunity.

4. Water reuse systems

In the early 1900's, Colorado Springs developed a municipal irrigation system that was supplied by raw surface water from Monument Creek. The system consisted of a series of reservoirs, pipelines and canals that irrigated medians, open spaces, parks and residential lawns in downtown Colorado Springs and the Old North End. This system, although modified over the years, is still a major part of Colorado Springs' nonpotable system.

In 1961, Colorado Springs built a wastewater reclamation facility along with a nonpotable distribution system and began delivering reclaimed water to parks, cemeteries, golf courses and commercial properties for landscape irrigation. *Reclaimed water* is domestic wastewater that has been through three levels of treatment, including filtration and disinfection. This system is one of the oldest in the western United States.

Other stand-alone systems have subsequently been developed that use raw water and groundwater supplies to irrigate several golf courses, including The Broadmoor and Kissing Camels, other large turf areas and industrial water for cooling at the Nixon Power Plant. Springs Utilities also provides the reusable water rights for stand-alone reclaimed water irrigation systems at the Air Force Academy and Fort Carson Army Base.

In aggregate, Colorado Springs' nonpotable systems deliver more than 12,000 acre-feet per year of water, accounting for approximately 13 percent of total water deliveries. Sources of nonpotable water include reclaimed water, raw surface water and groundwater. The system consists of pumping stations, storage reservoirs, holding ponds, transmission mains and two wastewater reclamation facilities.

The 1996 Water Resource Plan identified nonpotable water development as one of four components to ensure a safe and reliable water supply to the community. As such, nonpotable water development will continue to play a critical role in water supply planning and management. Nonpotable water development is described in more detail in both the *Water System Profile* section and the *Proposed Facilities* section.

5. Distribution system leak identification and repair

From 1990 through 2006, Springs Utilities' unaccounted-for water averaged 8.6 percent. Total unaccounted-for water due to main leaks has been estimated at one or two percent. Because unaccounted-for water from main leaks is so low, more emphasis has been placed on water main replacements than water distribution leaks. The water mains replacement program is discussed in more detail in the *Proposed Facilities* section.

When water distribution leaks do occur, Springs Utilities responds in terms of priority. Leaks with surfacing water are repaired within twenty-four hours. Other leaks are repaired within one week. A risk assessment of Springs Utilities' water system conducted in June 2007 suggested that Springs Utilities would benefit from a formal leak detection program and scheduled leak surveys. The assessment further suggested that Springs Utilities would benefit from implementing various components of a water audit program.

As the city continues to grow, Springs Utilities will continually evaluate if the benefits of a formal leak detection program outweigh the costs. When that threshold is crossed, Springs Utilities may consider allocating more resources to a proactive program. Until such time, most supply-side water conservation measures will focus on other measures, such as main replacement, valve replacement and smaller rehabilitation projects.

6. Dissemination of information regarding water use efficiency measures, including by public education, customer water use audits and water-savings demonstrations

Springs Utilities will continue a strong focus on education. Customer education provides the foundation for all of Springs Utilities' water conservation programs. The following table provides a snapshot of the education program that Springs Utilities delivers to the citizens of Colorado Springs and surrounding communities.

Table 13: Springs Utilities' Education Program

Conservation and Environmental Center	Public Information Campaign
Customer Newsletter	School Education Program
Home Efficiency Assistance Program	Speakers and Tours
Home Xeriscape Design Course	Web Site Information
Online Water Efficiency Profiles	Xeriscape Basics Class
Peak to Prairie Landscape Symposium	Xeriscape Demonstration Gardens
Printed Materials	Xeriscape Volunteer Program

To enhance the education program, Springs Utilities will evaluate an audit program for both residential and commercial customers. In 2006, the sprinkler check pilot program was offered to a small number of residential customers. Springs Utilities plans to evaluate the feasibility of expanding the sprinkler check program to all residential customers. Springs Utilities also plans to evaluate indoor and outdoor water audits for commercial and industrial customers.

7. Water rate structures and billing systems designed to encourage water use efficiency in a fiscally responsible manner

One of the key strategies of the 2008-2012 Water Conservation Plan is to encourage conservation through block rates for residential customers and seasonal rates for commercial customers. The following table illustrates the water rate structure as of May 1, 2006.

Table 14: Springs Utilities' Rates as of May 1, 2006

Residential Block Rates	
More than 2,500 CF	4.2 cents per cubic foot
1000 to 2,499 CF	2.8 cents per cubic foot
Up to 999 CF	1.6 cents per cubic foot
Commercial Seasonal Rates	
May 1 – October 31	2.6 cents per cubic foot
November 1 – April 30	1.4 cents per cubic foot

1 cubic foot = 7.48 gallons Visit www.csu.org for current rates.

8. Regulatory measures designed to encourage water conservation

Springs Utilities plans to update the Landscape Code and Policy, which requires water-efficient landscaping for new commercial, industrial and multi-family properties. For years, the landscape code in Colorado Springs has been cited as a model for other communities to follow. Given recent advancements in irrigation technology and changing customer expectations, the existing code needs review. Elements under consideration include stricter enforcement procedures and smart (ET) controller requirements. Springs Utilities will engage key stakeholders in the code review process.

Other regulatory measures include a water waste ordinance and landscape establishment permits. The water waste ordinance will set limitations on pooling or flowing of water across impervious surfaces as well as time-of-day watering restrictions. The landscape establishment permits will require customers to install at least three cubic yards of organic material for every 1,000 square feet of planting area. Springs Utilities will engage key stakeholders in the process due to the regulatory nature of the ordinance and the permits.

9. Incentives to implement water conservation techniques, including rebates to customers to encourage the installation of water conservation measures

Springs Utilities began offering rebates in 2002, when the community first entered mandatory water restrictions. Since that time, a number of rebates have been offered to encourage customers to upgrade their appliances and equipment to more water-efficient models. In 2007, rebates were available to residential customers for high-efficiency toilets, clothes washers and water-saving irrigation equipment. Springs Utilities plans to evaluate rebates for smart (ET) controllers for commercial customers. In addition, Springs Utilities will consider indoor and outdoor efficiency incentives for improvements to processes, facilities and landscapes. A builder incentive program will provide incentives to homebuilders for the design and construction of water-efficient homes and landscapes.

Statewide Water Supply Initiative (SWSI) Levels

Springs Utilities' current water conservation program is between a Level II (Basic) and a Level III (Moderate), per the SWSI conservation matrix. Implementation of the 2008-2012 Water Conservation Plan will move Springs Utilities' water conservation program to at least a Level III (Moderate) with several programs identified in Level 4 (Aggressive).

Table 15: Statewide Water Supply Initiative (SWSI) Conservation Matrix

Level I (Passive)	
Plumbing code	Yes
Fixture standards	Yes
Level II (Basic)	
Metering	Yes
Leak detection	Yes
Level III (Moderate)	
Education	Yes
Rebates for toilets & washers	Yes
Residential & commercial audits	Yes
Landscape audits	Yes
Increasing rate structure	Yes
Level IV (Aggressive)	
Steep pricing rate & surcharges	Partial
Rebate for landscape changes	Yes
Turf replacement & restrictions	Partial
Rebates for irrigation sensors & controllers	Yes
Sub-metering of master-meter properties	No
Fixture retrofit upon sale of property	No
Ordinance eliminating single-pass cooling	No
Level V (Maximum)	
Replacement of all inefficient water fixtures & appliances	No
Eliminate leakage by all customers	No
Eliminate high water-using landscape	No
Install non-water-using urinals by non-residential customers	No

IMPLEMENTATION PLAN

The following section specifies the strategy, steps and schedule that Springs Utilities will use to implement the 2008-2012 Water Conservation Plan. This section also provides a description of the public participation program, including past, present and future activities. Finally, this section addresses the timing for review and revision of the plan as well as the process for adoption and approval. The section that follows describes how Springs Utilities will monitor progress in order to adapt the 2008-2012 Water Conservation Plan to changing conditions.

Implementation Strategy

Over the next twenty years, Springs Utilities faces a number of strategic challenges, including: escalating costs, aging infrastructure and increasing rate pressures associated with more capital expenditures and changes to legislative and environmental regulations. The challenges are compounded because Springs Utilities must be responsive to market conditions not only in the water industry, but in the energy industry as well. In order to achieve the goals established for the 2008-2012 Water Conservation Plan, Springs Utilities must concentrate on those opportunities that reap the greatest rewards.

Water Conservation Strategies

The primary objective of the 2008-2012 Water Conservation Plan is help ensure the most effective and efficient use of water in the community. In order to fulfill this objective, Springs Utilities has adopted the following water conservation strategies:

1. Continue a strong focus on education
2. Continue to encourage conservation through block rates for residential customers and seasonal rates for commercial customers
3. Introduce a residential new construction program that includes education, incentives and regulations
4. Introduce a commercial and industrial program that includes indoor and outdoor water use audits, efficiency incentives plus access to AMR data
5. Partner with large water users (i.e., parks, schools, military) to improve water efficiency

Springs Utilities is committed to implementing programs that address legitimate customer needs and contribute to real water savings. As a result, some programs may take several years to develop and implement. During the first year, internal processes need to be established. At the same time, market assumptions need to be tested. For most programs, a "pilot approach" will be utilized during the first program year. During the second year, measurement and verification needs to take place in order to verify program assumptions. In most instances, the water savings may not be realized for two to three years after the program is launched. Although time-consuming, experience dictates that a slow and deliberate process is the most effective in introducing new water conservation programs to the market and to the community.

Implementation Steps

Springs Utilities has an established process for developing and implementing demand-side management solutions. This process has been modified to meet the requirements of the water conservation plan. For each program, the following ten steps will be followed in order to address the unique characteristics of each program.

Step One. Review internal policy and procedure documents to ensure programs are implemented consistently with organizational processes. Identify project manager, stakeholders and subject matter experts. Establish project schedule, budget and quality metrics.

Step Two. Assess organizational policies (i.e., Ends and Executive Limitations) and community plans (i.e., City Charter and Comprehensive Plan) for strategic alignment. Look at City Code and Regional Building Code to ensure compliance.

Step Three. Investigate state and federal regulations, if applicable. Involve regulatory agencies early in the process. Make legislative changes as necessary. Identify legal issues needing review by the City Attorney's Office.

Step Four. Research water conservation studies, sources and standards to ensure integrity of program design. Interview other water conservation professionals to identify strengths and weaknesses of program design and implementation.

Step Five. Establish launch date. Estimate market penetration rate. Agree on annual participation goals and market saturation objectives. Verify assumptions and calculations used in the technical analysis. Refine the cost/benefit analysis.

Step Six. Develop budget for years 2008 through 2012. Estimate human resources necessary to develop and manage program. Formalize request for regular, seasonal and temporary staff. Identify training needs, both internal and external.

Step Seven. Determine program requirements. Develop list of prospective bidders. Draft request for proposal and evaluation criteria. Evaluate proposals and select suppliers. Finalize agreements with vendors, contractors and consultants.

Step Eight. Conduct pricing analysis for materials and services. Evaluate customer segments and assess segment potential. Define target segment. Develop marketing strategy, tactics and materials. Identify distribution channels.

Step Nine. Describe measurement and verification plan. Create activity numbers, work order numbers and accounting strings for budget tracking. Develop QBD process document. Develop management tracking reports.

Step Ten. Launch program. Monitor and evaluate program on a routine basis. Track implementation costs, water savings data, annual participation and market penetration. Verify original assumptions and refine data over time.

Implementation Schedule

A number of factors have the potential to impact the implementation schedule. Shifting organizational priorities may limit budget and staffing availability. The water conservation staff will need to be focused yet flexible in their efforts to implement programs under changing conditions. Other factors that have the potential to impact the implementation schedule include regulatory and technology changes. At the state level, many water providers anticipate more stringent water conservation legislation in the coming years. At the same time, water-efficient technologies are becoming more prevalent in the marketplace. Springs Utilities will need to adapt the implementation schedule in order to keep up with trends in the industry.

Current Programs

Commercial Landscape Code and Policy
Commercial Seasonal Rates
Conservation Education
Home Efficiency Assistance Program (HEAP)
Online Water Efficiency Profile
Residential Block Rates
Residential Clothes Washer Rebate
Residential High-Efficiency Toilet Rebate
Residential Irrigation Equipment Rebate

2008 Implementation

Commercial Indoor Audit Program
Commercial Outdoor Audit Program
Commercial Outdoor Efficiency Incentive
Commercial Smart (ET) Controller Rebate
Pre-Rinse Spray Nozzle Retrofit
Residential Smart Irrigation Rebate

2009 Implementation

Commercial High-Efficiency Toilet Rebate
Commercial High-Efficiency Urinal Rebate
Commercial Indoor Efficiency Incentive
Water Waste Ordinance

2010 Implementation

Builder Incentive Program

2012 or Beyond

Commercial Car Wash Certification
Landscape Establishment Permits
Residential Sprinkler Check Program

Public Participation

Springs Utilities has an active public participation program. In fact, Springs Utilities has a research department and an issues management department that regularly involves citizens through customer surveys, focus groups, public meetings, advisory committees and community presentations. Most employees working in water conservation and issues management have received training in consent-building strategies from the Institute for Participatory Management and Planning. Springs Utilities is committed to involving, not just informing the public about the implementation effort.

Public Meetings

When Springs Utilities began to update the Water Conservation Plan, they first notified the green industry at a meeting in September 2005. At that time, the community was emerging from four years of water restrictions. The green industry expressed their support for an updated plan. Specifically, they explained how the drought had increased public awareness of water conservation. They encouraged Springs Utilities to continue public education efforts and to continue landscape establishment permits for residential new construction.

In 2006, public involvement activities continued through individual stakeholder meetings. Water conservation staff met with the following groups throughout the year:

City Parks & Recreation	Peterson Air Force Base
City Stormwater Enterprise	Pikes Peak Mechanical Contractors Association
Council of Neighbors & Organizations	School District 2
General Public Meeting	School District 11
Green Industry Meeting	Springs Utilities Account Managers
Housing & Building Association	Springs Utilities Ambassadors
Large Water Users Meeting	Western Resource Advocates

Springs Utilities also conducted a residential survey in order to better understand customer preferences regarding water conservation programs. The research indicated that customers expect Springs Utilities to take an active role in promoting water conservation.

Table 16: Public Expectations of Springs Utilities' Role in Promoting Water Conservation

How important is it for Springs Utilities to educate and encourage customers to conserve water?	2005
Extremely important	48%
Important	33%
Neutral	16%
Not important	1%
Not at all important	2%

Question was based on a 1-10 scale, with 1 being "not at all important" and 10 being "extremely important." The majority of customers (81%) gave a score from 7 to 10, some (16%) gave a score from 5 to 6 and very few (3%) gave a score from 1 to 4.

In October 2006, the water conservation staff updated the Utilities Policy Advisory Committee and the Utilities Board on the direction of the 2008-2012 Water Conservation Plan. There were no public comments at either session. The most recent public meeting was held in February 2007. At the close of the meeting, Springs Utilities informed the public that no additional meetings would be held until a draft plan was available.

Public Review and Comment Period

The draft plan was made available for public review and comment from November 15, 2007 through December 15, 2007. Comments are summarized in *Appendix A, Public Comments*. The draft plan was posted to Springs Utilities' web site and copies were made available at the following locations:

Conservation & Environmental Center	2855 Mesa Road
Utilities Customer Service Center	111 South Cascade Avenue
Regional Building Department	2880 International Circle

In addition, Springs Utilities sent notification to the following associations and organizations:

American Society of Landscape Architects	Council of Neighbors & Organizations
Apartment Association of Colorado Springs	Economic Development Corporation
Associated Landscape Contractors of Colorado	Green Industries of Colorado
Broadmoor Garden Club	Horticultural Art Society
Building Owners & Managers Association	Housing & Building Association
Center for Non-Profit Excellence	International Facility Management Association
Colorado Federation of Garden Clubs	International Society of Arboriculture
Colorado Nursery & Greenhouse Association	Pikes Peak Association of Realtors
Colorado Restaurant Association	Pikes Peak Lodging Association
Chamber of Commerce	Pikes Peak Mechanical Contractors Association
Convention & Visitors Bureau	Rocky Mountain Sod Growers Association
Community Association Institute	Western Resource Advocates

Copies of the draft plan were delivered to members of City Council and the following partners:

CSU Extension, El Paso County	Memorial Hospital
City Planning & Community Development	Peterson Air Force Base
City Parks, Recreation & Cultural Services	Pikes Peak Regional Building Department
City Stormwater Enterprise	School Districts 2, 11, 12 and 20
El Paso County Development Services	United States Air Force Academy
Fort Carson Army Base	University of Colorado at Colorado Springs

Springs Utilities also provided copies to neighboring water providers and cooperating agencies:

Cascade Metropolitan District	Southeastern Colorado Water Conservancy District
Cherokee Metropolitan District	Stratmoor Hills Water & Sanitation District
City of Fountain	U.S. Army Corps of Engineers
Colorado Department of Health and Environment	U.S. Bureau of Land Management
Partners for Responsible Water Use	U.S. Bureau of Reclamation
Pueblo Board of Water Works	U.S. Environmental Protection Agency
Pueblo West Metropolitan District	U.S. Fish and Wildlife Service
Security Water District	Widefield Water District

Ongoing Involvement

As implementation begins, Springs Utilities will continue to involve the public through surveys, meetings and presentations. More specifically, Springs Utilities intends to form several working groups to aid in program design and to monitor plan effectiveness:

- **Xeriscape Task Force** – Focus will be on increasing awareness and understanding of water conservation issues and Xeriscape principles and practices
- **Builder Advisory Group** – Focus will be specific to residential new construction, including education, incentives and regulations
- **Large Water Users Group** – Focus will cater to the unique issues of large water users and provide a forum to discuss emerging technologies

In addition, Springs Utilities will host specialized working groups to assist with program design, particularly when the program is of a regulatory nature. For example, Springs Utilities will convene a working group to build consent for and discuss elements of the landscape code, the smart controller requirement and the water waste ordinance. Ongoing monitoring, reporting and research are critical to the successful implementation of the 2008-2012 Water Conservation Plan. Springs Utilities discusses all three initiatives in the next section, *Monitoring Plan*.

Review and Revision of the Water Conservation Plan

The Colorado Water Conservation Board (CWCB) through the Office of Water Conservation and Drought Planning requires that water conservation plans be reviewed and updated every seven years. Springs Utilities plans to review the 2008-2012 Water Conservation Plan annually, with a formal update every three to five years.

Until that time, minor changes will be communicated to the CWCB Office of Water Conservation and Drought Planning for written or verbal concurrence. If major changes are necessary, Springs Utilities will give public notice of the changes, make the changes available in draft form and provide an opportunity for public comment before adopting the changes.

Adoption and Approval of the Water Conservation Plan

Springs Utilities is required to submit a water conservation plan to the CWCB Office of Water Conservation and Drought Planning for adoption and approval. Furthermore, Springs Utilities must have an approved water conservation plan in order to apply for a Water Efficiency Grant from the State of Colorado. Up to $500,000 is available annually to assist water providers in the implementation of water conservation plans.

The CWCB Office of Water Conservation and Drought Planning will provide written notification of approval, conditional approval or disapproval with modifications within ninety days of receipt of the water conservation plan.

MONITORING PLAN

Perhaps the most important step in implementing the 2008-2012 Water Conservation Plan is deliberate and regular monitoring of the plan. Compared to the energy industry, water providers have been less formal about tracking water savings from conservation. Not only did the extreme drought of 2002 increase public awareness, it also raised the bar for the water industry. The current expectation is that water providers have a thorough understanding of customer behavior, water use patterns and program effectiveness. For this reason, Springs Utilities has made a major commitment to monitoring and reporting through the following strategic initiatives.

Water Conservation Monitoring Project

Springs Utilities will develop a model to enable tracking of water conservation programs. The model will quantify and track costs and savings for individual programs. In addition, the model will compare projected and actual demand-side management (DSM) savings. The model will enable Springs Utilities to routinely analyze water conservation program alternatives. Springs Utilities will utilize standard methodologies to monitor per customer and per capita demand on an annual basis. Assumptions will be based on industry accepted practices and standards.

Water Conservation Reporting Project

Once the monitoring system is in place, Springs Utilities will begin to routinely report on program effectiveness. An annual report will be posted to Springs Utilities' web site and mailed to key stakeholders upon request. In addition, the Colorado Springs Utilities Board will receive regular updates through the Executive Limitation (EL) monitoring reports. For internal staff, a "hub" on the Intranet will provide easy access to water use statistics, water conservation trends and other frequently asked questions. Finally, Springs Utilities will involve the community through public meetings and working groups.

