Water Conservation Plan

East Cherry Creek Valley
Water & Sanitation District

May 16, 2011

East Cherry Creek Valley
Water & Sanitation District

Submitted by:

DiNatale Water Consultants, Inc.

&

Kennedy/Jenks Consultants

JOB NO. 1146008

Table of Contents

List of Tables

List of Figures

List of Abbreviations

acre-foot (AF) – Unit of volume to measure water, equivalent to an acre of area covered with one foot of water (325,850 gallons)
AFY – Acre-feet per year
AMR – Automated meter reading
AWWA – American Water Works Association
BMP – Best Management Practice
CII – Commercial, Industrial and Institutional
CWCB – Colorado Water Conservation Board
DF – Dual flush toilets (no more than 1.6 gallons per flush for solids and 0.9 for liquids)
ECCV – East Cherry Creek Valley Water and Sanitation District
ET – Evapotranspiration, a combination of water evaporation from soil and exposed surfaces and plant transpiration which is the loss of water from plants
FTE – Full time equivalent
GIS – Geographic Information System
GPM – Gallons per minute
GPCD – Gallons per capita per day
HET – High efficiency toilet (no more than 1.2 gallons per flush)
HOA – Home Owner's Association
LIRFs – Lawn irrigation return flows
MG – Million gallons
MGD – Million gallons per day
RO – Reverse Osmosis
SCADA – Supervisory Control and Data Acquisition
SFE – Single family equivalent
ULFT – Ultra Low Flow Toilet
WTP – Water Treatment Plant

Section 1: Introduction

1.1 Purpose

The East Cherry Creek Valley Water and Sanitation District (ECCV) has been proactive in promoting water conservation and has implemented ongoing water conservation, public education, residential customer rebate and nonpotable irrigation system programs. In response to recent changes in the State requirements for water conservation planning, coupled with new developments in the field of water conservation, ECCV has developed this Water Conservation Master Plan (the Plan). The development of this Plan has been funded in part by a grant from the Colorado Water Conservation Board.

The purposes of the Plan are to:

1. Assess the overall characteristics of current and future ECCV water use.
2. Summarize the current status of raw water supply and treatment capacity.
3. Use this information to frame ECCV's water conservation program with respect to current and ongoing water supply needs and water demand management.
4. Provide a detailed assessment related to the identification and selection of future water conservation measures and programs that ECCV may choose to implement.

Throughout its history, ECCV has provided safe, reliable potable water to its residential, commercial, irrigation, and institutional water users. ECCV is committed to sustainable and efficient use of its water resources and uses an integrated water resources planning approach by implementing and integrating both water supply additions and water conservation measures to manage demands. In response to the sustainability commitment, ECCV has recently developed a renewable water rights portfolio. Although it has made a major effort to develop significant renewable water supplies, ECCV is constantly aware of the need to evaluate and refine its water supply and demand management efforts in light of developing trends and the state of the science. Water conservation technology has improved to the point that water use efficiency can be planned and implemented more reliably and predictably than at any time in the past.

This Plan recommends water conservation measures and programs that will promote, support and sustain efficient water use by ECCV's residential, commercial, irrigation, and institutional customers. The Plan identifies the various stages of water conservation for the next ten years and has been prepared in adherence with the state statutory requirements.

1.2 Organization

This Plan was prepared following the nine steps outlined in the Colorado Water Conservation Board (CWCB) Water Conservation Planning Guidance Document. The nine steps are as follows:

1. Profile of Existing Water System
2. Characterize Water Use and Forecast Demand
3. Profile Proposed Facilities
4. Identify Conservation Goals
5. Identify Conservation Measures and Programs
6. Evaluate and Select Conservation Measures and Programs
7. Integrate Resources and Modify Forecasts
8. Implementation Plan
9. Monitor, Evaluate, and Revise

Each step of the planning process is incorporated in the Plan, noting that steps 8 and 9 will occur only after the Plan has been accepted, approved and implemented.

The Plan is organized as follows:

1. Introduction
2. Profile of existing system and proposed facilities
3. Current water use
4. Existing conservation efforts
5. Identification and screening of proposed conservation measures
6. Demand forecasts with different conservation programs
7. Impacts of conservation programs
8. Implementation and Monitoring Plan

Although the Plan is organized differently than the CWCB Water Conservation Planning Guidance Document, each of the nine steps has been incorporated into the Plan.

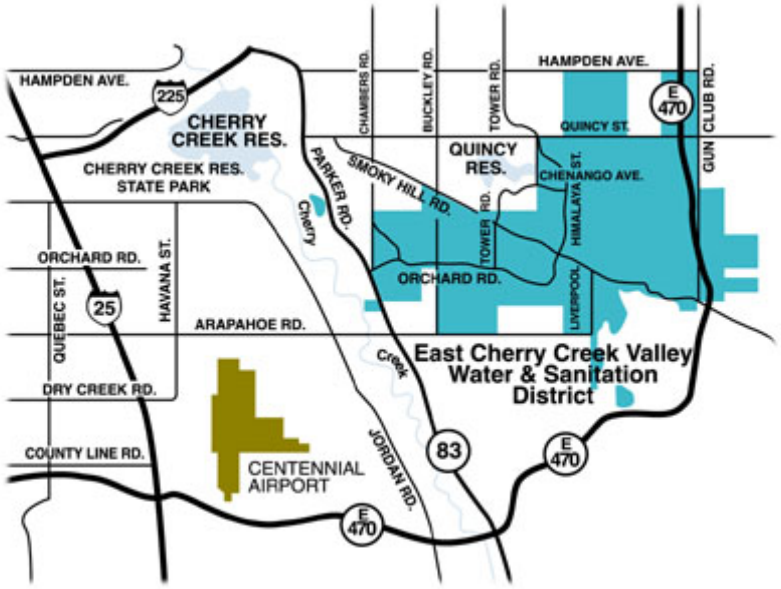
Section 2: Profile of Existing System and Proposed Facilities

2.1 District Formation

The East Cherry Creek Valley Water and Sanitation District is a quasi-municipal corporation and a political subdivision of the State of Colorado. ECCV was created pursuant to Article 1 of Title 32 C.R.S. for the purpose of providing a complete water supply system, complete sanitary sewer system and a regional storm drainage system for the inhabitants of ECCV. ECCV was formed in 1962.

2.2 Geography and Demographics

ECCV encompasses approximately 8,725 acres located in unincorporated Arapahoe County and the City of Centennial. It is located approximately 11 miles southeast of downtown Denver, Colorado and immediately south of the City of Aurora, Colorado. ECCV's service area is



highlighted in blue in Figure 2-1.

Figure 2-1
Location of East Cherry Creek Valley Water and Sanitation District

ECCV is located along the historic Smoky Hill Trail. As noted in the description below, the geographic area of ECCV is characterized by dry streams and a lack of surface water. The portion of the Smoky Hill Trail through ECCV was known as the Starvation Trail. Legends of America (http://www.legendsofamerica.com/ks-smokyhillstrail.html) provides the following description of the history of the Smoky Hill Trail: Originally an age-old Indian trail along the Smoky Hill River traversing Kansas, the Smoky Hill Trail became an emigrant "highway" in 1859 when news of the discovery of gold in Colorado (Kansas Territory at the time reached Kansas City. Ten years earlier, California bound '49ers had turned either north (Oregon Trail) or south

(Santa Fe Trail) to avoid the high barriers of the Colorado Rockies. The Smoky Hill Trail was virtually unused for that western migration. With the discovery of gold east of the Rockies, cutoff routes were made to Denver from both the Oregon and the Santa Fe Trails, but the main flow of the '59 gold rush was over the most direct route, the Smoky Hill Trail. Due to the scarcity of water and the danger of Indian attacks, it was by far the hardest and most dangerous of the three great prairie trails from the Missouri River to the Rockies.

The Smoky Hill Trail emigrants outfitted in Leavenworth, Kansas City, Abilene, or Salina and followed the Smoky Hill River to its headwater in southeast Colorado, near Old Cheyenne Wells. Here the Trail divided into the North Smoky, which took a cutoff to Hugo, and the South Smoky which followed Big Sandy Creek to Hugo. They continued on the same route to Lake (just south of Limon) at which point the North Smoky continued on a route similar to present U.S. 40 through Buick (Bueck), coming into Denver from the east while the South Smoky took a more western route to present Kiowa and then northwest to Parker and Denver. Along this route were built the Mile Houses-20 being at Parker, 17 just north of the Arapahoe-Douglas County line, and continuing on into Denver were the 12, 9, 7, and 4 Mile Houses.

The third section of the Smoky Hill Trail in Colorado was the fateful Middle Smoky Hill Trail, often called the "Starvation Trail." It was a direct western cutoff from the North Smoky near present Buick to the Kiowa Creek crossing and then a northwest route to Denver, meeting the South Smoky near present Quincy Avenue. The Smoky Hill Road of today, on which Smoky Hill High School was constructed runs on the ridge of Sampson Gulch and coincides very closely with the Starvation Trail. It gained this nickname because so many people died on this route. They came in covered wagons and on foot, even with pushcarts and wheelbarrows. They were poorly equipped and scantily fed, and they faced the chilling winds, and the snow and mud of early spring in their eagerness to reach the gold fields. This route was lined with abandoned property, broken wagons, dead horses, and many unmarked graves. They had met hostile Indians and had run out of water. Many of the creeks were dry, and when they did find water they could not carry a long-lasting supply.

2.3 Historical Water System Development

As noted in the description of the historic Smoky Hill Trail, ECCV is located in an area of limited and unreliable surface water supplies. The South Platte River is located many miles to the west and at the time of District formation ECCV did not have the financial resources to develop the water rights and infrastructure necessary to divert, store, convey and treat surface water supplies from the South Platte. Local streams in the vicinity of ECCV have intermittent flow and are unreliable for meeting the primary water supply needs of a water district such as ECCV. As a result, at the time of District formation, water supply development initially focused on non-tributary groundwater. Groundwater supplies in the Denver basin formation were readily available, drought resistant, could be developed incrementally at a relatively low cost, and needed minimal treatment. ECCV's goal was to eventually develop renewable water supplies to supplement the existing non-tributary groundwater supplies.

There was only minor growth in the District from its inception in 1962 through 1976. Growth during those years was annexed into and provided water service by the City of Aurora. Major

development commenced in 1977. Figure 2-2 shows the estimated ECCV population for 1981 through 2008. Population in 1981 was approximately 3,100 and has steadily increased to a population of approximately 56,600 in 2008. Growth rates in the early 1980's were as high as 40%. Since 1981 growth has averaged 12% per year. With the recent downturn in the housing market, growth rates are now in the single digits.

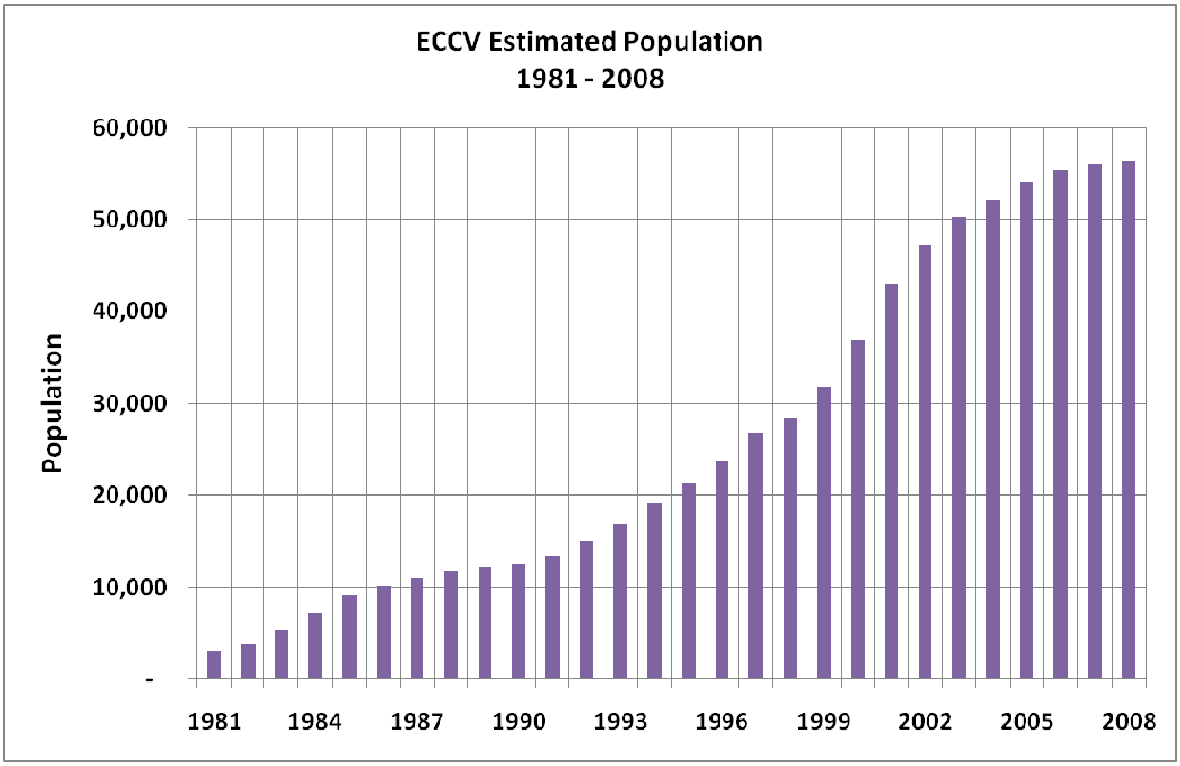


Figure 2-2
Estimated Population

2.3.1 Non-tributary Groundwater

ECCV's existing non-tributary groundwater supplies are derived from wells drilled in the Denver groundwater basin. The Denver basin formations underlying ECCV's service area include the Dawson, Denver, Arapahoe and Laramie-Fox Hills formations. Figure 2-3 is an illustrative cross-section of the Denver Basin aquifer formations.

