Water Conservation Plan 2007

Centennial Water and Sanitation District

CENTENNIAL
WATER AND SANITATION DISTRICT

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Introduction

Water is one of our most precious resources, and water conservation planning is a vital component of water supply management for Centennial Water and Sanitation District (District). The purpose of this document is to provide a plan for expanding Centennial's current conservation program and to integrate water supply planning with water conservation goals. This plan will fulfill the updated requirements of House Bill 04-1365 and associated Colorado Revised Statute 37-60-126.

There are several reasons to consider expanding the District's water conservation program. They include, but are not limited to: Reducing future water demands, reducing future District operating costs, reducing the cost and environmental impacts of new water supplies and reducing wastewater flows.

Specific goals of the water conservation program will be discussed in more detail in a later section of the plan. Some benefits of developing and implementing this plan include:

- Increased public awareness of methods to use water more efficiently.
- Reduction of indoor water use resulting in lower wastewater flows.
- Improved database to establish current use and allow measurement of future conservation impacts.
- Sustain past water savings behavior and attitudes.

Water conservation planning is an ongoing process of evaluating different conservation measures and programs. The key to integrating water conservation planning with water supply planning is evaluating measures and programs, determining the impact on utility management, identifying water savings and costs, establishing goals and developing a schedule to reach those goals.

As with any water conservation program, success relies heavily upon customer acceptance. A firm commitment and an extensive level of effort among the District, residents and businesses of Highlands Ranch will be necessary for the success of the program. Public education will play a vital role in developing the enthusiasm necessary for the successful implementation of new conservation measures.

Overview of Centennial Water and Sanitation District

Service Area and Population

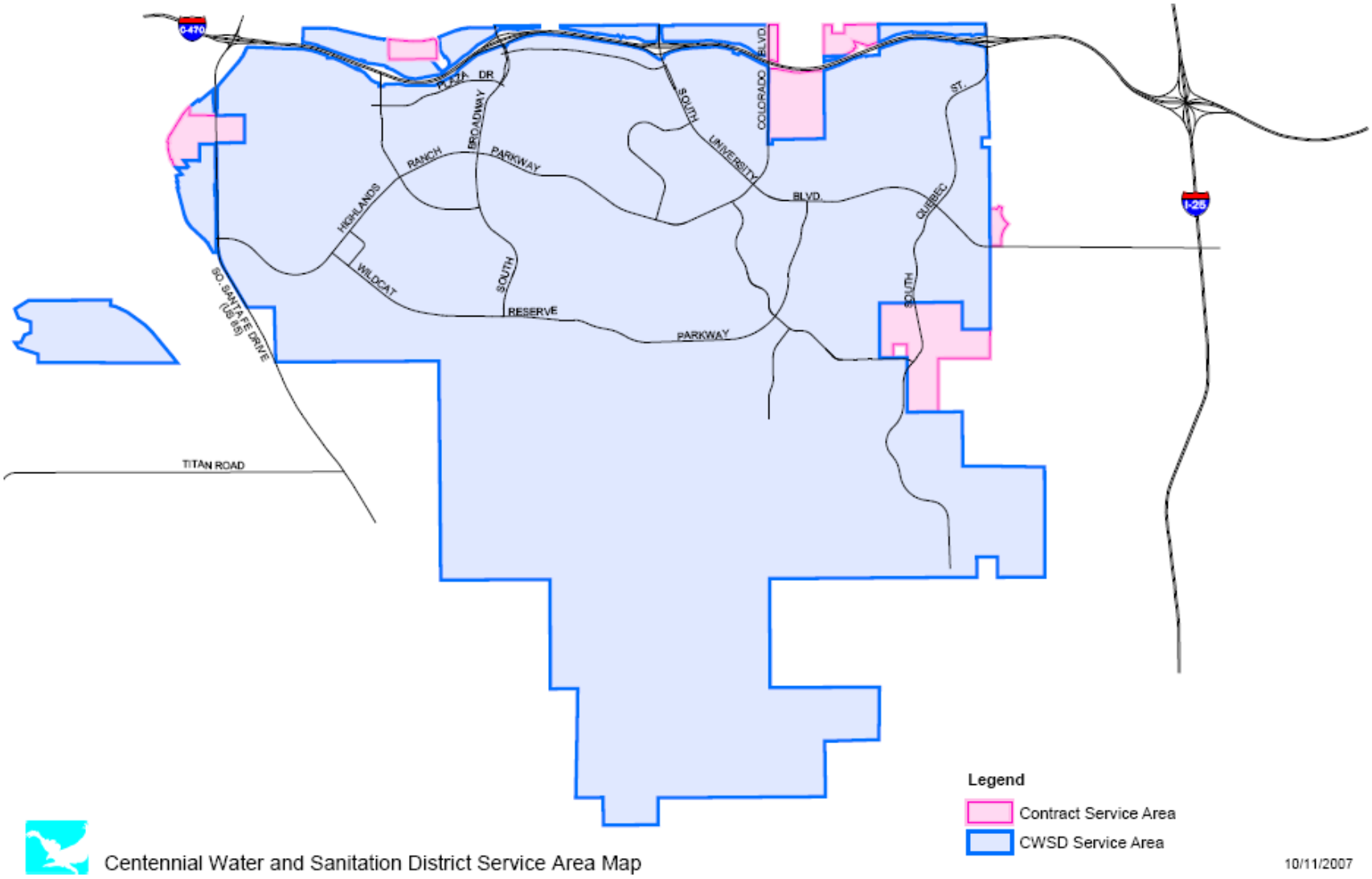
Centennial Water and Sanitation District provides water and wastewater services through an intergovernmental agreement to the Highlands Ranch Metropolitan District. Located in the southwest Denver metropolitan area, Highlands Ranch is located in unincorporated Douglas County approximately 12 miles south of Denver and one mile west of Interstate 25 (I-25). The District's service area includes the entire Highlands Ranch property, including the developed community. Several adjacent areas are serviced by Northern Douglas County Water and Sanitation District (NDCWSD), which is a wholesale customer of the District. The entire service area is approximately 21.9 square miles and is approximately bounded by Colorado State Highway 470 (C-470) to the north, Quebec/Monarch Rd. to the East, Daniels Park & Cherokee Ranch to the South, and Colorado State Highway 85 (Santa Fe Drive) to the West. A map of Centennial's service area is shown in Figure 1.

The Highlands Ranch Development Plan was approved by Douglas County in 1979 and laid the foundation for a community designed to provide a variety of land use types. Within the 22,000 acre development of Highlands Ranch, 61 percent of the land is designated for non-urban uses including open space and recreation. Thirty one percent of the land is residential, while the remaining eight percent is commercial property.

Residential home construction in Highlands Ranch began in 1981. Since then, the community has grown to see a population estimate of 90,000 residents living in approximately 27,000 homes and 4,000 multi-family units. The estimated completion or build out of the community is expected after the year 2013, and will include approximately 100,000 residents living in approximately 28,000 homes and 6,000 multi-family units.

Non-residential customers of Centennial Water and Sanitation District include the Highlands Ranch Metropolitan District (Metro District) which is responsible for the management of approximately 22 parks, more than 2,000 acres of open space, and landscape improvements along the community's roadways. Douglas County School District operates 17 elementary schools, four middle schools and four high schools in Highlands Ranch. In addition there are five private, charter and alternative schools. The Highlands Ranch Community Association is responsible for recreation centers and covenant control in the community with help from 26 home owner associations (HOA). Highlands Ranch is home to a variety of commercial business properties including retail, grocery, wholesale, technology and two public golf courses.

Figure 1: Centennial Water and Sanitation District Service Area



Water Supply

The water supply for Highlands Ranch is predominately renewable surface water from the South Platte River Basin. Surface water supply is supplemented with deep groundwater from Denver Basin aquifers beneath Highlands Ranch. Over the past 26 years surface water has comprised 85 percent of the District's water supply.

Surface Water

Surface water sources are provided from several decrees and leases that the District has acquired over the years. Storage for surface water is in McLellan Reservoir and South Platte Reservoir located just northwest of the District service area.

McLellan is a 6,000 acre-foot (AF) reservoir owned by the City of Englewood. The District leases 3,900 AF of space in the reservoir for surface water storage on a long-term basis. Surface water reaches McLellan Reservoir by way of five diversions: Dad Clark Gulch, City Ditch, Nevada Ditch, South Platte Alluvial Wells, and the High Line Canal. Surface water stored in McLellan is pumped to the nearby water treatment facility for distribution.

The South Platte Reservoir was completed in 2007 and is owned by Centennial Water and Sanitation District. The reservoir will give the District an additional 6,400 AF of surface water storage capacity. This additional storage capacity will ensure that the District is able to store water both seasonably and in wet years for future use by its customers. Surface water reaches South Platte Reservoir by way of five diversions: City Ditch, Nevada Ditch, Last Chance Ditch, South Platte Alluvial Wells and 7-11 Gulch. Surface water stored in South Platte will be pumped to McLellan Reservoir or directly to the water treatment plant for distribution.

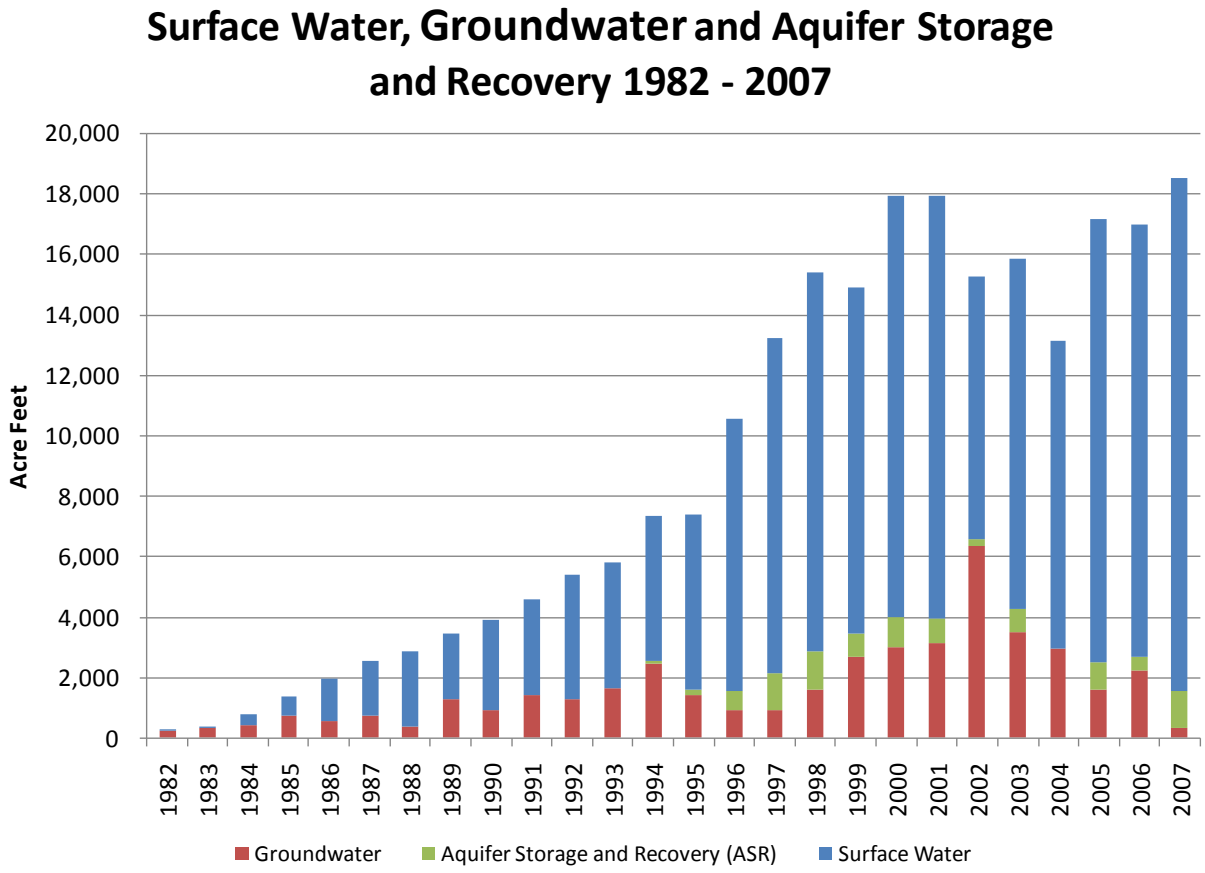
Surface water that has been treated is pumped into the distribution system or stored in one of eight treated water storage tanks. When surface supply is available in excess of system demand and surface storage reservoirs are near capacity, surface water may be injected into the Denver Basin Aquifers underlying Highlands Ranch for storage. Water stored this way can then be pumped back out into the Centennial supply system at any time it is needed, at the rate the pumping equipment is capable of. By installing the infrastructure that allows for this injection, the District has allowed for another option of storing surplus surface water when it is available, for later use when needed. By storing the water underground, evaporation losses are eliminated, conserving as much water as possible while in storage. The aquifer's physical properties limit the rate at which water can be injected and recovered, thus, there is still need for surface storage capacity.

Groundwater

Groundwater for the District is currently supplied by 51 operating wells in three different aquifers: Denver Aquifer, Arapahoe Aquifer and Laramie-Fox Hills Aquifer. The Denver Aquifer currently has 26 active wells, the Arapahoe Aquifer has 15 active wells and the Laramie-Fox Hills Aquifer has 10 active wells. The current well field has 12 million gallons per day (mgd) of on-line production capacity, and 16 mgd of groundwater treatment capacity. The annual delivery can provide 10,000 AF if needed.

Figure 2 shows the amount of raw surface water and groundwater produced by the District between 1982 and 2007. In addition, the amount of surface water transferred to the Denver Basin Aquifer through the District's Aquifer Storage and Recovery (ASR) program is shown for the same time period.

Figure 2: Surface Water, Groundwater and ASR 1982 - 2007



Water and Wastewater Facilities

Centennial Water and Sanitation District operates state of the art facilities that provide high quality water to its customers. Currently the District has one surface water treatment plant, two groundwater treatment plants, eight treated water storage tanks, 10 pump stations, 405 miles of main line, and one wastewater treatment plant. These facilities are shown in Figure 3.

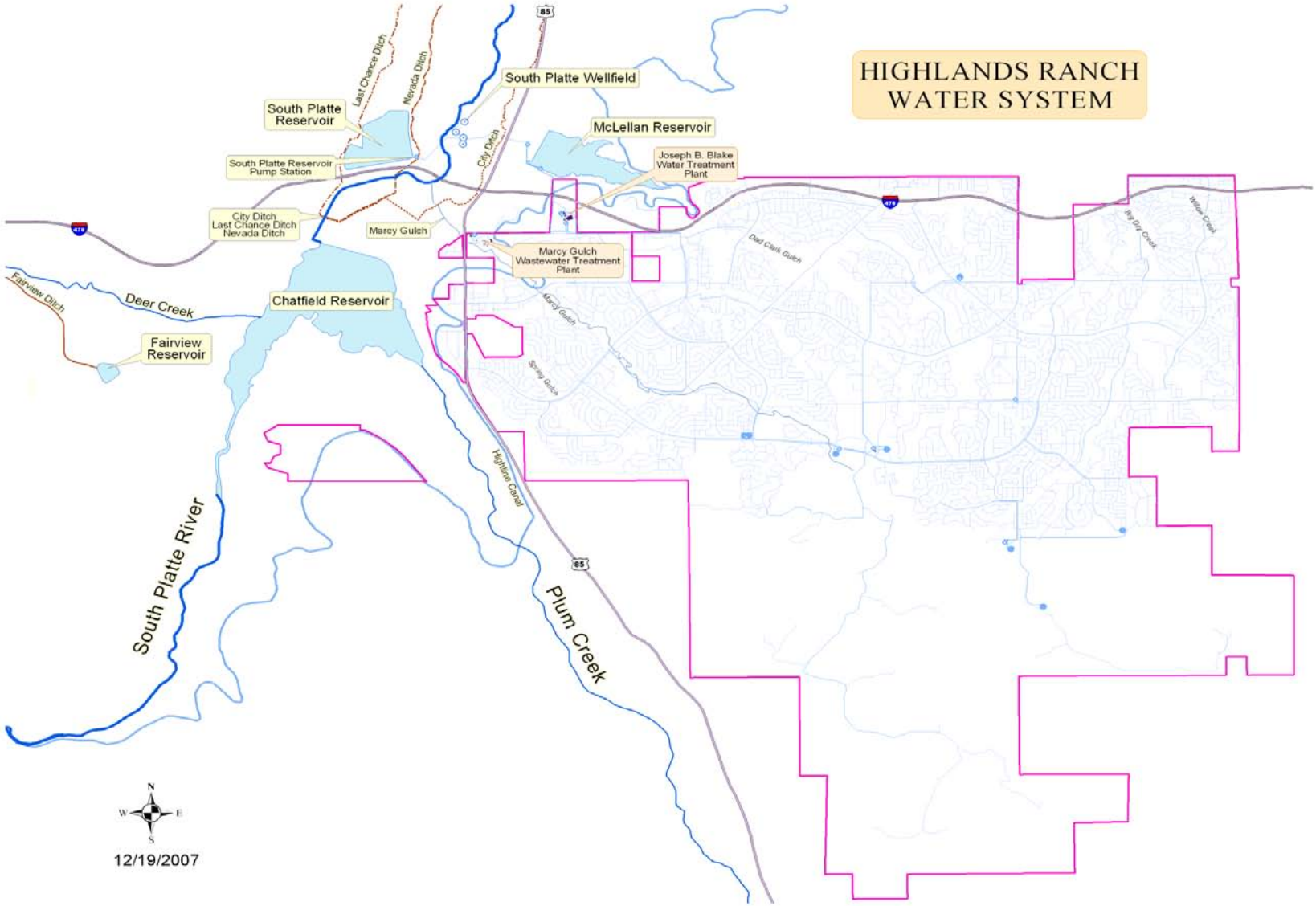
The Joseph B. Blake Water Treatment Plant has an operating capacity of 40 million gallons per day (mgd) that allows the District to treat and distribute water to customers. This facility also contains monitoring and controls for the distribution system. Water operations staff monitors system pressure, flow, tank volumes, pump operation and more from this location.

In addition, two groundwater treatment plants, totaling 16 million gallons per day of capacity, treat water that is pumped from the wells situated throughout Highlands Ranch. Treated water can then be stored in one of the eight treated water tanks to be pumped into the distribution system.

Wastewater flows to the Marcy Gulch Wastewater Treatment Plant where it is then treated to meet stringent water quality standards before it is discharged. The plant discharges treated wastewater to the Marcy Gulch tributary of the South Platte River. The plant has an average treatment capacity of 8.48 million gallons per day.

The wastewater polishing filters treat a portion of wastewater effluent from the Marcy Gulch Plant through three filter units having a design capacity of three million gallons per day. Filtered reusable effluent is used for irrigation. Currently the wastewater treatment plant site, the Highlands Ranch Golf Club, the landscape of Redstone Park and the Wind Crest development landscape are supplied with reusable effluent.

Figure 3: Highlands Ranch Water System



Demand and Customers

Centennial Water and Sanitation District supplies water service for many types of customers in and around Highlands Ranch. There are two major categories of water use: indoor and outdoor.

Indoor water use is categorized as single family residential, multi-family residential, and non-residential. All single family residential homes have individual ¾ inch meters, facilitating accurate water use data. Multi-family residential consists of apartment homes, condominiums and assisted living facilities. Non-residential indoor customers include businesses, churches and schools. Meter sizes vary according to demand at each user's property. Table 1 shows water use categories with corresponding examples.

Outdoor water use is categorized as single family residential and non-residential which includes; HOA (which includes multi-family outdoor use), Highlands Ranch Metropolitan District, Douglas County Schools, golf courses and construction. All Metro District parks and Douglas County schools within Highlands Ranch have separate meters for irrigation. A majority of the non-residential users also have separate meters for indoor and outdoor use. For comparison purposes, the District uses a ¾ inch equivalent system for non-residential taps.

The District also provides water to Northern Douglas County Water and Sanitation District (Northern Douglas County or NDC), which serves smaller neighborhoods adjacent to Highlands Ranch. While NDC is required to follow the rate structure and the rules and regulations of Centennial, billing, compliance and water conservation efforts are their responsibility.