Water Conservation Research Project

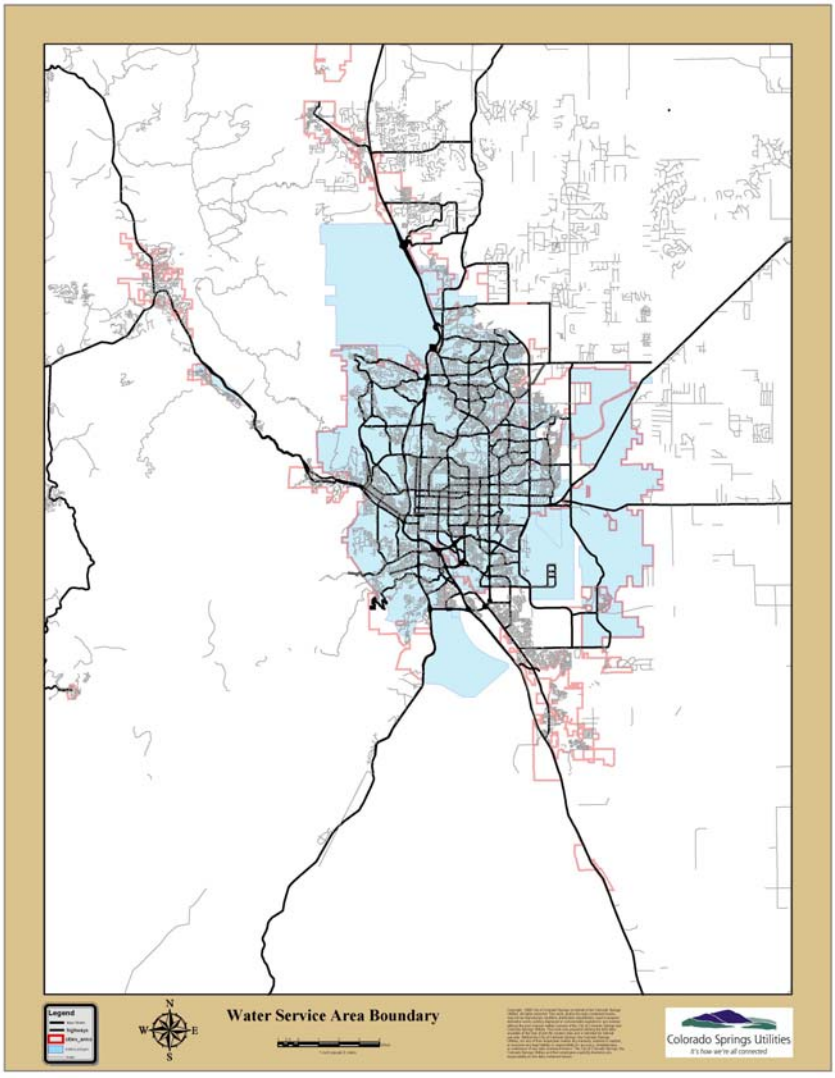
Springs Utilities has a dedicated research staff and a well-established research program. Historically, most water conservation research has been conducted on an ad hoc basis. Concurrent to the release of the 2008-2012 Water Conservation Plan, Springs Utilities will introduce an annual survey for both residential and commercial customers. In the first year, a baseline will be established in regard to water conservation awareness, behavior and technology. Over time, Springs Utilities will evaluate changing needs and conditions in order to modify water conservation programs as necessary.

WATER USE PROFILE

Geographic Area

Colorado Springs is located where the eastern Great Plains meet the Rocky Mountains in the shadow of Pikes Peak. Ground elevations range from 7,800 feet on the west side to 5,750 feet on the south side. The Monument Divide, the highest point along Interstate 25 at more than 8,000 feet, sits to the north of the city and with the high mountains to the west significantly impacts local climate. The climate is generally mild and semiarid, but weather patterns can vary dramatically from one part of the city to another. The eastern and southern edges of the city sit firmly in the short grass prairie and are generally warmer and more dry and windy than the northern and western edge, which occupies foothills and prairie. Soil conditions vary just as dramatically and range from decomposed granite to clay and sand. The varied natural elements and semiarid climate make for a uniquely challenging geography.

Figure 3: Water Service Area Boundary



Water Service Area

The water service area covers 184 square miles and includes Colorado Springs, Green Mountain Falls and Chipita Park. The community has a strong military presence and Springs Utilities supplies water to Fort Carson Army Base, Peterson Air Force Base, the North American Air Defense Command and the United States Air Force Academy. Springs Utilities also provides water to Cascade Metropolitan District and supplemental water to Security Water District.

Table 17: Service Area Population (2006)

Customer Type	Estimate of Population Served
Residential	328,742
Multi-Family	66,890
Military	18,092
Cascade	1,500
Security	2,350
Total	**417,574**

System Water Use

In 2006, annual water use was 26 billion gallons. In the same year, daily water use averaged 72 million gallons per day (mgd). The highest year on record occurred in 2000 when annual water use reached 31 billion gallons and daily water use averaged 84 mgd. The record for peak day occurred in 2001 reaching 182 mgd. Use has trended downward since that time due to drought awareness and water restrictions.

Table 18: Ten-year History of System Water Use (1997 – 2006)

Year	Annual Use (billion gallons)	Average Day (mgd)	Peak Day (mgd)
1997	25	67	164
1998	28	76	176
1999	27	74	159
2000	31	84	164
2001	30	83	182
2002	27	75	141
2003	25	67	138
2004	24	65	135
2005	26	72	163
2006	26	72	153

Water Use by Customer Type

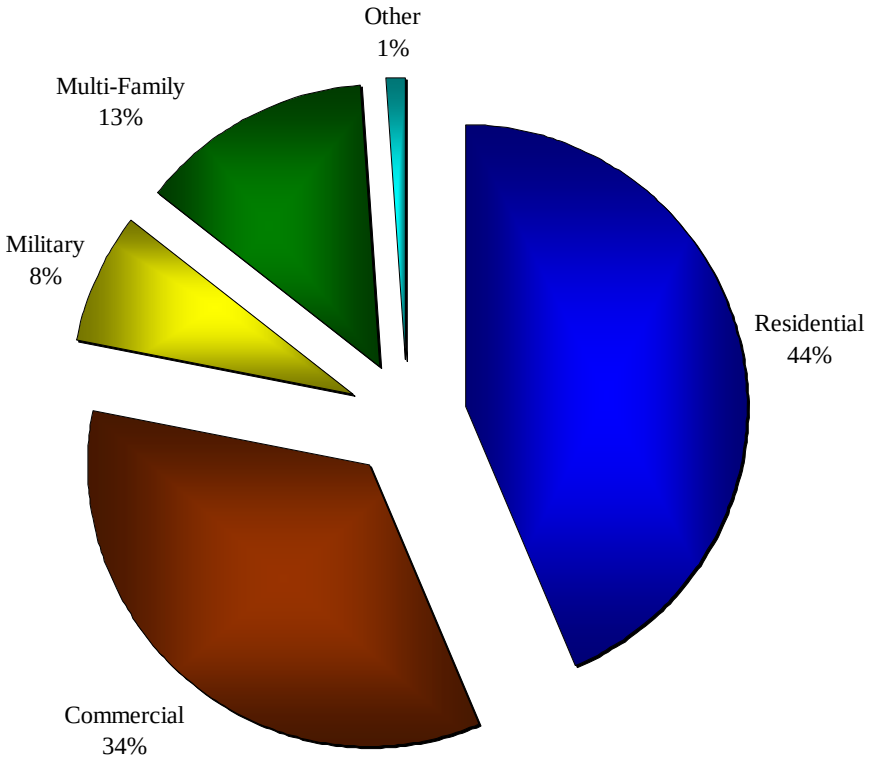
Springs Utilities provides water service to residential, multi-family, commercial, industrial, institutional, military and wholesale customers. In 2006, single-family residential customers made up the vast majority (90%) of the connections to the water system, followed by commercial and industrial customers (6%) and multi-family residential customers (4%).

Table 19: Water Use by Customer Type (2006)

Customer Type	Connections (meters)	Sales (gallons)
Single-family Residential	116,163	11,499,782,668
Commercial & Industrial	7,308	5,933,073,168
Multi-family Residential	5,546	3,884,630,288
Other	348	2,623,053,488
Total	**129,365**	**23,940,457,332**

From 1990 through 2006, single-family residential use comprised almost half (44%) of annual use. The other half was comprised of commercial (34%), military (8%), multi-family (13%), wholesale and other use.

Figure 4: Distribution of Water Use by Customer Type (1990 - 2006)



Per Capita Water Use

Per capita water use is a commonly used measure in the industry. However, the methodology used to calculate per capita water use is fairly inconsistent, particularly system-wide per capita water use. Springs Utilities calculates per capita water use as follows:

System-wide Per Capita Water Use =
Total Water Production ÷ Service Area Population

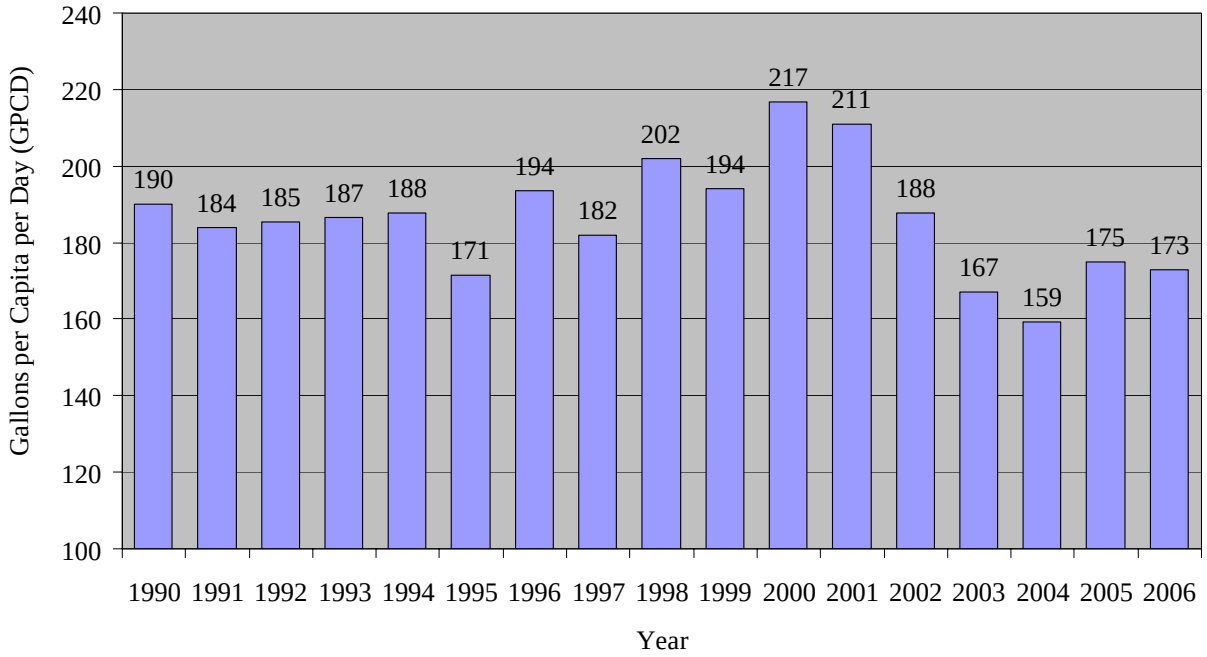
Single-family Residential (SFR) Per Capita Water Use =
Total SFR Sales ÷ Total SFR Taps ÷ People per SFR Home

System-wide Per Capita Water Use

System-wide per capita water use often varies between communities due to vast differences in commercial and industrial use. For example, Colorado Springs is home to a number of military installations, semiconductor facilities, college and university campuses and large resorts. Furthermore, Springs Utilities delivers wholesale water to the communities of Security and Cascade. As a result, system-wide per capita water use for Springs Utilities is proportionally higher than a community with limited commercial and industrial use.

System-wide per capita water use averaged 186 gallons per capita per day from 1990 through 2006. When water restrictions were in place from 2002 through 2005, system-wide per capita water use dropped to 172 gallons per capita per day. Since water restrictions were lifted, system-wide per capita water use has remained below pre-drought levels.

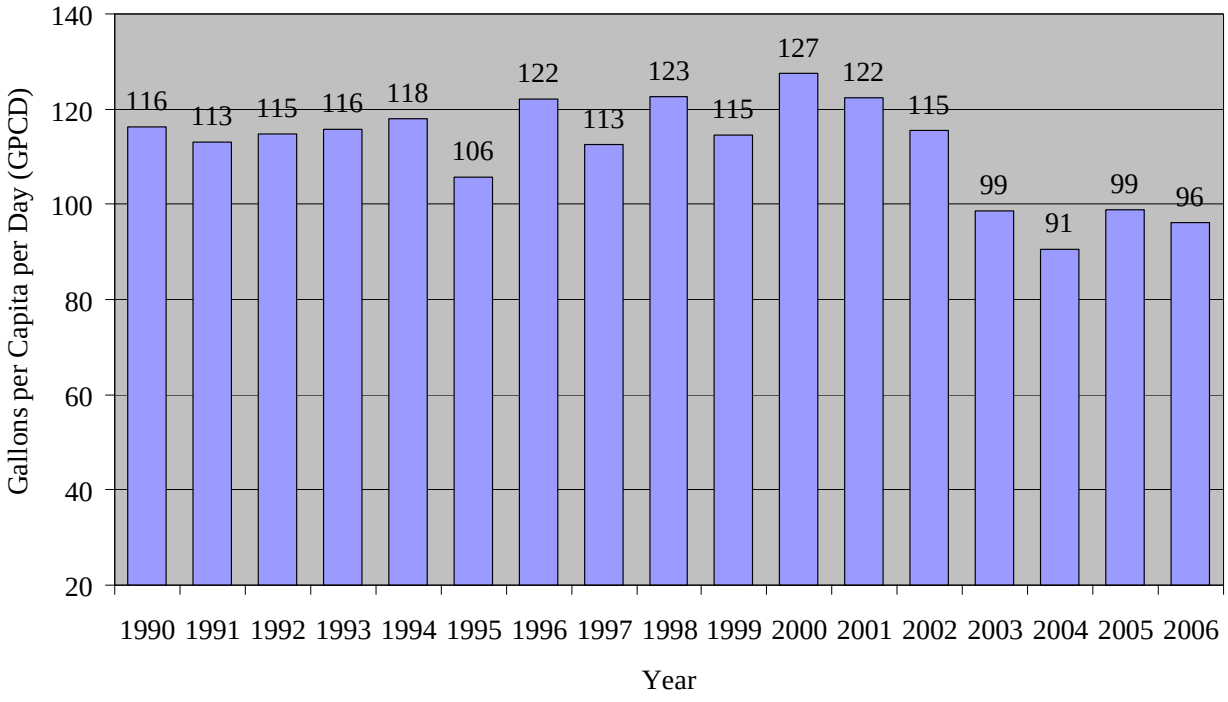
Figure 5: System-wide Per Capita Water Use (1990 – 2006)



Single-family Residential Per Capita Water Use

Single-family residential per capita water use is often used to compare water use between communities because it provides a better "apples to apples" comparison than system-wide per capita water use. Single-family residential use averaged 112 gallons per capita per day from 1990 through 2006. When water restrictions were in place from 2002 through 2005, single-family residential use dropped to 101 gallons per capita per day. Since water restrictions were lifted, single-family residential use has remained below 100 gallons per capita per day.

Figure 6: Single-family Residential Per Capita Water Use (1990 – 2006)



Seasonal Water Use

For all customer types, water use peaks in the summer and drops in the winter due to outdoor irrigation. In 2006, approximately 62 percent of total metered sales occurred during the irrigation season, from May through September. Based on twenty years of historical data, the peak month always occurs in June, July or August and typically occurs in July. The lowest month always occurs in December, January, February or March and typically occurs in February. In 2006, the peak month occurred in June due to relatively hot and dry conditions.

Figure 7: 2006 Seasonal Water Use

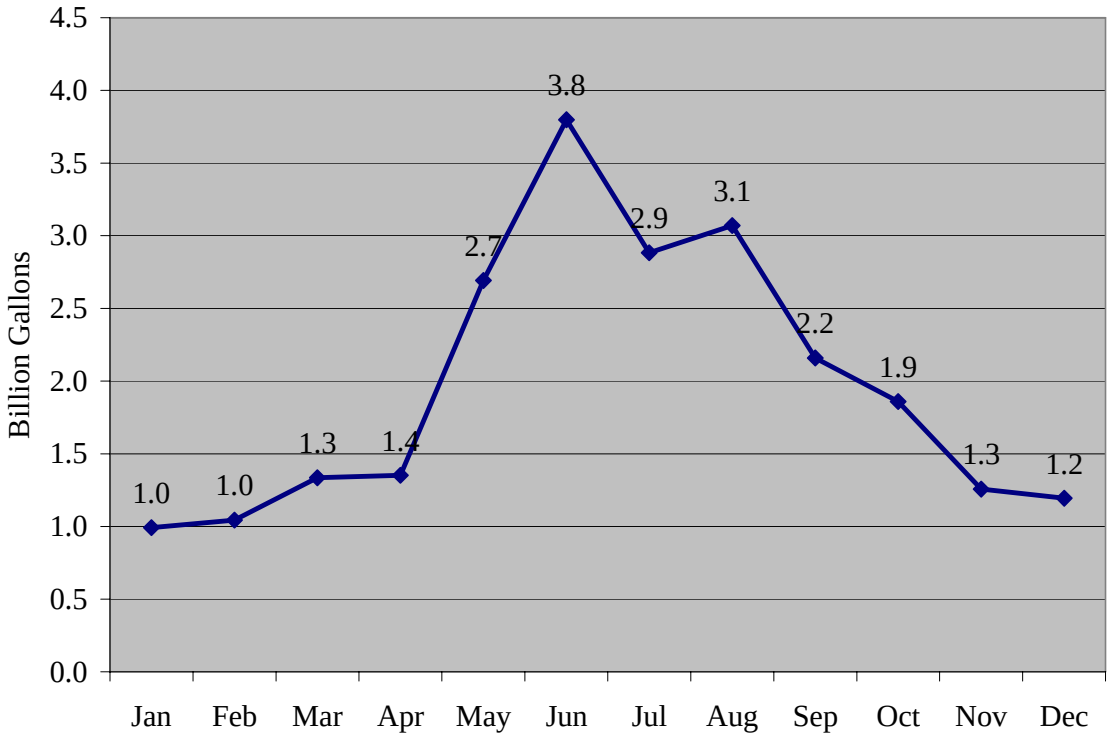
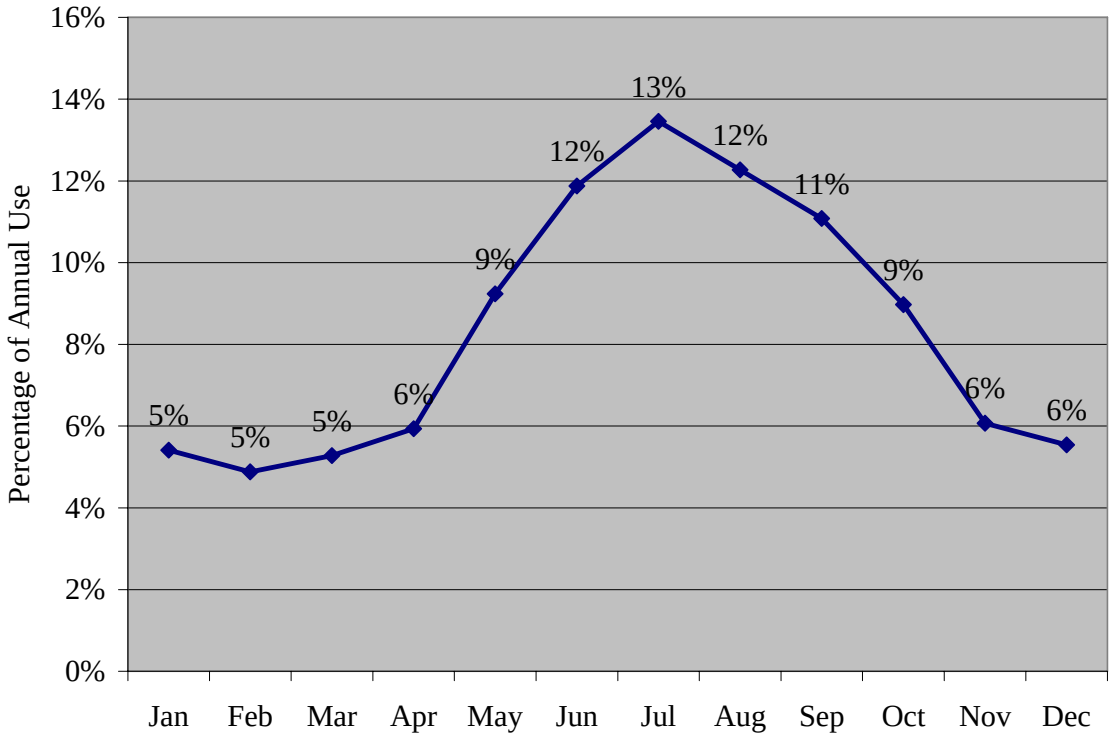


Figure 8: Seasonal Water Use as a Percentage of Annual Use (1990 – 2006)



Climate and Weather

Seasonal water use is directly influenced by climate and weather, which can vary dramatically across the city given differences in exposure and elevation. Weather data recorded by the National Weather Service at the Colorado Springs Airport provides the basis for describing the general climate of the Colorado Springs area.