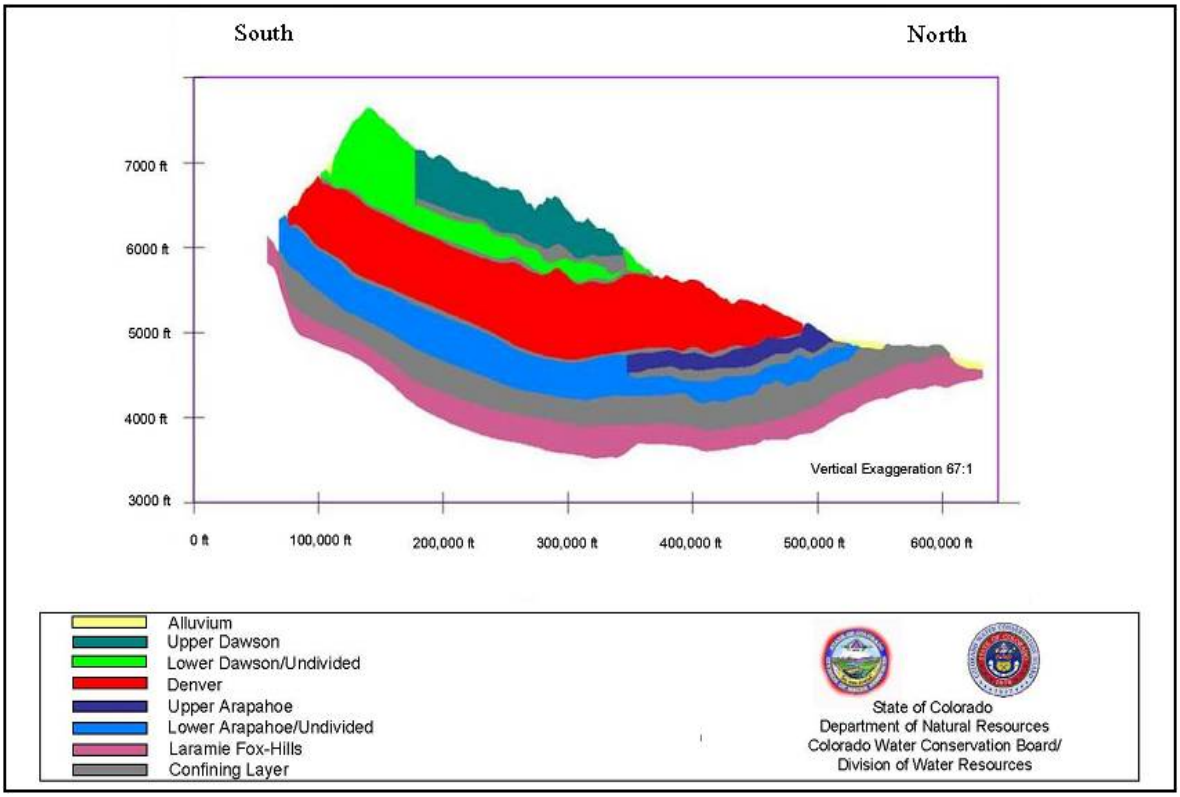


Figure 2-3
Denver Basin Aquifer South-North Cross Section -South Platte Basin
(Source: CWCB South Platte DSS)

The initial groundwater development to meet ECCV's water demands occurred within the District boundaries. Wells were drilled incrementally as development occurred. The non-tributary groundwater supplies developed by ECCV require minimal treatment. Treatment to meet regulatory requirements for disinfection is completed at all sources prior to entry into the distribution system. ECCV does not have a central water treatment facility for treating groundwater. Table 2-1 provides information on the number, location and aquifer source of ECCV's existing non-tributary groundwater wells.

ECCV's long range water supply planning recognized that future renewable supply sources would be required to complement the existing non-tributary sources and provide for long-term sustainability. As the search for renewable supplies continued, increasing water demands were met in the interim by drilling additional Denver Basin aquifer wells. Over time, ECCV did not realize the anticipated yields from the new wells as the result of a number of factors.

	Number of Wells in Each Aquifer			
Location	**Denver/ Dawson**	**Arapahoe**	**Laramie-Fox Hills**	**Total**
Within District	4	32	29	65
State Board of Land Commissioners	0	8	0	8
Western system	3	14	2	19
Total	8	53	30	92

Table 2-1
East Cherry Creek Valley Water and Sanitation District
Non-tributary Groundwater Supplies

2.3.2 Two Forks Reservoir Project

The first major attempt by ECCV to develop renewable water supplies was through participation in the Denver Water Board's Two Forks Reservoir Project and System-wide Environmental Impact Statement (EIS). Two Forks Reservoir was a planned 1,100,000 acre-feet reservoir that would store water from the Colorado and South Platte River basins and provide over 100,000 acre-feet per year of firm yield to Denver and its suburban participants. ECCV was one of the largest suburban participants in this project. ECCV's 6.05 % participation in the Two Forks Reservoir would provide approximately 4,840 AFY firm yield of renewable water supplies. The federal environmental permitting process commenced in 1982 with the suburban participants funding 80% of the cost of the EIS and other costs such as Denver Water Department staff time. After six years of environmental studies and over $40 million in expenditures by Denver Water Department and its suburban participants, the Army Corps of Engineers issued a final EIS and authorized a 404 permit for the construction of Two Forks Reservoir. The Environmental Protection Agency vetoed the Two Forks Reservoir Project permit in 1989. The veto of the permit was not appealed by the Denver Water Board. As a result, ECCV was forced to seek other sources of renewable water and commenced a 15 year search for reliable sources of renewable water.

2.3.3 State Board of Land Commissioners Wells

ECCV entered into an agreement with OAR, Inc., the predecessor to the Rangeview Metropolitan District (Rangeview), in 1983 for the lease and development of Denver basin groundwater on nearby State Board of Land Commissioners (SBLC) Lowry Range land leased by OAR. In order to delay the need for immediate development of the SBLC wells, ECCV entered into a temporary water trade agreement with the City of Aurora. Pumping of groundwater from the SBLC wells eventually started in 1996 and was used by ECCV to provide water to the City of Aurora under the terms of the water trade agreement in exchange for delivered from Aurora to ECCV. Eight wells were developed pursuant to this agreement and ECCV built a pipeline from the SBLC wells to the ECCV treated water storage tanks on Smoky Hill Road to deliver groundwater pumped from those wells to ECCV. ECCV is allowed to withdraw and use up to 4,000 acre-feet per year (AFY) through 2032.

2.3.4 Western Project

In 1999 ECCV entered into an agreement with the Willows Water District for the acquisition of the Willows non-tributary groundwater system. This system is located near C-470 and Quebec outside and west of ECCV boundaries. The acquisition of the Willows system and construction of pumping and transmission facilities (the Western Project) provides additional potable water deliveries to ECCV to meet average and peak demands while ECCV continues to develop long-term renewable water supplies. The Western Project also provides valuable long-term drought protection backup to future renewable supplies as well as a potential aquifer storage and recovery (ASR) system that ECCV and potentially other South Metro water providers can use in the future to better manage water supplies in the Denver basin aquifers. The acquisition of the Willows system was possible as the result of Willows entering into a treated water agreement with the Denver Water Board for service from Denver. The ECCV-Willows agreement was contingent on the water court approval of the transfer of the Willows non-tributary groundwater rights. The Water Court approval was concluded in 2001 and ECCV received title to the Willows facilities.

ECCV constructed a 48-54 inch pipeline along a 14 mile alignment that follows C-470 and E-470 from Quebec Street to its storage tanks on Smoky Hill Road to deliver the groundwater from the Western wells to ECCV. The Western Water Project began delivering water to ECCV in May 2003. The Western Project represents a potential 3,650 AFY of non-tributary groundwater supplies and 14 MGD of deliveries at full capacity. This supply was also intended to provide for renewable water supply while renewable water supplies were developed.

2.3.5 Nonpotable Irrigation System

As part of ECCV's overall water management and conservation program, the District implemented a non-potable irrigation system. The ECCV non-potable irrigation system pumps tributary groundwater from the Piney Creek alluvium. The non-potable system provides an additional water supply that is derived from the reuse of ECCV potable deliveries via the capture of lawn irrigation return flows (LIRFs) from ECCV customers. These LIRFs return to the Piney Creek/Cherry Creek alluvium. The accounting for ECCV's lawn irrigation return flows was decreed by Division 1 Water Court in Case #88CW054. As the ECCV wells are junior in water rights priority and rarely in legal priority to pump, ECCV's out of priority alluvial well pumping is replaced (augmented) by the use of the ECCV LIRFs. The ECCV accounting for its replacement of out of priority well pumping for its non-potable system is now coordinated as part of the Upper Cherry Creek Water Association (UCCWA) augmentation plan (Case #01CW284). The other members of UCCWA are the City of Aurora, Arapahoe County Water and Wastewater Authority, Cottonwood Water and Sanitation District and Colorado State Parks.

The ECCV non-potable system delivers disinfected treated nonpotable water to large irrigation customers in the southwest portion of ECCV. The system consists of 3 alluvial wells, a chlorination station, and a 2.3 MGD storage tank. The system currently supplies approximately 275 acre-feet/year of water. The use of the LIRFs represents a reuse of a scarce resource and reduces the demand for potable water supplies including pumping of non-renewable Denver basin groundwater supplies.

2.3.6 THE NORTHERN PROJECT
ECCV'S RENEWABLE WATER SOLUTION

ECCV is developing renewable surface water supplies through its Northern Project. The Northern Project is a multi-phase project to deliver surface water from the South Platte River to ECCV and reduce the reliance on Denver Basin non-tributary groundwater. ECCV initiated the planning of the Northern Water Project in 2003. The Northern Project provides a renewable surface water source that diversifies the resources of ECCV's water supply system providing a reliable and sustainable water supply for ECCV's customers. This project was developed in cooperation with United Water and Sanitation District and the Farmers Reservoir and Irrigation Company.

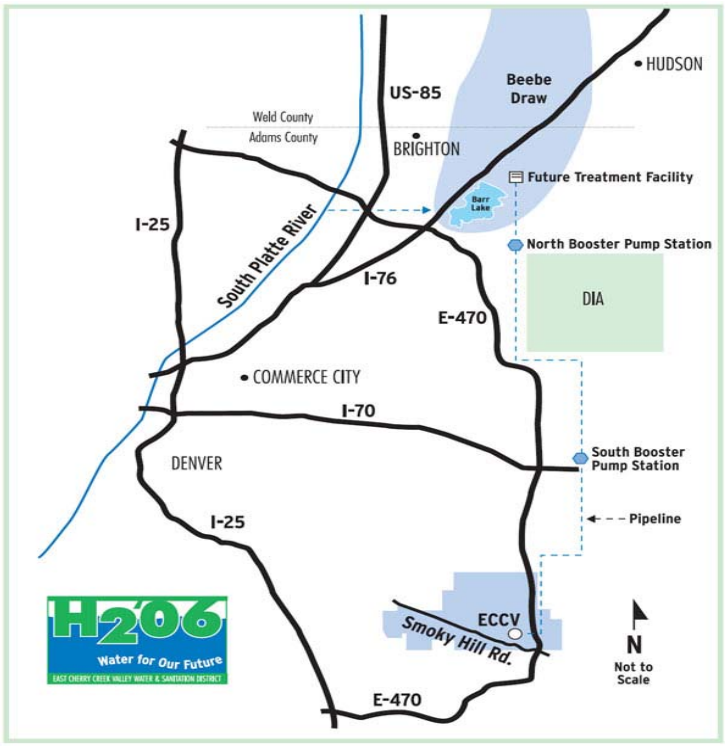


Figure 2-4
East Cherry Creek Valley Water and Sanitation District
Northern Project Facilities

Phase I of the Northern Project, known as H2'06, was completed in 2006 and included the acquisition of approximately 6,000 AF of renewable surface water rights, the construction of six wells in the Beebe Draw alluvium approximately 2.5 miles downstream from Barr Lake, a 48 inch, 31-mile pipeline (Northern Pipeline), two pumping stations and storage tanks to deliver potable water to ECCV, as shown in Figure 2.4. ECCV takes delivery of water pumped from the alluvial wells in the Beebe Draw and transports it to ECCV's storage tanks on the eastern edge of ECCV near Smoky Hill Road and E-470. At this location, water is blended with ECCV's other supplies and distributed to ECCV's customers. Water pumped from the Beebe Draw under the Northern Project is fully consumptive.

ECCV began construction of the next phase of the Northern Project in 2010 with completion in 2012. This phase includes the construction of a 10 MGD reverse osmosis (RO) water treatment plant (WTP) downstream of Barr Lake in Brighton. At final capacity, the water treatment plant

will be able to treat and deliver over 40 MGD of high quality water. Approximately 70 to 80 percent of ECCV's buildout water supply will come from the Northern Project system, with the remainder coming from the non-potable irrigation system, Denver Water treated water deliveries and non-tributary wells. The Northern Project will deliver over 9,000 AF of water for use by ECCV with additional treated water deliveries to Arapahoe County Water and Wastewater Authority (ACWWA) and potentially other members of the South Metro Water Supply Authority (SMWSA) that have acquired capacity in the northern pipeline. Participating SMWSA members in the ECCV Northern pipeline, in addition to ACWWA, include Centennial Water & Sanitation District, Cottonwood Water & Sanitation District, Inverness Water & Sanitation District, Stonegate Village Metropolitan District and the Town of Castle Rock. These members must secure their own water supplies and treatment in order to use their capacity in the Northern Pipeline.

2.3.7 Denver Water

In addition to non-tributary groundwater and the renewable surface water supplies from the Northern Project, ECCV has an agreement with Denver Water for 771 AFY of treated water. ECCV takes delivery of this water through a connection to its Northern Project pipeline from Denver Water's system near Denver International Airport (DIA). Denver Water retains ownership of the return flows associated with deliveries to ECCV to the extent the water delivered by Denver is reusable.

ECCV also has a temporary water lease agreement with Denver Water to receive an additional 1,000 AFY. Under the temporary contract, Denver Water agreed to sell ECCV 1,000 AF/yr for three years beginning May 1, 2006 with three additional one-year options. Denver has committed to deliver water under the temporary lease through April of 2012.

2.3.8 Reuse of ECCV Wastewater Return Flows

ECCV currently delivers approximately 4,000 AFY of wastewater to the Metro Wastewater Reclamation District (Metro) for treatment and discharge. This wastewater is currently delivered to Metro via the City of Aurora sewer system under a 1976 agreement that provides for some ability by Aurora to reuse the consumable portion of ECCV wastewater. In the future ECCV may pursue the right to reclaim the use of all or a portion of its consumable wastewater flows for diversion in its Northern Project, to augment alluvial nonpotable well pumping or by other means.

2.3.9 Timeline of ECCV Water System Development

Table 2-2 provides a timeline of the major ECCV water system development activities since the inception of the district in 1962.