Table 1: Water Use Categories

Water Use Categories	
Indoor	**Examples**
Single Family Residential	
Multi-Family Residential	Apartments, Condominiums, Assisted Living Facilities
Non-Residential	Restaurants, Office Buildings, Retail
Outdoor	**Examples**
Single Family Residential	Landscape, Irrigation
Non-Residential	
Home Owners Associations	Multi-family, Recreation Centers, Sub-HOA
Highlands Ranch Metro District	Parks, streetscapes
Douglas County Schools	Landscape, ball fields
Golf Courses	Highlands Ranch Golf Club, The Links at Highlands Ranch
Construction	Construction meters, temporary use

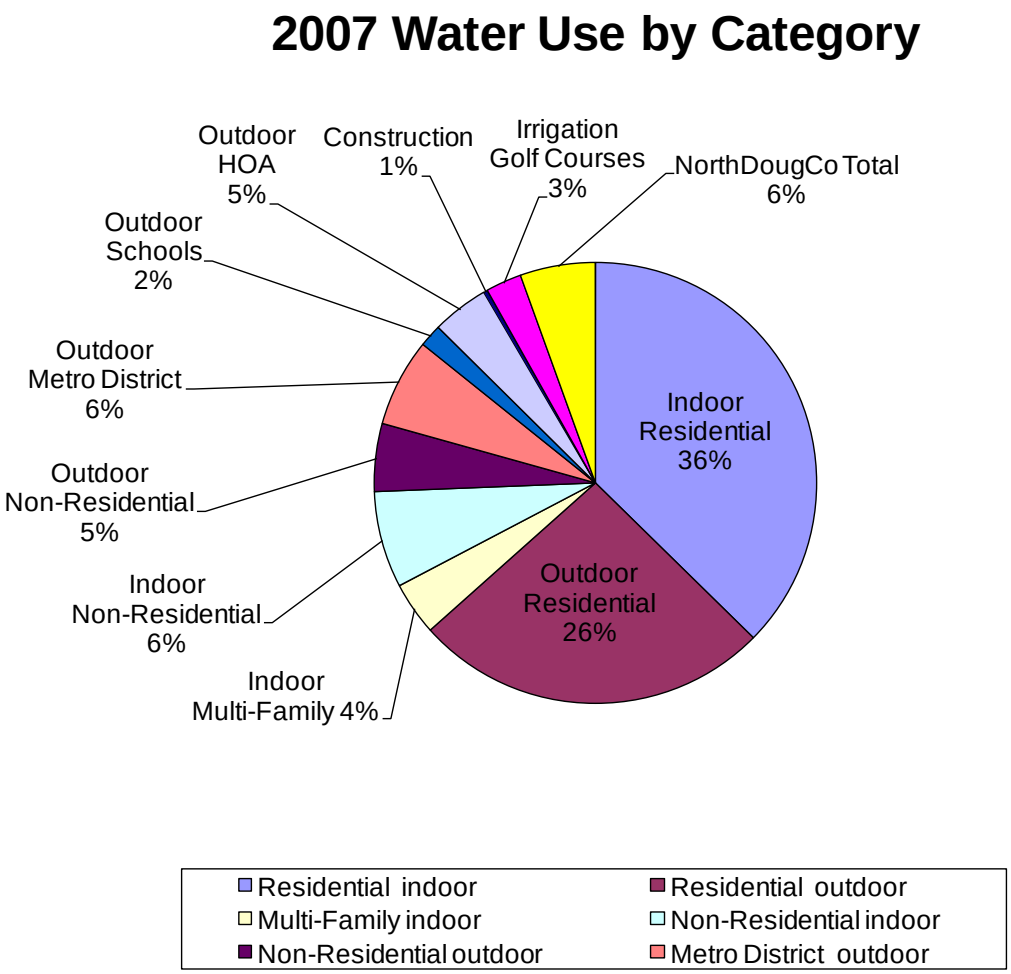
Table 2: 2007 Demand by Customer Category

Retail Customers	Demand (AF)
Residential	**9279.43**
- Indoor	*5470.99*
- Outdoor	*3808.44*
Multi-Family Indoor	**569.97**
Non-Residential	**1764.63**
- Indoor	*1035.68*
- Outdoor	*728.95*
Metro District Outdoor	**903.41**
Schools Outdoor	**241.86**
HOA Outdoor	**608.32**
Golf Courses	**382.26**
Northern Douglas County	**738.21**

Table 3: Number of Connections by Customer Category

Retail Customers	# of Connections
Residential	27014
Multi-Family Indoor	621
Non-Residential	
- Indoor	379
- Outdoor	233
Metro District Outdoor	153
Schools Outdoor	21
HOA Outdoor	103
Golf Courses	4
Wholesale Customers	
Northern Douglas County	16

Figure 4: 2007 Water Use by Category



Initial Demand Forecast

A critical step in the planning process is forecasting water demand. In order for the District to make an estimate of the water saved through the implementation of water conservation measures and programs in future years, a forecast of water demand must be made.

The demand forecast used by Centennial is based on 100 percent of the water budget. The water budget rate structure gives an allotment of water to each customer. Residential customers receive an allotment based on a fixed indoor amount and changing outdoor amounts throughout the irrigation season. Non-residential indoor customers receive an allotment based their tap size. Irrigation only meters receive an allotment based on the amount of irrigated landscape. See the Current Water Conservation Measures and Programs section for details about the water budget rate structure. Using the projected number of customers in each category, the District projected what future demand will be for all years in the planning period.

Table 4: Projected Demand by User Type in Acre Feet

	2008	2009	2010	2011	2012	2013
Highlands Ranch						
Residential	11,074	11,177	11,285	11,384	11,461	11,521
Multi Family	1,235	1,276	1,358	1,467	1,573	1,638
Non-Residential	4,087	4,134	4,145	4,145	4,145	4,145
Hydrant/Loss	1,288	1,300	1,313	1,326	1,338	1,346
Highlands Ranch Total	17,684	17,888	18,101	18,323	18,517	18,650
Northern Douglas County/Wholesale						
Residential	773	773	773	773	773	773
Multi Family	42	46	46	46	46	46
Non-Residential	485	485	485	485	485	485
Northern Douglas Total	1,301	1,304	1,304	1,304	1,304	1,304

Current Water Conservation Measures and Programs

Water conservation has been an important part of the District's management plan since its inception in 1980. In response to the Water Conservation Act of 1991, a water management study/conservation plan was done in 1996 to help focus the District's conservation efforts. Water conservation was brought to the forefront of the District's management plans during the drought of 2002.

The following is a summary of the current water conservation activities implemented by Centennial Water along with the estimated water savings attributed to each measure:

Conservation Promoting Rate Structure

In 2003 the District adopted the conservation-promoting, water budget rate structure. Detailed information about the water budget rate structure follows this section. Estimated water savings from implementation of the water budget rate structure is 16 to 18 percent.

Metering

The District has been 100 percent metered since construction began in 1981. Non-residential irrigation meters have been encouraged since 1981, and in 2003 non-residential combination indoor and irrigation meters were no longer allowed. In addition, Centennial Water has an ongoing program to conduct maintenance, sample meter accuracy and replace aging meters on a scheduled basis. Residential water meters are repaired or maintained in compliance with American Water Works Association (AWWA) standards. Every 10 years the body, including the measuring device and radio of residential meters, is replaced and every 20 years the entire meter, generator and remote are replaced. Non-residential meters are pulled annually and checked for accuracy. Any repairs or maintenance is also done at this time. Water meters provide indirect water savings as they allow the District to measure water use and monitor the effectiveness of conservation efforts. Meters also help to identify possible leaks and losses through the distribution system.

Water Conservation Specialist

In 2004 the District hired a full-time Water Conservation Coordinator to oversee the direction and implementation of its water conservation programs. The Water Conservation Coordinator works with both residential and non-residential customers in a number of ways. Home or site visits are conducted when high use is either reported or observed. Technical assistance is offered for both indoor and outdoor water conservation techniques including, but not limited to: Water use audits, leak detection, appliance water use, landscape materials, irrigation efficiency and controller scheduling. In addition, the Water Conservation Coordinator conducts public education programs, evaluates water conservation measures, and manages the water monitors employed during the irrigation season. It is difficult to measure the direct water savings that result from having a full-time water conservation specialist.

Water Efficient Fixtures and Appliances

In accordance with the District's rules and regulations, and the uniform plumbing code, low-flow or water efficient plumbing devices are required on all new construction. In 1992 the U.S. Congress passed the U.S. Energy Policy Act which established maximum allowable water flow rates for plumbing fixtures. Beginning January 1, 1994 all plumbing fixtures sold in the U.S. met these requirements. Seventy percent of homes in Highlands Ranch were built in 1994 or later. Seventy-three percent of non-residential construction occurred in 1994 or later.

Water Reuse Systems

Centennial Water's water reuse system of legally reusable water consists of two methods: (1) further treatment and direct reuse of reclaimed wastewater for irrigation and (2) recapture by direct diversion or exchange of reusable water discharged to the South Platte River including indoor return flow and lawn irrigation return flow credits. Currently the Waste Water Treatment Plant, Redstone Park, the Highlands Ranch Golf Club and the Wind Crest Assisted Living development use reclaimed water for their irrigation. In 2006, 281 AF of reuse water was used to irrigate the aforementioned facilities. 3,873 AF was recaptured or exchanged in 2006, resulting in a total of 4,154 AF of water that would have otherwise been supplied through either surface or groundwater resources.

Leak Identification and Repair

The District uses sonic leak detection equipment to locate leaks within the distribution system when they appear. Leaks that are identified at the surface and located are repaired immediately. Estimates of the number of gallons lost by each repaired leak are recorded in a log book once the repairs are made. A review of the system wide audit performed annually, and included in the appendices, shows that the District is consistently within the accepted range of unaccounted for water. Although customers are responsible for leaks that occur after the service connection, the District uses the billing system to help identify possible leaks. When the meter is read, and the use is high, a work order is generated to tag the home for leak detection and high use.

System Audits

System wide audits are conducted by the District annually 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 water unaccounted for 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 15 percent unaccounted for water to be acceptable. Over the past 11 years, the average percentage of unaccounted for water was 6.79 percent, showing that the District's water system is consistently within an acceptable range.

System Pressure Management

The District's water system contains five different pressure zones that are monitored at the water treatment plant for safety and optimal service. In addition service pressure regulation is mandated by the District on domestic water service lines and irrigation service lines. The pressure is restricted to 65 PSI on residential lines and 80 PSI on irrigation service lines. This pressure regulation has been shown to save an average of 6 percent when compared to unregulated service pressure.

Education/Information Dissemination

The District has a continuous public education program to help inform its customers of ways to conserve water both indoors and outdoors. This program includes:

1. **Water conservation workshops** are offered throughout the year to both residential and non-residential water users. A "Lunch and Learn" program takes place in the months of April through September, educating homeowners on wise use of water indoors and in their landscapes. Centennial Water has held workshops at local businesses so that employees could learn about water conservation during their lunch hour. Commercial landscape contractors are encouraged to attend seminars covering irrigation auditing and irrigation system maintenance.
2. **Water education literature**, including Home Water Management, Reading Your Meter, Reading Your Water Bill, Outdoor Watering, Mandatory Water Conservation Measures, Water and Wastewater and Water Supply is available at the District office building, and is handed out at all public events.
3. **Home water management kits** include a shower timer, rain gauge, shower/faucet flow bag, toilet leak detection tablets and the above literature. These kits are also available at the District office building and all public events. The kits are also handed out to customers who violate mandatory water conservation measures and are available by mail when requested.
4. **Promotion of low water use landscapes and efficient irrigation practices** with xeriscape literature, workshops, and demonstration gardens. The District encourages low water use landscapes or xeriscaping on all homes in the community through public education and the water budget rate structure. Centennial Water offers assistance through brochures, pamphlets and educational workshops. The District partnered with the Highlands Ranch Community Association to build a xeriscape demonstration garden at the Eastridge Recreation Center. In 2007 the District collaborated with the Douglas County Water Resource Authority (DCWRA) and the Colorado Water Conservation Board (CWCB) to produce and distribute a xeriscape DVD to all homes in Douglas County. Efficient irrigation practices are encouraged to all homeowners and landscape contractors who work within the District. Technical assistance is available through the water conservation coordinator, educational workshops and literature. The District continues to host GreenCO's Best Management Practice training, emphasizing water conservation in landscape management. The Metro District parks department uses computerized central control to manage their water use throughout the District.

5. **Water conservation section on the District's website** has all of the aforementioned literature available to residents. The website also contains links to other resources that will help customers conserve water.
6. **Water monitors** patrol the service area during the summer months to ensure compliance with mandatory water conservation measures and help educate customers. More information about the water monitor program is located in the Rules and Regulations section.
7. **Collaboration** with water conservation groups in the South Metro area, such as the Douglas County Water Resource Authority, to share ideas about water conservation. Through this cooperative effort, Centennial Water is able to gather new ideas and share its experiences with other suppliers in the area.

Centennial Water considers public education to be an important component of the water conservation plan. Unfortunately, it is virtually impossible to measure actual water savings achieved through public education. Opportunities to monitor and measure the success of the public education component of the program will be discussed later in the plan.

Regulations/Ordinances

Centennial Water and Sanitation District is a special district that was formed to provide water and wastewater services to the community of Highlands Ranch. Douglas County is the agency with land use authority for Highlands Ranch. Therefore, landscape regulations such as sod limitations and plant materials cannot be directly regulated. However, the District has placed several regulations governing the direct use of water in the rules and regulations. Primarily, in 2004 the District added to its rules and regulations that no outdoor watering could occur between the hours of 10 a.m. and 6 p.m. to minimize the loss of water due to wind and evaporation. It is estimated that 40 to 50 percent of irrigation water used during the afternoon hours can be lost due to wind and evaporation. Other rules and regulations are described in further detail in the Rules and Regulations section later in the plan.

Technical Assistance

Water audits are conducted by District staff at homes and businesses that request this service or have been determined by staff to have irregularly high use. Some estimates of water saved through residential water audits are 7,000 to 10,000 gallons annually if conservation measures identified are implemented. Non-residential audits have been estimated to save 20 to 26 percent once the conservation measures identified are implemented. Water audits are not mandatory but are offered to those who request the service or respond to communication from the District.

Table 5: Summary of Current Water Conservation Activities

Water Conservation Measures and Programs	Approximate Annual Water Savings (if known)	Implementation Dates	Is continued Implementation Planned?
Water Budget rate structure [1]	21%	2003 - Present	Yes
Metering all customers and separate meters for irrigation account	not known	1981 - Present	Yes
Full time Water Conservation Coordinator	not known	2004 - Present	Yes
70 percent of residential, 73% of non-residential low flow fixtures	not known	1994 - Present	Yes
Direct reuse of reclaimed wastewater for irrigation	281 AF (2006)	2003 - Present	Yes
Recapture of reusable water discharged into South Platte	3,873 AF (2006)	1989 - Present	Yes
Distribution system maintenance and repair	not known	1981 - Present	Yes
Distribution system audits	not known	1981 - Present	Yes
Distribution system pressure management	6%	1981 - Present	Yes
Water conservation workshops: Lunch and Learn	not known	2005 - Present	Yes
Certified Landscape Irrigation Auditor (CLIA) training	not known	2007 - Present	Yes
Commercial landscape irrigation troubleshooting workshops	not known	2007 - Present	Yes
Water education Literature	not known	2003 - Present	Yes
Home water management kits: shower timer, rain gauge, flow bag	not known	2005 - Present	Yes
Partner xeriscape demonstration garden with HRCA	not known	2003 - Present	Yes
Distribution of xeriscape DVD to all residents	not known	2007 - Present	Yes
Water conservation section on District website	not known	2003 - Present	Yes
Collaboration with others to promote water conservation	not known	2004 - Present	Yes
Daytime watering restrictions, no wate waste regulations	not known	2003 - Present	Yes
Water monitors to enforce District rules and regulations	not known	2005 - Present	Yes
Customer water use audits (voluntary)	not known	2003 - Present	Yes
Non-residential and residential irrigation audits	not known	2007 - Present	Yes

1. Savings based on projected use in 2007 before implementation of water budget rate structure.

Water Budget

Prior to 2003 the District employed an increasing block rate structure. After the drought of 2002, the District implemented a water budget rate structure. The rate structure has two key components: A fixed water service availability fee and a variable water consumption rate. The fixed water service availability fee helps to assure revenue stability to meet on-going debt service and customer service staff obligations. The variable consumption component consists of a four-tier rate structure where the break point between tiers is based on a percentage of water budget assigned to each customer. Table six shows the 2007 breakdown of the residential tiers.

Table 6 2007 Residential Water Rates

Percentage of Water Budget	Water Rate per 1000 gallons (Kgal)	
	Summer	Winter
Usage up to 100% of Budget (< 100%)	$ 2.30 per Kgal	$2.30 per Kgal
Usage of 101% to 120% of Budget (101% - 120%)	$ 3.45 per Kgal	$3.45 per Kgal
Usage of 121% to 140% of Budget (121% - 140%)	$ 5.20 per Kgal	$3.45 per Kgal
Usage over 140% of Budget (> 140%)	$ 7.80 per Kgal	$5.20 per Kgal

Residential water budgets are formulated from an indoor and an outdoor component. The indoor component is 12,000 gallons every two months based on an assumed 65 gallons per capita per day for a family of three. Customers can sign an affidavit to receive an additional indoor allowance for larger families. The outdoor component is based on the customer's actual lot size multiplied by an irrigable area factor of 45 percent. An allowance of 27 inches of water based on historical evapotranspiration (ET) rates for the area, minus average annual measurable rainfall, is provided. These budgeted outdoor amounts are then based on historical ET for the weeks within each billing cycle.

Non-residential indoor water budgets are calculated based on the size of the meter servicing the business. Each customer is allotted 189,000 gallons per ¾" equivalent. Outdoor budgets are based on actual irrigated areas for the customer. The customer is responsible for supplying the landscape area data to the District. Tables 7 and 8 illustrate the breakdown of water rate tiers for non-residential indoor and non-residential irrigation water use.

There have been several issues that have been addressed since the adoption of the water budget in 2003.

- Adding a permit program to allow extra budget once per year for customers wanting to add new sod in April, May, September or October discourages planting during the heat of the summer.
- A variance for households with a population greater than three persons supports fairness throughout the service area.
- Water budgets were increased by 1,000 gallons per month during the winter to accommodate winter watering of trees and shrubs, enabling customers to care for their landscape during the winter months.
- In 2007 the non-residential irrigation water rates were increased in order to help encourage more water conservation in that area. (Table 8)
- In December 2007 non-residential indoor water budgets were changed from allotments based on historical usage to an allotment based on meter size as state above. Budgets based upon historical usage were not effective in promoting water conservation.

Thus far, the water budget rate structure has been well received by customers of the District, and has been a successful water conservation measure. The flexibility of the water budget rate system allows the District to adapt to different issues as they arise.

Table 7: Non-Residential Indoor Water Rates

Percentage of Water Budget	Water Rate per 1000 gallons (Kgal)
	Summer
Usage up to 100% of Budget (< 100%)	$ 2.30 per Kgal
Usage of 101% to 120% of Budget (101% - 120%)	$ 3.45 per Kgal
Usage of 121% to 140% of Budget (121% - 140%)	$ 5.20 per Kgal
Usage over 140% of Budget (> 140%)	$ 7.80 per Kgal

Table 8: Non-Residential Irrigation Water Rates

Percentage of Water Budget	Water Rate per 1000 gallons (Kgal)	
	2006	2007
Usage up to 100% of Budget (< 100%)	$ 2.30 per Kgal	$2.30 per Kgal
Usage of 101% to 120% of Budget (101% - 120%)	$ 3.45 per Kgal	$4.00 per Kgal
Usage of 121% to 140% of Budget (121% - 140%)	$ 5.20per Kgal	$7.00 per Kgal
Usage over 140% of Budget (> 140%)	$ 7.80 per Kgal	$12.00 per Kgal

Rules and Regulations

Since construction began in 1981 all of the District's taps have been metered to allow accurate readings of actual water usage. There are however, several policies that the District has adopted to help decrease water demand:

- Customers may water their landscape any day of the week. However, outdoor sprinkler irrigation is prohibited from 10 a.m. until 6 p.m. daily. This policy ensures customers will not be watering their landscape during the hottest part of the day when evaporation rates are at their highest. The District also recommends that customers follow a voluntary three day per week watering schedule.
- Hand watering trees, shrubs and plants is allowed at any time, as long as a hose is held or a water conserving method is used (such as a drip, micro spray, deep root watering device or watering can).
- Car washing is allowed at any time. However, a hose end shut off device must be used.
- Wasteful water practices, such as allowing excess water to flow in street gutters and neglecting to repair leaks, are prohibited.