Temperature July is the hottest month with an average high temperature of 85° F. January is the coldest month with an average low temperature of 16° F. An extreme high of 100° F and an extreme low of -27° F have been recorded.

Precipitation Average annual precipitation is 17.43 inches, which classifies the area as semiarid. Eighty percent of the precipitation occurs during the irrigation season, mostly as heavy downpours accompanying frequent summer thunderstorms.

Growing Season The growing season averages 150 days with the average last frost on May 4 and the average first frost on October 2. However, season duration and frost dates are quite variable from one year to the next.

Snowfall Seasonal snowfall at the Colorado Springs Airport has ranged from 16 inches to nearly 90 inches, but averages 41 inches per season. Snowfall can be extremely variable in the area depending on elevation and exposure.

Daily Water Use

During the winter months, water demands remain fairly consistent from day to day. During the summer months, water demands can vary dramatically from day to day, given the uncertainty of the weather. Several days of hot and dry weather will bring about a spike in daily water use. Similarly, a few days of heavy downpours or frequent thunderstorms will cause daily water use to plummet. More research is being conducted, both from a customer perspective and a forecasting perspective, to better understand trends in daily water use.

Hourly Water Use

Water demands fluctuate hourly throughout the day. During the winter months, water demands begin to ramp up around 6:00am and peak around 10:00am, presumably as customers are getting ready for the day. During the summer months, water demands peak around 7:00am and then again around 9:00pm, presumably as customers are watering lawns and landscapes. Interestingly, this pattern is consistent regardless of whether or not the community is in mandatory water restrictions, which indicates that customers understand the importance of watering early in the morning or late in the evening.

DEMAND FORECAST

Springs Utilities uses an econometric model to forecast water demand. In the simplest terms, an econometric model estimates historical relationships between variables and uses those historical relationships to forecast future variables. The approach used by Springs Utilities is an evolution of the approach developed by Montgomery Watson and BBC Research and Consulting in 1993.

This approach relates water customers and demand to economic and demographic factors like population, personal income and employment. Specifically, the variables used in the water forecasting model include:

- Weather
- Population growth
- Personal income
- Military expansion
- Water prices
- Housing starts
- Inflation
- Employment
- Seasonal patterns
- Water restrictions and drought shadow

Explanation of Variables

Population forecasts come from the State Demographer's Office. Forecasts for the other economic variables like personal income and employment come from the economic consulting firm Global Insight. The Global Insight economic forecasts are calibrated to the state population forecasts in order to maintain consistency. The primary difference between the two relates to assumptions around troop transfers at Fort Carson.

The weather variables in the demand forecast are assumed to be normal. This assumption results in a forecast that has an equal chance of being high or low based on weather. This assumption is the best one for forecasting revenue, which is one of the principal uses of the demand forecast. In essence, half the time actual sales will turn out to be higher than forecast and half the time actual sales will turn out to be lower than forecast. On average, however, the forecast should be consistent with actual results.

The price term used in the forecast is the four-service typical bill. Customers respond to their bill more than to average or marginal prices. Because the bill for all four-services is included, changes in electric, gas and wastewater rates will also change customers' bills and will impact water demand. All price and income variables are in real, or inflation adjusted, terms.

The forecasting equations also include seasonal variables and dummy variables. The *seasonal variables* are monthly variables and reflect the normal monthly changes through the year. The *dummy variables* account for errors in the historical data, such as for billing changes.

Drought Impacts

Dummy variables are also included in the forecasting equations to reflect changes that customers made in their water use in response to the 2002 drought and water restrictions. The drought was a crisis that brought water to a higher level of awareness among customers. They made

behavioral and physical changes to their water use patterns in response to this crisis and also in response to messages and rates from Springs Utilities. The drought shadow reflects the persistence of these responses into the future. The drought shadow was estimated at 7.5 percent based on customer use in the years after mandatory restrictions were lifted and will be updated as more post-drought data is obtained.

Dummy variables for the drought are needed in the historical data because use was reduced substantially during water restrictions. This needs to be accounted for in the estimation of the coefficients on each of the variables. These variables are then used to incorporate the impact of the drought shadow on the forecast. The dummy variables are not returned to zero once restrictions end. The equation is run with zero and non-zero restriction dummies. The values of the restriction dummies are tuned until the forecast is reduced by approximately 7.5 percent from what the forecast would have been if the restriction dummies had been set at zero. Thus, the forecasts are set to reflect the estimated impact of the drought shadow.

The water forecasts are developed for each customer class and the forecasting equations for each class use the variables from the list above that are appropriate for that class. The equation and specific variables used for each class will be discussed below after introducing the concepts that apply to all classes and variables.

Residential Customers

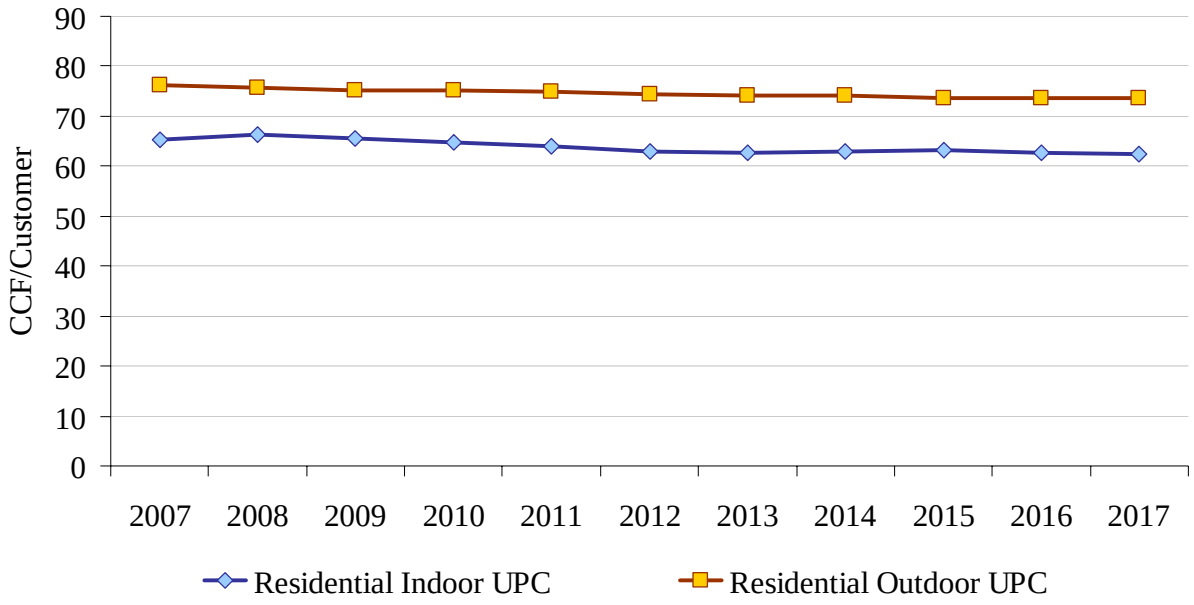
The primary explanatory variable in the residential customer equation is housing starts. The housing start forecast, as indicated above, is from Global Insight and is calibrated to the State Demographer's population forecast. Population was tested in the equation, but it was not significant. The equation also includes seasonal variables, dummy variables for errors in the historical data, and the lagged dependent variable (customers in the previous month). The resulting forecast projects customers to grow at a 2.3 percent per year rate from 2007 until 2016 compared with a historical average annual growth rate of 2.7 percent for the last ten years.

Residential Use Per Customer

Residential sales are the largest single class and account for almost half of total system water sales. Residential sales are forecast as the product of customers and use per customer. Use per customer is used because of the fairly homogenous nature of residential customers. The key variables in the residential use per customer equation include the four-service typical bill, which is adjusted for inflation. The weather terms include cooling degree days, heating degree days and precipitation. Each of these weather terms is applied during the months of March through November. Cooling degree days are also multiplied by a dummy variable for summer water restrictions to indicate a change in customer response to weather during water restrictions. A winter water restriction dummy variable is also included in the equation.

A post-1994 customer variable is included to account for the proportion of customers whose homes were built after federal water efficiency standards went into effect. This factor is based on the end-use analyses that have been performed for this sector. Seasonal factors are also included in the forecast equation. Personal income, or per capita personal income, is not included because it was not significant.

Figure 9: Residential Use Per Customer (UPC)



Commercial Customers

The primary driving variable for the commercial customer equation is residential customers. This is based on the principal that stores follow rooftops. As homes are built, stores will follow. The equation also includes the lagged dependent variable, seasonal factors and several dummy variables to account for changes in the historical data. Multi-family customers are also included in the commercial sector in this forecast. Multi-family, however, has switched back and forth from the commercial sector to the residential sector in the historical data. These changes have been accounted for as well as possible in the data, but there are periods when the data were not recorded separately and could not, therefore, be adjusted. Thus, dummy variables were used to account for these switches. Commercial customers are projected to increase at an average annual rate of 1.6 percent per year over the next ten years.

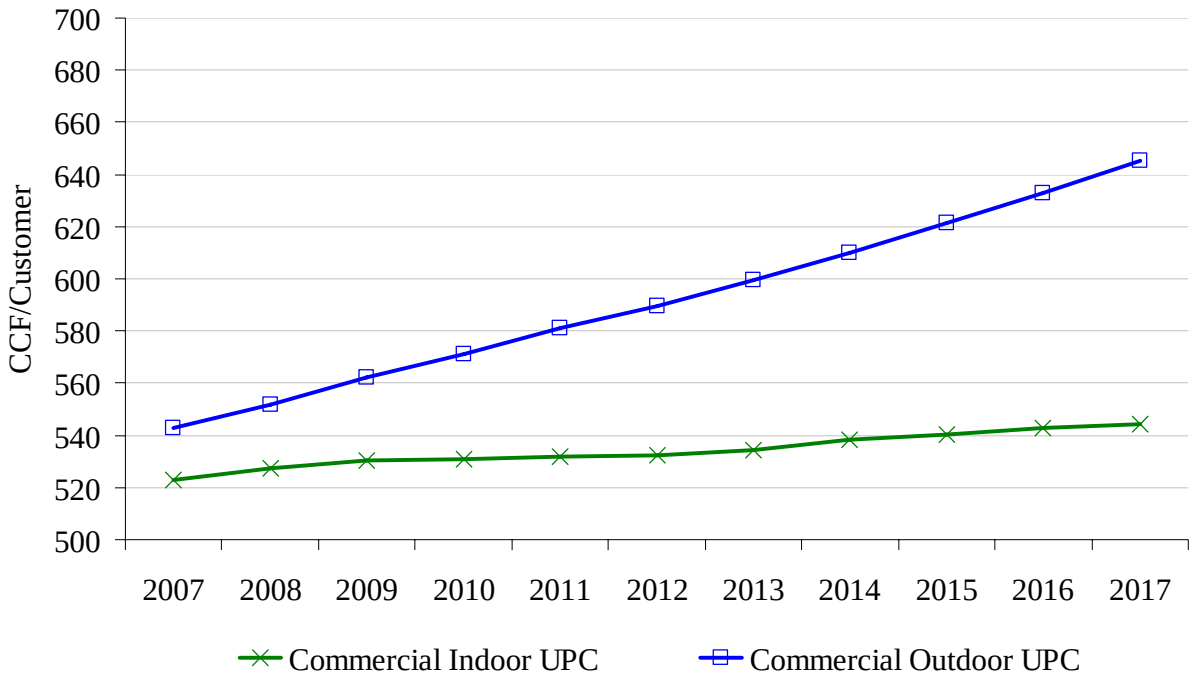
Commercial Use Per Customer

The primary variables in the commercial use per customer equation are price, per capita personal income, weather, water restriction dummies and seasonal factors. The price term, as discussed in the residential sector, is a four-service typical bill. Per capita income is divided into summer and winter months. This results in indoor and outdoor use growing at slightly different rates. Weather terms include cooling degree days, heating degree days and precipitation.

Cooling degree days are crossed with both year and water restrictions to account for a growing response to hot days over time and to account for a change in the response to hot periods during restrictions. Cooling degree days are also crossed with some of the monthly variables to indicate a

different response to weather in different months. That is, the amount of water used in response in a hot spring month is different than that used in a hot summer month. Commercial use per customer is projected to increase at an average rate of 1.2 percent per year over the next ten years.

Figure 10: Commercial Use Per Customer (UPC)



Military Sales

The military sector includes Fort Carson, Peterson Air Force Base and the Air Force Academy. This group accounted for about 6.5 percent of total system water sales in 2006. An equation was developed for the combined group, in part, because separate historical data for the three installations was not always maintained.

The variables included in the forecasting equation include price, employment, weather, seasonal variables and dummies for water restrictions. As usual, a four-service typical bill was used to represent the price term. The commercial sector typical bill was used rather than developing a special bill for this sector. Since rate changes generally apply for all classes, the commercial bill will tend to move in the same direction and at the same time as rate changes for the military sector.

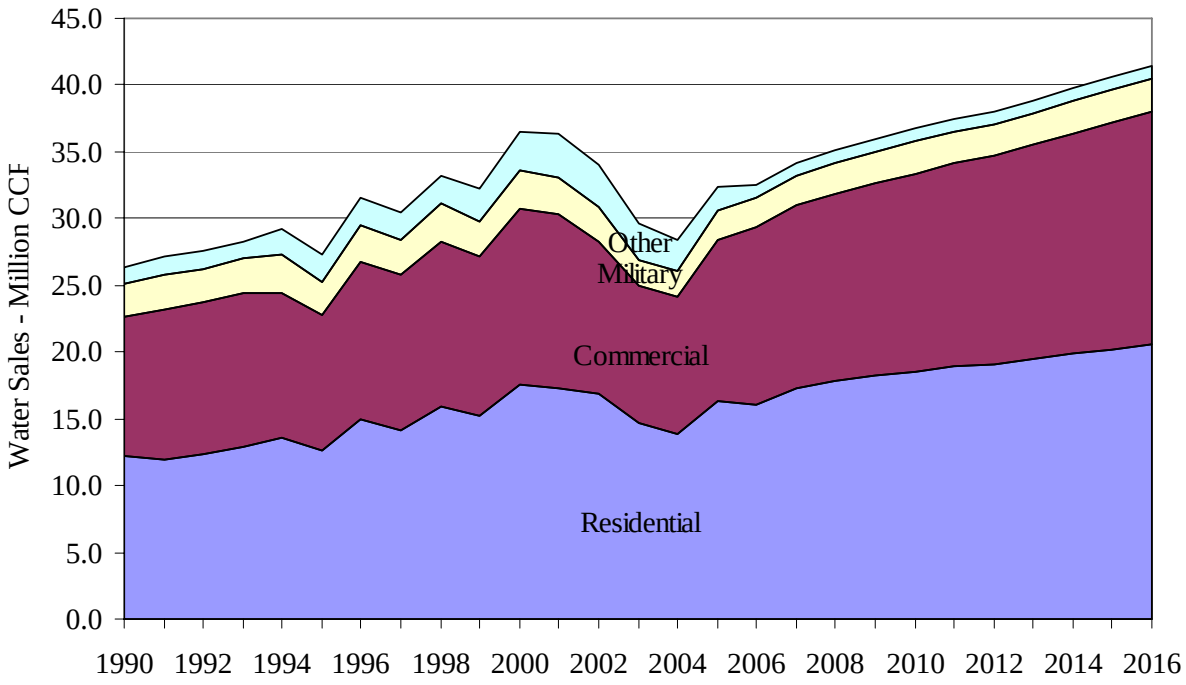
Total employment was used as the indicator of economic activity in the military equation. Water use at the military bases was found to be correlated with total employment in the region. As usual, the weather terms include cooling degree days, heating degree days and precipitation. Cooling degree days are crossed with the summer water restriction dummy to account for a different response to hot weather during restrictions. Water restriction dummies were included for both summer and winter use. Military sales are projected to increase at an average annual rate of 1.3 percent over the next ten years.

Other Classes and Total Water Sales

Forecasts are also developed for the smaller classes, but will not be discussed here. Total sales are the sum of the individual classes. This approach is referred to as a bottom-up forecast. The bottom-up approach allows the use of variables that are more appropriate to each class to be used. The bottom-up approach also offers the opportunity for errors in one class to be offset by errors in the opposite direction in another class. The benefit of these offsetting errors has been demonstrated in monitoring the variance of the forecasts over the years.

Total system sales are forecast to increase from about 32 million CCF in 2006 to 41 million CCF in 2016. The average growth rate over the next 10 years in both total sales and production is approximately 2.4 percent per year.

Figure 11: Water Demand Forecast



WATER SYSTEM PROFILE

Water Supply Portfolio

Water has never come easy for Colorado Springs. Early settlers found that local water sources would not meet future water demands so they began to look elsewhere. Through long-range planning and development of water rights, Colorado Springs grew from a small mountain town to the thriving community that exists today. Currently, the city has a diverse water supply portfolio that maximizes water rights from multiple basins and sources to the full extent.

Colorado Springs is dependent on transmountain and local systems along the Front Range as well as the Sawatch Range and the Mosquito Range. Snow that falls in the winter melts in the spring, providing fresh water to the citizens of Colorado Springs. The water supply portfolio is made up of transmountain sources, local sources, water reuse and exchanges, and groundwater.

The sum of all developed and undeveloped water supplies is approximately 161,000 acre-feet per year on a firm yield basis. *Developed water supplies* are those water rights that Springs Utilities has utilized due to fully developed systems and infrastructure. *Undeveloped water supplies* are those water rights that Springs Utilities will utilize in the future when planned infrastructure improvements have been constructed. Springs Utilities has 114,500 acre-feet per year (71%) of developed water supplies and 46,500 acre-feet per year of undeveloped water supplies (29%). These figures do not include additional water rights owned by Colorado Springs for which specific development plans have not been identified.

Local Sources

As a group, the collection systems on and around Pikes Peak are known as the Local Collection System. Development of the local collection system dates back to 1871 when the city bought rights to the El Paso Canal which delivered water from Fountain Creek to the newly incorporated city. Over the next decades, the city developed rights on Ruxton Creek and Monument Creek and in 1891, acquired the rights to the seven lakes on the south slope of Pikes Peak.

In the early 1900s, the city acquired private property rights on North and South Catamount, North and South Cascade and Crystal creeks on the north slope of Pikes Peak. In the 1930s, Crystal and South Catamount reservoirs were built. In 1948, the city obtained the rights to the original Northfield system, which is located west of the Air Force Academy.

Today, the local collection system includes diversions from Fountain Creek, Monument Creek and many of their tributaries. The local collection system also includes seventeen reservoirs.

Transmountain Sources

A *transmountain* system conveys water across the Continental Divide. The transmountain collection system includes diversions from the Blue River, Eagle River, Roaring Fork River and the Fryingpan River. Development of the transmountain system dates back to the 1950s when the Blue River project was constructed. The Blue River collection system diverts water from the

headwaters of the Blue River above Breckenridge and water from the headwaters of the Middle Fork of the South Platte above Fairplay.