Year	Water System Activities/Milestones
1962	East Cherry Creek Valley Water and Sanitation District is formed.
1976	ECCV enters into an agreement with the City of Aurora for carriage of ECCV sewer flows to Metro Wastewater Reclamation District via the City of Aurora sewer system
1977	Development in the District accelerates and the ECCV begins a program of annually drilling additional Denver basin wells to meet demands
1982	ECCV and other suburban water providers enter into participation agreement with the Denver Water Board for Two Forks Project and System-wide Environmental Impact Statement
1983	ECCV enters into an agreement with the OAR, Inc. for the development of Denver basin wells on State Board of Land Commissioners Lowry Range lands. This lease lasts through 2032
1989	After a total expenditure of over $40,000,000 by Denver Water Board and suburban providers, the Environmental Protection Agency vetoes the Two Forks Permit issued by the Army Corps of Engineers. Denver decides not to appeal the veto.
1998	ECCV identifies middle South Platte supplies as a potential water supply source and begins discussions with the Farmers Reservoir and Irrigation Company (FRICO), a Brighton based mutual ditch company, as a possible provider of renewable water.
1999	ECCV enters into an agreement with Willows Water District that provides the supply for the ECCV Western Project. The agreement provides for the acquisition, subject to water court approval, of the Willows non-tributary groundwater system.
2002-2003	Construction of the Western Project. Western Project commences delivery of water to ECCV in 2003
2003	ECCV enters into an agreement with United Water and Sanitation District to acquire 6,000 acre feet per year of South Platte surface water per year in Weld County and to develop the infrastructure to deliver it to a proposed ECCV water treatment plant located near Brighton. The project is named the "Northern Project."
2003 - 2004	ECCV develops a non-potable irrigation system based on renewable alluvial groundwater pumped from the Cherry Creek Alluvium
2005-2006	Construction of Phase One of the Northern Project – alluvial wells, pipeline and pump stations. Northern Project Phase One begins delivering approximately 1,800 AF/year of renewable supply in July 2006
2008	Design and permitting begins on Phase Two of the Northern Water Supply Project

Table 2-2
East Cherry Creek Valley Water & Sanitation District
Water System Development Timeline

2.4 Water Sources and Yields

A summary of the existing firm annual yield and peak day production capability of the major treated water sources for ECCV are summarized in Table 2-3. In 2012, ECCV will have brought on line the first phase of the Northern RO Water Treatment Plant with a total treatment capacity of 10 MGD. This will deliver up to 6,000 AFY of high quality renewable water at a peak flow rate of 7.8 MGD for use by ECCV customers and 2.2 MGD for use by Arapahoe County Water and Wastewater Authority. ECCV also has significant non-tributary groundwater supplies that can currently deliver 12,325 AFY at a sustained peak flow rate of 14.3 MGD. These non-tributary supplies can meet ECCV's current annual demand, but are not adequate to meet the current peak day demand over extended periods. In addition, ECCV estimates the production rates from its nontributary wells in the Denver, Dawson and Arapahoe aquifers will decrease by 2.7 percent annually and production rates from wells in the Laramie-Fox Hills aquifer will decrease by 1.7 percent annually. As a result, ECCV will continue to develop additional facilities and renewable sources to meet future water demands.

Water Supply Source	2012 Peak Day (MGD)	2012 Annual Yield (AFY)
In District non-tributary groundwater wells	8.5	8,175
State Board of Land Commissioners non-tributary groundwater wells	0.6	500
Western System non-tributary groundwater wells	5.2	3,650
Northern Project tributary water	7.8	6,000
Denver Treated Water	3.2	771
Total	25.3	19,096

Table 2-3
Summary of Major Water Sources
East Cherry Creek Valley Water and Sanitation District

2.5 Ability to Serve

ECCV currently relies on wells from the Denver Basin aquifers for approximately 60% of its water supply. Groundwater is pumped from 92 wells. If all the wells currently in operation are pumped simultaneously, the wells would produce approximately 20 MGD. As noted, the sustainable peak production is estimated at 14.3 MGD. If all of the non-tributary wells owned or under the control of ECCV were drilled, connected to the system, and could produce the decreed amount, the aggregate yield would be approximately 18,042 AFY.

ECCV has completed several internal planning studies for the raw and treated water systems that describe the planning of water supply acquisitions, treatment plants, pump stations, storage tanks and major distribution pipelines to serve ECCV. A summary of system conditions is shown in Table 2-4.

Planning questions	Yes	No	Comments
Is the system in a designated critical water supply area?	X		The ECCV system resides above the Denver Basin Aquifer. Scientific evidence shows recent draw down on the aquifer. This region was identified in SWSI as a critical water supply area.
Does the system experience frequency shortages or supply emergencies?		X	
Does the system have substantial unaccounted-for and lost water?		X	
Is the system experiencing a high rate of population and/or growth?		X	
Is the system planning substantial improvements or additions?	X		ECCV is continuing the development of its Northern Project with a Reverse Osmosis Water Treatment Plant on-line in 2012
Are increases to wastewater system capacity anticipated within the planning horizon?	X		Increases in capacity will be made to meet future growth. ECCV may pursue the right to reclaim some or all of its wastewater return flows

Table 2-4
Summary of System Conditions
East Cherry Creek Valley Water and Sanitation District

Section 3: Current Water Use

3.1 Annual Water Use by Customer Class

ECCV's customer base, as shown in Table 3-1 and Figure 3-1, consists primarily of single-family residential accounts, with the remainder multi-family, commercial and irrigation only accounts. Single-family residential represent 80% of total billed water use with potable irrigation the next largest user class at 9%. Multi-family use is 4% and commercial, industrial and institutional 3% of annual billed water usage.

General Class	2007-2008 Average (Kgal)	% of Total
Single Family	184,671	80
Multi-Family	9,752	4
Commercial, Industrial, Institutional	7,256	3
Irrigation (potable)	21,915	9
Irrigation (nonpotable)	9,426	4
Total	230,162	100

Table 3-1
Annual Water Use by Customer Class

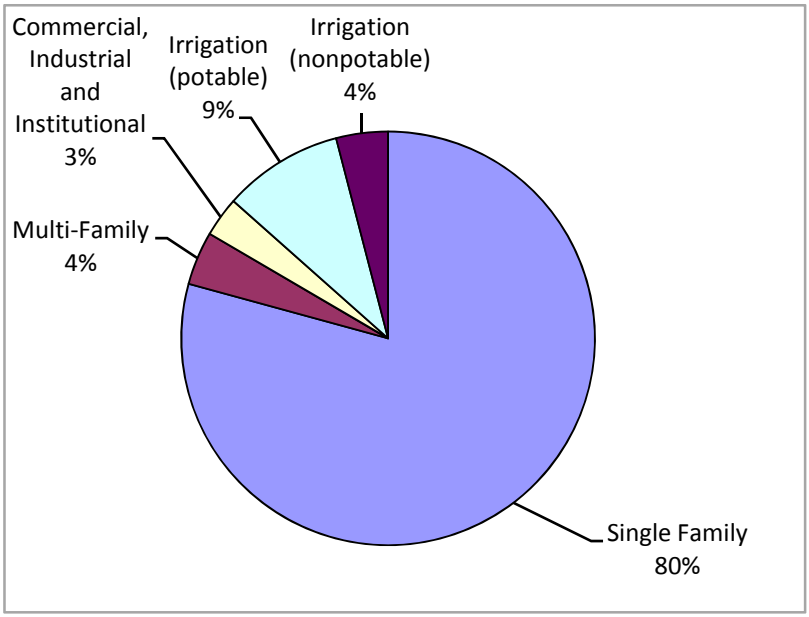


Figure 3-1
Percent of Annual Water Use by Customer Class

3.2 Historical Water Demand

Total annual water production for 1981 through 2008 is shown in Figure 3-2. Nonpotable water usage began in 2005 and is also included in the total water production shown in this figure. As seen in Figure 3-2, demand has increased an average of over 300 AF per year from approximately 600 AFY in 1981 to a current demand of approximately 8,600 AFY.

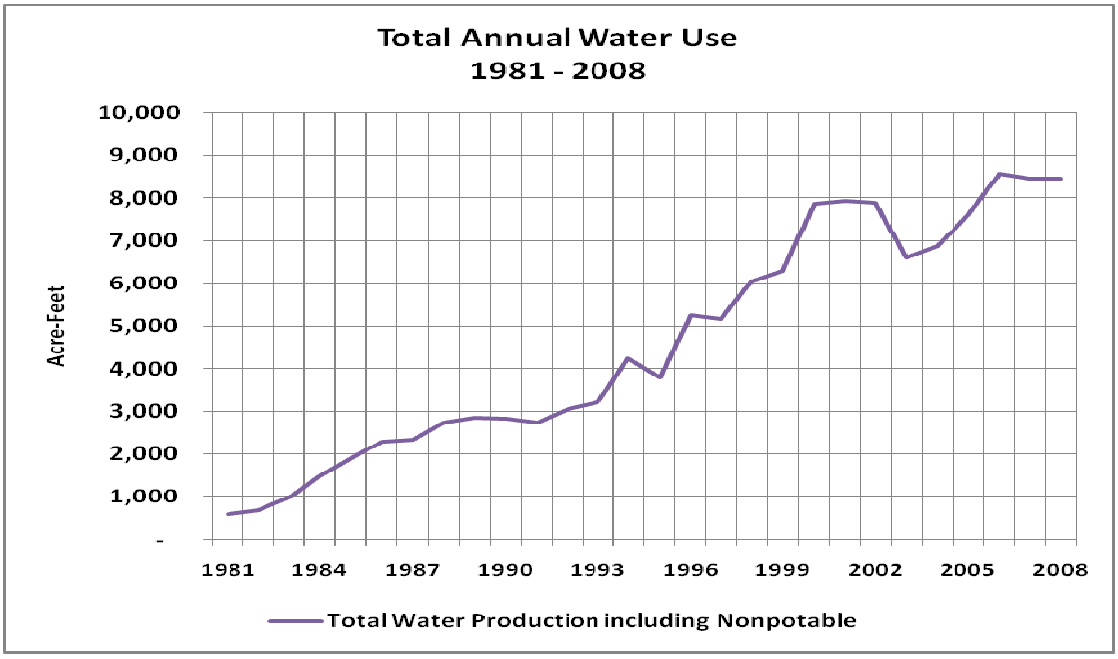


Figure 3-2
Total Annual Water Use

There has been significant growth in the District since 1981. ECCV tracks the number of water customers as single family equivalents (SFE). A single family equivalent is the estimated water use for a 3/4'' water tap. Other water users that have larger water taps are converted to SFEs as shown in Table 3-2.

Tap Size (inches)	Single Family Equivalent
3/4	1
1	2
1.5	4
2	8
3	18
4	36

Table 3-2
Single Family Equivalents by Tap Size

The growth of single family equivalents in ECCV is shown in Figure 3-2 as total SFEs in the ECCV system. Total water usage is also shown in the figure. The decrease in water usage after the 2002 drought is readily apparent in this figure. This figure also illustrates the recent slowdown

in ECCV growth as a result of poor local and national economic and financial conditions affecting the housing market.

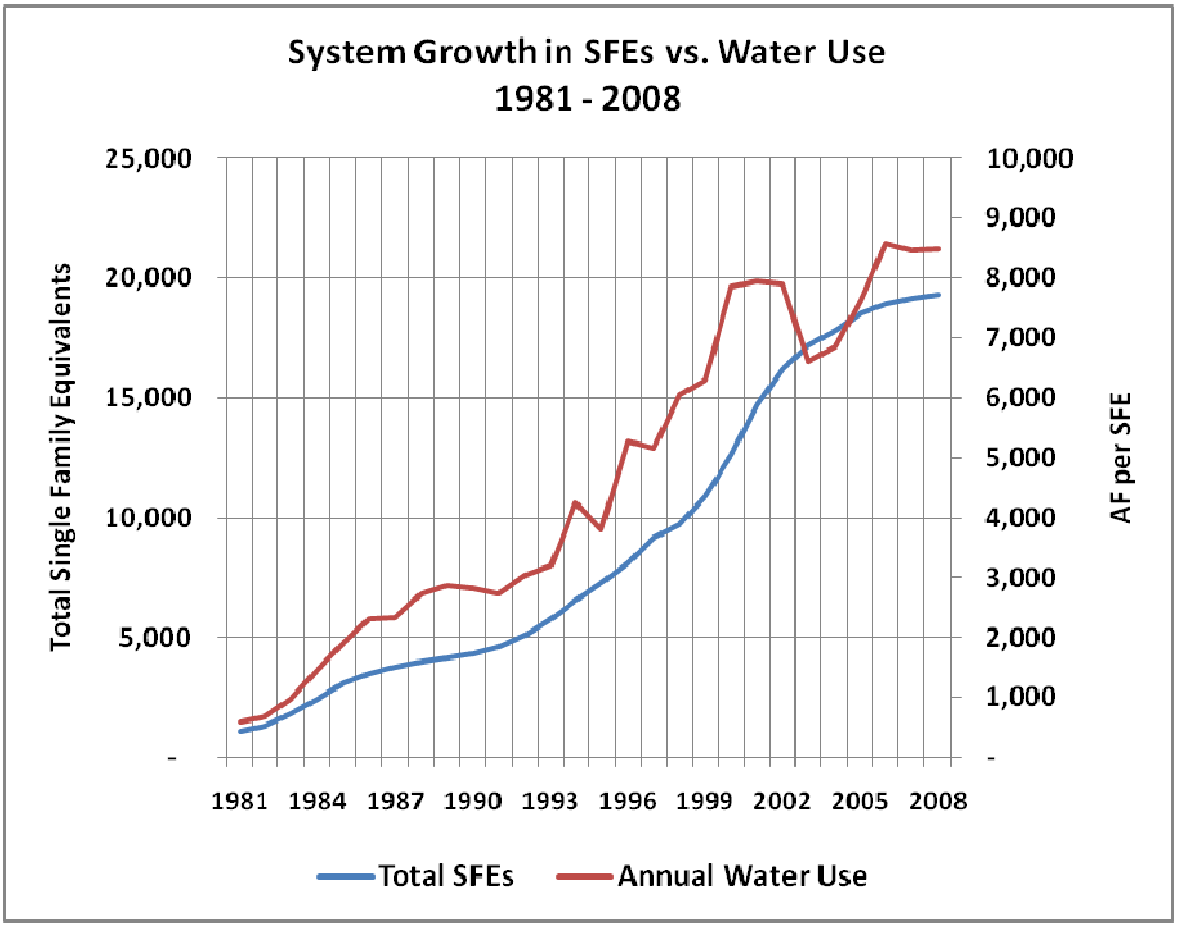


Figure 3-3
Single Family Equivalents and Water Use per SFE

3.2.1 Historical Water Demand by Customer Class

Historical water billed by customer class has been tracked since 1998 and is shown in Table 3-3 and Figure 3-4. As previously noted, residential water use represents approximately 80% of total demand, followed by potable and non-potable irrigation. The nonpotable irrigation system became fully operational in 2005 and currently represents approximately 4% of total water billed. The highest annual total billed water use occurred in 2006 with a total billed water use of 8,575 AF. The highest nonpotable use occurred in 2008 with 285 AF used for nonpotable irrigation.