The District employs seasonal water monitors, to help educate customers about wise water use practices, while they also patrol the service area to ensure that District policies are enforced. Table 9 shows the number of violations recorded by water monitors in 2007.

Table 9: 2007 Recorded Water Monitor Violations

Customer Type	# of Violations	# of Repeat Violations
Residential	549	6
Non-residential	73	5

2007 Water Conservation Program Highlights

Centennial Water made some significant changes to its conservation program in 2007. Some of these changes were made to improve upon existing measures, and some were new additions in order to increase the overall effectiveness of the conservation program. Highlights of the 2007 program changes are as follows:

- Collaboration with Douglas County Water Resource Authority and Colorado Water Conservation Board to produce and distribute a xeriscape DVD which covered the principles of xeriscape to all homes in Douglas County. This conservation tool was sent to all homes in the Centennial Water service area in order to help educate customers about the opportunity to save water in the landscape by practicing the principles of xeriscape. Centennial Water contributed more than $5,000 to this effort. A follow-up study showed that the DVD was viewed by as much as 50 percent of households that received it.

- Centennial Water partnered with the Center for Resource Conservation and participated in their Slow the Flow Colorado irrigation audit program. The District made 200 irrigation audit hours available to residential and non-residential customers as part of a pilot program to study the effectiveness of irrigation audits. It takes approximately two audit hours to complete one residential irrigation audit. Non-residential audit times vary depending upon the size of the property, but in 2007 the average time was 25 hours. The purpose of offering irrigation audits to the Districts customers is to help improve irrigation efficiency. Customers were shown areas where there irrigation system needed to be improved and how to properly schedule their irrigation cycles. In total 81 residential properties and two non-residential properties had their irrigation systems audited. Customer feedback about the program was favorable. Centennial will continue this pilot program in 2008 in an effort to gather more information about the effectiveness of the program. The monitoring of this program will be discussed in a later section.

- The District partnered with Ewing Irrigation Products and the Irrigation Association to host the Certified Landscape Irrigation Auditor class and exam for local landscape contractors and designers. This course is designed to increase the knowledge and skill level of landscape contractors and designers in the area of irrigation efficiency. Students learned how to perform an irrigation audit and how to properly schedule irrigation with an emphasis on water use efficiency. A total of 28 landscape contractors and architects attended the training with 20 taking the test to be certified following the classroom instruction.

- Centennial Water made changes to the non-residential irrigation rate structure. Approximately 20 percent of the District's water is used for non-residential outdoor irrigation. In 2006 residential, non-residential indoor, and non-residential outdoor were all billed with the same four-tier rate structure.

- Centennial Water also made a change to the fee structure for violating mandatory water conservation measures in 2007. It was determined by staff that the current fees for violating mandatory measures had virtually no impact on non-residential customers. New fees were established for 2007 based on size of irrigation service meter. No changes were made to residential fees and both non-residential and residential charges are shown in Tables 10 and 11 respectively.

Table 10: Non-Residential Charges for Violation of Mandatory Water Restrictions

Violation	Action	Charge		
		2006	2007	
			¾ and 1 inch	1-1/2" and up
First Offense	Notice of violation letter	No Charge	No Charge	No Charge
Second Offense	Notice of violation letter	$50	$100	$600
Third Offense	Certified letter	$100	$200	$1200
Fourth Offense	Certified letter	$250	$500	$3000
Fifth Offense	Certified letter	$500	$1000	$6000
Sixth Offense	Suspension of service	No Service	No Service	No Service

Table 11: Residential Charges for Violation of Mandatory Water Restrictions

Violation	Charge
1. First Offense	Door Hanger Notice of Violation and letter
2. Second Offense	$50 added to water bill and letter
3. Third Offense	$100 added to water bill and certified letter
4. Fourth Offense	$250 added to water bill and certified letter
5. Fifth Offense	$500 added to water bill and certified letter
6. **Sixth Offense**	Suspension of water service

- Finally, the Centennial Water Board of Directors recently adopted a change to the water budgets for indoor non-residential water use accounts. Previously, the water budgets for indoor and combination indoor/outdoor non-residential meters were calculated based on the previous years billed used during the same billing cycle. This approach rewarded a customer with a larger budget when they used more water rather than promote conservation. These types of accounts will now be allocated a water budget based on meter size as previously discussed.

Estimated Water Savings

Water conservation has always been an important part of Centennial Water's demand management strategy. The drought of 2002 caused Centennial, as well as other water providers, to place a renewed emphasis on water conservation as a method to help limit the demands of its customer base.

In the spring of 2003 the water budget rate structure was adopted as a means to encourage water conservation through water rates. This new rate structure provided individualized water budgets for all accounts and emphasized the importance of staying within that budget with a financial impact on customers who used more water than their allocated water budget. The water budget rate structure has played an important role in the water savings that Centennial Water has experienced through its conservation program. The combination of the water budget rate structure along with the other supply and demand side measures and programs discussed earlier has enabled the District to achieve significant water savings.

In 2001 the District witnessed the largest demand for water in its history. In 2002 the Front Range of Colorado experienced a significant drought event. Centennial Water was affected by this drought along with many other water providers in Colorado. In response to the drought, the District established a number of mandatory outdoor watering restrictions in an effort to reduce the demand for water. The mandatory water restrictions and increased water conservation messaging by Centennial Water resulted in a decrease in water use by the District's customers. The decrease in billed water use from 15,544 AF in 2001 to 12,137 AF in 2004 can be seen in Figure 5. Although the height of the drought was in mid-2002, the effects of the drought combined with increased water conservation efforts by the District, can be seen in the water use habits of customers through 2004.

In looking at Figure 5 one will notice that water use has started to increase since 2004. Increased water use is to be expected from a community with a growing population. One way to compensate for growing populations is to use gallons per capita per day (gpcd) as a measurement of water use. Using total gpcd as a measurement can be misleading since it does not take into consideration different water uses within the community. A community that is primarily non-residential customers will have an inflated gpcd since the residential population is not very high. In order to minimize the effects on gpcd from a community with multiple land uses, Centennial Water will use two different water use measurements. For residential population, residential gpcd will be used, while gallons per ¾ inch equivalent will be used for measuring non-residential water use.

When comparing water use and estimating water savings, Centennial Water will use 2001 water use since that is the most recent year when the water use habits of our customers were unaltered by drought conditions. Although the Centennial Water customer base has continued to grow since 2001, the demand for water has slowed due to increased water conservation efforts. Compared to 2001, the number of single family taps has increased by over 16 percent and multi-family units has gone up by over 17 percent. When combining single family and multi-family residential billed water use expressed in gallons per capita per day, there has been a decrease from 127 gpcd in 2001 to 103 gpcd in 2007, or a

19 percent savings in residential water use. Figure 6 shows annual billed residential gallons per capita per day from 1998 – 2007.

During the same period, there has been an increase of 25 percent in the number of non-residential ¾ inch equivalents. In 2001 billed non-residential water use was 431,000 gallons per ¾ inch equivalent. In 2007 billed non-residential water use was 303,000 gallons per ¾ inch equivalent resulting in a decrease in non-residential water use of 30 percent between 2001 and 2007. Figure 7 shows annual billed non-residential gallons per ¾ inch equivalent from 1998 – 2007.

When looking at total billed water use during that same period, Centennial Water has seen a decrease from 15,544 acre feet in 2001 to 14,756 acre feet in 2006. This decrease in total water use has come during a period when the customer base of Centennial Water has continued to grow. Since we used a ¾ inch equivalent to measure non-residential water use and single family residences are ¾ inch meters, we can use ¾ inch equivalents as a basis to measure total water use. Using this methodology, total billed water in 2001 was 157,089 gallons per ¾ inch equivalent and 123,320 gallons per ¾ inch equivalent in 2007. This shows a savings of 21 percent over that time period.

Figure 5: Total Billed Water Use versus Pre-Water Budget Projected Water Use

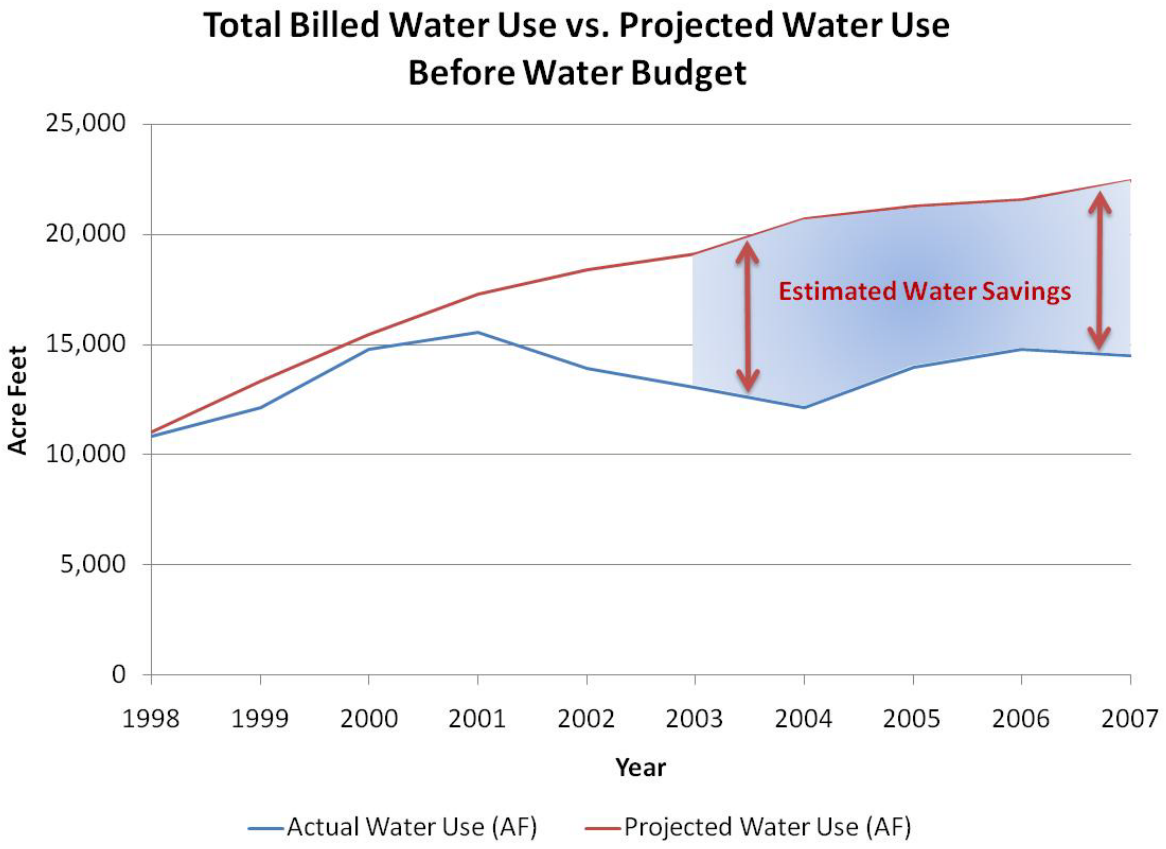


Figure 6: Annual Billed Residential Gallons per Capita per Day

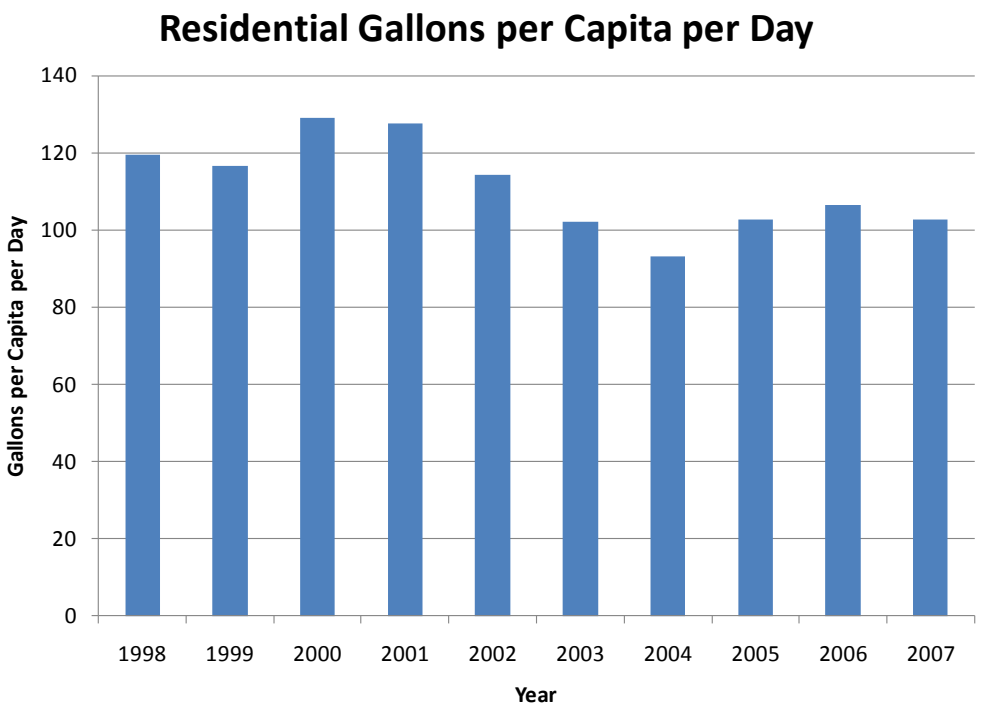
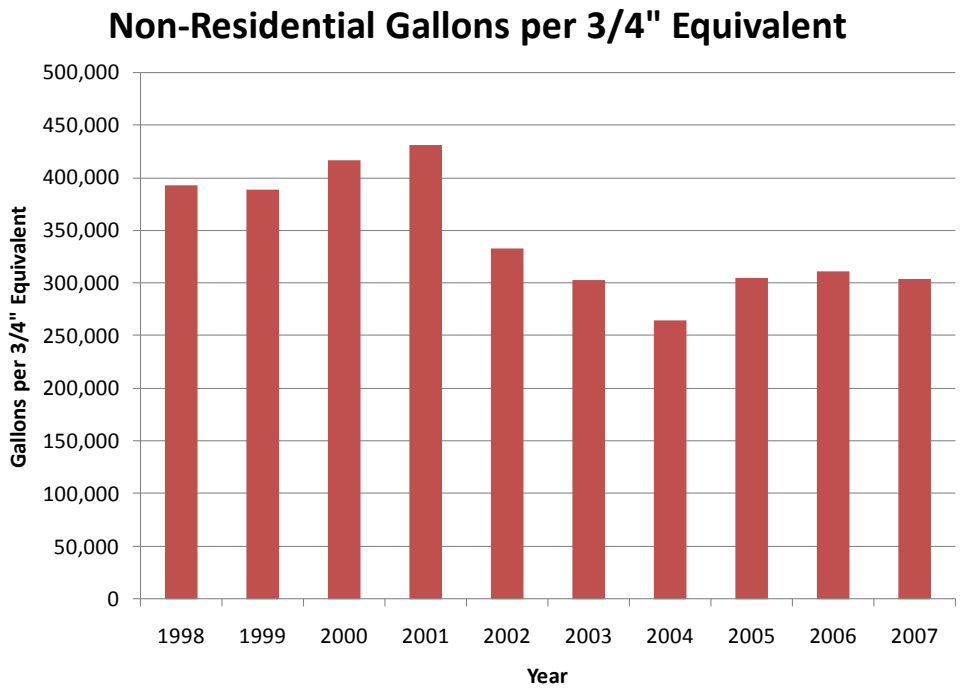


Figure 7: Annual Billed Non-Residential Gallons per ¾" Equivalent



Water Conservation Plan Development

Goal Development

An important process in developing a successful water conservation plan is the development of water conservation goals. Setting goals allows the District to measure the success of the overall plan. There are several reasons to develop these goals: To reduce annual water demand, reduce future District operating costs, reduce cost and environmental impacts of new water supplies, reduce unit wastewater flows and to meet the requirements of the Colorado Revised Statute 37-60-126.

The District involved several key members of their Water Resources staff and other departments when developing the conservation goals discussed in this plan. The first consideration was the need for demand management or reduction in water use. The current and future sustainable, long-term surface water supply meets the majority of the ultimate demand projections at build-out. Although the current surface and groundwater portfolio allows the District to meet its future water demands, the District would like to expand the role of sustainable surface water supplies in the future.

Another consideration when developing conservation goals was to review the level of financial or staff resources required for implementation as well as any legal limitations. If a measure/program can be shown to likely reduce water demand permanently, the resources could then be considerable. Therefore, resources allocated to a specific measure/program depend upon the demonstrated effectiveness, cost, and the resulting permanent water savings.

The water user categories that the District wants to target through water conservation was also considered during the goal development process. High use customers will be reviewed on a regular basis and possible measures/programs that target those users will be evaluated. Currently, some of the areas of concern within the District are non-residential and residential outdoor use. While the District recognizes the importance of addressing these areas, the District will continue to evaluate any measure or program that will result in water savings for any of its customers.

The effectiveness of the conservation plan is assisted if the results of implementation of various conservation measures are measurable. Some measures, like public education programs, are essentially impossible to measure. Centennial Water has the proper infrastructure in place to facilitate the measurement of the goals stated in this plan. As previously mentioned, all customers serviced by the District are metered. This will allow the District to accurately measure the difference in demand before and after any conservation measure or program is implemented. Side by side comparisons between those customers that implement a measure in contrast to those who do not, are useful measurements that will be utilized.

The goals of the conservation program are continually evolving. As steps are taken to reach the goals, the need for new goals will arise. The District will establish a plan for monitoring these goals and continue to develop new goals as the successes of the plan are demonstrated.

Water Conservation Goals

The goals of Centennial Water and Sanitation District are as follows:

1. Reduce water demand an additional five percent with the measures/programs evaluated in this and future versions of this conservation plan.
2. Continue the existing water conservation program and evaluate new conservation measures/programs that provide cost-effective, permanent water savings.
3. Implement conservation measures/programs that are compatible with the water supply system and community.
4. Implement conservation measures/programs that target high water use customers. These customers may include:
    a. Residential (indoor and outdoor)
    b. Non-residential and Homeowner Association irrigation
    c. Non-residential (indoor and outdoor)
    d. Highlands Ranch Metro District, the District's largest customer
5. Measure water savings achieved through both current and future measures/programs implemented on a regular basis.
6. Continually monitor and evaluate current conservation practices and adapt as necessary.

Identification of Conservation Measures and Programs

At the center of any water conservation plan is the combination of measures and programs that the entity will use to decrease overall demand and to be more efficient in its operations. In developing this plan, a wide array of both supply and demand side measures and programs were identified and are listed in Table 12.