In the 1960s, Colorado Springs and Aurora jointly developed the Homestake project. The Homestake system collects water from the headwaters of Homestake creek. Homestake creek is a tributary to the Eagle River which in turn flows into the Colorado River near the town of Dotsero. Springs Utilities and Aurora each own fifty percent of the system.

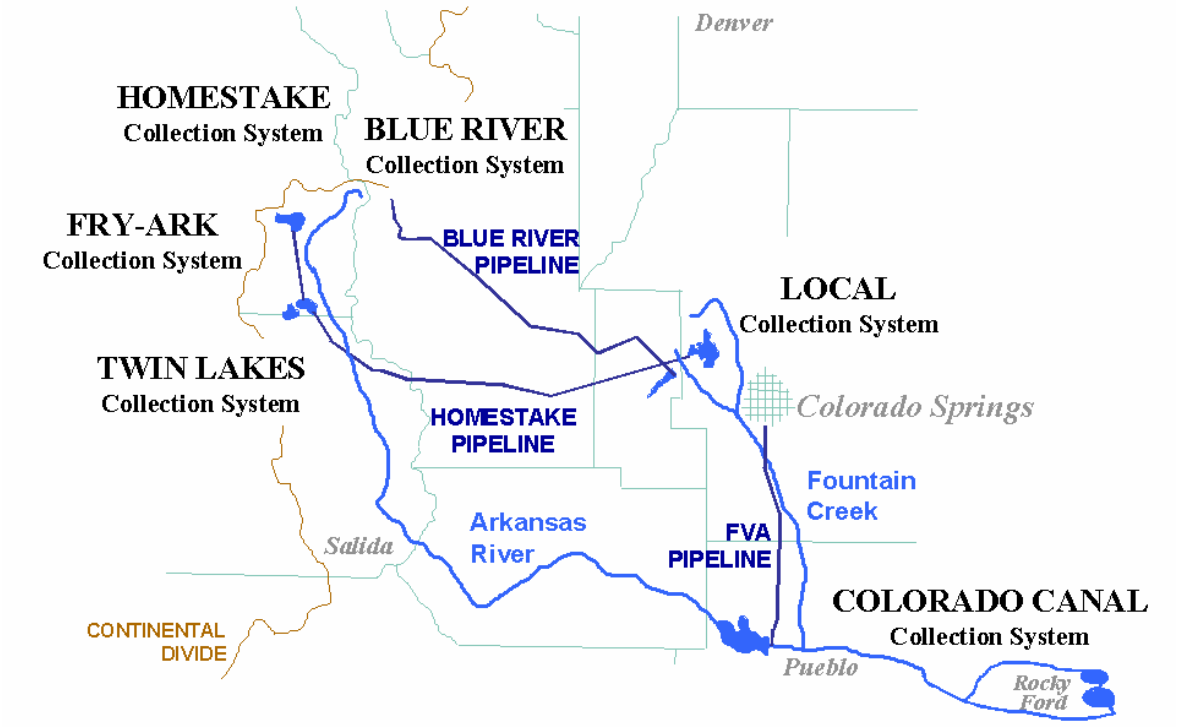
The Twin Lakes collection system diverts water from the headwaters of the Roaring Fork River just east of Aspen and from Lake Creek in the Upper Arkansas River Basin. The Twin Lakes Reservoir Company owns and operates the Twin Lakes collection system. Springs Utilities acquired shares in the company in the 1970s and currently owns fifty-five percent of the shares.

The Fryingpan-Arkansas (Fry-Ark) project provides water through its west slope collection system. The collection system diverts water from the headwaters of the Fryingpan River and from Hunter Creek, a tributary of the Roaring Fork River. The Fry-Ark project is owned and operated by the United States Bureau of Reclamation. The Southeastern Colorado Water Conservancy District holds the water rights. Springs Utilities receives about seventeen percent of the total Fry-Ark project water.

Colorado Canal System

The Colorado Canal System is a canal on the Arkansas River in Crowley County that was historically used for agricultural irrigation. In the 1980s, Colorado Springs and other municipalities purchased shares in this system and converted the consumptive use to municipal use. Springs Utilities now owns about 54 percent of the Colorado Canal System.

Figure 12: Raw Water Collection Systems



Water Reuse and Exchanges

Under Colorado water law, certain water types can be used to extinction. These include transmountain water imported by Colorado Springs, transferred agricultural consumptive use water and certain types of groundwater. Therefore, Springs Utilities quantifies both reusable return flows discharged from the wastewater treatment plants and return flows resulting from reusable water used for outside irrigation. Once these reusable return flows are quantified, Springs Utilities can reuse them in the nonpotable system, by exchange or through augmentation of groundwater pumping. A *return flow* is the unused portion of water that returns to a stream after the initial beneficial use.

Water exchanges are a common practice administered by the State Engineer's Office to move water to an upstream location by releasing an equal amount at a downstream location. This water exchange allows Springs Utilities to move its water to upstream locations, such as the Pikes Peak system and Upper Arkansas River reservoirs, for delivery to Colorado Springs' water delivery systems. Reuseable waters held in the Colorado Canal System can also be moved upstream using water exchanges.

Table 20: Fountain Creek Water Exchanges (2006)

Source	Acre-feet	Million gallons
Local exchanges	1,862	607
Arkansas River exchanges	20,135	6,561
Total	**21,997**	**7,168**

Nonpotable water is water used for municipal purposes that has not been treated to drinking water standards. Nonpotable water can be in the form of reclaimed water, raw surface water or groundwater. Colorado Springs began delivering reclaimed water to parks, cemeteries, golf courses and commercial properties in 1961. In 2006, approximately 11,478 acre-feet per year came from nonpotable sources.

Table 21: Nonpotable Water by Source (2006)

Source	Acre-feet	Million gallons
Reclaimed water	4,923	1,604
Raw surface water	1,751	571
Groundwater	4,804	1,565
Total	**11,478**	**3,740**

Groundwater

Groundwater is beneath the earth's surface in the crevices of sand, gravel and rock called aquifers. Groundwater sources include wells on the Air Force Academy and wells owned by Springs Utilities on Pinello Ranch and Clear Spring Ranch. Springs Utilities also owns groundwater in the Denver Basin aquifers. In 2006, approximately 4,804 acre-feet of nonpotable water came from groundwater sources. In addition, 1,045 acre-feet of groundwater was used in the potable system.

Water Delivery Systems

Water is currently delivered to the community through five major systems – the Homestake pipeline, the Blue River pipeline, the Fountain Valley pipeline, local systems and groundwater. The firm yield is currently 114,500 acre-feet per year, and is expected to be 119,000 acre-feet per year in 2012 if planned local system improvements are made.

The *firm yield* represents the maximum amount of water that can be delivered continuously without any shortages. Based on the demand forecast, a demand of 119,000 acre-feet per year may occur in 2012, after which time shortages may occur without another major delivery system.

The *average yield* is a planning measure of system performance and represents the average amount of water that can be delivered on an annual basis when the system is under tremendous stress and there is a probability of shortages in some years.

Table 22: Water Delivery Capacity

Delivery System	Firm Yield		Average Yield	
	acre-feet/yr	mgd	acre-feet/yr	mgd
Homestake pipeline	64,700	57.8	71,500	63.8
Blue River pipeline	7,800	7.0	8,100	7.2
Fountain Valley pipeline	8,300	7.4	12,600	11.3
Local systems	36,000	32.2	38,100	34.0
Groundwater	2,200	2.0	1,900	1.7
Total	**119,000**	**106.4**	**132,200**	**118.0**

Water Treatment Facilities

Springs Utilities owns and operates several water treatment plants. The Mesa water treatment plant was constructed in 1942 to treat water from the Pikes Peak collection system. The Pine Valley treatment plant was constructed in 1969, and the McCullough treatment plant was completed in 1996. In addition, Springs Utilities has added or acquired smaller water treatment plants and developed groundwater supplies over the past forty years to meet peak demands.

The facilities have a rated capacity of 220.3 mgd and a peak capacity of 241.8 mgd. The *rated capacity* is the maximum rate at which water can be treated continuously as approved by the State Health Department. The *peak capacity* is the maximum rate at which water can be moved through the plant for a short period of time.

Table 23: Water Treatment Capacity

Facility	Rated capacity (mgd)	Peak capacity (mgd)
Pine Valley	84.0	92.0
McCullough	75.0	80.0
Mesa	42.0	50.0
Fountain Valley	12.8	12.8
Groundwater	5.0	5.0
Ute Pass	1.5	2.0
Total	**220.3**	**241.8**

Water treatment facilities are impacted by peak day demand. The highest peak day on record occurred on July 7, 2001 at 182 mgd. Although the average day demand in 2001 was 83 mgd, peak day demand was over two times that amount. This is not surprising because the seasonal variations in Colorado's climate cause extremely low water use during the winter months and extremely high water use during the summer months.

From an operational perspective, treatment facilities must be built to meet peak day demand. During the summer months, treatment facilities may be at or near full capacity. During the winter months, many of the treatment facilities are taken offline for maintenance. Water conservation programs that address peak use can help reduce the ratio between average day demand and peak day demand.

Table 24: Maximum Day / Average Day Demand Factors (in mgd)

Year	Maximum Day (MD)	Average Day (AD)	Demand Factor (MD/AD)
1997	164	67	2.45
1998	176	76	2.32
1999	159	74	2.15
2000	164	84	1.95
2001	182	83	2.19
2002	141	75	1.88
2003	138	67	2.06
2004	135	65	2.08
2005	163	72	2.26
2006	153	72	2.13

One of the biggest challenges in water treatment is growth and the community's need for additional treatment capacity to support increased peak day demand. Other challenges include increasingly stringent drinking water regulations and aging infrastructure.

Water Distribution System

Springs Utilities' water distribution system consists of 38 treated water storage facilities, 2,300 miles of distribution mains and 27 pumping stations. The system is generally a gravity system that extends eleven miles from west to east and sixteen miles from north to south. Areas not served by gravity are served by pumped service.

Within the service area, ground elevations range from 7,800 feet on the west side to 5,750 feet on the south side. Because of the wide range in ground elevations, there are five major pressure zones across the city. Each zone has a different peaking factor due to variations in land use and soil type. Water conservation programs targeted at specific areas can help reduce peak day demand, particularly in areas with high residential use per capita and high peaking factors.

Table 25: Water Distribution Pressure Zones

Pressure zone	Demand Factor (MD/AD)
Briargate	2.87
Templeton	2.87
Northfield	2.76
Highline	2.43
Lowline	2.10
System Average	**2.61**

Water distribution facilities must be built to meet peak day demand. For planning purposes, Springs Utilities uses a demand factor of 2.50 since there is a ten percent probability of being exceeded in any given year.

Springs Utilities, like many municipals across the country, has an aging water distribution system. The water distribution system consists of over 2,300 miles of underground pipe that has been installed at different times over the past seventy years. Maintaining and operating this aging infrastructure is becoming more costly with each passing year.

In some situations, aging pipe can fail due to corrosion, material failure, ground movement and water pressure. In other situations, the pipe is undersized for current standards and does not meet fire flow requirements. Some of these mains are located in alleys and other areas with limited access which makes repair and maintenance difficult, if not impossible.

Unaccounted-for Water

Unaccounted-for water is the difference between the water entering the distribution system and the water that is metered. The American Water Works Association (AWWA) recommends that water loss occurring after treatment be maintained at ten percent or less. From 1990 through 2006, Springs Utilities' unaccounted-for water averaged 8.6 percent. Figure 13 illustrates the trend in unaccounted-for water, based on a five-year moving average.

The AWWA defines unaccounted-for water in terms of apparent losses and real losses. *Apparent losses* are the paper losses that occur due to meter variances, billing errors and unauthorized connections. *Real losses* are the physical losses of water from the distribution system.

Water losses can also be categorized by authorized uses and unauthorized uses. *Authorized uses* include beneficial uses such as water used for firefighting, hydrant testing and main flushing. *Unauthorized uses* include water losses from main breaks and main leaks as well as apparent losses. Table 26 illustrates the estimated breakdown of unaccounted-for water by type.

Recent research by the AWWA has found that the practices of calculating unaccounted-for water varied so widely in utilities around the world that the term has no consistent meaning. The AWWA's Water Loss Control Committee recommends against the continued use of the imprecise term unaccounted-for water, referring instead to the specifically defined non-revenue water, included in the IWA/AWWA Water Audit Method.

Figure 13: Trend in Unaccounted-for Water (1990 – 2006 data)

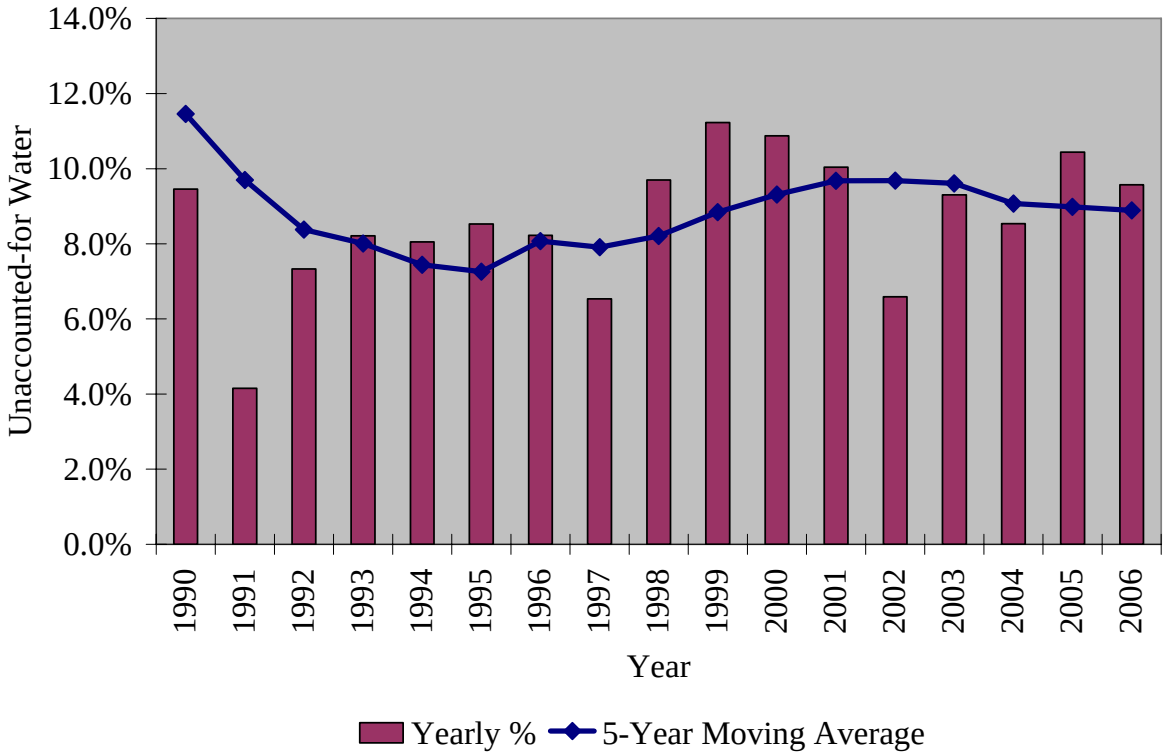


Table 26: Estimated Breakdown of Un-accounted for Water

Authorized Uses	3.6%
Firefighting	
Hydrant Testing	
Main Flushing	
Unauthorized Uses	2.8%
Main Breaks	
Main Leaks	
Apparent Losses	2.2%
Meter Variances	
Billing Errors	
Unauthorized Connections	
Total	**8.6%**

In order to ensure public health and safety, there will always be some amount of unaccounted-for water for firefighting, hydrant testing and main flushing. As such, efforts to reduce the amount of unaccounted-for water focus on main breaks, main leaks and apparent losses. Springs Utilities has several programs to help mitigate system losses, including a theft prevention program, a hydrant permit program and a meter testing program. Springs Utilities also has a water mains replacement program, which is discussed in more detail in the *Proposed Facilities* section.

PROPOSED FACILITIES

The Springs Utilities water system is vast and complex, spanning nine counties, consisting of two hundred miles of raw water pipeline and twenty-five raw water reservoirs. On a local level, Springs Utilities operates and maintains several water treatment plants, thirty-eight treated water storage facilities, 2,300 miles of distribution mains and twenty-seven pumping stations. Springs Utilities develops and maintains long-range plans for all water system facilities.

Specific to water supply, Springs Utilities uses an integrated resource approach to plan for facility improvements and additions. The integrated resource plan was last updated in 1996. The plan evaluated alternatives to address future water supply needs and provided a strategy and schedule for implementation. Springs Utilities is approximately ten years into the process of implementing the 1996 Water Resource Plan.

The 2008-2012 Water Conservation Plan is not an integrated resource plan. As such, this plan does not consider eliminating, reducing or postponing future water and wastewater system capacity through conservation. Instead, conservation serves the important role of extending the capacity of existing and future facilities. In addition, conservation serves to educate customers about the value of water and helps protect and preserve environmental resources.

When the integrated resource plan is updated in the 2009-2011 timeframe, Springs Utilities will compare the cost and yield of supply-side improvements and additions to determine the value of water conservation and demand-side activities. In the interim, Springs Utilities has provided a qualitative description of major improvements and additions planned for the next twenty years.

Major Improvements and Additions

The 2007 budget for major capital projects was $29 million, including projects and allocations. The most significant projects are listed below with brief project descriptions to follow.

Table 27: Major Projects with 2007 Capital Outlay > $1 million

Project	Type	2007 Budget
Southern Delivery System, Phase I	Addition	$9.6 million
Automated Meter Reading	Addition	$4.9 million
Water Mains Replacement Program	Improvement	$3.2 million
Fire Flow Improvement Program	Improvement	$2.3 million
Design/Review for Developers/Contractors	Ongoing	$1.2 million
Nonpotable Water Development	Improvement	$1.1 million

Phase I of the Southern Delivery System project, planned to be complete in 2012, includes the pipeline, pump stations, water treatment plant and distribution pipelines. Phase II of the project will begin following completion of Phase I and will include two water storage reservoirs and expansion of the water treatment plant.

Southern Delivery System, Phase I

One of the key findings of the 1996 Water Resource Plan was the need for a major raw water delivery system. Springs Utilities has adequate water supplies to meet projected needs through 2046. However, raw water delivery systems will be at capacity as early as 2012. The proposed Southern Delivery System (SDS) is a regional water delivery project designed to provide a safe, reliable and sustainable water supply through the foreseeable future. The Southern Delivery System is intended to fulfill the following needs for the community:

- To use developed and undeveloped water supplies to meet most or all projected future demands through 2046
- To develop additional water storage, delivery and treatment capacity to provide system redundancy
- To make use of existing Arkansas River Basin water rights

Future Demands Colorado Springs is the largest water provider in El Paso County. Based on population forecasts from the Colorado State Demographer's Office, El Paso County is expected to grow from its current population of almost 600,000 residents to over 900,000 residents by 2035. By 2035, El Paso County is expected to be the most populous county in Colorado.

More than half of the anticipated growth will come from within the community – children and grandchildren who stay in the area. People moving into the area from outside the county will make up the balance, including thousands of new families moving here due to military base expansions. Additional capacity is needed to meet the future demands of a growing community.

Table 28: Preliminary Population Forecasts for El Paso County, 2005 - 2035

Year	Population Forecast
2000	520,571
2005	565,341
2010	647,600
2015	708,186
2020	762,879
2025	816,060
2030	869,071
2035	935,542

Source: Colorado State Demography Office, Dvision of Local Government

System Redundancy Like many water providers across the nation, Springs Utilities is faced with the concern of aging infrastructure. The three major pipelines that deliver the majority of the raw water to Colorado Springs range in age from twenty to fifty years old. As demand grows, backup systems are needed to mitigate the risk of pipeline failure and to provide greater service reliability.

Water Rights Under Colorado law, water rights are real property and can be bought and sold. The value of a water right is based on geographic, temporal and legal characteristics. The legal

characteristics of a water right are bound by the conditions that are placed on it at the time it is created. Therefore, there is a limited opportunity for Springs Utilities to freely trade water rights that it currently owns. Colorado Springs has acquired senior water rights over the last thirty years to meet its water needs. If these water rights are not put to beneficial use, they could be considered abandoned and then could no longer be used.