Annual Water Use in Acre-Feet (AF)						
Year	**Commercial**	**Schools**	**Irrigation**	**Nonpotable Irrigation**	**Residential**	**Total**
1998	159	270	429	-	4,435	5,294
1999	184	298	495	-	4,729	5,707
2000	262	410	760	-	6,097	7,528
2001	215	351	828	-	6,539	7,933
2002	263	325	790	-	6,517	7,895
2003	215	243	553	-	5,602	6,613
2004	221	244	753	-	5,643	6,861
2005	237	306	608	179	6,296	7,626
2006	287	337	634	276	7,042	8,575
2007	302	358	679	264	6,861	8,464
2008	314	361	769	285	6,741	8,471

Table 3-3
Annual Water Billed by Customer Class

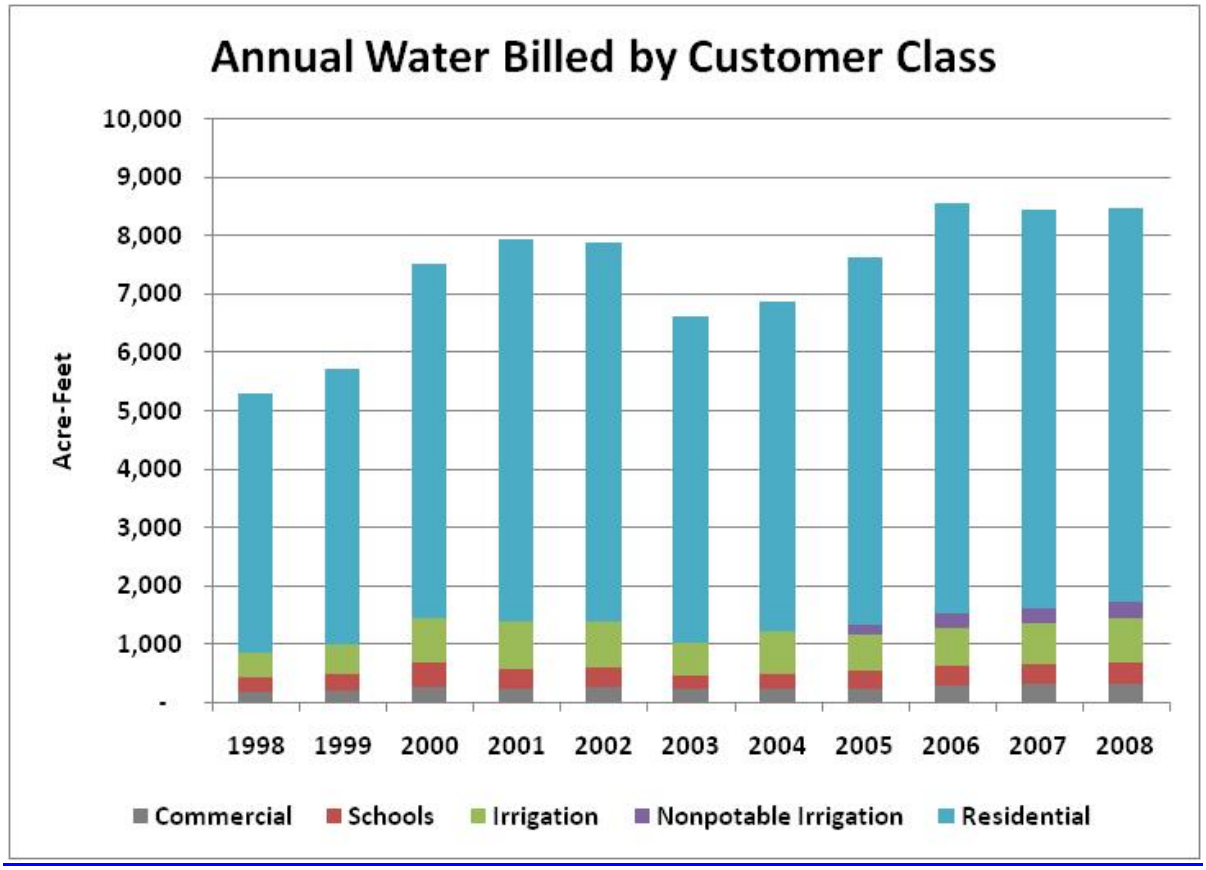


Figure 3-4
Annual Water Billed by Customer Class

3.2.2 Historical Residential and Per Capita Water Use

An analysis of per capita water demand is a common measurement of water use. Average daily water demand divided by the population served provides total system gallons per capita per day (gpcd). Comparison of total system gpcd should be cautiously used as the percentage of water use by nonresidential customer classes or nonpermanent residences can impact the gpcd calculation. Residential only gpcd is calculated by dividing residential water use by the population served. Single family only residential gpcd is also used if there is a high percentage of multi-family customers. Population and total and residential per capita water demands have been calculated for 1998-2008 and are shown in Table 3-4. Annual population increased at double digit rates from 1998 through 2002 and averaged over 2% growth from 2003 through 2008. Per capita water demands showed the opposite trend, with decreases in total and residential per capita water use over this same period. The 1998-2001 total gpcd averaged 164, while the 2005-2008 total gpcd averaged 135, a 19% decrease. Similarly, for residential only gpcd, the 1998-2001 average was 135 and the 2005-2008 average was 106, a 20% decrease. Total system and residential only gpcd are shown in Figure 3-5.

Year	Estimated Population	Percent Population Change	Residential Accounts	Total system gpcd[1]	Residential gpcd[2]
1998	29,273	-	9,206	161	135
1999	32,751	11.9%	10,299	156	129
2000	37,863	15.6%	11,907	177	144
2001	43,740	15.5%	13,755	162	133
2002	48,127	10.0%	15,134	146	121
2003	50,840	5.6%	15,987	116	98
2004	52,908	4.1%	16,638	116	95
2005	54,501	3.0%	17,139	125	103
2006	55,656	2.1%	17,502	138	113
2007	56,362	1.3%	17,724	134	109
2008	56,695	0.6%	17,829	133	106

Table 3-4
Historical Per Capita Water Use

[1] Calculated as the total residential + multifamily metered treated water demand divided by total service population.

[2] Calculated as the total treated water production divided by total service population.

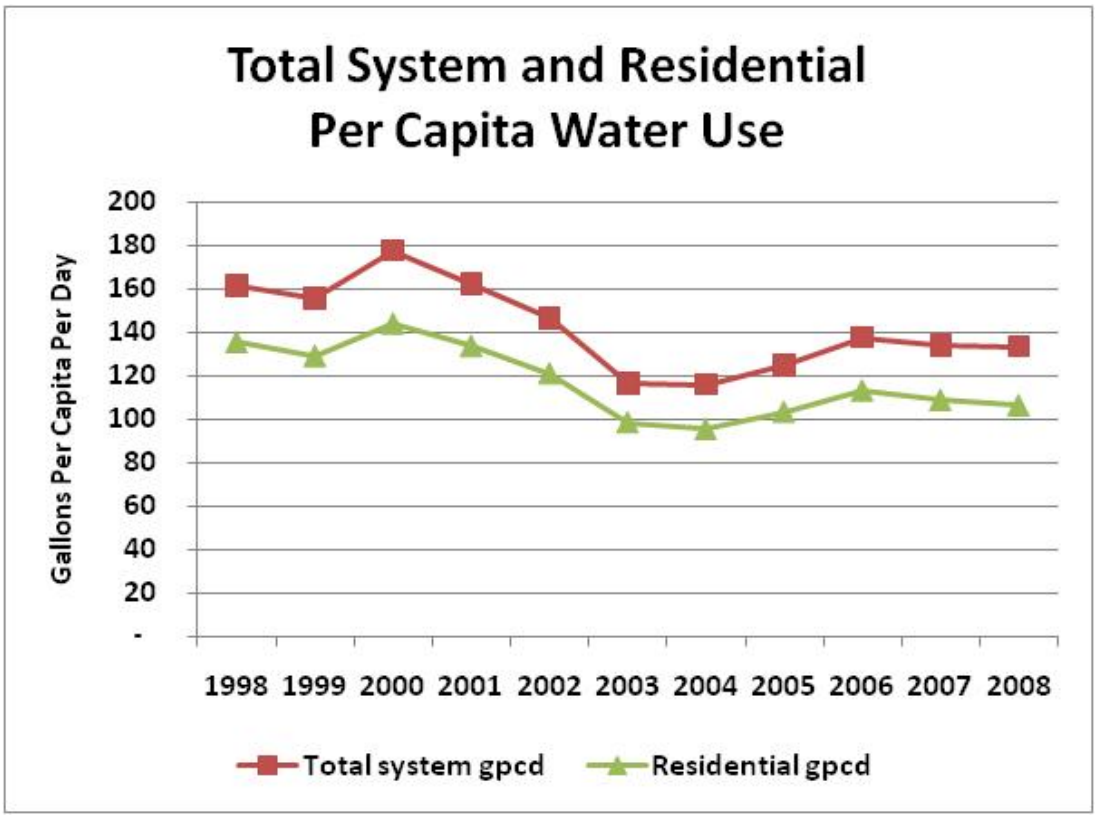


Figure 3-5
Historical Per Capita Water Use

3.2.3 Historical Peak Day Water Demand

ECCV determines water treatment and delivery capacity requirements using a maximum daily use per single family equivalent (SFE) and multiplying it by a projected SFE build-out figure. Historically, ECCV has used 1.2 gallons per minute (gpm) per SFE at maximum day as its planning criteria for sizing water production and transmission infrastructure. This planning criterion includes a reasonable safety factor and allowances for firefighting and other uses.

The tracking of daily water production for the ECCV system has historically been a challenge due to the significant number (>90) of individual wells in the ECCV water system. Historical daily water production and consumption data are incomplete for years prior to 2005 due to unavailability of data as a result of limited telemetry from individual wells prior to 2005. For the periods that have estimated peak day water use data, peak day water demand was highest at 1.27 gpm/SFE in 1990. By the mid 1990's, peak day demand averaged 1.0 gpm/SFE. Starting in 2002 ECCV implemented designated two days per week watering restrictions. These restrictions were modified to three days per week in 2007. The days of the week are specified based on address. Peak day water use has averaged 0.7 gpm/SFE from 2005 to 2008. The historical maximum recorded peak day occurred in 2007 at 21.0 MGD. Data are unavailable for 1999-2004, but a greater historical peak day may have been possible during this period. Historical average daily and peak day demands are shown in Figure 3-6. Average daily demands have increased from 0.5 MGD in 1981 to 7.5 MGD in 2008.

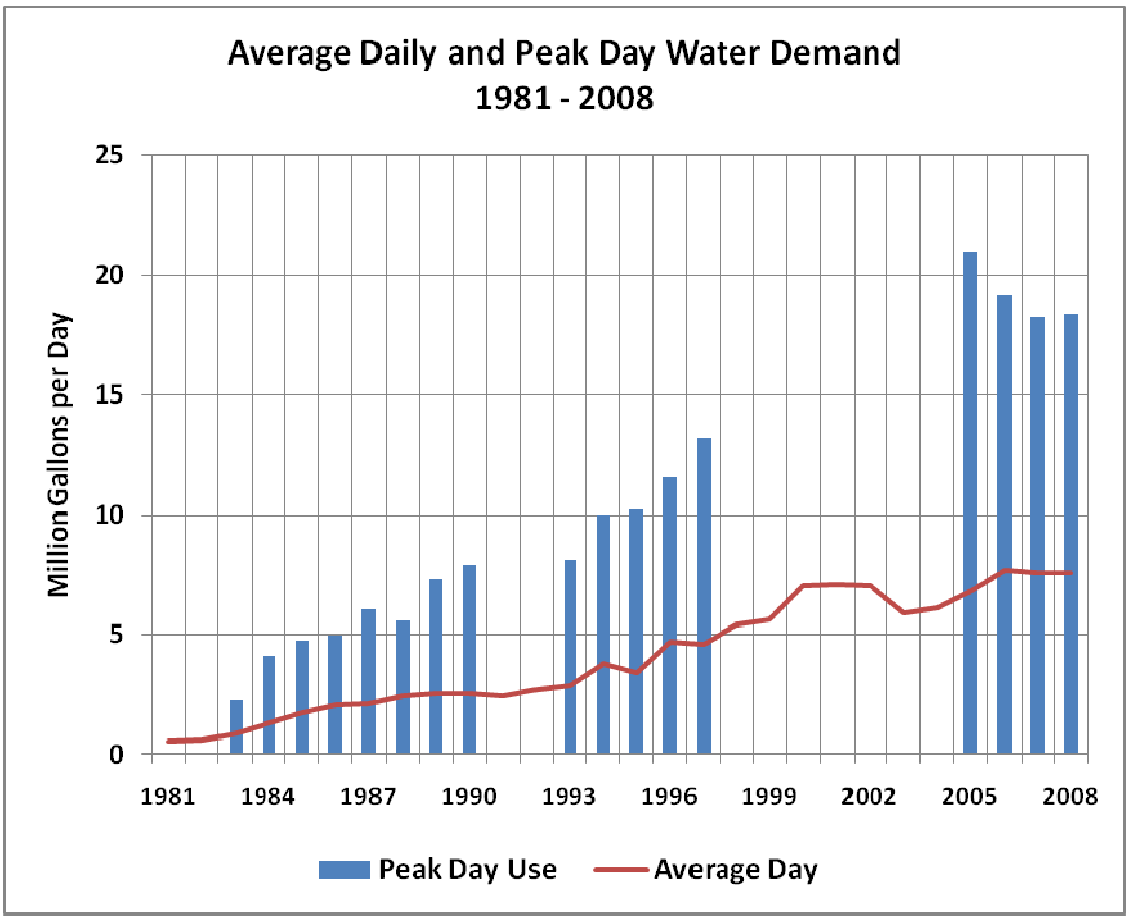


Figure 3-6
Historical Average Daily and Peak Day Demands

As noted, when planning for meeting peak day demands, appropriate safety factors should be included. The volume of treated water storage as a percentage of peak day demand is also a consideration when determining safety factors and the ability to meet peak hour demands for firefighting and other purposes.

3.3 Water Loss Accounting

The description of current water use in this Plan is meant to be consistent with the International Water Association (IWA) and American Water Works Association (AWWA) Water Balance approach, which was published in 2000 as part of the IWA publication Performance Indicators for Water Supply Services to provide utilities a consistent methodology for assessing water loss. Though the full assessment of a water balance is outside the realm of this report the terminology is consistent. The main categories discussed for ECCV are revenue (metered) and non-revenue (metered and unmetered) water, which are defined in Figure 3-7 below.

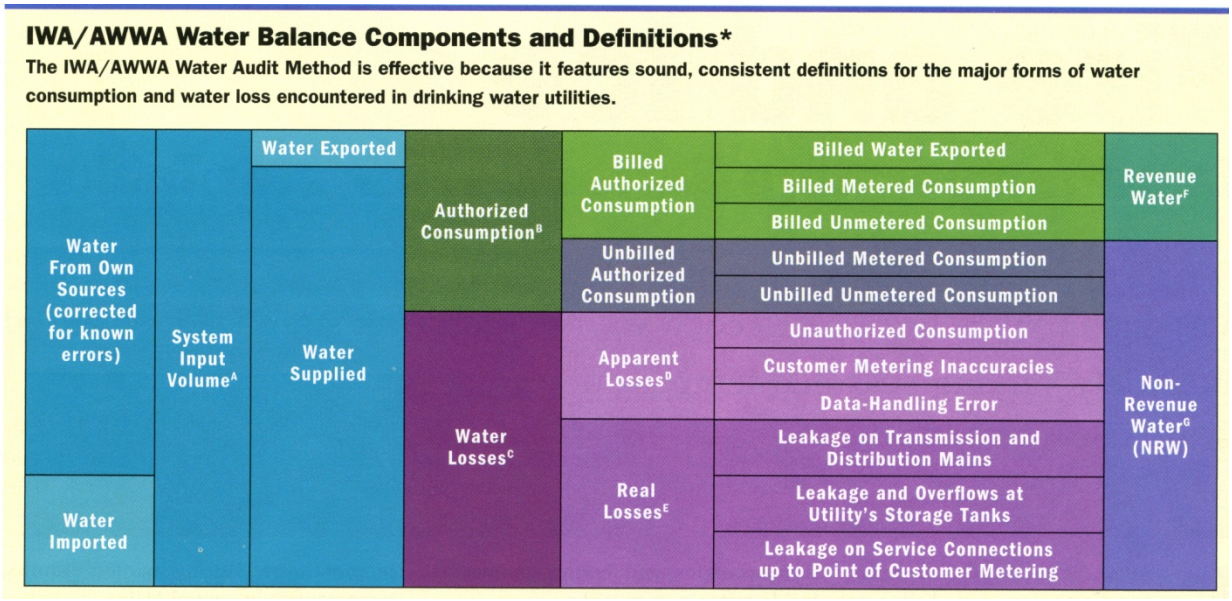


Figure 3-7
IWA/AWWA Water Balance Summary
(Source: AWWA Publication, Opflow, October 2007)

All of ECCV water use is metered and billed. There are no customers who receive water that is unbilled or charged and all metered water use is Revenue Water as defined in the IWA/AWWA Water Balance. The non-revenue water use for the ECCV system includes:

- Unbilled, unmetered consumption (see below)
- Customer metering inaccuracies
- Data handling error
- Leakage on mains
- Leakage on service lines
- Leakage and overflows at storage

Unbilled, unmetered consumption includes the following:

- Annual waterline and fire hydrant flushing program conducted by ECCV (estimated at 8 million gallons per year).
- Street sweeping operations using fire hydrants to fill street sweeping vehicles. These are local jurisdictions with street maintenance responsibilities that are separate from ECCV. They are required to have a hydrant meter, but occasionally a sweeper operator will not use the hydrant meter, in violation of ECCV requirements.
- Fire department operations filling fire trucks for firefighting and training activities. These fire departments are separate from ECCV.