Table 12: Conservation Measures and Programs Identified in the Planning Process

Demand-Side Measures	Demand-Side Measures	Demand-Side Programs
Water Efficient Fixtures/Appliances	Manual & Automatic Car Washing	**Education/Information Dissemination**
Low-Flow toilets and urinals	Hose end shut off	Public education
High efficiency toilets (HET)	Recycling	Water-saving demonstrations
Waterless toilets and urinals	Commercial Kitchen & Restaurant	School programs
Auto flush toilets and urinals	Pre-Rinse Sprayer Nozzles	Informative & understandable bill
Toilet retrofit devices	Commercial Laundries	Water bill inserts
Low-flow showerheads	Water efficient clothes washers	Website
Showerhead retrofit devices	Swimming Pools	Local media outreach
Low-flow faucets	Pool covers	Collaboration with others
Faucet retrofit devices (aerators)	Cooling Systems	**Technical Assistance**
High efficiency clothes washer	Once-through cooling systems	Customer water use audits
High efficiency dishwasher	Cooling towers	Residential landscape audits
Evaporative coolers	Evaporative coolers	Commercial landscape audits
Hot water recirculation system	Equipment cooling systems	Technical workshops
Tankless hot water heater	Heating Systems	Water conservation expert
Landscape Efficiency	Boilers & Steam generators	**Regulations/Ordinances**
Water-wise landscape design	Humidifiers	Addressing fixtures & appliances
Native and low-water use plants	**Supply Side Measures**	Fixture/Appliance standards
Drought-resistant vegetation	Water Reuse Systems	Time of sale upgrades
Practical turf areas	Large irrigation reuse	Addressing landscapes
Soil Preparation	Residential irrigation reuse	Turf restrictions
Mulching	Potable reuse	Landscape design/layout
Efficient Irrigation	Graywater reuse	Soil preparation
Automatic hose shutoff	Distribution System Efficiency	Irrigation equipment
Rain shutoff devices	Leak repair	Water time restrictions
Automatic controller	Removal of phreatophytes	Water waste prohibition
Proper scheduling	System pressure management	**Incentives**
Drip irrigation	Reasonable water recapture	Rebates
Soil moisture sensors	Source optimization	Give-aways
ET controllers	Conjunctive use	**Supply Side Programs**
Central control systems	System integration w/ others	**Distribution System Efficiency**
Pressure regulating sprinklers	Temporary transfers from ag	Improved water accounting
Check valve sprinklers	Dry year leasing	Leak identification
High efficiency nozzles	Rotational fallowing	Analysis of non account water
Pressure reducers	Water salvage	System audits
Water decorations and fountains	**Demand Side Programs**	Metering
Cooling mist systems	**Rate structures & Billing systems designed to promote conservation**	Meter source water
Commercial Efficiency	Volume billing	Meter service connections
Water Efficient Processes	Conservation rate structure	Sub-metering multi-family
Metering	Increased billing frequency	Irrigation only metering
Submetering		Meter testing and replacement

To meet the requirements of §37-60-126, C.R.S., measures in shaded rows must be considered.

Initial Screening of Conservation Measures and Programs

In identifying and considering the multitude of available conservation measures and programs, the District developed a set of initial screening criteria in order to eliminate measures and programs that are not consistent with the goals of the water conservation program.

Initial Screening Criteria

1. **Can be efficiently implemented**: Measures that will need extensive, lengthy implementation schedules will not be immediately considered.
2. **Technology is reliable**: The technology associated with the measure is proven to be reliable.
3. **Current measure/program:** The measure or program is currently being implemented and is an important part of the water conservation program.
4. **Does not match the service area:** The measure or program is not consistent with the water supply infrastructure or the local community development.
5. **Socially acceptable:** Will the measure be accepted and therefore implemented by the majority of customers?

A review of the measures and programs identified was completed by members of the water resources, community relations, finance, and customer service departments. The results of this review narrowed the list to include measures and programs that are more consistent with the goals of the District and the water conservation plan. Tables 13 and 14 show the conservation measures and programs currently being implemented by the District, along with those recommended for further evaluation and consideration for implementation.

Table 13: Conservation Measures Recommended for Further Evaluation

Measure	Already Implemented	Further Evaluation Needed	Measure	Already Implemented	Further Evaluation Needed
Demand-Side Measures			**Commercial Efficiency**		
Water Efficient Fixtures and Appliances			**Water Efficient Processes**		
Low-Flow toilets and urinals	✓	✓	Metering	✓	
Waterless urinals		✓	Submetering	✓	
Low-flow showerheads	✓		Manual & Automatic Car Washing		
Low-flow faucets	✓		Hose end shut off	✓	
High efficiency clothes washer		✓	Recycling	✓	
Landscape Efficiency			Commercial Kitchen & Restaurant		
Water-wise landscape design			Pre-Rinse Sprayer Nozzles		✓
Native and low-water use plants	✓	✓	Swimming Pools		
Drought-resistant vegetation	✓	✓	Pool covers	✓	
Practical turf areas		✓	**Supply Side Measures**		
Efficient Irrigation			Water Reuse Systems		
Automatic hose shutoff	✓		Large irrigation reuse	✓	
Rain shutoff devices		✓	Distribution System Efficiency		
Automatic controller	✓		Leak Identification and Repair	✓	✓
Proper scheduling	✓		Removal of phreatophytes	✓	
ET controllers		✓	System pressure management	✓	
Central control systems	✓		Reasonable water recapture	✓	
Pressure reducers	✓		Source optimization		
			Conjunctive use	✓	
			System integration w/ others	✓	

To meet the requirements of §37-60-126, C.R.S., measures in shaded rows must be considered.

Table 14: Conservation Programs Recommended for Further Evaluation

Programs	Already Implemented	Further Evaluation Needed	Programs	Already Implemented	Further Evaluation Needed
Demand-Side Programs			**Regulations/Ordinances**		
Rate structures & Billing systems designed to promote conservation			Addressing fixtures & appliances		
Volume billing	✓		Fixture/Appliance standards	✓	
Conservation rate structure	✓		Addressing landscapes		
Education/Information Dissemination			Water time restrictions	✓	
Public education	✓		Water waste prohibition	✓	
Water-saving demonstrations	✓		**Incentives**		
School programs	✓		Rebates		✓
Informative & understandable bill	✓		Give-aways	✓	✓
Water bill inserts	✓		**Supply Side Programs**		
Website	✓		**Distribution System Efficiency**		
Local media outreach	✓		Improved water accounting		
Collaboration with others	✓		Leak identification	✓	
Technical Assistance			Analysis of non account water	✓	
Customer water use audits	✓		System audits	✓	
Residential landscape audits	✓		Metering		
Commercial landscape audits	✓		Meter source water	✓	
Technical workshops	✓		Meter service connections	✓	
Water conservation expert	✓		Irrigation only metering	✓	

To meet the requirements of §37-60-126, C.R.S., measures in shaded rows must be considered.

Water Conservation Measures and Programs Already Implemented

In order to meet the requirements of House Bill 04-1365 certain water conservation measures and programs need to be considered for implementation. Listed below are the measures and programs required for consideration along with their status within the District. All measures and programs have been detailed in a previous section titled, Current Water Conservation Measures and Programs.

Water-efficient fixtures and appliances, including toilets, urinals, showerheads and faucets: Since 1994 all appliances have been required to meet EPA mandated low-flow characteristics. In Highlands Ranch, 70 percent of residential homes and 73 percent of non-residential construction has taken place since 1994. Even with such a large percentage of the construction compliant with low-flow standards the District will evaluate the opportunities to bring the remainder of the community up to standards.

Low water use landscapes, drought-resistant vegetation, removal of Phreatophytes and efficient irrigation: Centennial Water promotes water-efficient landscapes through community education and demonstration gardens as noted below. The District is in the middle of a pilot program promoting efficient irrigation. Centennial is partnering with the Center for Resource Conservation and conducting irrigation audits for homeowners, businesses and home owners associations.

Highlands Ranch Metro District Open Space staff has an aggressive program to remove Phreatophytes from opens space areas. The Metro District is also working on a public education campaign to educate residents about not using Phreatophytes in the landscape. The Metro District also uses central controlled irrigation scheduling to better manage their irrigation system.

Water-efficient industrial and commercial water using processes: All non-residential accounts in the District are individually metered, allowing accurate measurement of water use. A majority of non-residential accounts also have separate meters for their irrigation. Several of the automatic car washes within the District use recycling equipment. A change to the rate structure in 2008 will encourage those that do not recycle to invest in recycling equipment. An analysis of pre-rinse spray nozzles for non-residential customers is included in the evaluation section of the plan.

Water reuse systems: The District uses legally reusable water to irrigate parks, golf courses and the wastewater treatment plant. Windcrest, a large assisted living retirement community, will be using reuse water to irrigate their landscape in 2008. The District will continue to add customers to the reuse system as infrastructure allows.

Dissemination of information regarding water use efficiency measures, including by public education, customer water use audits, and water-saving demonstrations: A major component of Centennial's water conservation program is public education. As part of the public education program, information is disseminated by the above methods. Educational materials include information about low-water use landscapes, efficient outdoor watering habits, indoor water management and more. Water-saving demonstrations are given at community events and local workshops.

Customer water use audits are voluntary and given to those customers that request the service. Customers with high use are contacted and offered this service although it is not mandatory.

Water rate structures and billing systems designed to encourage water use efficiency in a fiscally responsible manner: Centennial Water currently uses a water budget rate structure that includes increasing rates for high water use.

Regulatory measures designed to encourage water conservation: The District uses mandatory outdoor water conservation measures to help eliminate water waste and in-efficient practices. The District is currently developing a program to review landscape and irrigation plans for commercial projects to improve water efficiency. The District does not have regulatory powers controlling land use such as landscape requirements.

Incentives to implement water conservation techniques, including rebates to customers to encourage the installation of water conservation measures: Currently the District uses water conservation kits as a giveaway to promote water conservation techniques. Using the materials distributed in the kits allows a homeowner to take action to save water in and around the home. In 1992 the U.S. Energy Policy Act established maximum allowable water-flow rates for toilets, urinals, showerheads and faucets. The standards became effective beginning in 1994. Further evaluations of rebates are included in the evaluation section of the plan.

Leak Identification and Repair: Leak identification and repair is currently achieved through field inspections and the customer billing system. Over the past 11 years, Centennial Water has averaged 6.79 percent unaccounted for water based on system wide audits performed annually.

Measures and Programs Not Selected for Evaluation

Measures and programs identified during the planning process that were not eliminated by the initial screening were considered for further evaluation by District staff. After considering some of these measures and programs, the District decided that some would not be selected for further evaluation. An explanation of the measures and programs not selected for further evaluation at this time follows:

High Efficiency Toilet (HET)

High Efficiency Toilets are those that use less than 1.6 gallons per flush. Since 70 percent of the single family homes and 73 percent of the non-residential construction was built at a time when 1.6 gallons per flush were standard, there is a potential for water savings with HET's. However, at this time the District will evaluate a potential toilet replacement program for homes built prior to 1994 that have toilets using 3.5 to 7 gallons per flush.

Soil Moisture Sensors

Soil moisture sensors have been around for a long period of time, although they have never been extremely popular. Through discussion with irrigation professionals (installers, distributors, manufacturers) it was determined that the technology is not reliable at this time. The District will continue to monitor the effectiveness of this potential water saving device.

High Efficiency Irrigation Spray Nozzles and Pressure Regulating Spray Heads

There are a few new products on the market that have proven to be high efficiency nozzles. The District feels that promotion of total irrigation system efficiency will be more productive than such a small component of the system. Distribution uniformity can be improved to acceptable levels using standard spray heads and nozzles. Pressure regulating spray heads and high efficiency nozzles will be discussed as one way to improve irrigation efficiency as part of the public education program. Additionally, the District regulates pressure at single family homes and irrigation meters as discussed in an earlier section.

Soil Preparation

The community of Highlands Ranch is 80 percent complete and nearing build-out with only one residential development remaining. Soil preparation is an important part of installing water efficient landscapes and will continue to be promoted through our education program. However, implementing a full scale soil preparation program is not a priority at this level of build-out.

Non-Residential Water Efficient Dishwashers, Cooling Towers, Equipment Cooling Systems

At this time the District does not have the resources to implement a full scale commercial water efficiency program. There are currently only two businesses in Highlands Ranch using cooling towers. District staff has met with these customers and discussed water efficiency. It appears that both customers, Qwest and Visa, are utilizing appropriate water efficient practices. These items and more will be researched further in upcoming years.

Increased Billing Frequency

All non-residential and multi-family accounts within the District are billed on a monthly basis. Residential accounts within the District are billed on a bi-monthly basis. The increased cost of more staff and retrofitting meters prohibits increased billing frequency for residential accounts at this time. This measure may be evaluated in future water conservation plans.

Sub Metering Multi-Family

Multi-family water use is currently at 50 percent of their water budget. At this time it is not a high priority for possible implementation. This measure can be evaluated in future water conservation plans.

Evaluation of Conservation Measures and Programs

In order to meet water conservation goals, the District recognizes that potential measures or programs need to be evaluated based on potential water savings and the cost of implementation. Cost effectiveness is not the only criteria that must be considered when evaluating a particular conservation measure. The District will also evaluate measures and programs based on the following:

1. **Demonstrated effectiveness** of the measure or program being considered. Has the measure or program been used by others and has it proven to be effective at saving water?
2. **Long-term, permanent reduction**. The measure or program provides a long-term, permanent reduction in water use.
3. **Superior to similar measures**. When the measure or program is similar to others, the measure or program will more effectively meet the other criteria.

For every potential water conservation measure the following information was gathered:

- Estimated water savings
- Estimated life span of measure
- Expected number of installations
- Estimated cost of implementation

Using this information the District was able to estimate the potential water savings for the life of the measure compared to the total cost of implementation. This basic cost effectiveness analysis was done in order to provide an initial ranking of measures based on cost per acre foot of water saved and volume of water saved. Results of this analysis are shown in table 15 below.

It is important to remember that a favorable cost effectiveness analysis of a measure or program does not make it an automatic candidate for implementation.

Table 15: Estimated Cost and Water Savings of Measures and Programs Evaluated

Conservation Measure or Program	Target Number of Units (Planning Period)	Estimated Total Cost[1] (Planning Period)	Estimated Water Savings During Planning Period (gallons)	Estimated Water Savings Over Life of the Measure (gallons)	Estimated Water Savings Over Life of Measure (AF)	Cost per Acre Foot of Water Saved ($/acre-ft)	Ranking (1 = most desirable)	
							By Cost	By Volume Saved
Residential Toilet Rebate (pre-1994 construction)	1,000	$ 100,000.00	30,000,000	100,000,000	306.89	$ 325.85	4	4
Clothes Washer Rebate	500	$ 75,000.00	7,500,000	7,500,000	23.02	$ 3,258.51	11	11
Non-residential Pre-Rinse Sprayer Giveaway	125	$ 22,500.00	18,750,000	31,250,000	95.90	$ 234.61	3	8
Residential ET Controller Rebate	500	$ 75,000.00	11,250,000	37,500,000	115.08	$ 651.70	6	7
Non-residential ET Controller Rebate	250	$ 250,000.00	176,250,000	587,500,000	1,802.97	$ 138.66	2	1
Residential Rain Sensor Giveaway	1,250	$ 31,250.00	9,375,000	15,625,000	47.95	$ 651.70	6	10
Non-residential Rain Sensor Rebate	500	$ 25,000.00	117,000,000	195,000,000	598.43	$ 41.78	1	3
Residential Turf Replacement Rebate	500,000 sq. ft.	$ 250,000.00	15,000,000	50,000,000	153.44	$ 1,629.26	10	6
Non-residential Turf Replacement Rebate	2,500,000 sq. ft.	$ 1,250,000.00	75,000,000	375,000,000	1,150.83	$ 1,086.17	8	2
System Wide Leak Identification Survey	Whole System	$ 192,000.00	50,750,000	50,750,000	155.75	$ 1,232.78	9	5
Non-residential Waterless Urinal Rebate	500	$ 37,500.00	6,000,000	30,000,000	92.07	$ 407.31	5	9

1. Cost estimate does not include existing District staff time.

Selection of Conservation Measures and Programs

The following table shows the measures and programs that have been recommended for implementation by the District. A brief explanation of why a measure or program was not recommended is also given. A measure or program that is currently being implemented or has been recommended for implementation can be removed from the water conservation program. The District will monitor and evaluate water conservation measures and programs on a continual basis to ensure that they continue to meet the goals of the water conservation program. A description of the monitoring and evaluation process is included in a later section. Conversely, if a measure or program has not been recommended for implementation is not permanently removed from consideration by the District.

Table 16: Conservation Measures Recommended for Implementation

Conservation Measure/Program	Recommended	Description	Estimated Water Savings Life of Measure (AF)
Water Efficient Fixtures and Appliances			
Residential Toilet Rebate (Pre-1994)	Yes*	Provide rebate for 1.6 gpf or less toilet for homes built prior to 1994.	306.89
Clothes Washer Rebate	No	Provide rebate for high efficiency clothes washers.	23.02
Non-residential Waterless Urinal Rebate	No	Provide rebate to non-residential customers who replace urinals with waterless urinals	92.07
Water Efficient Industrial and Commercial Processes			
Pre-Rinse Sprayer	Yes*	Provide and install high efficiency pre-rinse sprayer nozzles in commercial kitchens	95.90
Landscape Efficiency			
Residential ET Controller Rebate	No	Provide rebate for ET controllers to residential customers	115.08
Non-residential ET Controller Rebate	Yes*	Provide rebate for ET controllers to non-residential irrigation customers.	1,802.97
Residential Rain Sensor	Yes*	Provide rebate for wired rain sensor to residential customers	47.95
Non-residential Rain Sensor Rebate	Yes*	Provide rebate for wireless rain sensor tonon-residential irrigation customers	598.43
Residential Turf Replacement Rebate	No	Provide a rebate to residential customers who replace turf with low water use landscaping (xeriscape)	153.44
Non-residential Turf Replacement Rebate	Yes*	Provide a rebate to non-residential customers who replace turf with low water use landscaping (xeriscape)	1,150.83
Distribution System Efficiency			
System Wide Leak Identification Survey	No	Hire outside contractor to conduct a leak survey of distribution system. Staff to prioritize and repair leaks.	155.75

* All measures recommended for implementation will be evaluated further to verify potential water savings.

Recommended Measures

In order to verify the estimated water savings of the water conservation measures, Centennial Water will initiate certain measures during the planning period. The measures recommended for implementation are:

Residential Toilet Rebate (Pre-1994 Construction)

This program is targeted at the homes built in Highlands Ranch before January 1, 1994. Homes built prior to this date have toilets that range between 3.5 to 5 gallons per flush. Beginning in 1994 all toilets sold in the United States were required to meet the low-flow standard of 1.6 gallons per flush established by the Environmental Protection Agency. Approximately 9,000 single family homes were built in Highlands Ranch prior to 1994. The life span of toilets can be between 25 and 50 years, although it is estimated that many households replace toilets every 15 to 20 years. This program would provide a financial incentive for customers living in homes built prior to 1994 to replace older high volume toilets. Installation of low-flow toilets will decrease the amount of water used indoors.

Commercial Pre-Rinse Sprayer

Pre-rinse sprayers rinse large food waste from pots, pans, utensils, and dishware before they enter a dishwasher. Water conserving valves use less water and have equal to or better rinsing effectiveness due to improved spray pattern. High flow sprayers use over three gallons per minute, while water efficient models use 1.6 gallons per minute. By purchasing and installing water efficient pre-rinse spray nozzles, the District can reduce water demand from the food service industry.

Non-Residential ET Controller Rebate

Evapotranspiration, or ET, is the amount of water used by plants through the combined processes of evaporation and transpiration. ET is traditionally calculated and reported as inches per week. ET controllers automatically change the irrigation controller settings to apply only the amount of water needed to replace ET. The controllers receive the information from either a satellite paging system or an on-site ET gauge. It is estimated that 15 percent of water used to irrigate landscapes can be saved when using ET controllers. Since the water budget rate structure provides an allocation of water based on historical ET, it is not clear if the water savings is achievable. On average over the past three years, total water use of non-residential irrigation customers is 116 percent of the water budget. This customer class shows the biggest potential for water savings from using ET controllers to manage their irrigation water use.

Residential Rain Sensor

Rain sensors are devices that automatically interrupt the regular irrigation schedule in the event of a rain storm. Watering the landscape while it is raining is not socially acceptable and wastes water. It is difficult to determine the actual water savings from the installation of a rain sensor as it depends on how much rainfall is received in a given year. This program would provide an incentive for homeowners to install a rain sensor at their home.

Non-Residential Rain Sensor

The installation of a rain sensor on non-residential sites is typically more difficult than residential sites due to the lot size and location of the controller(s). Manufacturers have developed wireless rain sensors to make installation easier. This program would provide an incentive for non-residential irrigation customers to install a rain sensor.

Non-Residential Turf Replacement Rebate

Kentucky bluegrass is the predominant turf used in landscape along the Front Range. The water requirement for Kentucky bluegrass during the summer months is between 24 to 30 inches; making it one the most water thirsty plants in the landscape. By replacing turf with more water efficient plant materials and following the principles of xeriscape, it is estimated that the landscape would use between 30 to 50 percent less water. This program would provide an incentive to replace high water using turf with low water using plant materials. If Centennial Water is able to verify the water savings from these conversions, a potential turf replacement program for non-residential customers can be considered.

Measures Not Recommended for Implementation

Clothes Washer Rebate

Traditional top loading washing machines use between 39 and 51 gallons per load depending on when they were manufactured. Newer, high efficiency, front loading machines use approximately 27 gallons per load. Based on information from other Front Range water providers, estimates of the water savings achieved through installation of these washing machines is between 4,000 and 6,000 gallons per unit per year. While there is an apparent demand reduction from this measure a rebate for clothes washers was not selected because the District does not consider the water savings to be long-term or permanent. Most customers who buy high-efficiency clothes washers do not leave the appliance in the home when they decide to move. If the customer decides to move outside of the District, the resulting water savings that was subsidized by Centennial Water is lost.