Because SDS involves the use of a federal facility (Pueblo Reservoir), the project is currently undergoing the National Environmental Policy Act (NEPA) Environmental Impact Statement (EIS) process. NEPA is a public disclosure law that provides a means by which federal agencies inform the public of proposed projects, analyze potential impacts resulting from those projects and discuss the results in an environmental document. For each NEPA evaluation, a lead federal agency is selected based on agency jurisdiction and involvement. The U.S. Bureau of Reclamation is the lead agency for the EIS process for the SDS project.

The EIS is evaluating seven alternatives for the SDS project and will provide a detailed analysis of the environmental affects of these alternatives. Water conservation is incorporated into each of the seven SDS alternatives. The EIS looks at key issues identified by state and federal agencies as well as those identified during public meetings (i.e., surface water flow, surface water quality, channel stability and morphology, sedimentation, water rights, fish and other aquatic life, wetlands and other waters, wildlife including endangered species, socioeconomic conditions, recreation resources, vegetation, cultural artifacts, land use and hazardous materials).

The NEPA evaluation must be completed before plans are finalized and construction begins. Springs Utilities is approximately four years into the EIS process and anticipates a Record of Decision (ROD) by the U.S. Bureau of Reclamation in 2008. There will be continued opportunities for public comment throughout the remainder of the EIS process. Information on the EIS process can be found at www.sdseis.com.

The SDS project is the largest capital expansion project in Springs Utilities' history. The Southern Delivery System project is not just a pipeline, but includes storage, pumping, transmission, treatment and distribution.

Table 29: Southern Delivery System by Facility Type

Facility Type	Description
Storage	42,000 ac-ft of storage capacity in Pueblo Reservoir
Pumping	Three raw water pump stations
Transmission	A 43-mile long, 66-inch diameter pipeline capable of conveying 78 mgd of raw water to Colorado Springs
Treatment	A water treatment plant, with capacity to treat up to 109 mgd of water
Distribution	Distribution pipelines to convey treated water from the treatment plant into the distribution system

A reliable water supply is needed to sustain public health, provide fire protection, support economic vitality and maintain quality of life. Like other communities across Colorado, recent drought and regional growth have accelerated the need for water storage, delivery system improvements, treatment capacity expansion and conservation programs. These projects and

programs, including the Southern Delivery System, will impact water rates. Springs Utilities is aggressively exploring all financing options to balance rate impacts to customers with the need for a sufficient and reliable system.

Automated Meter Reading

The Automated Meter Reading (AMR) project is a five-year effort initiated in late 2005 to convert all 525,000 electric, gas and water meters used for billing from a manual meter reading system to an automated system. The new system uses a wireless radio system to communicate with radio units installed for each meter. Daily readings are captured for each meter and available for a ninety-day period. In 2007, approximately 45,000 water meters were connected to the AMR system with the remainder expected to be completed by mid-2010.

The objective of the AMR project is to reduce the field workforce, provide daily retrieval of meter reads, eliminate a significant amount of estimated reads, improve the accuracy of meter reads, enhance customer satisfaction and reduce safety risks to employees. AMR will also provide other opportunities such as remote connect and disconnect of meters, usage information for customers, utility monitoring and control services, real-time bill complaint resolution and load information to assist in optimizing system design.

Water Mains Replacement Program

Like many communities across the country, the potable water distribution system is experiencing an increase in pipeline breaks due to aging infrastructure. Most pipeline breaks can be attributed to corrosive soils, faulty materials, ground movement and water pressure. The purpose of the program is to proactively and strategically manage the Utilities' rehabilitation and replacement efforts to optimize the investments made to the system.

To select the most beneficial projects, assessment of infrastructure records, environmental conditions and field maintenance activity logs are conducted. Projects are prioritized according to a risk prediction rating. Considerations impacting prioritization include leak history, leak cause, soil characteristics, water pressure and pipe material, age and diameter. Implementation of the program helps stabilize service reliability, reduce system losses and streamline costs by coordinating work with other agencies (i.e., street resurfacing).

Fire Flow Improvement Program

The purpose of this program is to reinforce the water distribution system to meet fire flow standards set by the Colorado Springs Fire Department (CSFD), the National Fire Protection Agency (NFPA) and the American Water Works Association (AWWA). The project provides for upgrades of water distribution mains that cannot support adequate fire flows under existing conditions. A secondary benefit is improved water service reliability and operational efficiency as the aged and undersized mains are replaced.

The program enables the Colorado Springs Fire Department to more effectively fight fires by upgrading water mains in areas with substandard water flow from existing hydrants. Springs Utilities' customers in areas with aged and undersized water mains will benefit from improved fire flow protection. Efficiency gains are realized and maintenance costs reduced with upgraded

mains in place. This project was initiated under the direction of City Council in 1996 to improve public safety and to protect private property.

Design, Review & Inspections for Developers & Contractors

The purpose of this ongoing effort is to ensure that new extensions to the water system are designed and installed in accordance with City Code and Springs Utilities' service standards, tariffs and policies. Pursuant to the Utilities Rules and Regulations, Water Extension Policy, the property owner or developer is responsible for the cost of engineering, construction and materials for all water system infrastructure necessary to serve the development. This budget item captures the costs associated with design reviews, field inspections and other capital costs incurred by Springs Utilities.

Nonpotable Water Development

The 1996 Water Resource Plan identified nonpotable water development as one of four components to ensure a safe and reliable water supply to the community. Since the Water Resource Plan was adopted in 1996, Springs Utilities estimates that approximately $50 million has been invested to improve and expand the nonpotable water system.

In 2001, Springs Utilities completed the Nonpotable Master Plan. This plan identified potential nonpotable customers, investigated potential new nonpotable water sources and evaluated many alternatives to improve and expand the nonpotable system. Many projects are either completed, under construction or budgeted for construction over the next ten years.

In 2004, Springs Utilities completed the Nonpotable Strategy Project, followed by the Central Nonpotable Distribution System Planning Study in 2006. This study focused only on the infrastructure of the central nonpotable distribution system. Major areas evaluated included nonpotable supplies, treatment plant capacities, pumping capacities, transmission main capacities and storage requirements.

Some recently completed projects are the Drake Power Plant conversion, the Bear Creek nonpotable pipeline extension and tertiary treatment expansion at the Las Vegas Wastewater Treatment Plant. In addition, the new J.D. Phillips Water Reclamation Facility includes an additional 11 million gallons per day of tertiary treatment capacity, which brings Springs Utilities' tertiary treatment capacity to 23 million gallons per day.

Projects planned for design, construction or further evaluation include a southwest nonpotable pipeline, the Bear Creek diversion, a southeast nonpotable extension, a northeast pipeline extension and nonpotable distribution storage. One of the primary objectives is to utilize the additional tertiary treatment capacity available at the J.D. Phillips Water Reclamation Facility. Although these projects have been studied to various degrees, any expansion of the nonpotable water system is subject to budget appropriation.

APPENDIX A – PUBLIC COMMENTS

Springs Utilities has an active public participation program that regularly involves citizens through customer surveys, focus groups, public meetings, advisory committees and community presentations. From inception, the plan was drafted to reflect the core values of the Colorado Springs community while balancing the operational needs of the organization.

In accordance with the Colorado Water Conservation Board requirements and the Code of the City of Colorado Springs, the draft 2008-2012 Water Conservation Plan was made available for public review and comment from November 15, 2007 through December 15, 2007. An article appeared in the customer newsletter and advertisements were placed in the local newspaper.

Figure 14: Utilities Connection Article, November 2007 Issue

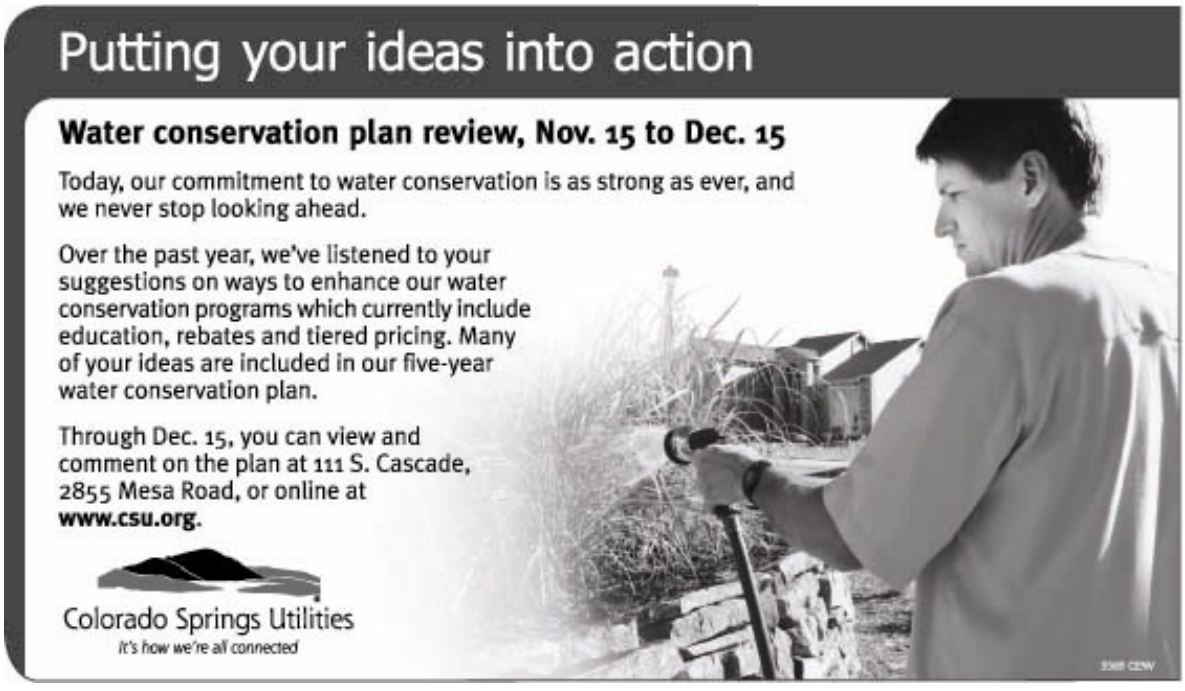
Putting your ideas in action:
Water conservation plan review Nov. 15 to Dec. 15

Colorado Springs has a long history of water conservation – from metering in the 1940s, before it was a standard practice, to pioneering the use of treated wastewater for irrigation in the 1960s. Today, our commitment is as strong as ever, and we never stop looking ahead.

Over the past year, we've listened to your suggestions on ways to enhance our water conservation programs, which include education, rebates and tiered pricing. Many of these ideas are included in our five-year water conservation plan – available for public review and comment from Nov. 15 to Dec. 15.

To review the plan and submit comments, visit the Customer Care Center 111 S. Cascade Ave.; the Conservation and Environmental Center, 2855 Mesa Road; or **www.csu.org**.

Figure 15: Sample Advertisement for Public Review and Comment Period



Springs Utilities sent notification to commercial and industrial customers through the *First Source* electronic newsletter. The draft plan was posted to Springs Utilities' web site and copies were made available at the following locations:

Conservation & Environmental Center	2855 Mesa Road
Utilities Customer Service Center	111 South Cascade Avenue
Regional Building Department	2880 International Circle

In addition, Springs Utilities sent notification to the following associations and organizations:

American Society of Landscape Architects	Council of Neighbors & Organizations
Apartment Association of Colorado Springs	Economic Development Corporation
Associated Landscape Contractors of Colorado	Green Industries of Colorado
Broadmoor Garden Club	Horticultural Art Society
Building Owners & Managers Association	Housing & Building Association
Center for Non-Profit Excellence	International Facility Management Association
Colorado Federation of Garden Clubs	International Society of Arboriculture
Colorado Nursery & Greenhouse Association	Pikes Peak Association of Realtors
Colorado Restaurant Association, Pikes Peak	Pikes Peak Lodging Association
Chamber of Commerce	Pikes Peak Mechanical Contractors Association
Convention & Visitors Bureau	Rocky Mountain Sod Growers Association
Community Association Institute	Western Resource Advocates

Copies of the draft plan were delivered to members of City Council and the following partners:

CSU Extension, El Paso County	Memorial Hospital
City Planning & Community Development	Peterson Air Force Base
City Parks, Recreation & Cultural Services	Pikes Peak Regional Building Department
City Stormwater Enterprise	School Districts 2, 11, 12 and 20
El Paso County Development Services	United States Air Force Academy
Fort Carson Army Base	University of Colorado at Colorado Springs

Springs Utilities also provided copies to neighboring water providers and cooperating agencies:

Cascade Metropolitan District	Southeastern Colorado Water Conservancy District
Cherokee Metropolitan District	Stratmoor Hills Water & Sanitation District
City of Fountain	U.S. Army Corps of Engineers
Colorado Department of Health and Environment	U.S. Bureau of Land Management
Partners for Responsible Water Use	U.S. Bureau of Reclamation
Pueblo Board of Water Works	U.S. Environmental Protection Agency
Pueblo West Metropolitan District	U.S. Fish and Wildlife Service
Security Water District	Widefield Water District

Although the formal comment period ended on December 15, 2007, Springs Utilities continues to involve the public through surveys, meetings and presentations. In addition, Springs Utilities will involve customers, associations and organizations, key partners, neighboring water providers and cooperating agencies through specialized working groups.

A list of the public comments received is provided in *Table 30, Water Conservation Plan Public Comments*. Individuals were notified that their comments were forwarded to the project manager for consideration. Common themes and items for consideration are summarized below.

Common Themes

In general, Colorado Springs Utilities' 2008-2012 Water Conservation Plan was well-received by the public. Many customers commented that they appreciated the opportunity to review and comment on the plan. Others commented that the plan was very comprehensive and set a good example for other utilities in the region. Some applauded Springs Utilities' continued pursuit of water conservation and offered perspective on what it will take for Colorado Springs to establish a reputation as a *national* leader in water conservation and efficient water use.

1. Lack of Detail

Of the public comments received, a prevailing theme is the lack of detail regarding individual program design. As a result of these comments, Springs Utilities modified the *Introduction* section to explain the scope of the plan. Springs Utilities also added *Appendix C, Program Alternatives Analysis* to illustrate the level of detail that went into the analysis.

The 2008-2012 Water Conservation Plan is a high-level strategic plan. The plan is not intended to provide detail for any one program. Individual programs will be refined during the implementation phase. Each program will be assigned to a program manager and refined using the steps outlined in the *Implementation Plan*.

When appropriate, key stakeholders will be engaged to assist with program design. Those customers who commented on the 2008-2012 Water Conservation Plan will be invited to participate in specialized working groups as program design begins.

2. Establishment of Goals

During the public comment period, Springs Utilities received comments regarding the goals established for the 2008-2012 Water Conservation Plan. Some commented that the goals need to be realistic, attainable and quantifiable. Others believe that the goals are not aggressive enough. A critical point was made that Springs Utilities must incorporate water conservation goals into supply planning and the water demand forecast.

For the residential market, the primary goal is to maintain low residential use per capita since Springs Utilities is already among the lowest in Colorado and the Southwest. The strategies are to continue a strong focus on education, to encourage conservation through block rates, and to introduce a residential new construction program. Springs Utilities will track the effectiveness of these goals and strategies through the *Monitoring Plan*.

For the commercial market, the primary goal is to gain a better understanding of how commercial customers use water in order to reduce commercial use per customer. The strategies are to encourage conservation through seasonal rates, introduce a commercial and industrial program, and to partner with large water users to improve water efficiency. A key focus will be on measurement and verification. Many programs will be introduced as pilot projects during the first year of implementation in order to work through program details. Springs Utilities will track the effectiveness of these goals and strategies through the *Monitoring Plan*.

The suggestion to incorporate real numbers in the goals will occur at the program level. Each program will be tracked through the program alternatives analysis model. The model will quantify and track costs and savings for individual programs. In addition, the model will compare projected and actual demand-side management (DSM) savings. The model will enable Springs Utilities to routinely analyze program alternatives. As individual programs are tracked over time, Springs Utilities will be in a better position to establish quantifiable goals.

Regarding incorporating water conservation goals into supply planning and the water demand forecast, water conservation has been incorporated into supply planning and demand forecasting since the Water Resource Plan was updated in 1996. Water conservation will continue to serve a significant role in water supply planning. Water conservation is incorporated into each of the seven Southern Delivery System alternatives and serves the important role of extending the life of the proposed delivery system, once constructed.

3. Stormwater and Rain Water

A number of customers commented about capturing stormwater or rain water for irrigation purposes. The legislative issues regarding the use of stormwater and rain water are outside the scope of the 2008-2012 Water Conservation Plan. Springs Utilities does recognize that opportunities exist to partner with the Stormwater Enterprise, including landscape design recommendations, commercial landscape ordinance modifications, as well as general education to the public. Springs Utilities further recognizes the need to increase education about the opportunities and limitations of using rain water in the landscape.

4. Turf Limits

Comments were received both *for* and *against* turf limits for new residential properties. Comments ranged from "residential new construction programs should limit or reduce turf" to "landscape ordinances and restrictions should be avoided completely." Historically, this type of program has been met with much controversy from the community. For this reason, Springs Utilities did not include a residential landscape ordinance in the 2008-2012 Water Conservation Plan. The plan does include landscape establishment permits which will require customers to install at least three cubic yards of organic material for every 1,000 square feet of planting area.

The plan also includes a builder incentive program that will provide incentives for homebuilders to design water-efficient homes and landscapes. The education component will target residential new construction and develop landscape guidelines for distribution to home buyers, home builders and realtors. The builder education series will increase the appeal of building water-efficient landscapes before a certificate of occupancy is issued. Springs Utilities recognizes the value and importance of establishing new landscapes in the community that are water-efficient. The proposed programs focus primarily on education and incentives, not on regulations.

Items for Consideration

During the public comment period, Springs Utilities received a number of comments that were incorporated into the plan or will be considered as the plan is implemented. As mentioned previously, the 2008-2012 Water Conservation Plan is a high-level strategic plan. The plan is not intended to provide detail for any one program. Some of the comments will be addressed

during the implementation phase. Others will be considered as resources become available. In either case, comments are captured here for future consideration.

Incorporated Into Plan

- Update plan every three to five years, instead of every five to seven years
- Changes "utilities hopes" to "utilities will" under AMR Data Access
- Include the savings goal for 2012 in Table 3 and Table 4
- Delete sentence related to labor optimization project
- Change description of Fry-Ark project

Landscape

- Review landscape covenant rules for new developments
- Explore opportunities to reduce square footage of turf
- Disallow irrigating small strips of sod (<10 feet wide)
- Examine ordinances for turf grass limits

Irrigation

- Expand irrigation equipment rebate to include flow sensors, master valves, ET monitors
- Repackage irrigation equipment rebates to include education
- Change implementation date of "Slow the Flow" program
- Consider master valves for all irrigation systems

Indoor

- Evaluate point-of-sale retrofit requirements for indoor appliances

Commercial

- Concerns about water running down the street, especially commercial
- Consider LEEDs program

Water Rates

- Adjust residential rate structure for monthly use >18,700 gallons
- Continually re-examine the level at which each block is priced
- Adjust summer rate and winter rate for commercial customers
- Continue to keep fixed monthly charge relatively low
- Target both low and high volume users

Stormwater and Rain water

- Concerns about turf being replaced with impervious area
- Consider state regulations related to pressure washing
- Investigate alternatives to use of rain water

Non-potable Water

- Investigate alternatives to expand non-potable use to residential
- Consider recirculation canals and pools to reuse cooling water
- What are plans for non-potable irrigation

Other

- Clarify where programs are within the implementation phase
- Ensure enforcement mechanisms are in place for ordinances
- Evaluate opportunities to improve unaccounted-for water
- Clarify that water savings is from existing rate structures
- Evaluate ways to make this plan available to schools
- Share cost-effectiveness analysis with other utilities

Table 30: Water Conservation Plan Public Comments

Received 11/20/2007
Thanks for working with Fort Carson and the community to develop our communities' water conservation plan. CSU has provided a good assessment and very comprehensive plan. Fort Carson supports this plan.
Received 11/29/2007
Your water conservation plan does not appear to address waste water runoff associated with the cities waste water enterprise. Can this water be captured to benefit Colorado Springs? What are you doing to work with the new Waste Water Enterprise?
Received 12/3/2007
I appreciate the time and effort put into creating the Water Conservation Plan. Our family has always been committed to the conservation of all resources, and we realize that living in Colorado means there will always be a shortage of water because it's a semi-arid zone. We also want to leave a beautiful city and enough water for our grandchildren and generations beyond them. I really like the idea of creating Colorado Springs to be the leader in water conservation. If the community will come together to work for the goal, then it will more easily be met. I encourage you to create a spirit of community working together to save resources while still making the city even more beautiful than it is. Great idea! I like the numerous rebate ideas, partly because the programs will educate the public about these easy or practical ways to save money and resources. I believe there has been a ban on the collection of rain water from roofs for re-use. Is that still true? It doesn't make sense to me to have that law in place. Using a simple waste bin and hose system would allow people to utilize rainwater more effectively and would allow the public to engage in taking more responsibility for their water bill and the state of their property. It could also save on costs from storm drain overloads.