As noted, the tracking of total and daily water production for the ECCV system has been a challenge due to the significant number (>90) of individual wells in the ECCV water system and the historical lack of central telemetering. Historical total water production data have not been included in the following analysis for years prior to 2005 due to unavailability of data as a result of limited telemetry from individual wells prior to 2005. In 2005 ECCV implemented a program of upgrading the SCADA reporting and meter accuracies of its approximately 90 individually metered wells. At present time, the SCADA system is being monitored on a continuous basis as part of ECCV's Water Loss Control Program. As a result, water production and billing data for 2005 – 2008 are the only years included in the estimate of water loss accounting.

System wide audits have been conducted by ECCV annually since 2005 to determine the efficiency of the water distribution system. There are three pieces of data used to perform this evaluation: total water production, total water billed to customers and water accounted for, but not billed. The non-revenue water is calculated by subtracting all accounted for water (total water billed and accounted for but not billed) from the total water production. All water use in the ECCV system that is metered is billed. The American Water Works Association guidelines consider up to 10 percent non-revenue water to be acceptable. For 2007-2008, the average percentage of non-revenue water was 7.5 percent, showing that the District's water system is consistently within an acceptable range.

A comparison of metered total water production vs. total water billed and accounted for/not billed is shown in Figure 3-8. The difference between total production and billed is non-revenue water as described above. As shown in Figure 3-9 non-revenue water ranged from a high of 13% in 2005 to a low of 7% in 2007 with the four year average of 10%. It is important to note that ECCV only implemented its water loss accounting program in 2005 and the actual non-revenue water will increase in accuracy as SCADA upgrades and individual well meter analysis are complete. The high non-revenue water in 2005 compared to subsequent years is partially attributable to the following:

- Meter accuracy testing improved in each subsequent year as the Water Loss Control Program was implemented.
- Water production accounting improved in each subsequent year as the Water Loss Control Program was implemented.
- In 2005 many production sources were estimated due to inoperable meters or data compilation. As a result, 2005 non-revenue calculation is only an estimate.
- Steps were taken to improve meter function in 2006 and 2007 and are ongoing as part of the Water Loss Control Program. This is reflected in the lower non-revenue percents for these years compared to the two previous years.

If there is a reason to suspect a leak, ECCV contracts out for sonic leak detection equipment to locate leaks within the distribution system. The SCADA system is monitored continuously for any unusual changes in pressure and tank level. Leaks that are identified at the surface and located are repaired immediately. As shown in Table 3-5, only 8 percent of ECCV's water lines are older than 30 years in age and 35% are older than 20 years. Sixty-five percent of ECCV's water lines

are less than 20 years old and leaks are estimated to be minimal. This is confirmed by the relatively low number of water breaks experienced annually, averaging less than 2 per year.

ECCV will start up its Northern Water Treatment Plant in 2012. As a result of this additional supply and treatment capacity, ECCV intends to take off-line up to 40 wells. In conjunction with this reduction in wells and associated meters, SCADA telemetry upgrades are underway, This will allow ECCV to increase its accuracy in determining system losses. Several years of data after the reduction in production wells are needed to determine if non-revenue water percentages have changed. With the ECCV system being a relatively new system and with the many production meters to monitor it is anticipated that the amount of non-revenue water will continue to fall within the acceptable range of less than 10%.

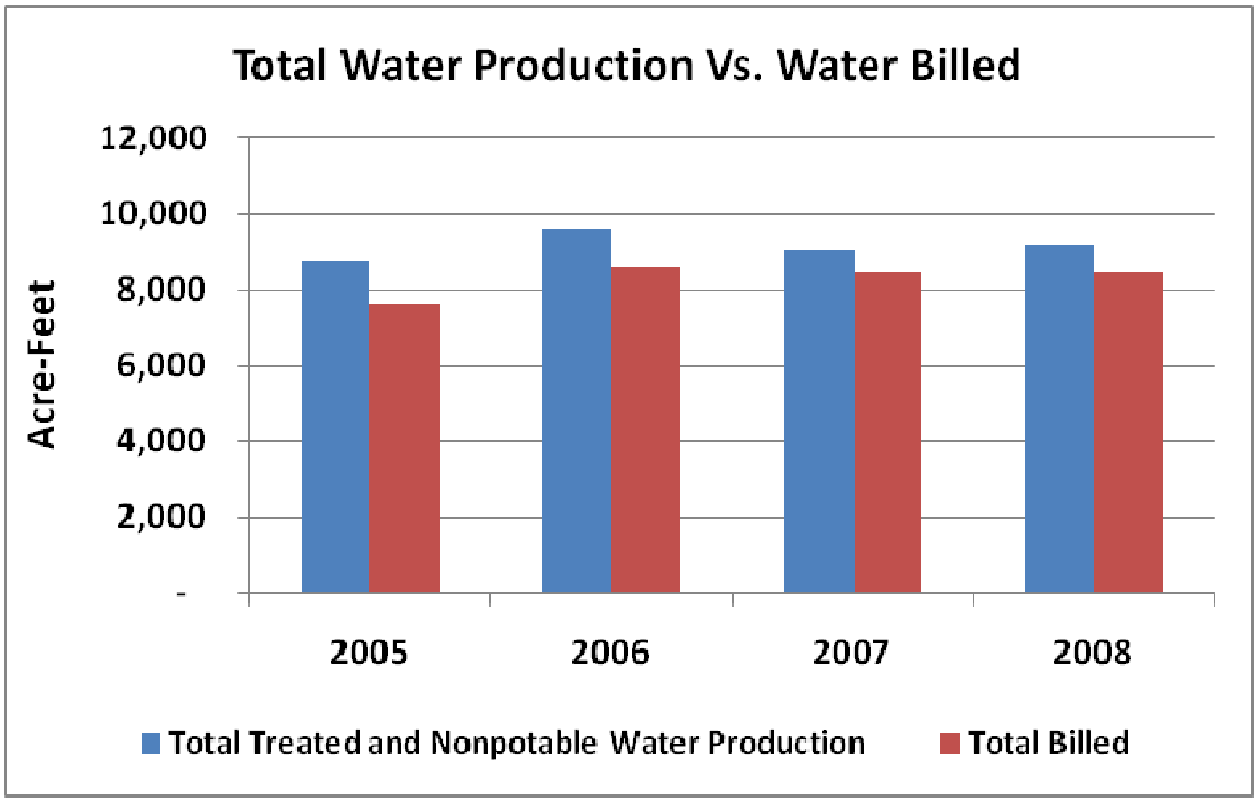
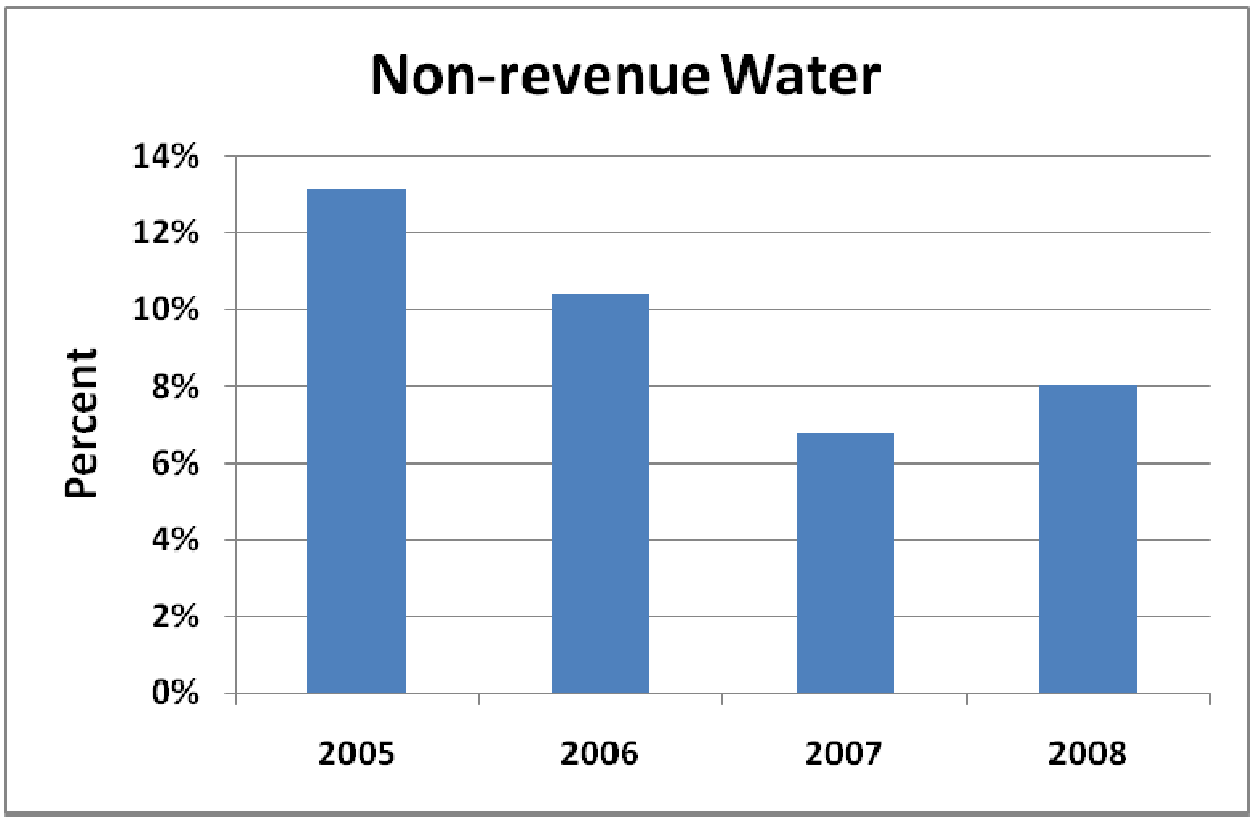


Figure 3-8
Total Water Production + Nonpotable vs. Water Billed



***Note**: 2005 Non-revenue water is estimated*

Figure 3-9
ECCV Non-revenue Water

Years Constructed	Miles	Percent	Age (years)
1970-1979	18	8%	31-40
1980-1989	62	27%	21-30
1990-1999	98	42%	11-20
2000-2009	55	24%	0-10
Total	233	100%	

Table 3-5
Age of Construction of ECCV Water lines

Section 4: Existing Conservation Efforts

ECCV has used water conservation measures to manage water demands and conserve water for over 10 years. ECCV's water conservation program offers a diverse range of programs and measures targeted at all water demand customer classes. Demand management strategies have included conservation measures designed to manage peak day demands and also measures designed to reduce total annual demands. ECCV has implemented a conservation oriented water rate structure designed to encourage efficient use with water budgets for irrigation accounts and tiered rate structure for all customers. Other measures include designated watering days to manage peak and irrigation season demands, rebates on high efficiency plumbing fixtures and range of activities designed for irrigation use. The current program is described in this section and summarized in Table 4-1.

4.1 Operational Utility Side Measures

Integrated Resources Planning – ECCV has practiced integrated resources planning (IRP) as part of its overall water supply and demand management strategy. A least-cost analysis of demand and supply options resulted in the conclusion that water conservation and demand management options were cost-effective and as a result incorporated into future supply planning. As implemented by ECCV, the integrated resources planning approach is a comprehensive planning effort that incorporates water conservation as a key component for meeting future needs. The results of the integrated resources planning approach has resulted in savings of tens of millions of dollars to ECCV as described in Section 7.

Full Metering – All ECCV customers and associated water use is metered and billed.

Modifications to Increasing Block Rate Structure – ECCV implemented significant changes in its tiered, increasing block rate water structure in 1998 in order to promote water conservation through pricing. As experience was gleaned from the implementation of the rate structure, the rates and blocks were modified to increase the water conservation effect. An analysis of average residential lot size and irrigated area using a generalized water budget approach was used in 2003 to adjust the tiers for residential water use in order to increase the water pricing and water conservation signal to customers. The blocks for the residential rate structure since 1998 are shown in Table 4-1.

Block	1998	1999	2000 to mid 2002	2003 to 2005	2006 to 2010
			Monthly Water Use in 1,000 gallons		
1	0 to 16	0 to 14	0 to 8	0 to 6	0 to 5
2	17 to 32	15 to 28	9 to 20	7 to 20	6 to 20
3	>32	>28	>21	21 to 30	21 to 30
4	N/A	N/A	N/A	31 to 40	31 to 40
5	N/A	N/A	N/A	>40	>40

Table 4-1
ECCV Residential Water Rate Tiers

Water Use Based Irrigation Tap Fees – All irrigation tap fees are based on irrigated area and planting materials. Existing large irrigators are allowed to add water taps at no charge (other than installation and meter cost) so they can irrigate more efficiently. This was in response to the fact that most of the older systems were undersized because the tap fees were based on meter size and developers undersized meters to avoid additional tap fee charges. In addition, most of the piping in the older irrigation systems is also undersized and adding additional taps also helps with water pressure.

Northern Water Replacement Fund – ECCV has developed and implemented a program to develop renewable water supplies and reduce dependence on non-tributary groundwater. In order to finance the implementation of this policy, a Northern Project Construction Fund Fee of $25/month was instituted for all customers. This additional water bill charge results in a water conservation signal to customers that has resulted in reduced water use.