Non-Residential Waterless Urinal Rebate

Since January 1, 1994 all urinals in the sold and installed in the U.S. have used a maximum of one gallon per flush. Prior to 1994, urinals used between 1.5 and 4.5 gallons per flush. Through research with other entities in the area, the District has determined that waterless urinal technology is not sufficiently reliable to consider for implementation. Although there is an obvious demand reduction benefit to waterless urinals, the increased maintenance and lack of social acceptance has caused the District to not select this measure at this time. Also, Douglas County plumbing code does not allow the installation of waterless urinals. This conservation measure will be looked at again in future versions of the water conservation plan.

Residential ET Controller Rebate

In 2007, 75% of residential customers were at or under their water budget allocation. Since the water budget outdoor allocation is based on historical ET rates in Highlands Ranch, the District is not confident that ET controllers will save a significant amount of water. While there are a percentage of customers who would benefit from installing an ET controller, the potential water savings from this conservation measure does not compare very favorably to other conservation measures targeted at saving water outdoors.

System Wide Leak Identification Survey

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 the District to prioritize and repair sections of the distribution system before a leak surfaces. Centennial Water understands the importance of identifying leaks within the distribution system and the water savings that can be achieved with such a water conservation measure. However, the system wide audit performed annually, demonstrates the efficiency of the distribution system. Over the past 10 years, unaccounted for water which includes leaks has averaged 6.79 percent. The AWWA standards suggest that unaccounted for water within the distribution system should be 15 percent or less. A copy of the 2006 system water audit can be found in appendix B.

Residential Turf Replacement Rebate

Since the majority of residential customers are within their water budget, residential turf replacement will not be considered for implementation until the water savings can be verified. The potential non-residential turf replacement program identified above will provide the data necessary to better evaluate this conservation measure. Non-residential turf replacement is recommended because non-residential irrigation accounts are metered separately and the water savings can be more accurately measured.

The Role of Water Conservation in Water Supply Planning

The objective of water conservation as defined by the State of Colorado is, "a long-term increase in the productive use of water supply in order to satisfy water supply needs without compromising desired water services." In other words, the objective of water conservation is to implement water conservation measures and programs that result in permanent water savings and allow water providers to meet increasing customer demands. At the same time, water providers must provide a quality product at a reasonable cost to customers without sacrificing quality service. In order for water providers to meet growing demands, they must forecast their needs for a determined number of years, and plan for additional water supplies to meet those demands.

The District's water supply is largely surface water from the South Platte River, supplemented with groundwater from Denver Basin aquifers. A water supply goal of Centennial Water is to meet a majority of demand at build out with renewable surface water. Surface water is preferred because it is renewable and replenished yearly from runoff created by snowmelt and precipitation. Groundwater is considered non-renewable because the water in the Denver Basin Aquifer is not naturally recharged like surface water. Current demand projections show that the conjunctive use of water supply will continue to support the community's needs for the foreseeable future. However, the development of cost effective renewable surface water combined with the efficient use of water, remains a constant goal of the District's water supply plan.

Since reliable, cost-effective, renewable water supplies are becoming more scarce, an alternative to acquiring new water supplies is to limit or manage the demand. One way to manage demand is through water conservation measures and programs. Water saved through implementation of water conservation measures will reduce the amount of new water supply needed to meet demands. Often times, water conservation measures are more cost effective than acquiring new water supply. In order for the District to provide its customers with a long-term, quality product, we will implement an approach that combines acquiring more surface water supply and managing customer demand. Water conservation is an important aspect of the overall water supply plan.

An evolving and proactive water conservation plan will help to reduce total demand, enabling the District to achieve the objectives of a high quality, renewable surface water supply without compromising desired water services.

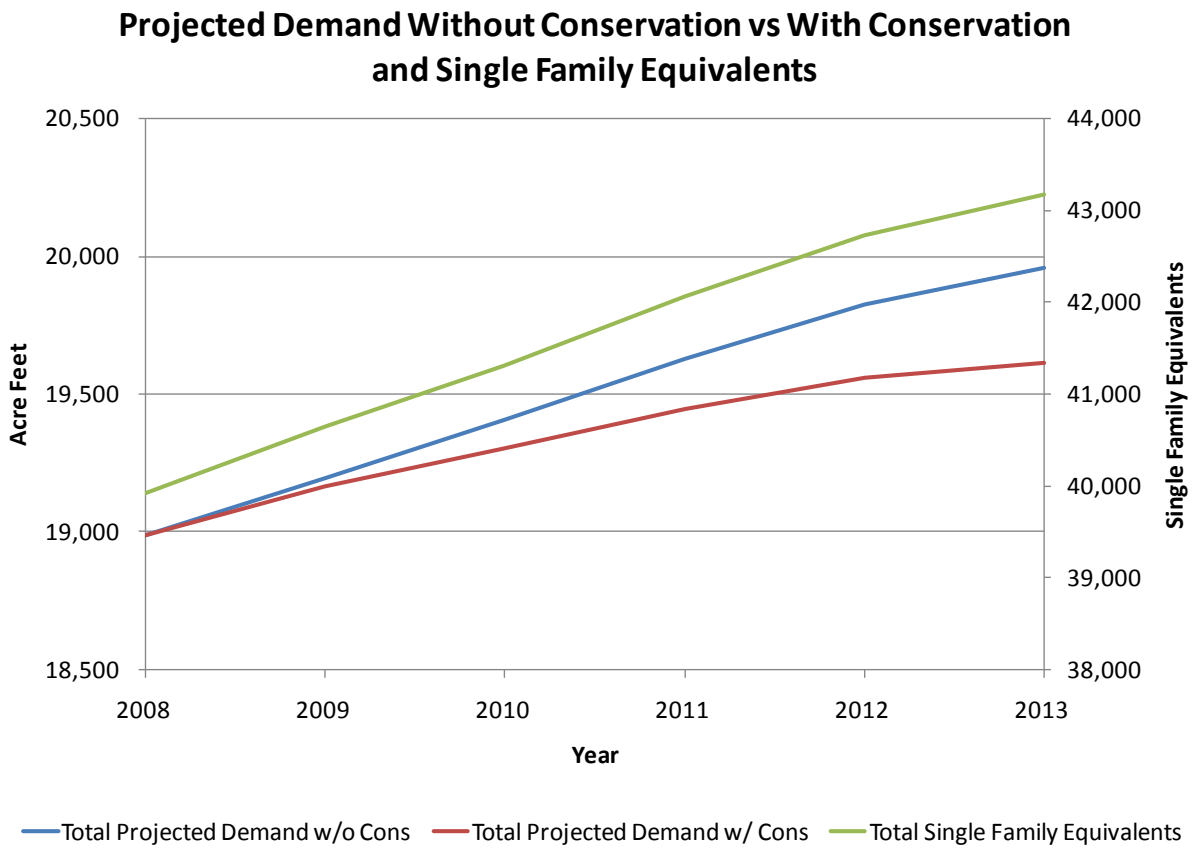
Revised Demand Forecast

In this section, a revised demand forecast is shown to include the expected savings from the water conservation measures and programs recommended for implementation. The conservation measures recommended for implementation are projected to save between 36 and 385 acre feet per year during the planning period. All potential measures would not be implemented in the first year as shown in the implementation schedule in the following section. As the water conservation program continues to grow and the number of installations increases, it is expected that annual savings will continue to increase. Table 17 and figure 8 below show the revised demand forecasts during the planning period.

Table 17: Revised Projected Demand by User Type with Conservation in Acre Feet

	2008	2009	2010	2011	2012	2013
Highlands Ranch						
Residential	11,074	11,169	11,269	11,360	11,429	11,481
Multi Family	1,235	1,276	1,358	1,467	1,573	1,638
Non-Residential	4,087	4,107	4,038	3,959	3,880	3,801
Hydrant/Loss	1,288	1,300	1,313	1,326	1,338	1,346
Highlands Ranch Total	17,684	17,852	17,978	18,112	18,220	18,266
Northern Douglas County/Wholesale						
Residential	773	773	773	773	773	773
Multi Family	42	46	46	46	46	46
Non-Residential	485	485	485	485	485	485
Northern Douglas Total	1,301	1,304	1,304	1,304	1,304	1,304

Figure 8: Projected Demand W/O Conservation vs. W/ Conservation and SFE's



Implementation Plan

This section provides the projected implementation schedule of the water conservation measures recommended for implementation. It also provides information on how the measures will be monitored and evaluated. The steps the District will take to review the water conservation program are listed along with the date the plan will be formally revised.

Implementation Schedule

The following implementation schedule shows the implementation dates of conservation measures recommended in this plan. Existing water conservation measures and program shown in Table 6 will continue to be implemented, monitored and reviewed based on the review schedule in the following section.

Measure/Program	Required Action	Beginning Date
Residential Toilet Rebates	Compile list of approved toilets. Introduce rebate through public outreach and education program including bill inserts and website. Partner with local businesses.	2009
Pre-Rinse Sprayer	Compile list of qualifying businesses. Solicit bids for installation of sprayers. Introduce program through direct contact with qualifying businesses.	2009
Residential Rain Sensor	Introduce rebate program through public outreach and education program. Compile list of where qualifying products can be purchased.	2009
Non-residential Rain Sensor	Introduce rebate program through public outreach and education program. Compile list of where qualifying products can be purchased.	2009
Non-residential ET Controller Rebate	Introduce rebate program through public outreach and education program. Compile list of where qualifying products can be purchased.	2010
Non-residential Turf Replacement Rebate	Set parameters of acceptable landscape materials for turf replacement. Introduce rebate program through public outreach and education program	2010

The selected programs and implementation dates are subject to change without notice. Centennial Water and Sanitation District can add and remove programs from the water conservation plan to meet the needs and of the District at any time.

Monitor and Evaluation Procedures

Centennial Water understands that for a water conservation program to be successful, the water conservation measures and programs implemented need to be monitored and evaluated for effectiveness. In order to determine the effectiveness of a certain measure or program the District needs to be able to measure the water savings. Fortunately, all of the District's customers have been metered since construction began in 1981. This will be instrumental in allowing the District to monitor the effectiveness of the water conservation program. The measures and programs that the District has evaluated and selected for implementation will have to continue to show evidence of long-term or permanent reductions in water use by its customers.

Monitoring the water conservation program will begin with a closer look at some current water conservation measures and programs. As new water conservation measures are implemented the District gather water use data in an effort to quantify water savings attributed to those measures. The following data will be used to evaluate water conservation measures:

- Metered water use before and after implementation of the conservation measure
- Number of installations of each conservation measure
- Irrigation application rates
- Daily ET rates from surrounding weather stations
- Measured rainfall
- Implementation costs for each conservation measure including: rebates, administration, data collection, data entry and evaluation
- Billed water use by customer type
- Number of acres irrigated
- Gallons per capita per day (residential)
- Gallons per ¾ inch equivalent (non-residential)
- Annual water use compared to water budget
- Name, address and phone number of conservation workshop attendees
- Any public feedback from program participants including feedback from public meetings, public events, direct correspondence or surveys

Conclusions drawn from analyzing the above data will be used to help direct future water conservation efforts by the District. This data will be collected and evaluated on an annual basis. A timeline for this review and evaluation is outlined in the section below. Any additional measures or programs implemented by Centennial Water in future years will be subject to similar monitoring efforts.

Review

The measures and programs used to conserve the District's water resources will be reviewed on a yearly basis. Below is the review schedule that Centennial Water will use to assess the progress and development of the water conservation plan annually.

January – Present final recommendations for implementation to the Board of Directors.

February – Upon Board approval, the new measures and programs will be added to the conservation plan.

March/April/ May – Begin to develop and implement new measures and programs. Hire and train additional staff if needed. Develop literature, handouts, etc.

June/July/August/September – Continue implementation of new and existing measures and programs.

September – Begin gathering information on results and effectiveness of measures and programs.

October – Assess the overall effectiveness of the water conservation plan. Use the effectiveness of the plan as part of the water supply planning process.

November – Review other potential strategies for the water conservation program. Begin the screening and evaluation process for new measures and programs. Discuss potential additions with Board of Directors.

December – Further evaluate possible measures and programs to be implemented in the conservation plan.

Measures and programs that prove to be consistent with the stated goals of the conservation program will be considered for implementation regularly.

Revision and Update

In accordance with House Bill 04-1365 and associated Colorado Revised Statute 37-60-126 the water conservation plan will be formally reviewed and updated once every five years beginning on the date of approval.

Appendix A: Public Review Process

Public Review Process

In order to meet the requirements of House Bill 04-1365 and Colorado Revised Statute 37-60-126, a public review of the proposed water conservation plan must take place. Upon review and direction from the Board of Directors, Centennial Water and Sanitation District made the proposed water conservation plan available to the public for a review period of 60 days beginning December 21, 2007 and ending on February 18, 2008.

A news release and accompanying article was placed in the Highlands Ranch Herald on December 20, 2007. An additional notice and a copy of the plan were provided on the District's website (www.highlandsranch.org). The water conservation plan was available at the District office building (62 W. Plaza Drive, Highlands Ranch, CO 80129) and the Highlands Ranch branch of the Douglas County Libraries (9292 Ridgeline Blvd., Highlands Ranch, CO 80129). A copy of the news release and associated newspaper articles are included in this appendix. Included in the news release was an invitation to participate in a public meeting held at the District office building on February 5, 2008 from 6 until 8 p.m. The public meeting was intended to give the public a chance to comment and ask questions about information contained in the water conservation plan.

Based on public comments, the District made changes where appropriate and on Monday, October 27, 2008 the Centennial Water and Sanitation District Board of Directors adopted the final water conservation plan.

Water plan awaits public comment

By Robyn Lydick
Staff Writer

Residents have 60 days to look over and comment on a plan by Centennial Water and Sanitation District concerning existing and future conservation methods.

Colorado law requires water utilities to create a conservation plan.

The plan outlines Centennial Water's goals for conservation, the steps that the district used to develop the plan, and the role water conservation plays in water supply planning. Additionally, the plan shows steps Centennial Water will use to annually review and evaluate measures for recommendation through the water conservation planning process.

Water budgets, metering, system audits and several other devices now help keep water use down in the district.

Slow the Flow, a residential water use auditing program is in the feedback stages. Fifty residents got audits while another 60-70 are on a waiting list should the program be continued in 2008.

"It's all a part of education," said Jon Klassen, water conservation specialist with

See WATER PLAN, page 7A

Water plan: Public meeting will be Feb. 5

Continued from page 1A

Centennial Water. "We don't have to have golf course green lawns."

The draft plan will be available for public review for a 60-day period from Dec. 21 through Feb. 18, 2008.

A public meeting will be at 6 p.m., Feb. 5, 2008 at the Centennial Water and Metro district office, 62 W. Plaza Drive, to hear public comments and to answer questions.

Copies of the plan are available at the office, at the library, 9292 Ridgeline Drive, and online at www.highlandsranch.org.

Comments and suggestions can be sent to jklassen@highlandsranch.org.

303-566-4107 | rlydick@ccnewspapers.com

loggedin

District water conservation plan ready for public review

Submitted by Jenn Garber

YourHub.com user

In accordance with Colorado House Bill 04-1365, Centennial Water & Sanitation District is releasing their Water Conservation Plan.

The water conservation plan is a document that describes specific conservation measures that Centennial Water is currently implementing conservation measures that will be evaluated for possible implementation in the future.

Jenn Garber is the community relations coordinator for the Metro District of Highlands Ranch. Enter 404167 in YourHub.com's Content Finder to read the rest of this story.

The plan provides an overview of Centennial Water's facilities, water supply, service area and customer base. Also covered in the water conservation plan are Centennial Water's goals for conservation, the steps that the District used to develop the plan, and the role water conservation plays in water supply planning. The document also outlines the steps Centennial Water will use to annually review and evaluate measures for recommendation through the water conservation planning process.

The draft plan will be available for public review for a 60-day period from Friday, December 21, through Monday, February 18.

Copies of the draft water conservation plan will be available on the District's Web site at **www.highlandsranch.org**, and at the following locations: Centennial Water and Sanitation District/Highlands Ranch Metro District office building, and at the Highlands Ranch Library, 9292 Ridgeline Blvd.

Comments and suggestions are encouraged and can be submitted via e-mail to jklassen@highlandsranch.org.

For more information, please contact **Jon Klassen** at 720-240-4917 or at jklassen@highlandsranch.org.

upcoming

What: A public meeting will be held to answer questions about the water conservation plan.
Where: Centennial Water/Metro District office building, 62 Plaza Drive, Highlands Ranch
When: 6-8 p.m. Feb. 5
Info: Call 720-240-4917

FOR IMMEDIATE RELEASE **FOR MORE INFORMATION:**

December 13, 2007 Sherry Eppers, 720-240-4908

CENTENNIAL WATER OFFERS PUBLIC REVIEW OF WATER CONSERVATION PLAN

In accordance with Colorado House Bill 04-1365, Centennial Water & Sanitation District is releasing their Water Conservation Plan. The water conservation plan is a document that describes specific conservation measures that Centennial Water is currently implementing and conservation measures that will be evaluated for possible implementation in the future. The plan provides an overview of Centennial Water's facilities, water supply, service area and customer base. Also covered in the water conservation plan are Centennial Water's goals for conservation, the steps that the District used to develop the plan, and the role water conservation plays in water supply planning. The document also outlines the steps Centennial Water will use to annually review and evaluate measures for recommendation through the water conservation planning process.

The draft plan will be available for public review for a 60-day period from Friday, December, 21 through Monday, February, 18. A public meeting will be held Tuesday, February 5 from 6 until 8 p.m. to hear public comments and to answer questions. The meeting will be held at the Centennial Water/Metro District office building at 62 Plaza Drive on the southwest corner of Broadway and Plaza Drive.

Copies of the draft water conservation plan will be available on the District's website at .highlandsranch.org, and at the following locations: Centennial Water and Sanitation District/Highlands Ranch Metro District office building, and at the Highlands Ranch Library, 9292 Ridgeline Blvd.

Comments and suggestions are encouraged and can be submitted via e-mail to @highlandsranch.org.

The following conservation measures are already being implemented by Centennial Water:

- A water budget rate structure
- Water metering
- Dedicated water conservation staff
- Low-flow or water efficient plumbing devices
- Low water-use landscapes or Xeriscaping
- Efficient irrigation
- A water reuse system
- An augmentation plan
- A distribution system leak identification and repair
- System-wide audits
- Service pressure regulation
- Public education programs
- Water audits
- Irrigation audits
- Collaboration with other entities.

For more information, please contact Jon Klassen at 720-240-4917, or at @highlandsranch.org.

Public Comment

Public comments were received by the District through U.S. Mail, electronic mail and attendance at the public meeting. In general, many of the public comments focused on a lack of detail and the need for clarification throughout the draft water conservation plan. A summary of responses to public comment follows.

One area that received significant clarification was the section on water supply, including detailed information about the new South Platte Reservoir, the aquifer storage and recovery (ASR) program and a graph showing the breakdown of surface water and groundwater supply since 1982.

Another area where more detailed information was included was the Current Water Conservation Measures and Programs section. Detailed information regarding the measures was included along with the estimated water savings of the measure if available.

A section was added to highlight the accomplishments of the District in 2007. This section highlighted major changes or additions to the water conservation program and provided specific data regarding those changes.

The Estimated Water Savings sections added detail to clarify how the District estimated the effectiveness of water conservation measures already implemented. An explanation for the rapid decline in water use between 2001 and 2004 was provided along with an explanation of the trend of increasing water use between 2004 and 2006.

Clarification of the measures and programs that are already implemented was included along with more detail about why certain measures or programs were not selected for further implementation.

Finally, the District included more information about the future implementation of the water conservation program. Including more information on how the District will monitor the past and future success of the water conservation measures and programs.

Some of the public comments were about detailed water supply issues that were beyond the scope of the water conservation plan and would be more fitting in a detailed water supply plan. Therefore comments of this nature were not addressed in the final water conservation plan.

Copies of the public comments received by Centennial Water can be seen in the following pages.