I hope the implementation of the commercial programs will prove to be effective. I have concerns, because I've seen too many automated sprinkler systems watering the street or sidewalks or parking lots; too many sprinklers running when the rain is pouring down. I live near the Garden Ranch Park and YMCA and in the 1/2 mile circuit of that area, there is a sprinkler head that has been running for 8 years - without stopping. No maintenance or repair has ever been done on it. The owner of the office building across the street from us was watering their grass for at least an hour EVERY SINGLE DAY this summer, from May through September. The ground was always mushy and muddy from overwatering. And this is just one little corner of a large and growing city. We can't expect the residents to continue to work hard at conservation when the businesses of the city don't seem to care enough to stop pouring water down the street.

Thank you for the opportunity to comment on the program and concerns for our city's future.

Received 12/5/2007

I think it would be beneficial to disallow irrigating small strips of sod (<10 ft wide?) along sidewalks, streets and in medians. With our prevailing winds, and the inevitable overspray and dysfunctional sprinklers, there is a lot of water waste in this area.

Also, I think it would be very beneficial to go one step further than using non-potable water for cooling purposes in our power plants. We should dig out recirculation canals and pools to reuse the cooling water as much as possible. Although there may be some loss due to evaporation, the overall benefit would save millions of gallons of non potable water for other purposes, such as irrigation projects for all parks or major commercial facilities.

1) LEEDS is never mentioned or encouraged? Perhaps one reason is that to get point for irrigation non-potable or 'collected' site water is a must?

2) It is my understanding that State law 'forbids' 'collected' water (if true then we NEED to change that law). If 30% of all developed property ends up being paved over and another 30% is roofed, then we should be allowed to 'collect' that 60% and apply it to the rest of our 'landscape'. Let me do some math. Site 43,560 sq ft. (one acre). Assume 15"/yr moisture falls on it all. Currently 60% or .6 acres is impervious and this means developed property sheds 244,387 gallons of water off site. It is all water that would normally soak into the ground anyway. Why is it we must instead 'import' water from hundreds of miles away on the western slope??? Instead we are paying storm drainage fees to handle this runoff? What is wrong with this picture? People who live on islands around the world have had to collect rainfall for hundreds of years. Why not us?

3) State also again I am told puts 'severe' restrictions on using non-potable on park projects, residential or even commercial if pedestrian traffic is allowed. This makes it almost impossible if not surely impractical to consider this option??? Again, I feel this MUST be changed. It only makes sense to use non-potable for irrigating our landscapes and save potable for human consumption. 'We are all in this together' and that should include

the State and/or Feds.

4) Residential program 'enforcement' and cost to monitor to benefit ratio I believe would be very challenging versus reward. Thousands of applicants? Who reviews? Who teaches each individual homeowner how to 'submit'? What kind of plan is acceptable? Can it be submitted as a 'sketch'? What liability does the City incur for approving plans? Commercially submitted plans by 'trained' consultants already regularly take 4-6 weeks to 'review' under the current Code. Would Residential loading add to this? Who would inspect and approve final install? If install 'Phased' will each Phase be inspected? Sound expensive to me? Who bears this cost?

5) Leakage of old fixtures is a known problem on interior fixtures. Old or non-maintained irrigation components also 'leak'. Without, however, separate or parallel water meters to isolate flows, we cannot 'see' these leaks. Cracked mainlines waste MILLIONS of gallons before ever being 'noticed'. At a very minimum ALL irrigation systems should have a Master Valve! All irrigation systems wear out. Problem is homeowners operate them till they fall completely into disrepair. With each passing year even a well designed, well installed system will become less efficient if not maintained properly.

6) I did several residential water audits last year for CSU. Two things ALWAYS came up. First, not one homeowner EVER checked to see if irrigation system was working on a preventative maintenance basis. Virtually EVERY consumer was shocked to find so many sprinklers were 'just not working' (clogged, missing, damaged, tilted, adjustment failure, vandalism, mowing mishaps) during our walkthroughs?! Second, not one customer knew what 'seasonal adjust' was or how to set their sprinkler controller to accomplish this water saving measure. Many were actually 'proud' of the fact they had 'purchased' a 'new' clock and got the rebate offered by CSU, but were never educated on "HOW TO SET IT UP"??? Lot of good that did?

7) Lastly, rebates should be expanded to include flow sensors, master valves, ET monitors.

Received 12/6/2007

Really nice job on your plan! I am excited to see Springs Utilities moving forward in such an aggressive and positive direction. You are definitely setting a great example for the other utilities in the basin.

Upon reviewing the plan I did have one concern. On page 52, paragraph 4 it states; "The Fryingpan-Arkansas collection system diverts water from the headwaters of the Fryingpan River and from the Ark River." In reality the "collection system" is only on the west slope and diverts water from the Fryingpan River and Hunter Creek, a tributary of the Roaring Fork River.

May I suggest this wording instead:
The Fryingpan-Arkansas (Fry-Ark) Project provides water through its west slope collection system. The collection system diverts water from the headwaters of the Fryingpan River and from Hunter Creek, a tributary of the Roaring Fork River. When in priority, Fry-Ark

storage facilities on the east slope divert and store Arkansas River water.

Please let me know if you have any questions or concerns. Thank you and kudos to all on a job well done!

Received 12/10/2007

I read through the draft for the water conservation plan and am impressed by how comprehensive it is. My main interest is in the area of landscape water conservation. I am a landscape designer. As designers trying to conserve water our biggest obstacle is in the landscape covenant/rules for the new developments. There are still many of them that have minimum sod requirements, plus require us to match the neighbors' yard with like kind of material. So if the neighbor has sod along the property then we would have to match it. Not only does it result in sod installation but forces us to put sod in inappropriate locations. Too much shade, poor drainage etc. This issue may have already been addressed at the meetings, but if not it would be worth bringing up.

I am a resident of Colorado Springs and a multiple property owner. I am also a member of the Wastewater Advisory Group. Below are my comments to the Water Conservation Plan. These are my thoughts and opinions. Overall I think it is a solid plan and well presented, I do think it lacks aggressiveness and lacks incorporating real numbers in the goals that can we can then later on measure to.

Page 5 - Formal update to the plan should be made every three to four years. Every seven or more years is too long.

Page 12 - The goals are weak, not aggressive enough and lack detail.
1. Goal is open ended. Consider - Reduce residential use per capita by 5% per year for the next five years.
2. Incorporate above type goal for commercial users.

Page 13 - Under Programs I do not see a Residential Landscape Code and Policy? Does this mean there is no change proposed?

Page 14 - Residential New Construction. Lacks aggressiveness. Need a goal that specifically reduces turf. For example "all new residential construction shall be limited to a maximum xxxx sq. ft of turf."
Peak Day program lacks detail.

Page 15 - AMR Data Access - Change "Utilities hopes to provide" to "Utilities will provide" (second sentence).
Residential New Construction - Again lacks aggressiveness, need to reduce turf. Get some real numbers/goals in here that can be measured to.
Residential Outdoors - Why are we waiting until 2013 for the sprinkler check? Go for 2010 at the latest.
Commercial Outdoor - Same comments as for residential. Limit the amount of turf they can install.

Page 23 - Don't think the last sentence should be included as it opens up conversation about Utilities staffing in general. This is not pertinent to the subject at hand.
I don't see any discussion about increasing the use of Non Potable for irrigation, Why?

Page 29 - Commercial Seasonal Rates - The Summer rate is not high enough to force their reducing irrigation uses. Also their Winter rate should be at least 1.6 cents.

Thank you for the opportunity to comments and I hope you find some of my comments useful.

I had a question on the turf removal that is mentioned on pages 19, 21, and 25. When turf is removed, what will it be replaced with? I'd be concerned with impervious areas. There was a separate program that required turf removal with conversion to native but the program I'm concerned with didn't mention this.

Also, what is the pressure washing program mentioned on page 20? I guess this one didn't make the cut. Just to be aware if you didn't know, the State regulates pressure washing (document attached). The State is working on a new MINDI for some types of outdoor washing. These would need to be accounted for with any pressure washing program Springs Utilities considers.

Received 12/15/2007

I applaud the Colorado Springs Utilities continued pursuit of water conservation. The action plan articulates some very important education and incentive based programs that will continue to help the conservation effort. Many of these same ideas have been responsible for the significant water savings that the community has seen over the past couple years. I believe that these education and incentive measures including the wildly successful block rate programs are the answer to future conservation goals, and that mandates, landscape ordinances, and landscape restrictions are a path that Colorado Springs should avoid completely.

Restrictive residential landscape ordinances reduce artistic expression, increase substantially the cost of the landscape, and reduce the individual utility of the landscape. Design elements including plant selection do play a role in water use within a landscape, but this role is very subordinate to many other factors including ground preparation, irrigation design, and most importantly, post installation landscape maintenance. Simply put, the primary factor in water use within the landscape is how much water the property owner places on the landscape.

In this conservation plan, the authors rightly identify how contentious ordinances tend to be as tools for water conservation. This is particularly true in a residential landscape ordinance or an establishment permit with objective restrictions placed on landscape design. By its nature landscapes are subjective expressions of art and individual needs and utility. Placing design constraints, especially with plant coverage maximums is contrary to the artistic and individual nature of landscaping.

The plan not only over-estimates the water savings of restricting design elements within the landscape but underestimates the costs associates with ordinances in the landscape process. A residential ordinance that restricts plant coverage including turf coverage would escalate the cost of a residential landscape significantly and would reduce water use negligibly. The greatest cost, though, would come in the loss of individual expression.

While I am a believer in proper ground preparation as a tool to reduce water usage, I am wary that the landscape establishment permit proposal is a backdoor method to a restrictive landscape ordinance. And for that reason I would rather favor a plan that encouraged education over a permit process to encourage proper ground preparation.

The successes of education and a block rate billing system are evident in the per resident water saving over the past few years. This is the path that Colorado Spring Utilities should continue down. Enhance these programs and keep the ordinances out of the landscape.

Introduction:
Western Resource Advocates appreciates the opportunity to comment on the Colorado Springs Utilities (CSU) Draft Water Conservation Plan and hope that CSU will take the following comments into consideration in finalizing the Plan.

We commend many elements in the draft Plan, including the analysis on cost of implementation of various conservation measures and the screening criteria used to prioritize future actions. We hope our suggestions, below, will improve the Plan, its implementation, and its ability to serve as an educational tool for interested citizens.

Some of the areas we feel could be improved include the CSU water rate structure, outdoor conservation (in both the residential and commercial sectors), leak detection and repair, and the clarity of target dates for water savings. CSU has great water savings potential. The final Plan should not underestimate the community's potential for managing water demand. Setting realistic and attainable goals is in the best interest of the community as it can help to save residents money by delaying or even obviating the need for costly water projects that usually carry a price tag far greater than that of water conservation.

Overview:
Currently, CSU has one of the lowest rates of single family residential per capita water use along the Front Range. CSU's system-wide per capita use, however, is considerably higher. Many other Colorado cities, including Aurora and Boulder, have much lower rates of system-wide per capita use. With so much projected growth, setting realistic, but strong conservation goals now and incorporating them into supply planning will help to prepare the utility for a future of continued economic growth and sustainable development, and help the utility to meet its goal of being a "national leader in water conservation and efficient water use."

Water Rates:
According to the draft Plan, increasing block rates for residential use and seasonal rates for

commercial use are likely to result in more water savings than any other measures examined (p. 13). It is unclear from the draft Plan, however, exactly what water rates (existing or revised) will realize these savings. WRA's analysis of rate structures (including our most recent comparison of water rates found in the November 2007 *Front Range Water Meter*[1]) indicate that CSU could greatly improve the conservation price signal by adjusting its rate structure, especially for monthly water use that exceeds 18,700 gallons. We would encourage CSU to increase the effectiveness of its rate structure by targeting both low and high volume users as well as continually re-examining the level at which each block is priced. Similarly, we recommend that CSU continue to keep its fixed monthly charge relatively low, to allow the consumption rate to send an effective price signal (see *Front Range Water Meter* at 13-16).

Ordinances, Especially for Outdoor Use:
We strongly encourage you to examine city ordinances that can help further reduce water demand throughout the CSU service area. In addition to water waste and time-of-day ordinances (draft Plan p. 16), we strongly encourage CSU to work with city council to adopt turf grass limits and soil amendment requirements for new commercial and residential areas, as well as point-of-sale retro-fit requirements for indoor appliances. Ordinances of this type have been implemented in communities across the Front Range (indeed across all of the southwestern U.S.) with great success in reducing demand. Relatedly, CSU's draft Plan notes landscape codes and audits are among the highest water saving measures. We would highly recommend implementing these measures in the near future to continue to conserve water now and long into the future.

Ordinances and incentives should be expanded to include the single family residential sector and to focus even more on new homes to lock in water savings for years to come. The draft Plan includes implementing the residential "slow the follow Colorado" program in 2013; this should be moved up to fit inside the Plan's proposed time-frame—2012.

Ordinances are only as effective as their enforcement mechanisms. While it is good to have ordinances on the books, it is imperative to have enforcement mechanisms in place to ensure that those ordinances are working as they were intended. Far too often the later is left out and ordinances consequently fall short of their projected savings potential.

Commercial Water Use:
Commercial sector conservation currently has few conservation programs but the sector is forecasted to largely drive demand over the next decade. Consequently, it is essential that strong, effective commercial program be implemented. While the draft Plan discusses some commercial indoor and outdoor measures (p. 15) it does not provide much detail of when these would be implemented or how much water would be saved. Given that commercial water use currently accounts for 25% of total sales (draft Plan p. 41) and the expanding role of commercial use in coming years, better defining projected water savings and timeframe is important to successful implementation.

[1] Western Resource Advocates, *Front Range Water Meter: Water Conservation Ratings and Recommendations for 13 Colorado Communities* (2007) at 10-16.

Future Growth:
With CSU's growing population it is essential that the city work with developers to encourage the construction of water efficient homes that embrace the semi-arid landscape of Colorado while still maintaining the high quality of life that attracts people to the area. *The Costs and Financial Benefits of Green Buildings: A Report to California's Sustainable Building Task Force* finds that "an upfront investment of less than two percent of construction costs yields life cycle savings of over ten times the initial investment."[2]

Many nearby communities are taking steps to build homes with water efficiency in mind. For example, the City of Broomfield's municipal code states that "Not more than sixty percent of the landscape area of any single-family or multiple-family residential lot shall be comprised of turf grass,"[3] thus encouraging the use of more drought-tolerant plants that need little or no irrigation. Furthermore, the Broomfield has adopted efficient irrigation and soil preparation standards[4] (see also comment on "Ordinances" above).

Developers who have embarked upon such projects have found that these homes sell for very competitive prices.[5] Working with developers would help staff shape the water-related impacts of development and make the city a leader in water efficient homes in Colorado.

Cost-Effectiveness:
The CSU draft Plan demonstrates (see, e.g., Table 2 at p. 14) that water conservation is quite inexpensive, with many measures costing less than $1000/acre-foot.[6] We strongly encourage CSU to use this analysis to select conservation programs and to share this cost-effectiveness information with other utilities.

Goals and Implementation Issues:
As the draft Plan notes (p. 9 & p. 16), recent amendments to Colorado law require an analysis of how much water conservation has already taken place and how much CSU plans to achieve in the future. While CSU does present a savings percentage goal (bottom p. 16) it is related to a time period outside of the scope of the Plan. The draft Plan should include the savings goal inside the planning period—i.e., 2012—and include that information in Table 3 and Table 4 (p. 17).

The draft Plan presents some data on unaccounted for water (Figure 13 & Table 26, p.59) but fails to include any water savings goals for unaccounted for water (UFW). Although it is true that the American Water Works Association uses 10% UFW as a general measure, many other cities in Colorado have rates of 6% or even lower (see *Front Range Water Meter,* p.15). What might CSU do to improve (i.e., lower) its rate of UFW?

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[2] Greg Kats et al, *The Costs and Financial Benefits of Green Buildings: A Report to California's Sustainable Building Task Force*, http://www.ciwmb.ca.gov/GreenBuilding/Design/CostBenefit/Report.pdf, October 2003
[3] City and County of Broomfield, 2006 Municipal Code §17-70-010 (ord. 1721- 2003).
[4] Id.
[5] Personal communications with Civano engineers, Alan Nichols and Jason Laros (June 2006).
[6] CSU figures are consistent with the Statewide Water Supply Investigation's conclusion that many conservation measures cost $1000-2000 per acre-foot. See Colorado Water Conservation Board, *Statewide Water Supply Initiative Report* (November 2004) Appendix E, p. 44.

Although the draft Plan notes "Implementation Steps" (p. 32) it is unclear where CSU is on this ten-step path for any particular measure or program. Should the reader assume that CSU has completed all ten steps for some of the programs? all of the programs?

Finally, and critically, the conservation goals articulated in the final Plan must be integrated into the water demand forecasting inside of CSU's supply planning efforts, including the alternatives analyzed in the proposed Southern Delivery System.

Conclusion:
We strongly urge CSU to adopt an integrated and multi-faceted approach to water planning and conservation, which includes setting robust, yet attainable conservation goals that set CSU on a path towards long term sustainability and make it possible for the city to reach its goal of becoming a "national leader in water conservation and efficient water use." WRA looks forward to working with CSU as it moves toward pro-active, conservation-oriented solutions.

We would be happy to meet to discuss any of these comments at your convenience.

Received 12/17/2007

I have reviewed the Water Conservation Plan and find it to be thorough. I would respectfully urge you to work with the School Districts in the CSU service boundary area to make this plan (or excerpts from it) mandatory reading for all of our school age children. It is an important lesson in civic responsibility. Thank you!

APPENDIX B – TECHNICAL REVIEW OF PROGRAM ALTERNATIVES

Overview

Great Western Institute (GWI) was retained by Colorado Springs Utilities (CSU) to review its ongoing water conservation planning efforts that will ultimately be used to develop and submit a plan to the CWCB for review and approval. Specifically, GWI focused its efforts on reviewing the CSU program alternatives analysis model (hereafter "the model") including program assumptions and calculations for purposes of commenting on the following:

- The appropriateness of the model to support the WC plan development including the model assumptions and spreadsheet mechanics;
- The reasonableness of the specified water conservation goals; and
- The effectiveness of the selected measures and programs in creating measurable results of saved water.

GWI will also comment upon the need for effective monitoring and verification efforts related to the proposed water conservation measures and programs, since the model does not provide for the explicit definition of expected monitoring and verification activities.

Data Provided

GWI met with Mr. Scott Winter of CSU on October 11 to receive hard copies of selected portions of the model, including:

- Revenue forecast;
- Water use per capita with higher population, corrected population sums and revised security population;
- Detailed list of labor and marketing assumptions;
- Summary of water conservation measures and programs annual savings and costs;
- Stream of costs, savings and benefit analyses for commercial high efficiency urinal rebates, commercial high efficiency toilet rebates and the water waste ordinance;
- Estimates of water savings and costs for ongoing water conservation measures and programs;
- 2007 water conservation plan Progam Implementation Schedule; and
- Various excel graphs related to predicted water conservation effectiveness over time.

During the meeting, Mr. Winter explained the background of the model, including some of the assumptions and processes used to develop the model (e.g., revenue forecasts) and how past modeling efforts were used to develop model inputs and support model assumptions (e.g., Maddaus's 2003 Evaluation of Water Conservation Program efforts). As a follow-up to the meeting, GWI was provided with the spreadsheet model on October 30th for review and comment. Therefore, based on the meeting and subsequent communications, GWI conducted a review of the information provided, including the specific assumptions used to estimate future water savings and costs for selected measures and programs.

Review Comments

The model that GWI reviewed is robust and comprehensive. Overall, the model does an excellent job of organizing and combining the various data into the backbone of a comprehensive water conservation plan. The detail that is presented and contained within the model, from the revenue forecast that includes estimated rate increases over time to the detailed costs estimates and water savings predicted for each individual water conservation measure and program, is extraordinary and will prove to be valuable both during the preparation of the water conservation plan and performance of future plan updates.