Designated Watering Days – Designated watering days are in effect for all customers. This program manages peak irrigation demands as well as total water use. The current program allows watering three days per week and prohibits watering between the hours of 10 am and 6 pm. Designated watering days started in 2002 and watering was limited to 2 days/week. The number of water days was increased to 3 days/week in 2007 when the ECCV Northern water supply came on line. Experience has shown that the 3 days/week watering schedule allows water production to be paced closer to demand. Enforcement of the watering day schedules is

accomplished using seasonal water conservation staff. From 2002 through 2006, water conservation patrols were 7 days/week. Since 2007, the patrols are only on the weekends.

Seasonal Planting Limits for Turf – No new sod or grass seed planting is allowed from June 1 to September 1. Exemptions have been made on a case specific basis for buffalo grass planting and large irrigators with a short planting season such as athletic fields.

4.2 Water Loss Control Program

Water Loss Control Program – System wide audits have been conducted by the ECCV annually since 2005 to determine the efficiency of the water distribution system. ECCV will continue this best practice annually as part of its normal operations. There are three pieces of data used to perform this evaluation:

1. Total water production
2. Total water billed to customers
3. Water accounted for, but not billed

The non-revenue water is calculated by subtracting all accounted for water (total water billed and accounted for/not billed) from the total water production. The American Water Works Association guidelines consider up to 10 percent non-revenue water to be acceptable. From 2005-2008, the average percentage of non-revenue water was 10 percent, and 7.5 percent for 2007-2008 showing that the District's water system is consistently within an acceptable range since the SCADA upgrades. Currently, ECCV's goal is to maintain their current level of non-revenue water, not to exceed 8 percent. If the annual system water audits show an increase above 8 percent on a three year running average, ECCV will implement system wide sonic leak detection covering 20 percent of the system annually.

If there is a reason to suspect a leak, ECCV contracts out for sonic leak detection equipment to locate leaks within the distribution system. The SCADA system is monitored continuously for any unusual changes in pressure and tank level. As shown in Table 3-5, only 8 percent of ECCV's water lines are greater than 30 years in age and 35% are older than 20 years. Sixty-five percent of ECCV's water lines are less than 20 years old and leaks are estimated to be minimal. This is confirmed by the relatively low number of water breaks experienced annually. In the past 6 years, ECCV has had a total of 5 water breaks, an average of less than 1 per year.

ECCV will start up its Northern Water Treatment Plant in 2012. As a result of this additional supply and treatment capacity, ECCV intends to take off-line a significant number of low yielding non-tributary wells. In conjunction with this reduction in wells and associated meters, SCADA telemetry upgrades are underway. This may result in an increase in accuracy in determining system losses. Several years of data after the reduction in production wells are needed to determine if non-revenue water percentages have changed. With the ECCV system being a relatively new system and with the many production meters to monitor it is anticipated that the percent of non-revenue water will continue to fall within ECCV's goal of <8%. Over the past 2 years, non-revenue water, including leaks, has averaged 7.5 percent.

4.3 Education and Public Information

Conservation Public Information Campaign – Water conservation information is disseminated via bill inserts, brochures and website. Water conservation topics include information on the toilet and clothes washer rebate programs, irrigation management, Xeriscape landscaping and other water saving tips. Staff responds to residential and commercial customers with water use or billing questions and requests for water conservation information.

School Education Programs – Staff responds to requests for water conservation presentations to school classes. ECCV joined the Douglas County Water Resources Authority (DCWRA) in the mid 1990s and the education resources of DCWRA are available to ECCV customers. A DVD on Xeriscape prepared by DCWRA was distributed to every customer. A proactive education program to visit schools with water conservation programs is also underway.

Annual Large Irrigators Water Conservation Meetings – ECCV staff holds an annual meeting with Large Irrigators, including home owners associations, irrigation management companies and irrigation specialists. Every March since 2003 an annual meeting is held to review the ECCV water conservation program including irrigation water budgets, watering schedules and water rates and penalties. The meeting is also used to explain in detail the components of the water budget and irrigation management program including evapo-transpiration calculations, calculation of irrigated area and establishment of water budgets.

Online Access to Water Use History – Customers have online access to their water bills and have the ability to view and compare monthly water use history. This program allows customers to adjust water use in response to past history and cost of water.

Water Monitor – ECCV offers its water customers an option to purchase a water monitor at a discounted rate of $50. A water monitor allows a customer to remotely read the water meter on a real time basis. The monitor can be located anywhere in the building or elsewhere on the premises, but for residential customers, it is common to have the monitor on the refrigerator. The monitor allows the customer to observe the actual meter readings and determine the total water use for that month or during a specific water use event, such as an irrigation zone. This program has been in effect since the fall of 2005.

Enhanced Water Meter Data Logging – Since January 2009, as ECCV replaces water meters as part of its normal replacement program, it is installing meters with data logging capabilities. The meter has a data profiler transmitter that allows a detailed analysis of water usage patterns. Meter readings are stored at user programmable intervals. This is an ideal tool for addressing customer service issues such as erroneous meter readings and other billing complaints, leak detection, and water use data for water audits. Once it is stored, the captured information can be retrieved by ECCV customer service representatives using a laptop or data collector and graphed. A customer can view the information with ECCV customer service representatives at the customer's location and also request a paper copy

4.4 Indoor – Residential

High Efficiency Clothes Washer and Toilet Rebates – Rebates are offered for low flow toilets and high efficiency clothes washers. The program has been in effect since 2004. Toilet rebates are for low-flow toilets and limited to homes constructed before 1994. Each customer can receive up to two toilet rebates. The annual number of rebates is shown in table 4-2. The annual budget allocated for rebates has been spent for each year of the rebate program.

Indoor High Efficiency Fixture Rebates 2004 - 2009					
Year	**Washer**	**Toilet**	**Actual Total**	**Annual Budget Total**	**Date Program Ended**
2004	356	138	$58,338	$50,000	12/29/2004
2005	330	103	$51,188	$50,000	11/17/2005
2006	345	68	$49,963	$50,000	9/6/2006
2007	445	94	$65,000	$65,000	7/13/2007
2008	666	156	$98,850	$100,000	9/3/2008
2009	622	188	$96,613	$100,000	12/14/2009

Table 4-2
ECCV Residential Indoor Fixture Rebates

4.5 Outdoor Efficiency - Landscapes and Irrigation

Water Budgets For Irrigation Accounts – Water budgets for irrigation accounts were first implemented in 2005. Aerial photography and GIS were used to calculate the irrigated areas for each irrigation account. Customers were provided the opportunity to verify the calculation of irrigated areas. Monthly water budgets are established based on E-T requirements for bluegrass in the Denver area. Individual block rate structures are established for each irrigator that corresponds to blocks used for residential customers. For residential customers, irrigation is assumed to average 14,000 gallons during the peak month based on average residential lot size as calculated using GIS. The blocks for residential and irrigation water use is shown in Table 4-3

Block	Residential Block (1,000 gallons)	Large Irrigator Block	2010 Rate (per 1,000 gallons)
1	Indoor usage	N/A	$ 2.80
2	Average outdoor usage	Water budget	$ 4.90
3	1.7 x average outdoor usage	1.7 x water budget	$ 8.10

4	2.4 x average outdoor usage	2.4 x water budget	$ 10.00
5	< 2.4 x average outdoor usage	< 2.4 x water budget	$ 12.50

Table 4-3
ECCV Blocks for Residential and Irrigation Customers

Due to the potential impacts on irrigators, the water budgets were phased in over a four year period, beginning in 2005, based on the following schedule:

- 2005 – Allowed 150% of allotted water budget
- 2006 – Allowed 130% of allotted water budget
- 2007 – Allowed 115% of allotted water budget
- 2008 – present – Allowed for 100% of allotted water budget

Irrigation System Water Conservation Requirements and Certification of Landscape Professionals – Irrigation design and water use requirements have been established as a performance standard. All irrigation system designs must be submitted for review and approval prior to the issuance of an irrigation tap for non-single family residential properties. Irrigation systems are inspected after installation. These design and usage requirements were established to conserve water. High water and maintenance expenses can be reduced when these irrigation system design requirements and performance standards are implemented and maintained. The water reduction implementation measure requirement applies to all new irrigation systems, except single family residences. The irrigation designer shall be a Certified Irrigation Designer (Commercial) as certified by The Irrigation Association or other professional with extensive experience in the design of commercial irrigation systems as determined by the District Manager.

Water Efficient Maintenance Practices for New and Existing Landscapes – ECCV irrigation design standards require that a regular maintenance schedule shall be submitted to ensure irrigation efficiency. The maintenance schedule shall include weekly or biweekly reviews of the system. Heads will be checked for coverage & leakage, and controllers will be reprogrammed monthly or more often if necessary. A landscape irrigation audit for irrigation accounts must be performed every 5 years by an auditor approved by the District and a copy of the audit shall be provided to the District.

Irrigation Controllers – A program to assist irrigators in replacing outdated irrigation controllers with systems that can improve irrigation efficiency has been in place since 2000. If irrigation customers request financial assistance for the replacement of irrigation controllers, ECCV staff evaluates the requests on a case specific basis to determine if there is potential for significant water savings from replacement of controllers. Several HOAs have participated in the E-T irrigation controller pilot program. All irrigation controllers must have battery backup or be unaffected by a power interruption and be secured to prevent tampering. Financial assistance from ECCV to irrigators is phased over several years based on actual water use reductions achieved by the irrigators.

The results of the E-T irrigation controller pilot program suggest that using controllers reduces water demand in the spring and fall but results in higher water use in the summer. Once the pilot program is complete, ECCV will analyze the data and determine if the E-T controllers meet the goal of managing peak demands. There are not set schedules for schools due to the many activities and use of athletic fields. Schools have established water budgets and water use must be within the budget.

Pilot Programs of Efficient Irrigation Systems – ECCV has participated in pilot program funding of local park districts and HOAs use of subsurface irrigation methods to reduce evaporation losses and increase overall irrigation efficiency. Netafim subsurface drip irrigation systems were installed in several local parks and HOA irrigated areas.

Xeriscape of ECCV Office – New District offices and maintenance facilities were constructed in 2003. A portion of the facility was landscaped using Xeriscape plantings and customers can view several Xeriscape gardens as they enter the facility.

4.6 Water Reuse Systems

Non-potable Irrigation System – As part of ECCV's overall water management and conservation program, the District implemented reuse of legally reusable flows. This is accomplished via a non-potable irrigation system. The ECCV non-potable irrigation system pumps tributary groundwater from the Cherry Creek alluvium and delivers disinfected treated nonpotable water to large irrigation customers in the southwest portion of ECCV. The system currently supplies approximately 275 acre-feet/year of water. The use of the LIRFs represents a reuse of a scarce resource and reduces the demand for potable water supplies including pumping of non-renewable Denver basin groundwater supplies.

Water Conservation Measure	Year Implemented
Operational Utility Side Measures	
Integrated Resources Planning	2004
Full Metering	1976
Modifications to increasing block rate structure	1998
Water Use Based Irrigation Tap Fees	2001
Northern Project Water Charge	2003
Designated Watering Days	2002
Seasonal planting limits for turf	2002
System Water Loss Control	
Annual system water audits	2005
Education and Public Information	
Conservation public information campaign	2001
School education programs (via DCWRA)	2009
Annual water conservation meetings with HOAs	2005
On-line access to water use history	
Water monitors	2005

Water Conservation Measure	Year Implemented
Enhanced water meter data logging	2009
Indoor - Residential	
Residential clothes washer rebates	2004
Residential toilet rebates	2004
Outdoor Efficiency - Landscapes and Irrigation	
Water budgets for irrigation accounts	2005
Irrigation System Water Conservation Requirements and Certification of Landscape Professionals	2001
Water Efficient Maintenance Practices for New and Existing Landscapes	2001
Pilot Program for E-T Irrigation controllers	2000
Pilot Program for Efficient Irrigation Systems	2000
Xeriscape of ECCV Office	2003
Water Reuse Systems	
Nonpotable system augmented by reusable return flow credits	2004

Table 4-4
ECCV Current Water Conservation Program

Section 5: Identification and Screening of Proposed Conservation Measures

ECCV has implemented a comprehensive water conservation program described in Section 4. Significant water use savings have been realized. As part of this water conservation plan, the existing water conservation measures and additional water conservation programs and measures were evaluated. It is important to note that as a water district, ECCV does not have land use or building permit regulatory authority. As a result, ECCV does not have the regulatory authority to require certain water conservation measures.

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

The existing ECCV water conservation measures were evaluated and compared to the Best Practices Guidebook to determine if there were potential best practices to be considered that are not of the current ECCV water conservation program. The Best Practices are shown in Table 5-1. The Best Practices Guidebook was also used to evaluate potential additional conservation measures.

Measure	Best Practice	Category or Sector Impacted
Full metering	BP 1	ALL
Conservation oriented rates	BP 1	ALL
Conservation oriented tap fees	BP 1	ALL
Integrated resource planning, goal setting and monitoring	BP 2	Utility
Water loss control	BP 3	Utility
Conservation coordinator	BP 4	ALL

Measure	Best Practice	Category or Sector Impacted
Water waste ordinance	BP 5	ALL
Public information and education	BP 6	ALL
Landscape water budgets	BP 7	Outdoor irrigation
Rules and regulations for landscape design and installation	BP 8	Outdoor irrigation
Certification of landscape professionals	BP 8	Outdoor irrigation
Water efficient design, installation and maintenance practices for new and existing landscapes	BP 9	Outdoor irrigation
Irrigation efficiency evaluations	BP 10	Outdoor irrigation
Rules for new construction (residential and non-residential)	BP 11	ALL
High efficiency fixtures and appliances-Residential	BP 12	Residential
High efficiency fixtures and appliances-Non Residential	BP 12	CII
Residential water surveys and evaluations, targeted at high demand customers	BP 13	Residential
Specialized non-residential surveys, audits, and equipment efficiency improvements	BP 14	CII

Table 5-1
Water Conservation Best Practices from Guidebook

Descriptions of the existing and proposed conservation measures that were evaluated are included below. A summary of the water conservation measures are shown in Table 5-1.

5.1 Operational Utility Side Measures

Integrated Resources Planning – This is an existing measure and will continue to be the foundation of ECCV's water supply and demand management strategy. As described in Section

7, this approach has resulted in significant infrastructure and water rights development and O&M costs. This measure is listed as Best Practices Guidebook Best Practice **(BP) #2**.

Full Metering – All ECCV customers and associated water use will continue to be metered and billed**. (BP #1)**

Modifications to Increasing Block Rate Structure – ECCV will continue to refine its water rate structure to promote water conservation. **(BP #1)**

Water Use Based Irrigation Tap Fees – ECCV will continue to implement irrigation tap fees that are based on irrigated area and planting materials. **(BP #1)**

Northern Project Water Charge – ECCV will continue its program to develop renewable water supplies and reduce dependence on non-tributary groundwater and finance this with a Northern Project Water Charge of $22/month was instituted for all customers. This additional water bill charge results in a water conservation signal to customers that has resulted in reduced water use. **(BP #1)**

Designated Watering Days – Designated watering days will remain in effect for all customers. This program manages peak irrigation demands as well as total water use. The continued use of patrols to enforce the program will be evaluated annually.

Seasonal Planting Limits for Turf – No new sod or grass seed planting will be allowed from June 1 to September 1. Exemptions may be made on a case specific basis for buffalo grass planting or for specific uses such as athletic fields.