To: Centennial Water and Sanitation District (jklassen@highlandsranch.org

From: DeDe Williams and Del Wagner (del.dede@gmail.com)

283 Southpark Road

Highlands Ranch, CO 80126

303-791-6618

Re: Water Conservation Plan 2007 (draft)

We are writing this in response to the Centennial Water Conservation Plan 2007. We have both questions and concerns relating to this document.

The objectives for Centennial Water district are to reduce future water demands, reduce future District operating costs, reduce the cost and environmental impacts of new water supplies and reduce wastewater flows. However, in reading this report we did not find these questions answered.

1. You did not address the issue of how long each of the wells we now have is projected to last and at what pumping capacity. From what I can read in the newspaper, ground water levels are decreasing which would certainly impact the type of water restrictions imposed in the future. Are we going to drill more wells, into what water basin and what will be the impact? Do we have water treaties that will allow us to keep the flow we now have or will it change if future groundwater supplies start to diminish.

2. This water plan does not seem to take into account reduced stream flow coming from the Platte if we have years of severe drought.

3. Where is the South Platte Reservoir getting its water inflow. How much will the reservoir contribute to our total water supply and will water inflow be subject to reduced conditions in drought years?

4. The largest demand comes from outdoor use. This is where water conservation and education could have the greatest impact—but does it?
    a. Why continue to allow planning of sod and continue to give an extra water budget for new sod. Las Vegas is paying homeowners to tear out their sod.
    b. The Metro district has many parks and playfields. The district should be setting an example of water conservation by using low-water plants, artificial turf and signs explaining how this type of landscaping is conserving water.
    c. Why not pull up grass along road areas and use these areas to become the showcase of water conservation efforts.

5. The water budget is a good idea but is the increased charges over the basic rate high enough to discourage usage considering the income level of HR residents. By reducing water demand at build out to 17,500 acre feet, what is the projection of how long our existing water resources will last at this level. This projection looks like an average. Does it take into account future water

availability? I do not see where the issue of supply versus demand was ever addressed in this document.

6. HR Metro District is the largest customer. It stated the District would like to expand the role of sustainable surface water supplies in the future. What does this mean?

7. Under "initial screening criteria" items 5 and 6, page 23. You ask is it socially acceptable and does not require an unreasonable behavioral change. What is considered socially acceptable and what is an unreasonable behavioral change in regards to what?

8. In your chart on page 24 you identify under landscape efficiency water-wise landscaping. I still read in the paper about the district planting grass and trees in the mediums. You address turf restrictions under regulations but how is this going to translate into action in the district especially when you allow an increased water budget for planting sod. Do we have more golf courses planned using our water supply-this was not addressed?

9. I don't think House Bill 04-1365 was addressed. You mentioned drafting the plan because of this bill but it seems this plan was written without any hard facts on water usage now versus the future. It certainly did not address the issue of decreased ground water supplies or decrease water usage from the Platte.

10. In an area of over 90,000 residents we have one demonstration garden at Eastridge. We need demonstration gardens at all major intersections and at all parks and recreation centers where residents can view the garden and have the district lead the way in water-wise gardening. We need to educate people about water usage of Russian Olive trees and Tamarisk. Restrictions need to be in place so that homeowners plant only low water plants.

11. You keep mentioning water conservation kits but I have never seen one nor have I seen it promoted around the community. If they are in use have they resulted in any water savings?

12. There should be a requirement for all new homes that before landscaping is installed the homeowner has to show plans for an efficient irrigation system along with low water usage plants.

13. There is no water usage plan at any of the HR Recreation Centers. Showers can run as long as possible, sinks can be left running and I am not sure if low-water use toilets are installed in any of the centers. Again, the recreation centers should lead the way in water conservation efforts.

I think your initial plan needs to address in hard figures how much water we are using now, where this water is coming from, what is the capacity of these water sources in the future versus our planned water consumption.

Thank you.

Comments on the CWSD Draft Water Conservation Plan, February 17, 2008

It is unclear how many of the measures and programs that CWSD claims to have "already implemented" have in fact been implemented. For example, CWSD claims to have already implemented low water use landscapes; however its programs only involve education and demonstration gardens. While it is valuable to have education and demonstration gardens, other communities are developing ordinances for soil amendments, sprinkler systems and median and parkway plant material requirements[1]. Has CWSD considered these measures and programs? If not, why not? What were the results of the screening of ordinances that would save water and provide for a more sustainable development?

With respect to metering, how old are residential, commercial and irrigation meters in Highlands Ranch? How often are meters replaced for large commercial and irrigation accounts? Has automated meter reading (AMR) technology been considered for new and existing large commercial and irrigation accounts? What are the sophisticated leak detection programs that CWSD has in place? Does it include use of AMR devices to test for leaks on large accounts? If this technology was not included in the screening and evaluation process, why not?

Does CWSD track large customer water use? Does CWSD audit large water use accounts? If so, what are the results of these audits? If not, why not? When will CWSD conduct these audits and who is targeted?

Outdoor irrigation technology has been greatly improved in recent years. Rain sensors and ET controllers are being used successfully in other locations within Douglas County and in the front range[2], yet CWSD has chosen to not include these technologies for rebates for any of its customers? Why not? CWSD could provide rebates for those customers that have irrigation audits, which CWSD is conducting in cooperation with CRC. Why has this not been considered? If it was considered, why was it not selected for implementation?

Pre-wash nozzles for commercial water users are likely the most cost effective water conservation measure available to CWSD. Why has it not been selected for implementation? What are the specific analyses that CWSD performed to screen this measure? What are the specific results of that screening?

[1] Castle Rock, Longmont, Colorado Springs, Aurora

[2] Castle Rock, Castle Pines North, Colorado Springs, Aurora, Longmont, Brighton, Northglenn

What is the "mandatory" outdoor water conservation measures that CWSD uses to eliminate water waste and inefficient watering practices? The green spaces along Highlands Ranch Parkway are often watered between 10 am and 6 pm during the summer, and the watering always extends into the street causing substantial runoff in the gutters, etc. How is CWSD "mandatory" program working to fix that waste of water?

There are a number of homes built before 1994 that do not have ultra low flow toilets, low flow shower heads, and/or low flow aerators on the faucets that could be retro fitted with high efficiency fixtures and appliances? Why have these measures and programs been omitted by CWSD? Also, improving the efficiency of commercial toilets (to either 1.0 or 1.28 gallon per flush) and urinals (to 0.5 or 0.7 gallons per flush) can provide substantial water use reductions. Why have these measures not been considered by CWSD? Waterless urinals have been in place at locations throughout the Denver Metro area for years[3]. Why does CWSD conclude that this technology is "not sufficiently reliable"? No quantitative analyses are presented to support the conclusions reached by CWSD.

The section of the Draft Plan entitled "Moving Forward" is a list of activities CWSD has already conducted. It would be desirable to see what it is that CWSD is planning to do to improve its water conservation programs that are substantially lacking based on the state of the science and those programs that other Metro Area water providers are implementing.

The CWSD Plan lacks any information regarding future monitoring of proposed water conservation measures and programs in any meaningful manner. CWSD has claimed that its water budget billing efforts are responsible for the reduction of water use by its customers since 2001, even though the water budget billing effort was not initiated until 2003. In addition, customer water use has been on the increase since 2004 during which time the water budget billing has been in place. It therefore appears that the water conservation programs of CWSD have not been effective in reducing customer water usage. It is vital that CWSD implement a monitoring and verification effort that allows for the tracking of individual customer water use, as well as water use by customer class to understand the impacts of CWSD's water conservation measures and programs.

How many water audits has CWSD performed for those entities requesting an audit? How many Slow the Flow irrigation audits has CWSD sponsored? How many customers have been given warnings about inappropriate water use? What types of customers have received warnings? CWSD needs to provide a written update on its water conservation program including a summary of water savings and lessons learned on at least an annual basis for distribution to its customers.

[3] Denver Water, Aurora, Longmont, Colorado Springs

CWSD does not have an effective public relations campaign regarding water conservation. It should therefore look to develop a public relations program that would help its customers understand more about their water supply and their needs to conserve water. This could be initiated with a survey to determine the effectiveness of CWSD's current customer education programs. Many water utilities are finding that bill stuffers and newsletters may not be very effective in broadcasting a message related to water use efficiency and wise water use. Spending money on these types of programs may not have any substantial impact on customer water use. CWSD owes it to its customers to understand the benefits of expenditures being made regarding these efforts.

January 24, 2008

Centennial Water and Sanitation District (CWSD)
c/o Board of Directors
62 W. Plaza Drive
Highlands Ranch, Colorado 80126

Re: Public Comments on the Draft Water Conservation Plan

Dear Distinguished Board Members:

As you know, ensuring that reliable, high quality water is delivered to the citizens and businesses of Highlands Ranch and environs at a reasonable cost is among your most important responsibilities. This is a responsibility that has a direct influence on the quality of life of over 100,000 people in northern Douglas County. We are dependant upon you to make choices for us based on sound engineering and economic analyses that are consistent with the "standard of care" of any special district and/or water utility.

Although CWSD has been successful in obtaining raw surface water supplies from various sources in the past, a significant quantity of this water has been purchased through temporary agreements, such that Highlands Ranch continues to need new water supplies developed and storage facilities constructed to ensure that a safe, reliable water supply is available for our citizenry in the future. **The relative importance of "meaningful water conservation" as a compliment to future water development activities has never been more important – as a means to wisely manage our current water resources and support permitting for new water development projects.**

Given the importance of meaningful water conservation to the future of Highlands Ranch, CWSD's Draft Water Conservation Plan ("Draft Plan") was met with substantial interest given not only the needs of the community and the District's customers (and rate payers), but CWSD's prominence in the South Metro Area water community. As you know, CWSD provides leadership and resources to many local and regional planning efforts and in many situations graciously assists entities with fewer and/or limited resources.

Unfortunately, the Draft Plan neither represents the work of an organization that purports to provide leadership in water management nor does the Draft Plan provide the public, and the District's customers with the requisite information needed to evaluate the programs proposed by CWSD. First and foremost, **the Draft Plan lacks the necessary transparency regarding the type and effectiveness of programs currently in place, and the justification and rationale for spending rate payer monies on future water conservation measures and programs.** Do not misunderstand; I strongly believe that meaningful water conservation is a basic requirement of any conscientious, ethical water provider in Colorado and the West. It is the lack of disclosure by CWSD of the true benefits of past expenditures and the expected benefits of future expenditures that calls into question the validity and appropriateness of the proposed programs.

One telling component of the Draft Plan that calls into question the effectiveness of past water conservation activities relates to the state requirement that water savings from past water conservation measures and programs be estimated. The Draft Report discusses how one measure of water use, per capita water use on a gallons per day basis (gpcd), has decreased since 2001 (noting that this metric was chosen since it is not necessarily influenced by increasing population). Although this observation is true, it does not align with two other observations. First, the key water conservation measure and program implemented by CWSD, the water budget billing

program, did not go into practice until after the decline in per capita water use was observed. Second, **the decline in per capita water use was short-lived since per capita water use has been on the rise in Highlands Ranch since 2004.** No effort is given in the Draft Report to try and clarify or understand this observed rise in per capita water use. Are the current programs truly effective if water use is on the rise?

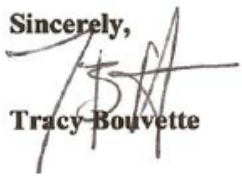
If meaningful water conservation measures and programs were in place, CWSD would have the monitoring data to identify which activities were effective in promoting improved water use efficiency and which were not; however none of these data has been included in the report. Instead, **CWSD has chosen to continue with its current measures and programs without adequate justification or explanation of their past effectiveness.** In addition, the Draft Report omits all analyses used to screen and select new water conservation measures and programs. Without transparency, it is unclear as to how and why CWSD has made decisions regarding water conservation practices.

It should be noted that substantial information exists from various reputable sources regarding the cost and benefit of various water conservation measures and programs, which CWSD chose to eliminate from implementation. Dozens of Front Range communities, some of which are smaller than Highlands Ranch, operate residential rebate programs saving water at a cost of $10,000 to $18,000 per acre-foot. However, many of these same communities are finding that commercial rebate programs for ultra low flow toilets and urinals provide substantial, measurable water savings at costs of less than $7,500 per acre-foot. In addition, commercial rebates for outdoor irrigation equipment can provide water savings at costs of less than $3,000 per acre-foot. Finally, one of the most successful water conservation programs in the Front Range has involved the free replacement of restaurant pre-wash spray nozzles at a cost of less than $500 per acre-foot of water saved. Given that CWSD is looking at finding renewable water supplies at a cost of $15,000 per acre-foot and greater, **it would seem that a harder look at the cost-benefits of water conservation are not only warranted, but is mandated by the Board's standard of care to its customers and rate payers.**

Finally, the Draft Plan does not indicate how the District will monitor the effectiveness of the various selected measures and programs - this is also a requirement of the plan as per state statute. It is vital that CWSD implement measures and programs that allow for tracking of water savings, individually and collectively, such that the District's rate payers can be assured that their funds are being appropriately managed and well spent.

Given the various shortcomings identified in the Draft Plan, I strongly suggest that CWSD re-craft the Draft Plan including the omitted information, taking into account the known cost-benefits of any number of measures and programs that were not selected for implementation, and re-define the proposed efforts of the District. The re-crafted Draft Plan should then be provided to the public allocating the full 2-month review and comment period to honor the state defined public process and be fair to the District's customers. Without this type of substantial and clearly justified revision, **it is not possible or fiscally prudent for the District's customers to support the water conservation efforts of CWSD as documented in the Draft Plan as it currently exists.**

Sincerely,



Tracy Bouvette

9486 Chesapeake Court
Highlands Ranch, CO 80126

Rebecca L. Carovillano
9486 Chesapeake Court
Highlands Ranch, CO 80126
303.434.7322

February 15, 2008

Mr. Jon Klassen
Centennial Water & Sanitation District
62 W. Plaza Drive
Highlands Ranch, CO

Dear Jon:

Thank you for the opportunity to provide comments on the Draft Water Conservation Plan 2007 (hereafter referred to as the "Plan"). In addition to providing specific comments on the Plan, I would also like to take this opportunity to provide two additional comments about the participation process. The first (and this was mentioned during the Public Meeting) is that the timing of the Public Meeting was inappropriate given that it was held on the same night as the Colorado Caucuses. I had several friends and neighbors ask why they did not see me at the Caucus, only to be shocked and disappointed to hear that a Public Meeting on the Plan was scheduled for the same night.

My second comment has to do with the conduct of the Public Meeting. I thought it was inappropriate to discourage the expression of <u>any</u> opinions at the meeting. There was no question that one of the opinions being expressed was highly critical of Centennial Water & Sanitation District's (CWSD's) Plan, and was much more educated on the subject than the general public, but this is <u>exactly</u> the type of opinion that should be welcomed and not discouraged. Had there been more people in the audience that needed time to express their opinions, or had there been substantive information to present on features of the Plan, then facilitation of public dialogue might have been warranted. Given that this was not the case, the attempt to "shut down" or diminish the expression of critical opinion was inappropriate, and at best, unfair.

My comments on the Water Conservation Plan fall into two categories: 1) general comments and 2) specific comments, and are provided in the following paragraphs.

<u>General comments</u>:

The Plan misses an opportunity to educate its audience about the dire situation concerning the water supply of the South Metro area. Nowhere is it mentioned that groundwater levels in the Denver Basin are declining at alarming rates. Instead, a picture is painted of a community that gets it water primarily from renewable surface water. There is no mention of the interconnections and interdependencies of the various communities along the front

range, the cities of Denver and Aurora being the two most prominent, as they vie for the finite surface and groundwater resources that are available around the state.

The Plan contains too many generalities in its wording, and is lacking substantive technical details (many specific instances of these are included in the "specific comments" section) concerning current conservation measures and programs, as well as those that have been selected for further consideration and implementation. The net result is that the Plan has little substance, and CWSD has missed an opportunity to step to the forefront in the area of responsible and meaningful water conservation.

Specific comments:

Page 5 (The Role of Water Conservation in Water Supply Planning): The statement "…this supply will continue to support the community's needs for the foreseeable future" is vague. Please define what "foreseeable" means. Obviously 100 years of water supply invokes an urgent need for conservation, whereas 1000 years invokes less urgency.

Page 5, fourth paragraph: There is mention that surface water is considered to be a renewable water source in paragraph 2, however there is no mention in this paragraph that groundwater is considered to be non-renewable source.

Page 8 (Water Supply), paragraph 3: This paragraph (on the South Platte Reservoir), is lacking information on where the water to fill the reservoir will come from. Since this information was provided for McLellan Reservoir, it should be provided for the South Platte Reservoir.

Page 8, fifth paragraph: There is an implication made that the excess surface water that is injected by way of the CWSD's ASR system can simply be withdrawn when needed. This is not the case. This paragraph should either be clarified, or reference to ASR should be removed.

Page 8, sixth paragraph: Please provide information on how surface water and groundwater have been used to meet demand over the past 26 years (a single graph with two lines, one for surface water, one for groundwater, will suffice). It is not clear how the dependence on groundwater may change during times of drought.

Page 9 (Water and Wastewater Facilities): Is surface water and groundwater commingled in the distribution system? The fact that there are separate treatment facilities for groundwater and surface leads me to believe this is the case. What is the treatment capacity for each of the groundwater treatment facilities and the one surface water treatment plant? It surprises me that there is one treatment plant for surface water when surface water makes up 90% of our supply.

Page 9, last paragraph: Is the reason why the Highlands Ranch Golf Club and Redstone Park are supplied with reusable effluent because of the proximity to the Marcy Gulch Wastewater Treatment Plant? One of the areas lacking in the Plan is the discussion of increased use of reusable effluent. Water conservation cost benefit analyses for this measure should include the infrastructure changes necessary to use more wastewater treatment plant effluent for additional parks, or landscaped common areas.

Page 13 (Water Conservation Activities), fifth bullet: The District may encourage Xeriscape (although it is not clear how), but there are HOA covenants that restrict it. CWSD should do more to work with the HOAs so that residents can convert their landscapes entirely to Xeriscape if desired.

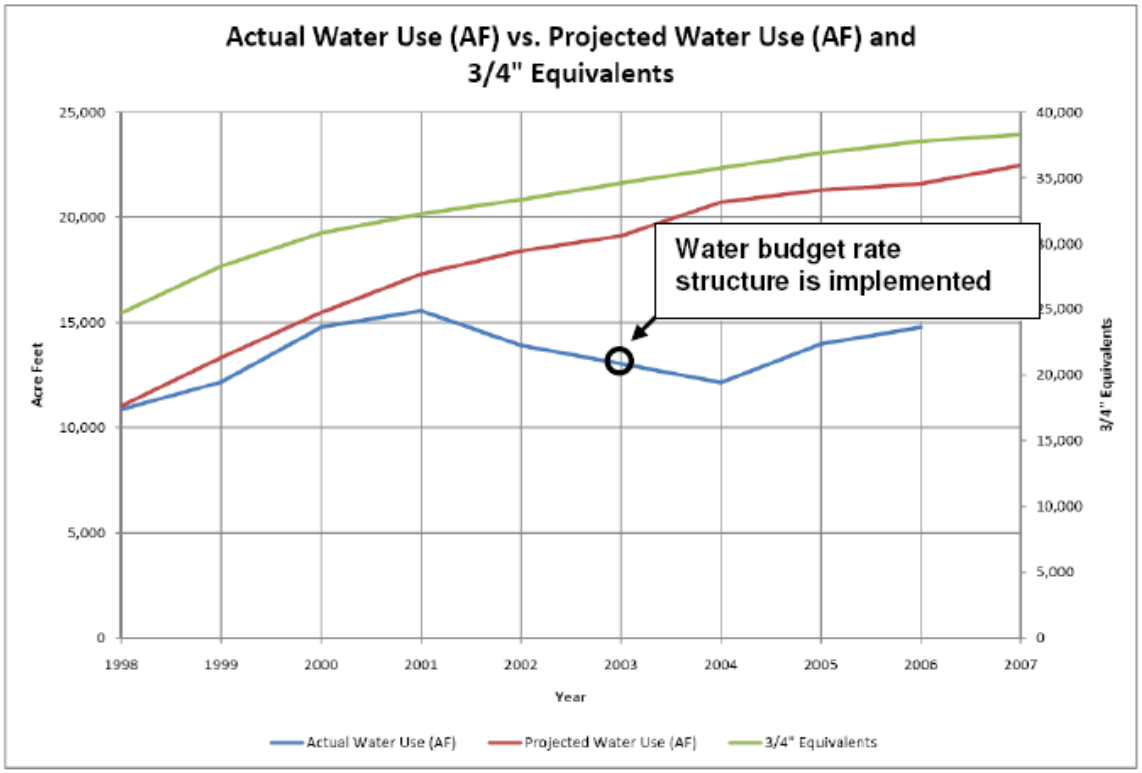
Page 14, fifth bullet: As someone who has lived in Highlands Ranch for five years, this list surprised me. I was unaware of most of these things and I think most residents would have a similar reaction. A public education program is of little use if it does not reach your public.