There are a few areas of the model that improvements can be made to improve its future usability. Specifically, the cost assumptions used to support the project implementation schedule need to be more clearly documented. The costs presented in the assumptions worksheet include organization wide costs, whereas the costs in the project schedule implementation worksheet are those for the conservation section only. The assumptions worksheet should include columns showing both the total costs for the organization and for the conservation section to make it easier for future model users to understand the source of the implementation costs. The assumptions worksheet should include assumptions for all categories of expected future costs including labor hours, labor costs, incentive costs and other costs.

The cost estimates in the project implementation schedule also need to be developed using a more consistent set of assumptions. It will be important for the model to be simplified to the extent possible, in part through improved documentation of assumptions in the assumptions worksheet, such that future model users can more readily access and understand model assumptions.

Another potential area of improvement recommended by GWI relates to the documentation of future water savings. Some of the water savings are developed using detailed assumptions listed and documented on individual worksheets developed for each measure and program. Other water savings are estimated using methods that are not well documented. Again, this comment relates chiefly to the need for better documentation to improve future model usability. The summary sheets that have been partially developed will be completed to a consistent end before the model is finalized and used to support the water conservation plan. It is anticipated that a summary sheet will be prepared for each measure and program that CSU will propose to implement in the water conservation plan.

It is important to understand the meaning of measures and programs within the framework of the CSU water conservation plan. Based on the prevailing literature (e.g., Water Use and Conservation, Amy Vickers, 2001), measures include both hardware devices and practices that actually reduce demand, whereas programs are strategic combinations of activities and measures (e.g., education and incentives with measures) that will bring about reduced water use demands. To this point, hardware measures are typically more reliable in achieving long-term water savings because they typically need to be installed only once and require no ongoing effort to maintain creating water saving. In contrast, educating water users to adopt low-water-use or native landscaping and irrigation practices can require considerable time and ongoing reminders are needed if water-efficient landscape and irrigation practices are to be maintained. The best water conservation programs link hardware installations with practices that support behavioral

changes such that end user water demands are measurably reduced to levels that can be maintained and sustained. This is exactly the approach that CSU is proposing to take.

The water conservation measures and programs are focused on those activities that will occur over the next ten years, or until 2017. Any planning horizon beyond this time period, albeit valuable for long range and strategic planning, is wrought with extrapolations and estimates that do not necessarily support the short and midrange planning that is needed to develop the tactics which must be included in the water conservation plan. Therefore, this review will focus its efforts chiefly on an evaluation of the activities planned for the next ten years.

Staging future water conservation activities into a ten year time period serves a key function for CSU – it allows CSU to respond to how end users embrace and engage the various measures and programs being promoted and provided by the utility. As indicated above, behavioral changes, which occur as a result of institutional, business, association, and/or individual customer's response to key water conservation measures and programs, are important components of any water conservation effort. Meaningful water conservation requires that end users respond to the education, request and utilize rebates, conduct audits and/or adhere to ordinances being implemented by the water utility for water demand to be reduced. Given that behavioral changes strongly influence the acceptance and effectiveness of any water conservation measure or program, it is imperative that continuous and deliberate monitoring and verification of the proposed activities occur, and that the information collected is used to refine and alter the ongoing programs as they are implemented in response to customer behavior. CSU is proposing to implement monitoring and verification activities for just this purpose.

To this point, having water conservation measures and programs that include explicit means to monitoring customer/end user acceptance and adherence is vital to the overall success of the water conservation plan. Monitoring customer water use becomes increasingly important as water conservation programs mature, such as those measures and programs that CSU has implemented and is looking to implement. Therefore, key components of any revised or newly developed water conservation program must include individual customer water use tracking for existing customers, substantial education for new customers (including both residential and commercial water users), and the use of deliberate customer feedback mechanisms such as surveys and polling to track perceptions and behaviors.

Program Breadth

The overall water conservation program is very well conceived and organized. The first one to two years of planned measures and programs leverages ongoing residential programs such as clothes washer and high efficiency toilet rebates with water conservation education to maintain current levels of water savings. During this same time period, CSU plans to develop and initiate implementation of key (and vital) commercial water conservation programs related to both the management of indoor and outdoor water demand.

Within three years (i.e., by 2010), the current residential programs (aside from toilet and washer rebates and customer education) will be phased out and the majority of CSU's water conservation resources will be used to improve commercial and residential outdoor water use. This is an appropriate focus for CSU given the expected growth in the commercial water use

segment, and the current lack of measures and programs that have been implemented to support improved water conservation with CSU various commercial and residential customers.

Beyond 5 years, CSU looks to expand its water conservation programs to address builder incentives for residential construction. This is a valuable area for CSU to extend its water conservation activities, especially given the expected residential growth expected in the CSU service area. It is appropriate to postpone the development of builder incentives for some period of time (3 to 5 years) until specific programs are tested and evaluated in cooperation with the construction and land development community, both locally and in concert with regional, statewide, and national efforts (e.g., EPA's water sense program will have matured to help identify appropriate builder specific actions that achieve water savings).

By 2017, CSU will have a much different water conservation program than it currently operates. This is due in part to the CSU's intent to more directly address and support commercial water use conservation efforts. It also reflects CSU's desire to improve water efficiency regarding new construction leveraging expected improvements in new construction water conservation measures and programs that will be developed locally and by other western states. Overall the breadth of the CSU water conservation program implementation is well conceived and well documented, due in part to the comprehensive nature of the model.

It will be nonetheless imperative for CSU to develop explicit monitoring and verification procedures for each of the 25 measures and programs that are planned to be implemented to ensure that future water conservation efforts are based on quantifiable results to the extent possible (noting, of course, that water conservation education, which adds to each and every other implemented water conservation measure and program is not readily measured and verified as a stand alone effort).

Water Savings and Costs

The water savings that are predicted by CSU are fairly reasonable given the breadth of planned water conservation measures and programs, and the amount of resources that CSU is planning to commit to the implementation of these measures and programs. Nonetheless, GWI suspects that water savings will not be realize as quickly as predicted. This is due to the expectation that the measures and programs designed to support improved commercial water use efficiency will require more time than is currently budgeted to realize "real" water savings, due to the time required for data collection, customer acceptance, and customer implementation (which will be based in part on commercial customer annual budget cycles and cost benefit analyses).

GWI expects that predicted water savings due to the "expanded program savings" should be reduced for the period from 2008 to 2013 since there will most likely be a time lag between the implementation of the new commercial water savings programs and realized water savings. The predicted water savings for 2015 are reasonable; however, to realize the predicted 2015 water savings, it is vital for CSU to push water conservation education to new commercial and residential customers, including the new military users, during the 2008 to 2013 time period.

The cost of water saved for each of the 25 proposed water conservation measures and programs carried in the model are reasonable, although some of the commercial programs will likely be

more cost effective than indicated. For example, builder incentive programs can be highly effective depending on the nature of the program.

In addition, commercial indoor audits can also be more cost effective, especially if the audits are followed with deliberate account tracking of individual accounts and regular feedback to those commercial customers that have implemented indoor improvements. This program can be further enhanced by publicized certification and awards.

Residential irrigation equipment rebates may also be more cost effective than currently represented. It is admittedly challenging to implement residential irrigation equipment rebates given that homeowners typically cannot install and program new equipment without a plumbing or landscape contractor, and therefore it is often the case that homeowners do not appropriately operate irrigation equipment correctly. However, if the irrigation rebate is combined with the tracking of an individual residential account to verify that improved outdoor water use occurs, this specific measure can be substantially more cost effective. Similarly, the residential sprinkler check program, which can be offered in concert with local non-profit organizations that are subsidized by the State (e.g., Center for Resource Conservation out of Boulder), can be substantially more cost effective in concert with individual account tracking and individualized customer feedback.

The water savings for new commercial rebates and audit programs may be higher than predicted, especially during the first few years of program rollout; however, some of the costs related to implementing these new programs are probably imbedded in the water conservation education effort – noting that commercial customer education and awareness regarding CSU's efforts will be vital for the utility and its customers to realize water savings.

Lastly, the water savings that are expected to occur due to water conservation education seem somewhat inflated. As indicated above, water conservation education will go "hand in glove" with the other measures and programs that CSU is planning to implement such that water savings related to solely to educational efforts may be less than predicted. With strong marketing and enforcement of new water waste programs, and substantial marketing and penetration of the commercial and residential rebate programs (linked closely to training and customer audits), the overall savings predicted by the model are certainly attainable.

To this last point, the water savings and related cost of saved water are fairly consistent with the current state of the science, with the exception of water pricing, as noted below. There may be small discrepancies for any specific water conservation measure and/or program; however on the total, the plan provides a reasonable prediction of long-term water savings and costs.

The water pricing strategy that CSU proposes to implement to reduce water demand, including both residential inclining block rates and to a lesser extent commercial seasonal pricing, may not provide the savings expected. Water rates have been shown via recent studies (e.g., Kinney, et. al., Residential Water Demand in Aurora: Learning from Drought Crisis. Colorado Water Resources Research Institute February-March 2007; and Howe and Goemans, Journal of AWWA, October 2007) to produce elastic results (i.e., residential response to rate hikes does not necessarily correlate to water savings). Water savings related to residential water rate structures,

which were predicted to be the second largest savings of any CSU proposed measures and programs, is not necessarily consistent with the current state of the science.

The relative elasticity of inclining block rate structures is fairly well documented. Therefore, the basic concept of linking water use to cost, which is a good one, is limited in its effectiveness since water in the US is generally undervalued (CSU's top rate of slightly over a nickel for one cubic foot of water in 2017 would translate to a cost of about $250 for a residential customer to fill a backyard swimming pool with potable drinking water). However, increasing water rates based on water usage when coupled with other meaningful water conservation measures and programs, as CSU is doing, improves the effectiveness of water conservation pricing. Nonetheless, it remains to be seen if inclining block rates for residential customers and seasonal pricing for commercial customers can produce the water savings predicted. Careful monitoring and verification of this program will be needed to ensure that the overall water savings predicted by the model actually occurs – either temporarily or permanently.

Monitoring and Verification

The value of water conservation in terms of generating "true" saved water (which relates to return on investment and, in the end, supports the fiduciary responsibility of CSU as a water utility) is based on the effectiveness of the monitoring and verification effort to identify and quantify water demand reductions. To this point, the model did not provide an explicit definition of monitoring and verification tactics that CSU will implement to quantify water savings. Therefore, it will be imperative that CSU not only identify and detail the monitoring and verification activities that will be performed, by individual customer and customer type, but clarify how the data obtained through the monitoring and verification programs will be used to verify, refine and adjust the proposed water conservation measures and programs as information is collected and processed. The ultimate success and effectiveness of the water conservation plan will be dependent on the usefulness and applicability of the monitoring and verification program.

One key component of the monitoring and verification program should be the deliberate and regular use of customer surveys and audits. The vast majority of the marketing assumptions and related cost estimates for each of the 25 water conservation measures and programs identify in the model include paid media, collateral, direct mail, first source and related expenses. However, it is imperative that CSU utilizes formal and well funded customer feedback mechanisms such as surveys, focus groups and/or audits to gather information regarding end-use behaviors and responses to the proposed measures and programs. Without deliberate feedback mechanisms, the best conceived water conservation programs can flounder and become ineffective since the success of most measures and programs is reliant upon behavioral changes in the utility's customer base. Only through surveys, focus groups and/or audits can CSU gather the necessary information to understand and respond to its customer's behaviors, needs and desires regarding water use and water conservation.

It is unclear as to how feedback mechanisms are embedded in the proposed water conservation measures and programs to appropriately monitor the effectiveness of the proposed water conservation measures and programs and verify the projected water savings – by account, by water use segment and overall. Nonetheless, it is clear that there is a discrepancy between the

current conversation staff resources and those needed to support development and implementation of the proposed measures and programs. Therefore, additional staff resources and outside professional services will be needed to effectively implement, and collect and characterize customer response to the various proposed measures and programs; and to verify predicted water savings. Based on the predicted level of customer penetration, at least 2 new FTEs will be needed to support the ongoing and proposed water conservation efforts; however, if additional penetration, and therefore water savings are needed, then additional conservation section resources in the form of staff and outside professional services will be required.

Summary

The model that GWI reviewed is robust and comprehensive. Overall, the model does an excellent job of organizing and combining the various data into the backbone of a comprehensive water conservation plan. Suitably, the water conservation measures and programs are focused on those activities that will occur over the next ten years, or until 2017. The model is predictably more accurate for this shorter period of time.

The overall water conservation program is very well conceived and organized. Of particular importance and effectiveness is the proposed phasing of residential and commercial measures and programs. CSU appropriately plans to utilize ongoing residential activities to improve current water efficiency, while more robust commercial programs are developed. By 2010, resources within CSU are shifted from residential programs to commercial programs, improving water use in the utility's two key customer bases – residential and commercial.

Although CSU has estimated the need for an appropriate amount of additional resources, in terms of staff time and funds, to implement the proposed water conservation measures and programs, it is somewhat unclear how CSU will verify that the predicted water savings have actually occurred. Therefore, it will be imperative that CSU develop explicit monitoring and verification procedures for each of the 25 measures and programs that are planned to be implemented to ensure that future water conservation efforts reduce water demand in an appropriate and cost effective manner.

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APPENDIX C – PROGRAM ALTERNATIVES ANALYSIS

Springs Utilities was rigorous in its analysis of costs and savings. The model was developed using industry accepted practices and standards. Many of the inputs and assumptions were based on previous work conducted by Maddaus Water Management (*Evaluation of Water Conservation Program, Final Report, July 2003*). As described in *Appendix B, Technical Review of Program Alternatives*, Springs Utilities retained Great Western Institute (GWI) to review the model for appropriateness, effectiveness and reasonableness.

The model consists of six summary worksheets and twenty-two program worksheets. The summary worksheets include an assumptions sheet, a *detailed* program implementation schedule, existing program summary, proposed program summary, summary tables and summary charts. The individual program worksheets provide painstaking detail regarding the 40-year stream of costs and savings for each individual program.

The model is a dynamic document that will be used to quantify and track costs and savings for individual programs over time. In addition, the model will compare projected and actual demand-side management (DSM) savings. The model will enable Springs Utilities to routinely analyze water conservation program alternatives. Samples of the program summary sheets are provided for the builder incentive program and the commercial high-efficiency urinal program.

Table 31: Sample Technical Analysis – Builder Incentive Program

Program Description

The Builder Incentive Program encourages builders to install high efficiency toilets (1.1 to 1.28 gpf), showerheads (1.5 to 2.0 gpm), and weather-based (ET) irrigation controllers in new homes and landscapes and adhere to specific guidelines regarding the design and installation of landscapes and irrigation systems by offering an incentive of approximately half on the anticipated incremental cost. Other devices such as faucets may be included in the final program design, but the above elements contribute to the cost and savings figures. EPA is currently developing criteria for a WaterSense New Home certification which may replace criteria assumed in this analysis.

Start Date	Jan-10
Program Length (Years)	16
Measure Life	Permanent

Sources:
Maddaus Water Management, 2003. Evaluation of Colorado Springs Utilities Conservation Programs
Maddaus Water Management, 2002. Decision Support System Model
Professional estimates

Water Savings

Savings from HETs assumed to be 2,526 gallons per year based on 5.1 flushes per person per day, 2.83 persons per household, 350 days per year, and .5 gallons saved per flush. Savings from showerheads assumed to be 1,925 gallons per year based on 5.5 gallons per day and 350 days per year. Savings from irrigation standards assumed to be 5% percent of estimated annual irrigation use. Savings from landscape standards assumed to be 7.5% of estimated annual irrigation use. Savings from ET controller assumed to be 16% of estimated annual irrigation use minus irrigation and landscape standards savings. Total measure savings assumed to be 18,901 gallons per year in 2010.

2010 Customer Pay-Back Period (Years)	0.08
2017 Program savings (MGD)	0.10
2017 SFR GPCD Reduction	0.19
2017 Peak Day Reduction (MG)	0.30
2017 Cumulative Savings (AF)	430

Sources:
Western Policy Research. Bamezai, Anil, Ph.D., 2001. ET Controller Savings Through the Second Post-Retrofit Year
Vickers, Amy, 2001. Handbook of Water Use and Conservation. WaterPlow Press, Amherst, MA
2007 Colorado Springs Utilities Sales and Revenue Forecast
California Urban Water Conservation Council, 2005. BMP Cost and Savings Study.
Maddaus Water Management, 2003. Evaluation of Colorado Springs Utilities Conservation Programs
Maddaus Water Management, 2002. Decision Support System Model.
Professional estimates

Penetration

2017 Penetration Rate	15% (of new homes participating)
2017 Cumulative Penetration	1,977

Source:
Professional estimates

Costs

Utility Rebate Cost Per Unit	$600
Utility Labor Cost Per Unit	$61
Customer Cost Per Unit	$600
10-Year Levelized Total Cost Per Unit	$1,024
2017 Cumulative Utility Costs	$1,323,354
2017 Cumulative Customer Costs	$1,186,454
2017 Cumulative Total Costs	$2,509,809
10-Year Levelized Utility Cost	$1,559,160
10-Year Levelized Customer Cost	$1,240,525
Total Utility Cost ($/AF)	$9,987
Total Customer Cost ($/AF)	$7,946
Total Cost ($/AF)	$17,932

Sources:
California Urban Water Conservation Council, 2005. BMP Cost and Savings Study.
Maddaus Water Management, 2002. Decision Support System Model.
Colorado Springs Utilities, 2006. Marketing Cost Estimates.
Colorado Springs Utilities, 2006. WCP Labor Cost Estimates.
Labor Cost Analysis Work Session with internal SMEs on October 24, 2006.
Professional estimates

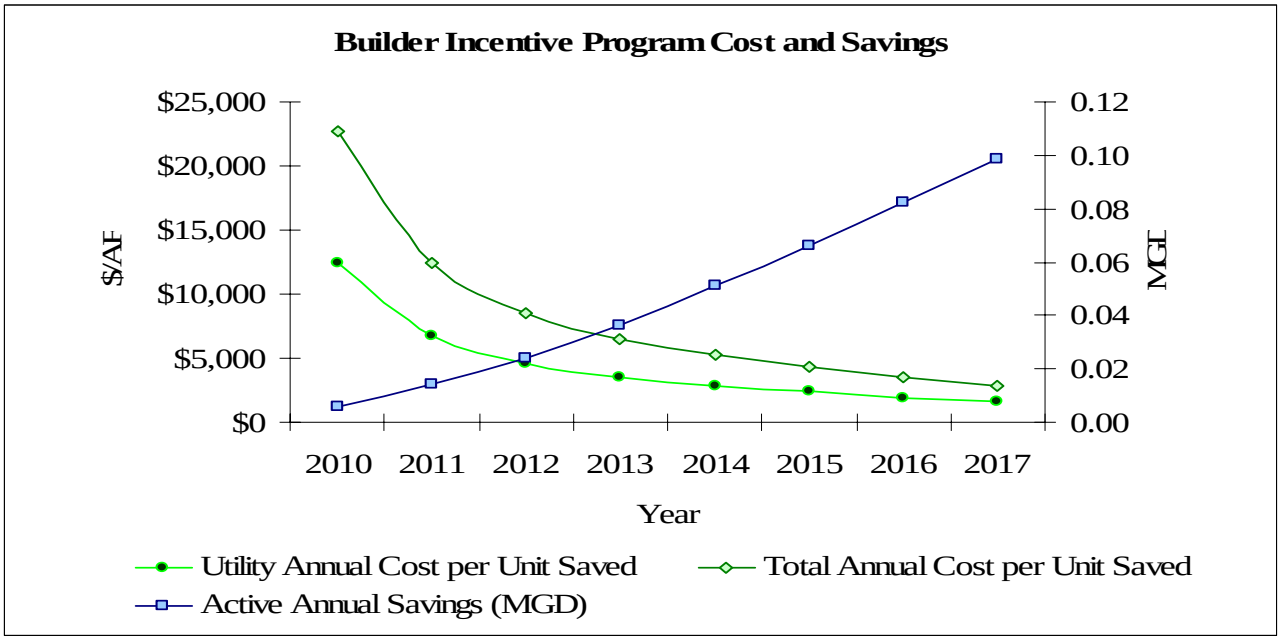


Table 32: Sample Technical Analysis – Commercial High-Efficiency Urinal Rebate

Program Description

The High Efficiency Urinal (HEU) rebate provides an incentive to business customers to retrofit existing low flush (1.0 gpf), intermediate flush (2.5 gpf), or high flush (3.5 gpf) urinals to High Efficiency Urinals (HEUs), which use .25 gallons (1 liter) per flush. The incentive is for retrofit only and is initially targeted at commercial customers with use of approximately 40 flushes per urinal per day or more. The aim however, is to incentivize any commercial customer that is already replacing a urinal to install an HEU. Free ridership is assumed to be a minor issue and is accounted for in the savings calculation.