Conservation Coordinator – ECCV will evaluate the need for a centralized in-house water conservation coordinator or if these functions shall continue to be shared among existing staff and supplemented by DCWRA and Center for Resource Conservation staff. **(BP #4)**

Residential Water Surveys and Evaluations, Targeted at High Demand Customers – ECCV has existing programs and aggressive increasing water block rates that limit the water use and minimizes high water users. At this time additional residential water surveys and evaluations are not needed as there are few high demand users. **(BP #13)**

5.2 Water Loss Control Program

Water Loss Control Program – System wide audits have been conducted by the ECCV annually since 2005 to determine the efficiency of the water distribution system. The American Water Works Association guidelines consider up to 10 percent non-revenue water to be acceptable. For 2007 and 2008, the unaccounted for water has averaged 7.5 percent.

A leak identification survey uses sonic leak detection equipment to identify leaks within a section of piping. The results of the survey would determine the amount of water that could possibly be saved. This measure would allow ECCV to prioritize and repair sections of the distribution system before a leak surfaces. ECCV understands the importance of identifying leaks within the distribution system and the water savings that can be achieved with such a water conservation

measure. A system wide leak detection program that would survey 20 percent of the system each year is estimated to cost $30,000 per year for contractor and administrative costs. The expenditure of additional funds for leak detection would reduce the financial resources for other conservation programs. ECCV has established a goal of a maximum of 8 percent non-revenue water and will implement a system wide leak detection program if non-revenue water increases to over 8 percent on a 3 year running average. **(BP #3)**

5.3 Education and Public Information

Conservation Public Information Campaign – In addition to its existing in-house public education program, ECCV will use the services of the Douglas County Water Resources Authority for the dissemination of water conservation information. **(BP #6)**

School Education Programs – ECCV will use the services of the Douglas County Water Resources Authority (DCWRA) for implementation of school education programs. **(BP #6)**

Annual Large Irrigators Water Conservation Meetings – ECCV staff will continue to hold an annual meeting with Large Irrigators, including home owners associations, irrigation management companies and irrigation specialists. The annual meeting will review the ECCV water conservation program including irrigation water budgets, watering schedules and water rates and penalties. **(BP #6)**

Online Access to Water Use History – Customers will continue to have online access to their water bills and have the ability to view compare monthly water use history. This program allows customers to adjust water use in response to past history and cost of water.

Water Monitor – ECCV will offer its customers an upgraded water monitor when these become available in mid 2011. The upgraded water monitor is anticipated to have graphing capabilities.

Enhanced Water Meter Data Logging – ECCV will continue its meter replacement program with meters that have data logging capabilities.

Xeriscape Design Clinics – ECCV will work with the Douglas County Water Resources Authority on the implementation of Xeriscape Design Clinics for all water providers in the DCWRA.

5.4 Indoor – Residential

High Efficiency Clothes Washer and Toilet Rebates – ECCV will continue its toilet and clothes washer rebate program but will limit the toilet rebates to only those toilets that meet the EPA WaterSense criteria. The annual budget allocated for rebates will be evaluated annually as well as the continued inclusion of clothes washers as new efficiency requirements for clothes washers will take effect in 2011 and the cost-effectiveness of a rebate program for clothes washers may be diminished. (BP #12)

Low Flow Faucets and Showerhead Rebates – ECCV does not intend to extend its residential indoor rebate program to low flow faucets and showerheads as its residential indoor

rebate program has been successful for toilets and clothes washers and the annual budget has been expended each year. **(BP #12)**

Rules for New Construction – ECCV as a water district does not have the regulatory authority to require high efficiency plumbing fixtures or other conservation measures for new residential construction. ECCV will work through the Douglas County Water Resources Authority on the development of residential building regulations for areas covered by DCWRA water providers. **(BP #11)**

5.5 Indoor – CII

High Efficiency Indoor Fixture Audits and Retrofits – ECCV has very limited commercial customers and no industrial customers representing 4% of total billed water usage. Within the next 2 years, ECCV will conduct water audits of its commercial customers. At the conclusion of this audit, ECCV will evaluate the cost-effectiveness of a CII indoor fixture retrofit program or other measures to address CII indoor usage including processes. **(BP #12)**

Rules for New Construction – **Building Codes Requiring High Efficiency Fixtures and Process Equipment** – ECCV as a water district does not have the regulatory authority to require high efficiency plumbing fixtures or other conservation measures for new Commercial, Industrial or Institutional construction. ECCV will work through the Douglas County Water Resources Authority on the development of CII building regulations for areas covered by DCWRA water providers. **(BP #11)**

Specialized Non-Residential Surveys, Audits and Equipment Efficiency Improvements – ECCV has very limited commercial and no industrial customers representing 4% of total billed water usage. As a result, ECCV will not independently implement a non-residential program. ECCV will work through the Douglas County Water Resources Authority on the development of non-residential surveys, audits and equipment efficiency improvements for areas covered by DCWRA water providers. **(BP #14)**

5.6 Outdoor Efficiency - Landscapes and Irrigation

Water Budgets for Irrigation Accounts – Water budgets for irrigation accounts will continue. Local E-T data will be used to establish the water budgets. **(BP #7)**

Irrigation System Water Conservation Requirements and Certification of Landscape Professionals – Irrigation design and water use requirements will continue as a performance standard. All irrigation system designs must be submitted for review and approval prior to the issuance of an irrigation tap for non-single family residential properties and inspected after installation. The irrigation designer shall be a Certified Irrigation Designer (Commercial) as certified by The Irrigation Association or other professional with extensive experience in the design of commercial irrigation systems as determined by the District Manager. **(BP #8)**

Water Efficient Maintenance Practices for New and Existing Landscapes – ECCV irrigation design standards will continue to require that a regular maintenance schedule shall be

submitted to ensure irrigation efficiency. The maintenance schedule shall include weekly or biweekly reviews of the system. A landscape irrigation audit for irrigation accounts must be performed every 5 years by an auditor approved by the District and a copy of the audit shall be provided to the District. **(BP #9)**

E-T Irrigation Controllers – If irrigation customers request financial assistance for the replacement of E-T irrigation controllers, ECCV will evaluate the request on a case specific basis to determine if there is potential for significant water savings from replacement of controllers. All irrigation controllers must have battery backup or be unaffected by a power interruption and be secured to prevent tampering. Financial assistance from ECCV to irrigators, if approved, will be phased over several years based on actual water use reductions achieved by the irrigators. **(BP #9)**

Efficient Irrigation Systems Program – If irrigation customers request financial assistance for the replacement of existing irrigation systems or installation of new systems with highly efficient irrigation systems, ECCV will evaluate the request on a case specific basis to determine if there is potential for significant water savings. Efficient irrigation systems include subsurface irrigation methods to reduce evaporation losses and increase overall irrigation efficiency such as the Netafim subsurface drip irrigation system. The irrigation customer must show the ability to perform recommended operations and maintenance for the life of the system as a prerequisite to financial assistance from ECCV. **(BP #9)**

Residential Irrigation Efficiency Evaluations – In addition to the existing Efficient Irrigation Systems Program for large irrigators, ECCV will evaluate the costs and benefits of contracting with the Center for Resource Conservation for residential irrigation system audits. **(BP #10)**

Limits on Turf Landscaping for New Construction – ECCV as a water district does not have the regulatory authority to limit turf landscaping for new construction and does not intend to pursue this with local governments at this time.

Rebates for Turf Replacement – ECCV has evaluated a rebate program for the replacement of turf, but does not intend to pursue this program at this time due to concerns with long-term savings and administration.

5.7 Water Reuse Systems

Non-Potable Irrigation System – ECCV will continue to reuse lawn irrigation return flows (LIRFs) for non-potable irrigation. It will expand the system where it is cost-effective and supply has been determined to be sustainable. A study for a potential next phase of the non-potable system has been completed. Expansion would require a pump station and additional piping infrastructure. Long-term lawn irrigation return flow credits may diminish due to increased irrigation efficiency and there may be insufficient LIRFs to justify the cost of expansion.

Reuse of Consumable Effluent Return Flows – ECCV will continue to investigate the right to reclaim the use of all or a portion of its consumable wastewater flows for diversion in its Northern Project, to augment alluvial nonpotable well pumping or by other means.

Water Conservation Measure	Existing Measure to be Continued	ECCV has Regulatory Authority?	Best Practices Guidebook BP #	Retained for Continued and/or Future Implementation?
Operational Utility Side Measures				
Integrated Resources Planning	X	Yes	2	Yes
Full Metering	X	Yes	1	Yes
Modifications to increasing block rate structure	X	Yes	1	Yes
Northern Project Water Charge	X	Yes	1	Yes
Designated Watering Days	X	Yes	1	Yes
Seasonal Planting Limits for Turf	X	Yes		Yes
Conservation Coordinator		Yes	4	Yes
Water Waste Ordinance		Yes	5	Yes
Residential water surveys and evaluations, targeted at high demand customers		Yes	13	No
Water Loss Control Program				
Water Loss Control Program	X	Yes	3	Yes
Education and Public Information				
Conservation public information campaign	X	Yes	6	Yes
School education programs (via DCWRA)	X	Yes	6	Yes
Annual water conservation meetings with HOAs	X	Yes	6	Yes
Customer on-line access to water use history	X	Yes	6	Yes
Water monitors	X	Yes	6	Yes
Enhanced water meter data logging		Yes	6	Yes
Xeriscape design clinics		Yes	6	Yes
Indoor - Residential				
Residential clothes washer rebates	X	Yes	12	Yes

Water Conservation Measure	Existing Measure to be Continued	ECCV has Regulatory Authority?	Best Practices Guidebook BP #	Retained for Continued and/or Future Implementation?
Residential toilet rebates	X	Yes	12	Yes
Residential toilet rebates for WaterSense high efficiency only		Yes	12	Yes
Residential low flow showerheads and faucets		Yes	12	No
Building Codes requiring high efficiency fixtures		No	11	No
Indoor - CII				
CII indoor audits and retrofits		Yes	12	Yes
Rules for new construction - building codes requiring high efficiency fixtures and process equipment		No	12	No
Specialized non-residential surveys, audits and equipment efficiency improvements		Yes	14	No
Outdoor Efficiency - Landscapes and Irrigation				
Water budgets for residential and irrigation accounts	X	Yes	7	Yes
Irrigation System Water Conservation Requirements and Certification of Landscape Professionals	X	Yes	8	Yes
Water Efficient Maintenance Practices for New and Existing Landscapes	X	Yes	9	Yes
Efficient Irrigation Systems Program	X	Yes	9	Yes
E-T Irrigation controllers	X	Yes	9	Yes
Residential Irrigation Efficiency Evaluations		Yes	10	Yes
Limits on turf landscaping		No		No

Water Conservation Measure	Existing Measure to be Continued	ECCV has Regulatory Authority?	Best Practices Guidebook BP #	Retained for Continued and/or Future Implementation?
for new construction				
Rebates for turf replacement		Yes		No
Water Reuse Systems				
Nonpotable system augmented by reusable return flow credits	X	Yes		Yes
Recapture and reuse of reusable effluent		Yes		Yes

Table 5-2
Evaluated Water Conservation Program Activities

Section 6: Demand Forecasts

The Alliance for Water Efficiency (AWE) Conservation Tracking Tool v1.2 was used to project water demands. The Water Conservation Tracking Tool is an Excel-based spreadsheet tool for evaluating the water savings, costs, and benefits of urban water conservation programs. In addition to providing users a standardized methodology for water savings and benefit-cost accounting, the tool includes a library of pre-defined, fully parameterized conservation activities from which users can construct conservation programs. Detailed information on the inputs, assumptions and methods used in Water Conservation Tracking Tool can be found in the User Guide.

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

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

6.1 Baseline Demand Forecast

The baseline forecast represents the ECCV demand forecast based on the historical water use of 0.6 acre-feet per single family equivalent (SFE.) This forecast is based on SFE demands before the implementation of aggressive water conservation measures starting in 2000 and the drought of 2002. The baseline forecast includes growth in SFEs as projected by ECCV. Since ECCV is near buildout and remaining undeveloped land within its service area has been platted, the future land use and SFEs is known with a relatively high degree of certainty. ECCV projects that its service area will reach buildout by 2022 at 23,500 SFEs. This results in a buildout water demand of 14,060 acre-feet per year (AFY.) This demand forecast includes an estimated 7% water loss, but does not include the normal raw water supply planning safety factors that would increase the 14,060 AFY treated water demand by approximately 10%. For the purposes of this plan, demand forecasts will be treated water forecasts, understanding that firm yield raw water supply requirements are approximately 10% greater.

6.2 Baseline + Plumbing Code Savings Forecast

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

The Baseline + Plumbing Code Savings demand forecast is approximately 13,500 AFY in 2022, a savings of 560 AFY.

6.3 Baseline + Plumbing Code Savings + Program Savings Forecast

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

The existing and planned water conservation programs were included as inputs into the AWE Water Tracking Tool to estimate and forecast the water savings from the existing and planned programs. The total water savings from 2001 to 2010 from water conservation programs is 1,362 acre-feet per year. Water savings have been estimated for the programs listed in Table 6.1. It is difficult to attribute savings to individual measures, such as select education and public information programs as these savings are reflected in the successful implementation of other programs. As a result, the estimated water savings should be evaluated by major category rather than evaluating the efficacy of individual conservation programs. The very low average water savings attributed to the commercial and industrial indoor retrofit program is the result of implementation of a program aimed at a very limited number of newer commercial and no industrial accounts that may already have higher efficiency indoor fixtures. ECCV will conduct indoor audits of commercial users to determine the potential water savings from a program to address indoor plumbing fixtures and processes. As a result, the projected savings may change.

The loss control program at an annual cost of $30,000 per year is also estimated to result in only minor savings as the ECCV water transmission and distribution system is relatively young, water line breaks average less than one per year and system losses are well within industry standards. As described in Sections 4.2 and 5.2, system wide leak detection will be implemented if non-revenue water exceeds 8% on a 3 year running average.

Program	Savings through 2010	Average Annual Savings*
CII Indoor Audits and Retrofits	0	0.2
Water Loss Control Program (System wide Leak detection)	0	4.4
Large Land. Irrigation Controller	15.7	6.8
Other Operational Utility Side Measures	0	21.8
Residential HE Washer, SF	73.3	37.1
Large Landscape Water Budgets	54.1	41.0
Residential HE Toilets, SF	27.8	44.3
Education and Public Information	50.7	49.8
Designated Water Days	571.4	597.9
Residential Increasing Block Rates	569.5	609.5
Total	1,362.5	1,412.7

**These are the average annual savings. Savings by 2022 are estimated at 1,630 AFY*

Table 6-1
ECCV Water Conservation Activities and Savings included in AWE Tool

The total of all of the ECCV water conservation programs are forecast to save an additional 1,630 AFY by 2022 for a total savings of 2,190 AFY for the plumbing code savings plus the ECCV program code savings. This represents a 15.6% total savings over the baseline water demands as shown in Table 6.2.