Page 15, first paragraph: Please add additional detail on how programs will be measured and evaluated and at what frequency. The statement "the ability to quantify results being virtually impossible" is not correct. There certainly are ways to quantify the results of a public education program – one of them is the use of surveys. The ease with which this is discounted as being "impossible" is disconcerting.

Page 15, Table 2: My overall comment is that the rates for the >140% category should be increased significantly (although this is not a comment on the Plan, but a comment on the rates charged for a precious resource). Residents have a responsibility to stay out of this category, and there should be a rate structure in place that acts as a strong motivator. The fact that the indoor component of the residential water budget is based on 65 gallons per capita per day is quite generous, especially in light of the fact that other industrialized nations use far less. Please add statistics of how many households typically fall within each of the budget categories during each billing period.

Page 16, third paragraph: The statement "the water budget rate structure…has been a successful water conservation tool" is incorrect when the information in Figure 4 is examined. The rate structure was implemented in 2003, whereas the decline in water demand began in 2001 at the height of the drought. In fact, the decrease in demand between 2002 and 2003 appears to be the same as that seen between 2003 and 2004 while the drought was continuing to worsen. There is no indication that the demand would have been any different had the rate structure not been implemented. The trend since 2004 is disconcerting – it indicates that public awareness of the drought and related mandatory water conservation measures was the cause of the demand decrease. When the drought lessened and water conservation measures became voluntary, the demand began to increase. The rate structure remained in place, and clearly did not act as a deterrent to excessive water use.

Figure 4: Actual Water Use versus Projected Water



Page 17 (Policies): Please provide additional information, such as the number of violators in each category, and by year.

Page 19 (Estimated Water Savings): The information presented in the third paragraph would benefit greatly from a graph. You are manipulating demand and taps to get at residential water usage, but the decline in residential usage since 2001 is not evident from the information presented in Figure 4.

Page 21 (Water Conservation Goals): It is not clear how either water demand at build out (19,500 AF/yr and 17,500 AF/yr) were developed. Inspection of the information provided in Figure 4 indicates that a demand of 15,000 AF/yr is entirely reasonable if proven water conservation measures are implemented and accompanied by heightened public awareness

Page 23 (Initial Screening of Conservation Measures and Programs): The sixth screening criterion does not belong on the list. Who decides what an "unreasonable behavioral change" is, and how "unreasonable" is defined?

Page 24, Table 6: It is not clear how these measures and programs were identified, while others may have been excluded. It is recommended that this section be expanded, with additional detail added for each measure or program, including a brief description and the reasons for inclusion or exclusion from further consideration.

Page 27 (Evaluation of Conservation Measures and Programs): The cost benefit analysis mentioned in paragraph 3 is the type of content that is needed (and is currently sorely lacking) in the Plan.

Page 28 (Selection of Conservation Measures and Programs): Centennial Water needs to be in greater communication with Metro Districts. For example, in the Open Space near my house, Metro Districts erected signs indicating that they were going to remove the Russian Olive trees. There was no mention in the signage that these trees are phreatophytes. It was also interesting that the signs went up, but the trees were not removed. It should not be possible for a homeowner to plant Russian Olive or Tamarisk trees in our area, and yet many yards have them as part of their landscaping. Cooperation between CWSD and Metro Districts (and again, HOAs) is very important in order to increase public awareness in this area.

Page 29, second item: Please provide more information. What are the mandatory outdoor conservation measures that are mentioned?

Page 29, third item: Please provide more information. How many kits are given away each year? How does a resident get one?

Page 29, last item: one-third of the homes in the District's area were built before 1994, which means that a substantial percentage of faucets may **not** be low-flow. If Douglas County schools had one-third of its students rated as below proficient in the CSAPs, there would be significant actions taken.

Page 30, second item: Please provide more information. Why does the District feel that total irrigation system efficiency will be a better water conservation measure than installing high efficiency spray nozzles? Are there data to support this opinion?

Page 31 (Moving Forward): This section does not talk about future actions – it reviews past actions. During the Public Meeting you mentioned that this section may be renamed. It is not only recommended that this section be renamed, but in addition, a section should be written that discusses the path forward regarding the implementation of meaningful water conservation in CWSD's service area.

Once again, I appreciate having the opportunity to provide comments on this Plan. If you care to discuss any of these comments further, or need clarification, please do not hesitate to contact me.

Sincerely yours,

Rebecca L. Carovillano
9486 Chesapeake Ct
Highlands Ranch, CO 80126
303.434.7322

c. Ms. Sherry Eppers

Kay Dry
9273 Wiltshire Drive Highlands Ranch, CO 80130

2/17/2008

Mr. Jon Klassen
Highlands Ranch Metro District
62 W Plaza Drive
Highlands Ranch, CO 80129

Dear Mr. Klassen:

Thank you for the opportunity to provide comments on the Draft CWSD 2007 Water Conservation Plan (Plan). In general, the plan is well organized, but I think lacks detail in some areas and could define more terms to be understood by the layman. I also believe the plan could provide some additional facts to further detail the water consumption in Highlands Ranch. To illustrate my thoughts, I have attached my comments on the Plan to this letter.

I have some thoughts I would like to share after attending the February 5th public meeting on this subject. I understand from this meeting that the district has limited financial resources and feels that they are doing what they can with the available funding. However, in reading the plan, it states that there is a full-time Water Conservation Coordinator (page 13) and that there is ongoing collaboration with water conservation groups (page 15). Thus, I was shocked during the meeting when the Director suggested to one of the community members in attendance that he provide them with backup information regarding the research on water saving devices. I cannot believe with a full-time person being

assigned to this and the collaboration with other water conservation groups there is not a better understanding of what was being discussed. It begged the questions of 1) whether my utility charges are being spent in a constructive matter to protect our future water resources and 2) if the CWSD is serious about water conservation.

Furthermore, on the conduct of the meeting, I was appalled that in a public meeting, the Director was rude to one of the community members, telling him that he didn't know what he was talking about with respect to a memorandum of understanding regarding water rights in the metropolitan area and suggesting that he was not letting Mr. Klassen finish his presentation. While it seems that the two have a business association, opinions need to be heard and we live in a country where we should be able to do just that in a forum of a public meeting. When someone is paying utility fees or taxes, no matter what the relationship, they have a right to be heard.

In short, it bothers me that we are in a time when our culture is changing to become more sustainable, and my water district is not on the forefront of that. It seems that everyone around us is working to conserve our natural resources, for example:

- I toured the new Stone Mountain Elementary School which was designed to use less electricity and water
- My children know how to recycle
- Denver Water advertises on park benches and buses to use less water

- Denver has implemented single stream recycling and it is available to us in Highlands Ranch, if we choose
- The meridian on Quebec Street planted by the HRMD is xeriscaped

Thus, given the examples of what is going on around us, I wonder if CWSD's goal of reducing water consumption of 652 million gallons a year enough? In a suburban area with 100,000 people I think we can do more. A starting point would be letting the community know when we are using our aquifers instead of surface water for our household and outdoor water use and subsequently requiring them to conserve.

Please contact me with any questions you have about this letter or comments on the plan itself. I can be reached at 303.471.6391.

Sincerely,

Kay Dry

Comments on the CWSD Draft Water Conservation Plan		
1.	General	Some page numbers are missing
2.	General	Give the conversion from acre-feet to Gallons. Most people think in gallons.
3.	General	Define that a kgal is 1,000 gallons.
4.	Page 4, 3rd bullet	Improve database – What database? Give the reader an explanation of the existing database and how CWSD going to improve it.
5.	Page 5, 2nd paragraph	Explain how surface water is renewable. Insert the word "non-renewable" or some other wording to indicate that groundwater is not recharging at the same rate as surface water. Define "foreseeable future", 10, 50, 100 years?
6.	Page 5, 3rd paragraph	Define "foreseeable future", 10, 50, 100 years? After foreseeable future, insert "it is a finite source of water and".
7.	Page 5, 4th paragraph	Explain why we can't manage what we have and why we need more supply.
8.	Page 8, 3rd paragraph	Explain how the "South Platte Wells" are considered surface water supply? Doesn't the water come from groundwater from the ASR system?
9.	Page 8, 4th paragraph	This paragraph should read the same as the previous one. Who owns the reservoir, where does the water come from? Why is it currently empty?

Comments on the CWSD Draft Water Conservation Plan		
10.	Page 8, 7th paragraph	Who has the water rights to the groundwater wells and for how long?
11.	Page 9, 1st paragraph	Seems like "wastewater treatment plant" should be at the end of the list, not in the middle. I am not sure why it is in the "sources of water" list to begin with; however, it becomes clearer as you read the last paragraph.
12.	Page 9, 2nd paragraph	Match the paragraphs to the list in paragraph 1, i.e. "The Joseph B. Blake WTP treats surface water from the McClellan and South Platte Reservoir…" This also seems like a good place to state the capacity of the plant in MGD and the average daily flow/demand, etc. Treat and distribute is too ambiguous.
13.	Page 9, 4th paragraph	It would be nice to use the same usage amounts for the water treatment plant and the wastewater treatment plant. I would like to know for example how much potable water CWSD treats versus how much the wastewater plant treats on an annual basis.
14.	Page 9, 5th paragraph	I find this confusing. Does this water come from the Marcy Gulch Plant and then get filtered? Isn't all effluent reusable, CWSD is discharging the wastewater to the South Platte River, which is later reused. What about the ASR?
15.	Figure 2	My copy is b/w, but the groundwater wells shown as dots need to be labeled. Where are the groundwater treatment plants? Lift stations? Storage tanks? This map could be more comprehensive, but I realize this may conflict with the Homeland Security Act.

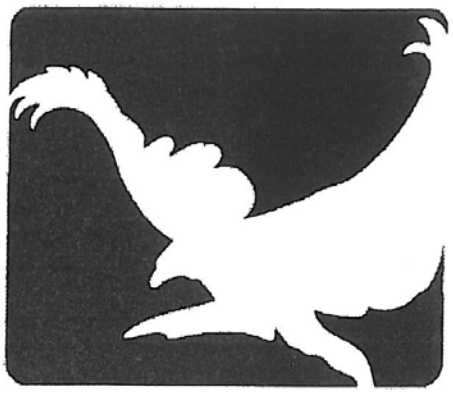
Comments on the CWSD Draft Water Conservation Plan		
16.	Page 13, 4th bullet	What does the Plan mean by "low-flow devices"? I can't believe we can't improve upon 1981 technology and mandate it. The Plan also discusses that these weren't required by the government until 1994, so how did Highlands Ranch require them?
17.	Page 13, 5th bullet	Great for Douglas County, but when is CWSD going to work with the HRCA to get their buy in? Why don't developers who strip off the top soil have any responsibility in this?
18.	Page 13, 6th bullet	What about developers? Why don't they have any responsibility in installing water-conserving front yards?
19.	Page 14, 1st bullet	Not sure what "return flow credits" are.
20.	Page 15, 1st bullet	Great! Glad people are talking. What about communities outside of the front range? Certainly Phoenix must have some good ideas, how about California? What changes have come from this collaboration?
21.	Page 16, 2nd bullet	Really, three people? Come on. We have four people and we are always below our budget. Pay for what you use, no exceptions.
22.	Page 16, 4th bullet	I still do not think commercial businesses are paying enough for going over budget.
23.	Page 18, number 6 on both tables	Needs to be bolded.

Comments on the CWSD Draft Water Conservation Plan		
24.	Figure 4	I think it was voiced in the meeting that this graph is confusing. You can also add 2007 data. This graph makes it look like use is going up; I would imagine it would be given that Highlands Ranch is not built out and is still being developed.
25.	Page 21, Item 1	What is this based on and how was it developed?
26.	Page 21, last paragraph	The tone of this Plan up until this point seems to be that there is plenty of water. This is the first I have noted that CWSD "needs to save". Explain why CWSD needs to save 11 to 12 percent through water conservation measures.
27.	Page 22	Why was this done all in-house? What about involving members of the community?
28.	Page 22, 3rd paragraph	Will the District continue to evaluate <u>any</u> measure or program? Really? Seems like "any" is misleading. I have some suggestions that I doubt CWSD wants to evaluate.
29.	Page 26	Improved water accounting needs a check mark.
30.	Page 28 vs. Page 29	Water-efficient fixtures. The Plan states that low-volume flow devices were required since 1981. Like what? Page 29, third paragraph that this has been required by the government since 1994. Be consistent on this point.

Comments on the CWSD Draft Water Conservation Plan		
31.	Pages 28 through 30	There are a lot of blanket statements in this section with no real quantitative data to back them up. In addition there are some inconsistencies and clarifications, such as: Water reuse systems. Previously in the Plan it discusses the three areas that use treated effluent to water landscapes. Here it sounds like all parks and golf courses use this water. The Plan double dips with the "removal of phreatophytes". Regulatory measures. Define what is done to help eliminate water waste and in-efficient practices. Waterless Urinals. This needs to be reevaluated. I think there are new systems that require less maintenance.

Appendix B: 2006 Water Audit

CENTENNIAL WATER & SANITATION DISTRICT



2006 WATER AUDIT

PREPARED BY: MATT TYLER,

FIELD CUSTOMER SERVICE REP III – COLLECTION DISTRIBUTION

CENTENNIAL
WATER AND SANITATION DISTRICT

2006 WATER AUDIT

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CENTENNIAL
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2006 WATER AUDIT

INTRODUCTION

The annual water audit is a method of determining how efficient the water distribution system is operating. There are three pieces of data used when performing the audit. These areas are as follows:

Total water production
Total water billed to customers
Water accounted for, but not billed

Unaccounted for water is calculated by subtracting all accounted for water (total water billed and accounted for/not billed) from the total water production.

The following is a summary of how the amount of water for each of the categories is determined.

Total Water Production:

Centennial Water and Sanitation District obtains water from two sources. The first source is surface water. Centennial's surface water is stored in McClellan Reservoir and pumped to the water treatment plant. Some of the raw surface water is utilized for irrigation. In 2006, 18,014,000 gallons of raw surface water and 91,893,000 gallons of reuse water was utilized for irrigation. Once the surface water has been treated, it is metered as it is pumped into the water distribution system. The total amount of surface water produced from the water treatment plant in 2006 was 4,571,426,486 gallons. A portion of the treated surface water is utilized for aquifer storage and recovery (ASR). This operation places treated surface water into groundwater aquifers for storage during off peak water consumption periods of the year. The second source of water is ground water. The ground water is pumped out of the Denver, Arapahoe and Laramie Fox Hill Aquifers with Centennial's well system. In 2006 Centennial utilized 51 wells for it's ground water production. Each well site has a meter to track production. The total production of ground water in 2006 was 588,505,823 gallons. The combined total of all water production in 2006 was 5,269,839,309 gallons or 16,173.63 acre feet of water.

Total Water Billed to Customers:

Through intergovernmental agreements, Centennial provides water service to the Highlands Ranch Metro District as well as the Northern Douglas County Water & Sanitation District. Centennial requires water consumption to be metered for billing purposes. The following is an accounting of water billed for in 2006.

1. Highlands Ranch Metropolitan District #1:

Residential	Commercial	Irrigation	Total
954,160,000	124,728,000	189,246,000	1,268,134,000

2. Highlands Ranch Metropolitan District #2:

Residential	Commercial	Irrigation	Total
823,135,000	98,391,000	364,112,000	1,285,638,000

3. Highlands Ranch Metropolitan District #3:

Residential	Commercial	Irrigation	Total
705,044,000	39,915,000	235,964,000	980,923,000

4. Highlands Ranch Metropolitan District #4:

Residential	Commercial	Irrigation	Total
795,593,000	61,932,000	164,027,000	1,021,552,000

5. Northern Douglas County Water & Sanitation District

Total = 255,300,000

6. Construction/Hydrant Meters

Total = 104,362,000

Total amount of water billed for in 2006 was 4,915,909,000 gallons, or 93.28 percent of total water production (5,269,839,309).

Water Accounted for, but not Billed:

Water consumed in this area is typically utilized for water distribution system development, maintenance, system failures and lift station chlorination to control hydrogen sulfide gases in the collection system. Further explanations of these items are as follows:

1. Distribution System Development:

In 2006, a total of 54,275 feet of new water mains were installed within Highlands Ranch. The diameter of the pipelines varied from 4 inch through 16 inch. A detailed accounting of the quantity for each size of pipe is provided later within this water audit. During the installation of a pipeline, tablets of calcium hypochlorite are placed inside the pipe for disinfection purposes. When the new pipeline is initially filled with water, the calcium hypochlorite tablets dissolve to produce a chlorine concentration of at least 50 mg/l. This concentration of chlorine is at least 25 times the normal amount of chlorine found in our potable water, and disinfects the interior of the pipe. The highly chlorinated water must then be flushed out of the pipeline. To accomplish this procedure, approximately 2 times the volume of the pipeline must be flushed to lower the chlorine level to that of the potable water which ranges from 0.2 mg/l to 2.0 mg/l. Typically, three times the volume of the pipeline is required before it is ready for service. In 2006 a total of 546,795 gallons or .01 percent of total water production was used for distribution system development.

2. Distribution System Maintenance and Failures:

In order to maintain water quality, flushing of the distribution system may be required. Some of the reasons that water is utilized by maintenance staff are as follows:

- Maintain proper chlorine residual.
- Routine flushing to maintain water quality.
- Water utilized to fill sewer jet cleaning equipment.
- Water utilized for meter testing.

Water consumption by lines maintenance staff is tracked on a daily basis and recorded. Additionally, any distribution system failures that result in loss of water are also accounted for. A detailed accounting of all water utilized for distribution system maintenance, meter testing and failures follows further within this audit. The total amount of water accounted for, but not billed to customers in 2006 for distribution system maintenance was 2,701,043 gallons, or .051 percent of total water production.

3. Willow Creek & Big Dry Lift Stations Chlorination:

At the Willow Creek Lift Station, water is injected through a chlorinator at the rate of 8.0 gallons per minute, 24-7-365 to control the formation of hydrogen sulfide gases. The total amount of water used for this purpose in 2006 was 4,204,800 gallons or .08 percent of total water production.

At Big Dry Lift Station the chlorinator flow rate is 16 gallons per minute for a total annual use of 8,409,600 gallons or .16 percent of total water production. (The combined total of water used for chlorination at Big Dry & Willow Creek Lift Stations is 12,614,400 gallons or .24 percent of the total annual water production.)

The combined total amount of accounted for, but not billed for water in 2006, from distribution system development, distribution system maintenance, meter testing, failures and Willow Creek and Big Dry Lift Stations chlorination is 15,862,238 gallons or .30 percent of total water production for 2006.

Unaccounted for Water:

The amount of unaccounted for water is arrived at by subtracting the total amount of water billed for, and the total amount of water accounted for, but not billed to customers from the total amount of water produced. There are several factors that contribute to the amount of unaccounted for water and they are as follows:

1. Unauthorized water use:

   Any time unmetered water is consumed from the distribution system without the consent of the District; it is termed unauthorized water use. Unauthorized use of water can occur on construction sites by contractors, and by customers who purposely bypass the water meter. However, District staff does monitor the distribution system and customer's internal plumbing in an attempt to minimize water theft.

2. Water meter accuracy:

   When water meters are new, they must meet the American Water Works Association's standards, C700-90 and C710-90, pertaining to new water meter accuracy. The standards require a new ¾" water meter to have a minimum accuracy of 95 percent at 1/2 of a gallon per minute and at normal flows of 2 to 30 gallons per minute an accuracy of 98.5 to 101.5 percent. However, the water meter's internal parts are subject to wear and to the buildup of minerals from the water. Both can cause a water meter to become inaccurate and typically under register actual water consumption. This is the reason for the District's meter exchange and testing program.