Start Date	Jan-09
Program Length (Years)	11
Measure Life	Permanent

Sources:
Maddaus Water Management, 2003. Evaluation of Colorado Springs Utilities Conservation Programs
Maddaus Water Management, 2002. Decision Support System Model
Professional estimates

Savings

Assumes 2.4 flushes per person per urinal per day and 19 persons per urinal per day. Assumes 235 days per year of use. The incremental savings per flush is .75 gallons for low flush urinals, 1.75 for intermediate flow, and 3.25 for high flush. Free ridership is assumed to be 10% initially increasing by 2% per year as the technology becomes more accepted and available. Free ridership of 10% is figured into water savings. Penetration rate based on rate of natural replacement which is assumed to be 3%. It is assumed that initially 10% of all natural replacement and new installation is HEUs. This is assumed to increase by 5% per year until reaching 95% at which point the program ends. Annual savings per unit equals 21,806 gallons in 2009.

2009 Customer Pay-Back Period (Years)	0.20
2017 Program savings (MGD)	0.10
2017 Total GPCD Reduction	0.31
2017 Peak Day Reduction (MG)	0.10
2017 Cumulative Savings (AF)	456

Sources:
2007 Colorado Springs Utilities Sales and Revenue Forecast
California Urban Water Conservation Council, 2005. BMP Cost and Savings Study.
Maddaus Water Management, 2003. Evaluation of Colorado Springs Utilities Conservation Programs
Maddaus Water Management, 2002. Decision Support System Model.
Professional estimates

Penetration

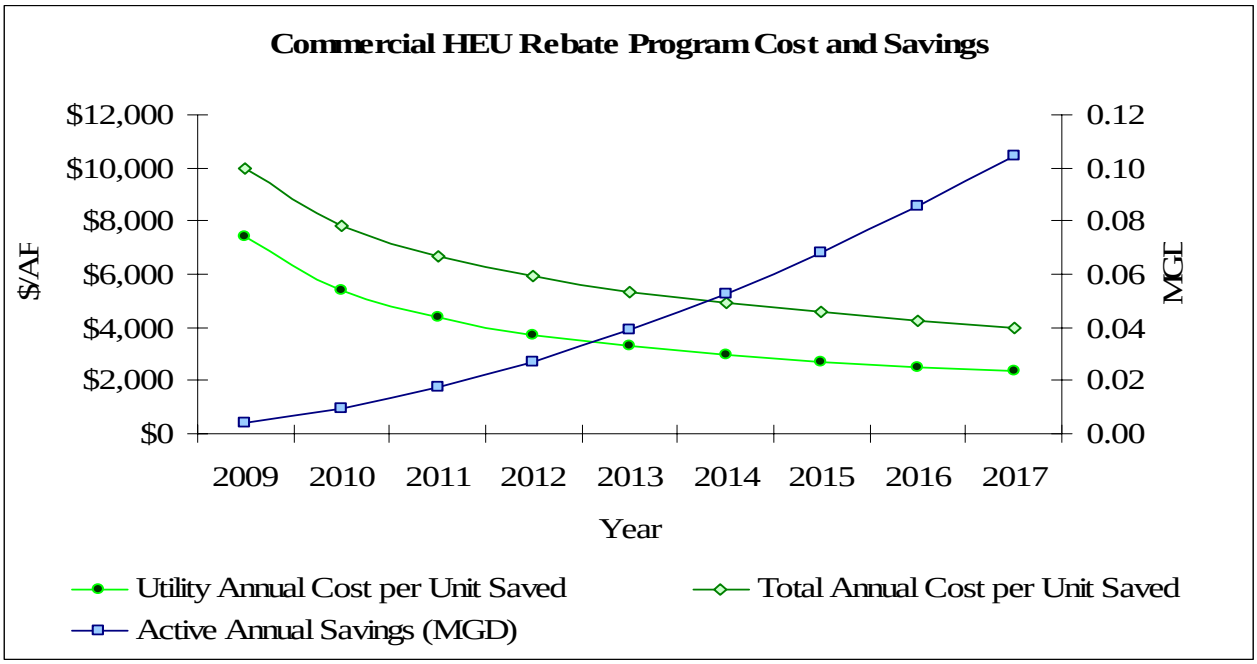
2017 Penetration Rate	50% (of replacement & new)
2017 Cumulative Penetration	3,844

Source:
Professional estimates

Costs

Utility Rebate Cost Per Unit	$100
Utility Labor Cost Per Unit	$69
Customer Cost Per Unit	$150
10-Year Levelized Total Cost Per Unit	$299
2017 Cumulative Utility Costs	$441,578
2017 Cumulative Customer Costs	$299,818
2017 Cumulative Total Costs	$741,396
10-Year Levelized Utility Cost	$452,021
10-Year Levelized Customer Cost	$267,579
Total Utility Cost ($/AF)	$3,201
Total Customer Cost ($/AF)	$1,895
Total Cost ($/AF)	$5,095

Sources:
California Urban Water Conservation Council, 2005. BMP Cost and Savings Study.
Maddaus Water Management, 2002. Decision Support System Model.
Colorado Springs Utilities, 2006. Marketing Cost Estimates.
Colorado Springs Utilities, 2006. WCP Labor Cost Estimates.
Labor Cost Analysis Work Session with internal SMEs on October 24, 2006.
Professional estimates



APPENDIX D – STATE REQUIREMENTS

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

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

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

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

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

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

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

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

(g) "Water conservation" means water use efficiency, wise water use, water transmission and distribution system efficiency, and supply substitution. The objective of water conservation is a long-term increase in the productive use of water supply in order to satisfy water supply needs without compromising desired water services.

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

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

(2) (a) Within five years after June 4, 1991, each covered entity that does not have a water use efficiency plan satisfying the provisions of subsection (4) of this section shall, subject to section 37-60-127, develop, adopt, make publicly available, and implement a plan pursuant to which such covered entity shall encourage its domestic, commercial, industrial, and public

facility customers to use water more efficiently. Any covered entity that makes an initial determination that it has satisfied subsection (4) of this section shall, within five years after June 4, 1991, give public notice of such determination at an official meeting of the appropriate governing body of the covered entity.

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

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

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

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

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

(I) Water-efficient fixtures and appliances, including toilets, urinals, showerheads, and faucets;

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

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

(IV) Water reuse systems;

(V) Distribution system leak identification and repair;

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

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

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

(IX) Regulatory measures designed to encourage water conservation;

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

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

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

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

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

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

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

(7) (a) By July 1, 2005, the board shall adopt guidelines for the office to review water conservation plans submitted by covered entities. The guidelines shall define the method for submitting plans to the office, how the office will prioritize the distribution of moneys, including any additional moneys made available through the grant program, and the interest rate surcharge provided for in paragraph (a) of subsection (9) of this section.

(b) If no other applicable guidelines exist as of June 7, 2005, the board shall adopt guidelines by August 14, 2005, for the office to use in reviewing applications submitted by covered entities and agencies for grants from the grant program. The guidelines shall establish deadlines and procedures for covered entities and agencies to follow in applying for grants and the criteria to be used by the office and the board in prioritizing and awarding grants.

(8) A covered entity may at any time adopt changes to an approved plan in accordance with this section after notifying and receiving concurrence from the office. If the proposed changes are major, the covered entity shall give public notice of the changes, make the changes available in draft form, and provide the public an opportunity to comment on such changes before adopting them in accordance with subsection (5) of this section.

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

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

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

(10) Repealed.

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

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

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

(A) An architect's stamp;

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

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

(D) The adoption of a landscaping change fee.

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

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

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

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

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

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

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

(12) (a) There is hereby created the water efficiency grant program for purposes of providing state funding over a three-year period to aid in achieving the water efficiency goals outlined in locally adopted water conservation plans and to promote the benefits of water efficiency. The board is authorized to distribute grants in accordance with this subsection (12) to covered entities and agencies from the moneys transferred to and appropriated from the water efficiency grant program cash fund, which is hereby created in the state treasury. For the 2005-06, 2006-07, and 2007-08 fiscal years, the general assembly shall appropriate from the fund to the board up to five hundred thousand dollars annually for the purpose of providing grants to covered entities and agencies in accordance with this subsection (12). The general assembly shall also appropriate to the board an amount necessary to cover the costs associated with the administration of the grant program, but such appropriations shall not exceed an aggregate amount of eighty thousand dollars for the three fiscal years of the grant program. However, if less than five hundred thousand dollars is appropriated or expended in the 2005-06 or 2006-07 fiscal year, an amount equal to the difference between five hundred thousand dollars and the amount actually appropriated or expended in that fiscal year shall be available for appropriation and expenditure in the next fiscal year in addition to the five hundred thousand dollars available for appropriation in that fiscal year. Any moneys remaining in the fund on June 30, 2008, shall be transferred to the reserve in the operational account of the severance tax trust fund described in section 39-29-109 (1) (c) (III) (A), C.R.S.

(b) Any covered entity that has adopted a water conservation plan and that supplies, distributes, or otherwise provides water at retail to customers may apply for a grant to aid in the implementation of the water efficiency goals of the plan. Any agency may apply for a grant to fund outreach or education programs aimed at demonstrating the benefits of water efficiency.

The office shall review the applications and make recommendations to the board regarding the awarding and distribution of grants to applicants who satisfy the criteria outlined in this subsection (12) and the guidelines developed pursuant to subsection (7) of this section.

(c) This subsection (12) is repealed, effective July 1, 2008.

Source: L. 91: Entire section added, p. 2023, § 4, effective June 4. **L. 99:** (10) repealed, p. 25, § 3, effective March 5. **L. 2003:** (4)(g) amended and (11) added, p. 1368, § 4, effective April 25. **L. 2004:** Entire section amended, p. 1779, § 3, effective August 4. **L. 2005:** (1), (2)(b), and (7) amended and (12) added, p. 1481, § 1, effective June 7; (11) amended, p. 1372, § 1, effective June 6.
Editor's note: Subsection (12) was originally enacted as (13) in House Bill 05-1254 but has been renumbered on revision for ease of location.
Cross references: (1) In 1991, this entire section was added by the "Water Conservation Act of 1991". For the short title and the legislative declaration, see sections 1 and 2 of chapter 328, Session Laws of Colorado 1991.

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

APPENDIX E – GLOSSARY

acre-foot: A volume of water equal to one foot in depth covering an area of one acre.

annual growth rate: The total increase or decrease in a given area's population during a period of one year divided by the area's population in the previous year. This figure is expressed as a percentage and reflects the number of births and deaths and the number of people moving to and from an area during the year.

aquifer: An underground deposit of sand, gravel or rock through which water can pass or is stored. Aquifers supply the water for wells and springs.

audit (end-use): A systematic accounting of water uses by end users (residential, commercial or industrial), often used to identify potential areas for water reduction, conservation or efficiency improvement.

audit (system): A systematic accounting of water throughout the production, transmission and distribution facilities of the system.

automated meter reading (AMR): The technology of automatically collecting data from metering devices (water, gas, electric) and transferring that data to a central database for billing and/or analyzing.

average-day demand: A water system's average daily use based on total annual water production (total annual gallons or cubic feet divided by 365).

baseline: An established value or trend used for comparison when conditions are altered, as in the introduction of water conservation measures.

beneficial use: Application of water without waste for human or natural benefit.

benefit-cost analysis: A comparison of total benefits to total costs, usually expressed in monetary terms; used to measure economic efficiency and evaluate alternatives.

best management practice: A measure or activity that is beneficial, empirically proven, cost-effective, and widely accepted in the professional community.

block: A quantity of water for which a price per unit of water (or billing rate) is established.

capital facilities: Physical facilities used in the production, transmission, treatment and distribution of water or the collection, treatment and disposal of wastewater.

Clean Water Act: The federal law that sets forth how the United States will restore and maintain the chemical, physical and biological integrity of the country's waters (oceans, lakes, streams and rivers, ground water and wetlands).

Colorado Water Conservation Board (CWCB): A division of the Colorado Department of Natural Resources, the CWCB was created in 1937 for the purpose of aiding in the protection and development of the waters of the state. The mission statement of the CWCB is to conserve, develop, protect and manage Colorado's water for present and future generations.

conservation (water): Any activity that increases the productivity of water supply and use in order to satisfy water needs without compromising desired water services. Includes water use efficiency, wise water use, system efficiency and supply substitution.

conservation pricing: Water rate structures that help achieve beneficial reductions in water usage.

consumptive use: Any use of water that permanently removes water from the natural stream system.

Continental Divide: An imaginary boundary line that runs north-south along the crest of the Rocky Mountains, separating river and drainages that flow west to the Pacific Ocean from those that flow south and east to the Gulf of Mexico.

cost-effectiveness: A comparison of costs required for achieving the same benefit by different means. Costs are usually expressed in dollars, but benefits can be expressed in another unit (such as a quantity of water).

customer segment: A group of customers (residential, commercial, industrial, wholesale) defined by similar costs of service or patterns of water usage.

decreasing-block (or declining-block) rate: A pricing structure for which the dollar amount charged per unit of water (such as dollars per gallon) decreases with the amount of water used.

demand forecast: A projection of future demand that can be made on a system-wide or customer-class basis.

demand-side management (DSM): Measures, practices, or programs deployed by water utilities to permanently reduce the level or change the pattern of demand for a utility service.

demographic: Having to do with population or socioeconomic conditions.

diversion: The removal of water from its natural course or location, or controlling water in its natural course or location by means of a ditch, canal, flume, reservoir, bypass, pipeline, conduit, well, pump or other device.

discount rate: A percentage that is used to adjust a forecast of expenditures to account for the time value of money or opportunity costs; it can be based on the utility's cost of capital.

distribution facilities: Pipes, treatment, storage and other facilities used to distribute drinking water to end users.

drought: A sustained period of inadequate or subnormal precipitation that can lead to water supply shortages, as well as increased water usage.

end use: Fixtures, appliances and activities that use water.

end user: Residential, commercial, industrial, governmental, institutional or other water user that applies water to beneficial use.

Energy Policy Act (EPACT): A 1992 federal law that states, among other things, that after January 1, 1994, toilets for household use may not use more than 1.6 gallons per flush and that showerheads and faucets may not use more than 2.5 gallons per minute.

evapotranspiration (ET): Water losses from the surface of soils and plants.

exchange: A process by which water, under certain conditions, may be diverted out of priority at one point by replacing it with a like amount of water at another point.

firm annual yield: The yearly amount of water that can be dependably supplied from the raw water sources of a given water supply system.

ground water: Water found below the earth's surface, often between saturated soil and rock, that supplies wells and springs.

incremental cost: The additional cost associated with adding an increment of capacity.

integrated resource planning: An open and participatory planning process emphasizing least-cost principles and a balanced consideration of supply and demand management options for meeting water needs.

irrigation scheduling: A method for optimizing outdoor water use by matching the watering schedule to plant needs; can refer to manual or automated scheduling.

leak detection: Methods for identifying water leakage in pipes and fittings.

life span: The expected useful life of a supply-side or demand-side project, measure, or practice.

load management: Methods for managing levels and patterns of usage in order to optimize system resources and facilities.

low water-use landscaping: Use of landscape designs and plant materials that are appropriate to an area's climate and growing conditions (usually native and adaptive plants). See Xeriscape™.

market penetration: The extent to which an activity or measure is actually implemented compared to all potential uses or markets.

maximum-day demand: Total production for the water system on its highest day of production during a year.

measure (conservation): A technology or practice that directly reduces water use.

meter: An instrument for measuring and recording water volume.

National Environmental Policy Act (NEPA): The federal law enacted to ensure the integration of natural and social sciences and environmental design in planning and decision-making for projects that may impact the quality of the human environment.

peak demand: The highest point of total water usage experienced by a system, measured on an hourly or a daily basis.

per capita use: Total use divided by the total population served.

phreatophyte: A plant that obtains water from the water table or the unsaturated zone just above it. Often found along water supply canals, phreatophytes can consume significant quantities of water through evapotranspiration, reducing the availability of water to a water system.

potable: Water that is considered safe for domestic consumption; drinkable.

program (conservation): An action or policy that encourages, requires or otherwise leads to implementation of water-saving measures.

rain sensor: A switching device connected to an automatic irrigation system that causes the system to shut down in the event of rainfall.

raw water: Untreated water.

reclamation: Treatment of used water to make it available for beneficial reuse.

reservoir: An impoundment of collected water controlled by a dam (raw water) or storage tank (potable water).

retrofit: Replacement of parts in an existing plumbing fixture or water-using appliance in order to improve its operational efficiency.

return flows: The unused portion of water that returns to a stream or river after a beneficial use.

reuse (water): The reclamation and recycling of water for a beneficial use.

runoff: Water that flows on the earth's surface to streams, rivers, lakes and oceans.

Safe Drinking Water Act (SDWA): Federal legislation that regulates the treatment of water for human consumption. Requires testing for and elimination of contaminants to levels for the protection of human health.

seasonal rate: A pricing structure for which the dollar amount charged per unit of water (such as dollars per gallon) varies by season of use; higher rates usually are charged in the season of peak demand.

service area: The geographic area served by a water utility.

source of supply: Facilities used to extract and/or store raw water prior to transmission and distribution.

submetering: Metering for units comprising a larger service connection, such as apartments in a multifamily building.

supply-side management: Measures and programs deployed by the utility that improve the efficiency of production, transmission and distribution facilities.

surface water: Water present on the earth's surface.

system (water): A series of interconnected conveyance and treatment facilities owned and operated by a water supplier.

system efficiency: Water conserving improvements to a water supply and distribution system, such as operational changes that stretch supplies or distribution system leak repairs that reduce water losses.

system loss: An amount of water, expressed as a percentage, lost from a water storage or distribution system due to leaks, evaporation, seepage and unauthorized use.

tariff: The schedule of a utility's rates and charges.

transmission facilities: Pipes and canals used to transport raw or treated water to distribution facilities.

transmountain diversion: The conveyance of water from one drainage basin to another across the Continental Divide.

treated water: Water treated to meet drinking water standards.

tributary: A stream or river that flows into a larger one.

ultra-low-flush toilet: A toilet that uses not more than 1.6 gallons per flush.

unaccounted-for water: The difference between the water entering the distribution system and the water that is metered.

water conservation: Any activity that increases the productivity of water supply and use in order to satisfy water needs without compromising desired water services. Includes water use efficiency, wise water use, system efficiency, and supply substitution.

Water Conservation Act: The "Water Conservation Act of 2004," which amended Section 37-60-126 of the Colorado Revised Statutes concerning water conservation planning by covered entities and the role of the state with regards to plan review and approval.

water right: A property right or legal claim to withdraw a specified amount of water in a specified time frame for a beneficial use.

watershed: A regional land area, defined by topography, soil, and drainage characteristics, within which raw waters collect and replenish supplies.

water use efficiency: Technologies and practices that provide the same or better level of end-use service.

wholesale water: Water purchased or sold for resale purposes.

Xeriscape™: Landscaping that involves seven principles: proper planning and design; soil analysis and improvement; practical turf areas; appropriate plant selection; efficient irrigation; mulching; and appropriate maintenance.

APPENDIX F – UNITS OF MEASURE

Abbreviations

ac-ft	acre-feet
cu ft	cubic feet
ccf	hundred cubic feet
gpd	gallons per day
gpm	gallons per minute
kgal	one thousand gallons
mgd	million gallons per day

Conversion Factors

1 acre = 43,560 square feet
1 acre-foot = .3259 million gallons
1 acre-foot = 325,851 gallons
1 acre-foot = 43,560 cubic feet
1 cubic foot = 7.4805 gallons
1 hundred cubic feet = 748 gallons
1 million gallons = 3.0689 acre-feet
1 million gallons per day = 1,121 acre-feet per year

APPENDIX G – REFERENCES

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