Service Area Water Savings	Units	2022
Plumbing Code Water Savings	AF	560
Program Water Savings	AF	1,630
Total Water Savings	**AF**	**2,190**
% of Baseline Demands	**%**	**15.6%**

Table 6-2
ECCV Water Conservation Savings

Section 7: Impacts of Conservation Programs

The forecasted total water savings of 2,190 AFY represents significant benefits to ECCV. Figure 7-1 shows the annual water demands based on the baseline, baseline + code savings and baseline + code savings + program savings for 2000 to 2030. Also included in this figure is the estimated current capacity of the ECCV water supply system. The current limiting factor is water production capacity. As shown in this figure, without the implementation of the major water conservation programs in the early 2000's, ECCV would have needed to add water treatment capacity by 2004. The successful implementation of these measures has delayed the need for ECCV to add water treatment capacity until 2012.

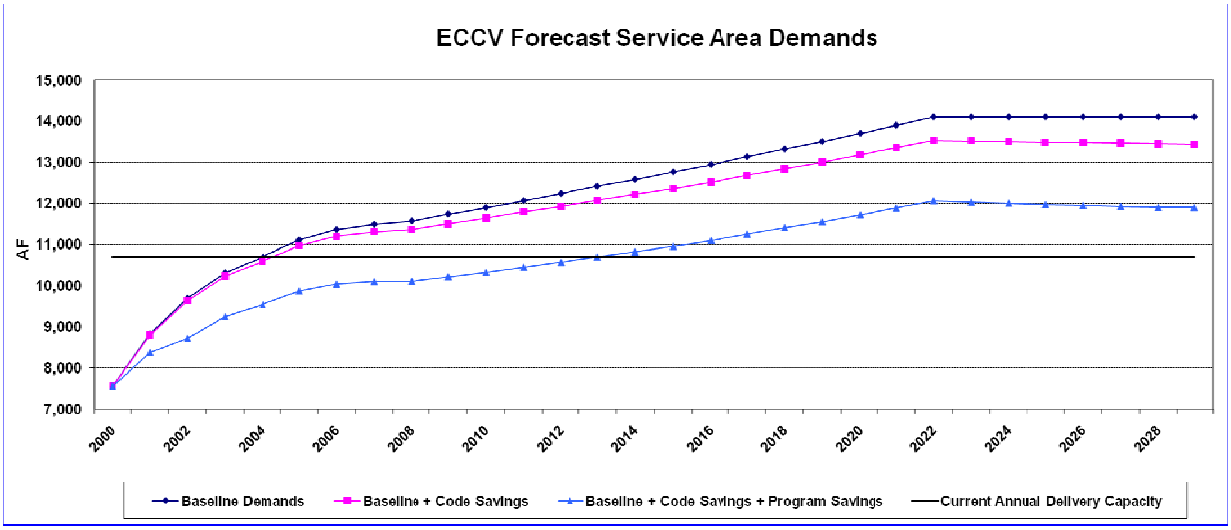


Figure 7-1
ECCV Forecast Total Water Demands

7.1 Benefits and Financial Savings

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

Raw Water Supply Development – ECCV will continue to acquire renewable water supplies to meet buildout water demand. The estimated cost for additional raw water supply development, including water rights acquisitions, water court transfers, diversion facilities, operational and firming storage, alluvial pretreatment and conveyance to the ECCV Water Treatment Plant is $22,000 to $25,000 per acre foot. The forecast demand reduction of 2,190 AFY from the ECCV water conservation programs and plumbing codes (combined program), if permanent, represent a savings of $48.2M (based on $22,000/AF.)

Water Treatment Plant – The projected reduction in peak demands from the combined program is 8 MGD. The projected cost per MGD of additional water treatment capacity, including RO concentrate disposal is $3.2 million. This represents a total savings of $25.6M from avoided water treatment capital projects.

Northern Pipeline and Pump Stations – The projected savings in peak demands from the combined program is 8 MGD. ECCV has already constructed the Northern Pipeline to meet its baseline peak demands. The projected savings allows ECCV to sell 8 MGD of its existing Northern Pipeline Capacity. ECCV has already sold 2.75 MGD of this now available capacity for $1.5M per MGD and is negotiating for sale of the additional 5.25 MGD. The cost to develop additional pumping capacity in the ECCV North and South Booster Pump Stations is $750,000 per MGD. The total combined savings or additional revenue if freed capacity is sold is $20M.

The savings to ECCV for capital expenditures is summarized in Table 7-1. The total savings in avoided capital expenditures for raw water supply development, water treatment and conveyance infrastructure is $93,780,000. Ongoing water conservation programs will be needed to ensure that these savings are permanent.

Water Development Activity	Water Demand Units	Total Water Conservation Program Forecast Demand Reductions	Estimated Unit Cost	Total Financial Savings if Demand Reductions are Permanent
Raw Water Supply Acquisition and Development	AFY	2,190	$ 22,000	$48,180,000
Water Treatment	MGD	8.00	$3,200,000	$25,600,000
Northern Water Line and Pump Stations	MGD	8.00	$2,500,000	$20,000,000
Total				**$93,780,000**

Table 7-1
ECCV Capital Expenditure Savings

7.2 Conservation Program Costs

The estimated cost to ECCV per AF saved by the program was evaluated using the AWE Tool as shown in Figure 7-2. The relatively high costs for education and public information is partially attributable to the incorporation of some of the savings from education and public information to other conservation measures that are successfully implemented as a result of the education and public information programs. The high estimated cost per AF of $60,300 per AF for the commercial and industrial indoor program is the result of the high administrative costs associated with the implementation of this program for a very limited number of newer commercial and no industrial accounts. The estimated loss control (system wide leak detection) program is also a high cost program ($40, 900 per AF) as the ECCV water transmission and distribution system is relatively young, water line breaks average one per year and non-revenue water are well within industry standards. As the system ages, water loss control may be expected to be more cost-effective. As noted, a system wide leak detection program covering

20% of the system annually will be implemented if system losses average greater than 8% on a 3 year running average. The CII indoor program will include audits of all commercial users. A measure to address commercial indoor fixtures or processes will be implemented if warranted based on the results of the audits. As a result, the estimated cost of $60,300 per AF saved may change based on the results of the audits.

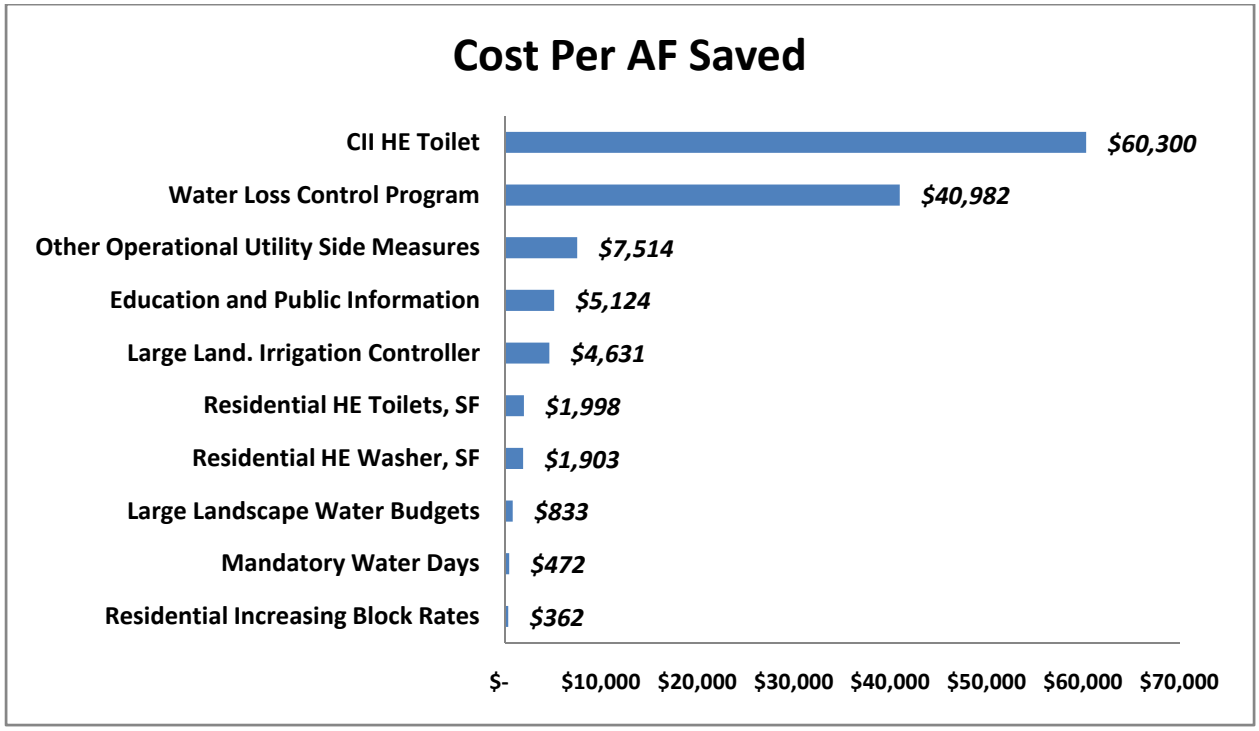


Figure 7-2
Conservation Programs Cost to ECCV per AF saved

7.3 Other Considerations

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

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

Sewer Charges – ECCV currently pays a flat monthly fee per SFE to the City of Aurora for conveyance of sewer flows to Metro Wastewater Reclamation District and treatment by Metro. ECCV charges its customers a flat monthly fee for sewer service. As a result, any decreases in sewer flows by individual users do not result in reductions in sewer charges to that customer. The estimated sewer flows are evaluated periodically by reviewing water usage data and any

reductions in indoor water usage resulting in reduced total sewer flows can result in reductions in the total sewer charge paid by ECCV to Aurora that can be passed on to customers.

Operations, Maintenance and Replacement – Most of the ECCV O&M costs are fixed, especially for labor. The 15% forecast demand reductions will likely only result in minor savings in labor costs. The savings will primarily be realized in operations and maintenance costs such as electricity and chemicals from the reduced need to divert, treat and pump supplies. Over the long-term, there will be less capital facilities to replace. The AWE Tool provided an estimate of the variable operations, maintenance and replacement costs per AF of water treated of $580, for an annual savings of $1.28M. This is not a direct savings to ECCV as it would not treat and deliver this water without customer demand. The customers would experience an annual savings of $3.5M, assuming an average cost of saved water at $4.90 per 1,000 gallons.

Reduced Revenue – As noted, ECCV will experience less O&M and the customers will pay less in water bills. This results in a loss of potential revenue to ECCV. As long as ECCV can recover its costs for existing investment in the Northern Pipeline and Pump Stations, this loss of potential revenue should not present a problem for operations, although the ECCV fixed costs for labor will likely not be reduced.

Reduced Energy Costs – The AWE Tool was used to estimate reduced energy costs to residential customers from the replacement of existing clothes washers with high efficiency clothes washers. The existing ECCV rebate program is proposed to continue up to a total of 4,290 rebates over the life of the program. The AWE Tool estimates that this will result in annual savings of $71,800 in electricity and $392,400 in gas charges to residential customers.

Section 8: Implementation and Monitoring Plan

8.1 Implementation

ECCV will continue its current water conservation programs. In addition it will implement the new programs previously described in Section 5 and shown in Table 8-1. This table also indicates the proposed dates of implementation.

Water Conservation Measure	Date of Implementation if New Measure
Operational Utility Side Measures	
Integrated Resources Planning	Ongoing
Full Metering	Ongoing
Modifications to increasing block rate structure	Ongoing
Northern Project Water Charge	Ongoing
Designated Watering Days	Ongoing
Seasonal Planting Limits for Turf	Ongoing
Conservation Coordinator	See Note 1
Water Waste Ordinance	2012
Residential water surveys and evaluations, targeted at high demand customers	2013
Water Loss Control Program	
Water Loss Control Program	Ongoing
Education and Public Information	
Conservation public information campaign	Ongoing
School education programs (via DCWRA)	Ongoing
Annual water conservation meetings with HOAs	Ongoing
Customer on-line access to water use history	Ongoing
Water monitors	Ongoing
Enhanced water meter data logging	Ongoing
Xeriscape design clinics	2013
Indoor - Residential	
Residential clothes washer rebates	Ongoing
Residential toilet rebates	Ongoing
Residential toilet rebates for WaterSense high efficiency only	2011
Indoor - CII	
CII indoor audits (and retrofits, if warranted by audits)	2012
Outdoor Efficiency - Landscapes and Irrigation	
Water budgets for residential and irrigation accounts	Ongoing
Irrigation System Water Conservation Requirements and Certification of Landscape Professionals	Ongoing
Water Efficient Maintenance Practices for New and Existing Landscapes	Ongoing
Efficient Irrigation Systems Program	Ongoing
E-T Irrigation controllers	Ongoing

Residential Irrigation Efficiency Evaluations	2012

Water Reuse Systems	
Nonpotable system augmented by reusable return flow credits	Ongoing
Recapture and reuse of reusable effluent	See Note 2

Table 8-1
ECCV Implementation Plan

Notes:

1. *The Conservation Coordinator position will be evaluated based on experience with implementation of the new measures. If the workload justifies, a recommendation will be made to the ECCV Board for funding of this position.*
2. *ECCV will continue to investigate the right to reclaim the use of all or a portion of its consumable wastewater flows for diversion in its Northern Project, to augment alluvial nonpotable well pumping or by other means.*

8.2 Ongoing Monitoring

ECCV will track the impacts of the conservation plan annually. Monitoring of total and billed water usage will provide information on water use and progress toward the water conservation goals. Utilities staff will continue to produce an annual report on the conservation program that includes a detailed description of plan implementation as well as the measured impacts on usage.

8.3 Plan Refinement

ECCV will review the program and implementation for conformance with this Plan. ECCV may adjust the programs identified in this Plan as warranted due to new technology or analysis of the effectiveness of individual programs. A complete review and revision of the conservation plan will be completed seven years after adoption

8.4 Compliance with State Planning Requirements

Colorado Statutes Title 37 Water and Irrigation – Colorado Water Conservation Board (CWCB) and Compacts 37-60-126 requires a state approved water conservation plan for covered entities as a condition of seeking financial assistance from the CWCB. Key planning requirements of the statute include the following items:

1. Consideration of specific conservation measures and programs including – (I) fixtures and appliances; (II) water-wise landscapes; (III) CII measures; (IV) water reuse systems; (V) water loss and system leakage; (VI) information and education; (VII) conservation oriented rate structure; (VIII) technical assistance; (IX) regulatory measures; (X) incentives and rebates.
2. Role of conservation in the entity's supply planning.
3. Plan implementation, monitoring, review and revision.
4. Future review of plan within 7 years.

5. Estimated savings from previous conservation efforts as well as estimates from implementation of current plan.
6. A 60-day minimum public comment period.

As identified in Sections 5 and 8.1, all of the criteria listed in 1-5 above have been satisfied. In addition, as noted in Section 5, the measures identified in the Best Practices Guidebook were also used to guide the selection of conservation measures.

A public review of the conservation plan (#6) took place from February 24 to April 20, 2011. No comments were received.