   As part of the intergovernmental agreement with the Highlands Ranch Metropolitan Districts, Centennial maintains and tests the water meters as required. This program involves the annual testing of large commercial and irrigation meters. Any necessary repairs and calibrations are also made at this time. Additionally, Centennial provides an ongoing residential water meter exchange program. This task involves exchanging water meters that have been in service for ten years with meters that have been rebuilt and tested, meters that have been in service for 20 years are replaced with new meters. All rebuilt residential water meters are checked for accuracy on a meter test bench that has been certified by the Colorado Department of Weights and Measurements. Once rebuilt and tested to verify operation within American Waterworks Association standards, the water meters are placed back into service at a new location. In 2006, approximately 2,805 residential water meters were exchanged. This number will increase each year, as did the growth within the District ten years previously.

3. Distribution System Leakage:

When new pipelines are installed, they are pressure tested to check for leaks. However, there is a small amount of leakage that is allowed on a new pipeline. This amount varies depending on the diameter and length of the pipeline. The pressure test is performed before any water services are connected to the water main. Once the water services are connected to the water main, it is possible that they may also contribute to the amount of leakage from the distribution system. The following is a footage report of the distribution system as of the end of 2006 and what would be considered an acceptable amount of leakage from a distribution system of its size. The amount of leakage shown is made utilizing pressure test standards for new pipelines and assuming an average system pressure of 87 psi with no service connections having been made.

This amount of water is not included in the audit because the actual amount of distribution system leakage is unknown.

Pipe Diameter	Length in Feet	Maximum Acceptable Amount of Leakage in Gallons Per Year
4"	26,347	64,550
6"	295,647	1,085,024
8"	1,078,778	5,264,437
10"	167,742	1,028,258
12"	185,514	1,365,383
16"	109,046	1,068,651
20"	94,083	1,153,458
24"	146,403	2,155,052
30"	42,970	790,648
36"	38,296	846,342
		Total 14,821,803 Gallons

The formula utilized to determine the previous amounts of loss is as follows:

$$L = (SD(\sqrt{P}))\ \left(\frac{1}{133{,}200}\right)$$

L - is the allowable leakage in gallons per hour.
S - is the length of pipe.
D - is the Diameter of the Pipe.
P - is the average pressure within the pipe line.

4. New Home Construction:

Another area of unmetered water consumption takes place during the construction of new homes. The District charges $28.00 for construction water use for each new home. The amount charged allows the building to utilize 12,000 gallons of water per home for general

construction purposes, to check the internal plumbing, and for cleaning, before the water meter is installed. In 2006, 684 new homes were constructed. A total of 8,208,100 gallons of water, or 0.155 percent of total water production was billed for; however, the actual amount of unmetered water consumed in this area is unknown. This amount of water is not included as part of the water billed for, portion of the water audit because it was not metered and is considered part of the construction fee for a water service tap.

Unaccounted for Water

In 2006, the total amount of unaccounted for water was 338,068,071 gallons, or 6.41 percent of total water production. The amount of unaccounted for water in the past 11 years is in a bar chart on the following page. The average unaccounted for water during the past 11 years is 6.79%.

Total accounted for water is 4,931,771,238 gallons or 93.59 percent of total water production.

The American Water Works Association guidelines consider up to 15 percent unaccounted for water to be acceptable. The Highlands Ranch water system has remained consistently within an acceptable range.

It should be noted that a primary factor in the accuracy of the water audit is the accuracy of the 2-24" Zone 1 & Zone 2 mag-meters that measure the finished potable water leaving the water treatment plant. These meters are factory calibrated and cannot easily be tested in place. The 24" Zone 1 mag-meter was replaced in February of 2007 due to ongoing intermittent problems with the electronics and the signal dropping out. It is possible that this could have affected the overall accuracy of the audit. Also, inquiries have been made to insure that the master meters for all Northern Douglas County extended service areas are being tested on a regular basis, as these represent about 4.8 percent of total water production in 2006.

BREAKDOWN OF WATER SOLD BY DISTRICT

Water Billed For:

District #1	1,268,134,000 gallons
District #2	1,285,638,000 gallons
District #3	980,923,000 gallons
District #4	1,021,552,000 gallons
Construction/Hydrant Meters	104,362,000 gallons
N.D.C.W.S.D.	255,300,000 gallons
Total Billed	4,915,909,000 gallons

NEW WATER LINES INSTALLED IN 2006

4"	6849'	4383 gallons
6"	1519'	2172 gallons
8"	32,876'	85,806 gallons
10"	2037'	8,291 gallons
12"	7257'	42,599 gallons
16"	3737'	39,014 gallons
20"	0	0 gallons
24"	0	0 gallons
36"	0	0 gallons

Total gallons	182,265 gallons
Load, Flushing	x 3
New Water Lines	546,795 gallons

WATER USED BY COLLECTION/DISTRIBUTION

JANUARY		
1/3/06	Meter Testing	120
1/4/06	24" Main Break	1,000,000
1/9/06	Meter Testing	120
1/12/06	Flushing	15,000
1/13/06	Flushing	16,500
1/17/06	Street Clean Up	800
1/17/06	Meter Testing	240
1/23/06	Meter Testing	120
1/26/06	Meter Testing	120
1/27/06	Meter Testing	120
	TOTAL	1,033,140
FEBRUARY		
2/1/06	Meter Testing	120
2/6/06	Meter Testing	120
2/8/06	Meter Testing	120
2/13/06	Meter Testing	240
2/16/06	Meter Testing	120
2/22/06	Meter Testing	120
2/27/06	Meter Testing	240
2/28/06	Meter Testing	240
	TOTAL	1,320
MARCH		
3/6/06	Meter Testing	120
3/7/06	Meter Testing	120
3/10/06	Meter Testing	120
3/15/06	Meter Testing	7,970
3/20/06	Meter Testing	120
3/22/06	Meter Testing	120
3/24/06	Meter Testing	2,000
3/28/06	Meter Testing	12,920
	TOTAL	23,490
APRIL		
4/3/06	Meter Testing	120
4/4/06	Leak on Apple Blossom	50,000
4/10/06	Leak on Burgundy	6,400
4/10/06	Meter Testing	240
4/11/06	Meter Testing	2,000
4/12/06	Fire Flow - Dumont	5,000
4/17/06	Meter Testing	120

4/18/06	Meter Testing	120
4/22/06	Leak on Timberline Road	9,000
4/24/06	Meter Testing	120
4/25/06	Meter Testing	240
4/26/06	Meter Testing	120
4/28/06	Meter Testing	2,600
	TOTAL	76,080
MAY		
5/1/06	Meter Testing	120
5/4/06	Meter Testing	6,750
5/9/06	Meter Testing	480
5/15/06	Leak – Redstone School	8,800
5/16/06	Meter Testing	240
5/17/06	Meter Testing	1,820
5/19/06	Meter Testing	120
5/23/06	Meter Testing	480
5/25/06	Meter Testing	7,610
5/26/06	Meter Testing	3,400
	TOTAL	29,820
JUNE		
6/5/06	Meter Testing	120
6/6/06	Meter Testing	240
6/12/06	Meter Testing	120
6/13/06	Meter Testing	240
6/14/06	Water Down Road at Res 3	1,500
6/15/06	Meter Testing	480
6/19/06	Leak on Chesapeake Lane	180,000
6/19/06	Meter Testing	120
6/26/06	Meter Testing	240
6/28/06	Meter Testing	120
	TOTAL	183,180
JULY		
7/5/06	Meter Testing	120
7/7/06	Meter Testing	500
7/9/06	Reservoir 4 Overflow	10,000
7/10/06	Meter Testing	240
7/12/06	Meter Testing	120
7/17/06	Meter Testing	120
7/18/06	Meter Testing	150
7/19/06	Meter Testing	520
7/24/06	Meter Testing	240
7/25/06	Leak on Apple Blossom	100,000

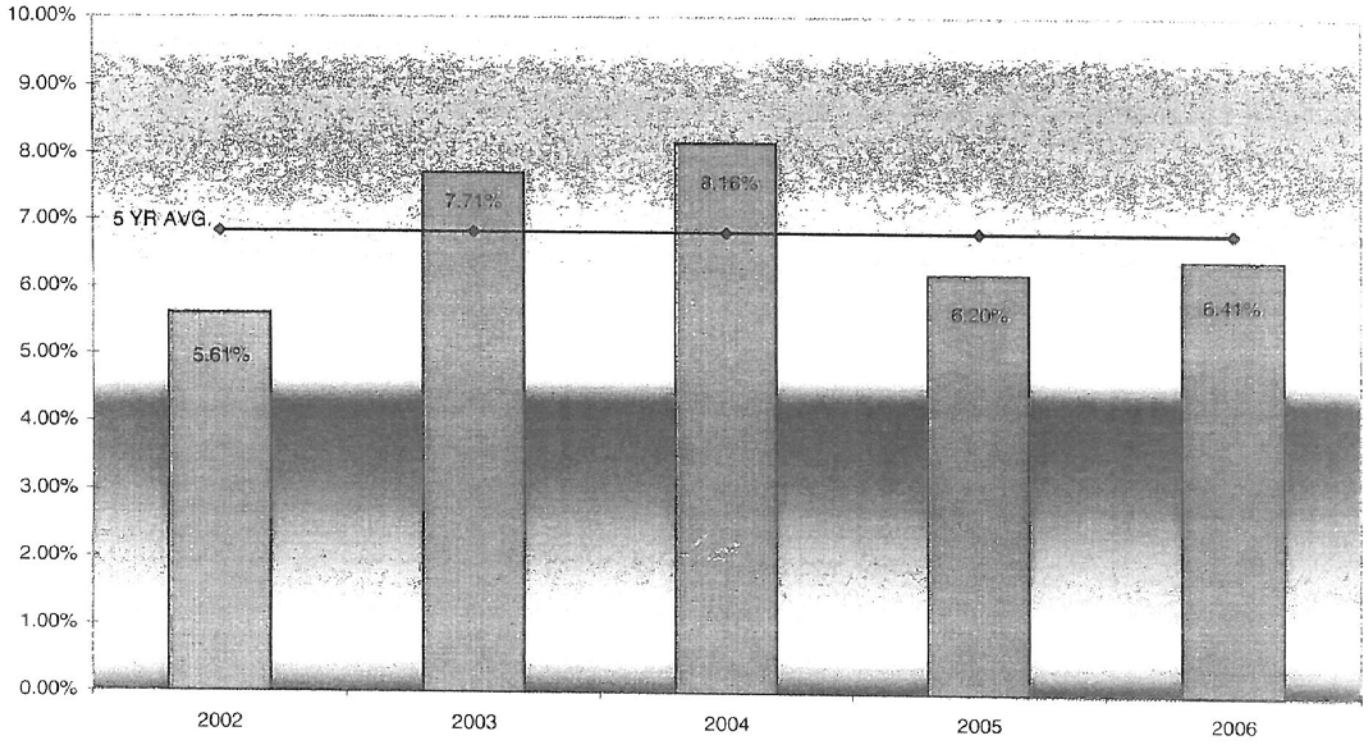
7/25/06	Leak on Bell Flower	200,000
7/26/06	Meter Testing	120
	TOTAL	312,130
AUGUST		
8/8/06	Meter Testing	240
8/9/06	Meter Testing	120
8/14/06	Meter Testing	240
8/16/06	Meter Testing	120
8/17/06	Meter Testing	120
8/17/06	CL2 Flushing	330
8/18/06	CL2 Flushing	900
8/21/06	Jetting	500
8/21/06	Meter Testing	120
8/22/06	Jetting	1,000
8/22/06	Meter Testing	240
8/23/06	Jetting	500
8/24/06	Jetting	2,500
8/25/06	Jetting	1,000
8/25/06	Meter Testing	11,200
8/28/06	Jetting	1,500
8/29/06	Jetting	2,000
8/29/06	Meter Testing	120
8/30/06	Jetting	500
	TOTAL	23,250
SEPT.		
9/8/06	Meter Testing	2,620
9/12/06	Meter Testing	9,800
9/13/06	Meter Testing	120
9/15/06	CL2 Flushing	12,000
9/18/06	Jetting	1,500
9/19/06	Jetting	1,000
9/19/06	Meter Testing	120
9/20/06	Jetting	1,000
9/21/06	Jetting	1,000
9/22/06	Jetting	500
9/25/06	Jetting	3,500
9/25/06	Meter Testing	240
9/26/06	Jetting	1,000
9/27/06	Jetting	2,000
9/27/06	Meter Testing	300
9/28/06	Jetting	1,000
9/29/06	Jetting	2,000
	TOTAL	39,700

OCTOBER		
10/2/06	Jetting	1,000
10/2/06	Meter Testing	220
10/3/06	Jetting	1,500
10/4/06	Jetting	1,500
10/4/06	Meter Testing	420
10/5/06	Jetting	1,000
10/5/06	Meter Testing	4,760
10/6/06	Jetting	1,000
10/7/06	Fire Hydrant – Vandals	750,000
10/9/06	Jetting	1,500
10/9/06	Meter Testing	220
10/10/06	Jetting	3,000
10/10/06	Meter Testing	1,000
10/11/06	Jetting	1,000
10/11/06	Meter Testing	570
10/12/06	Jetting	2,500
10/12/06	Meter Testing	7,180
10/13/06	Jetting	2,000
10/16/06	Jetting	1,000
10/16/06	Meter Testing	670
10/17/06	Meter Testing	4,960
10/18/06	Jetting	1,000
10/18/06	Meter Testing	6,960
10/19/06	Jetting	1,500
10/19/06	Meter Testing	7,490
10/20/06	Jetting	1,500
10/20/06	Meter Testing	3,760
10/23/06	Jetting	2,000
10/23/06	Meter Testing	420
10/24/06	Jetting	3,000
10/24/06	Meter Testing	540
10/25/06	Jetting	1,500
10/25/06	Meter Testing	120
10/30/06	Jetting	3,000
10/30/06	Meter Testing	490
10/31/06	Jetting	2,500
10/31/06	Meter Testing	350
	TOTAL	823,130
NOV.		
11/1/06	Jetting	1,000
11/2/06	Jetting	500
11/3/06	Jetting	1,500
11/6/06	Jetting	2,500

11/6/06	Meter Testing	350
11/7/06	Jetting	2,725
11/7/06	Meter Testing	100
11/8/06	Jetting	2,000
11/8/06	Meter Testing	500
11/13/06	Meter Testing	200
11/14/06	Meter Testing	120
11/15/06	Meter Testing	660
11/16/06	Meter Testing	100
11/22/06	Meter Testing	700
11/27/06	Meter Testing	465
11/27/06	Jetting	1,500
11/28/06	Jetting	1,500
11/28/06	Meter Testing	400
	TOTAL	16,820
DECEMBER		
12/5/06	Meter Testing	1,100
12/6/06	Meter Testing	6,120
12/7/06	Meter Testing	5,339
12/8/06	Meter Testing	3,980
12/11/06	Meter Testing	5,014
12/12/06	Meter Testing	7,014
12/13/06	Meter Testing	6,065
12/14/06	Meter Testing	7,533
12/15/06	Meter Testing	4,112
12/18/06	Meter Testing	9,027
12/19/06	Meter Testing	1,790
12/20/06	Meter Testing	2,767
12/21/06	Meter Testing	1,589
12/22/06	Meter Testing	10,446
12/26/06	Meter Testing	15,468
12/27/06	Meter Testing	13,694
12/28/06	Meter Testing	18,576
12/29/06	Meter Testing	19,359
	TOTAL	138,983

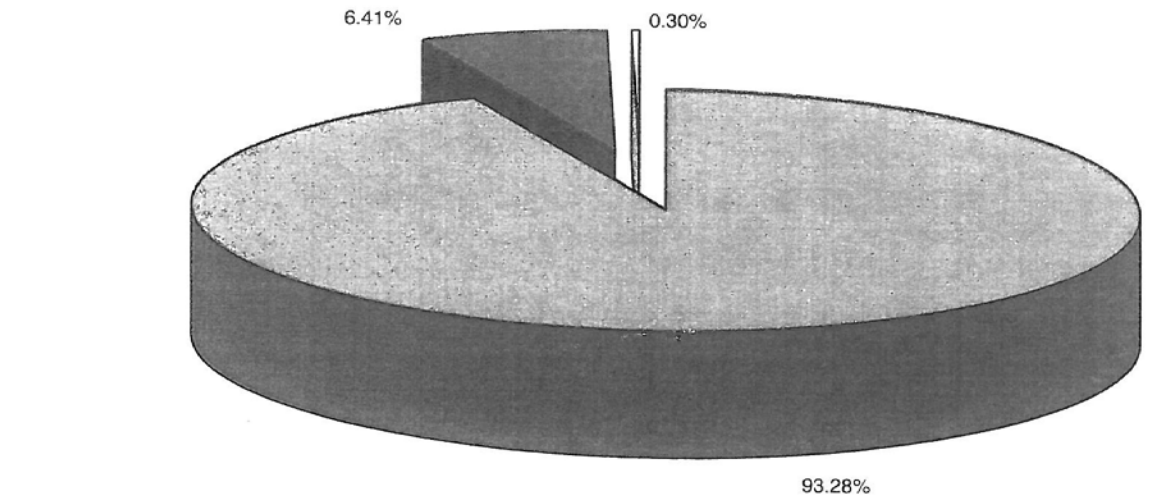
WATER USE BY COLLECTION/DISTRIBUTION SUMMARY	
JANUARY	1,033,140
FEBRUARY	1,320
MARCH	23,490
APRIL	76,080
MAY	29,820
JUNE	183,180
JULY	312,130
AUGUST	23,250
SEPTEMBER	39,700
OCTOBER	823,130
NOVEMBER	16,820
DECEMBER	138,983
2006 GRAND TOTAL	**2,701,043**

UNACCOUNTED FOR WATER
2002 - 2006



CENTENNIAL WATER & SANITATION DISTRICT
2006 WATER AUDIT

TOTAL PRODUCTION	5,269,839,309 GALLONS
TOTAL BILLED	4,915,909,000 GALLONS
ACCOUNTED FOR, NOT BILLED	15,862,238 GALLONS
UNACCOUNTED FOR	338,068,071 GALLONS



Appendix C: Water Conservation Rules and Regulations

HIGHLANDS RANCH METROPOLITAN DISTRICTS

RULES AND REGULATIONS

EXHIBIT A -2

Water Use Restrictions

A. Water Use:

Consistent with the Amended Water Conservation Plan as part of the Highlands Ranch Rules and Regulations, wasteful use of water is prohibited at all times. Examples of wasteful water use include:

- Excess water flowing in street gutters from irrigation or other outdoor uses,
- Unrepaired leaks or fixture malfunctions that lead to excess water use

B. Mandatory Outdoor Water Restrictions:

Consistent with the Amended Water Conservation Plan as part of the Highlands Ranch Rules and Regulations concerning Mandatory Outdoor Water Restrictions the following restrictions apply at all times:

- Outdoor irrigation is prohibited between the hours of 10:00 A.M. and 6:00 P.M. on all days with exception of prior approved permit.
- Hand watering of landscape materials is allowed at any time. Hand watering is defined as the application of irrigation from a hose held in the hand with a shut off valve; or a water-conserving method such as a drip, trickle, micro spray, deep root watering device or watering can are used.
- Car washing is allowed at any time. However, if water for car washing is coming from a hose rather than a bucket, a hose end shut off device must be in use to prevent uninterrupted water flow.

C. Changes to Mandatory Outdoor Water Restrictions:

The mandatory Outdoor Water Restrictions imposed by the District's Rules and Regulations may be changed at any time by declaration of Centennial Board of Directors at a regular or special board meeting. Such changes may include, but are not limited to:

- Mandatory day-of- week limits on irrigation
- Mandatory limits on the hours of watering
- Mandatory limits on the allowed run times of irrigation systems
- Mandatory prohibitions of all outdoor water use under severe water supply shortages

HIGHLANDS RANCH METROPOLITAN DISTRICTS

RULES AND REGULATIONS

EXHIBIT A

Rates, Charges and Restrictions

S. Charges for violation of Mandatory Outdoor Water Use Restrictions:

Compliance with the Mandatory Outdoor Water Use Restrictions (see Exhibit A-2) will be determined by Centennial and the following charges for violations thereof shall apply:

The first annual offense will result in a recorded violation documented by a door hanger followed by a letter. The second offense would result in a recorded violation documented by a letter and assessing a fee to the customer's bill water bill. All following offenses would result in a recorded violation documented by certified letter and assessing a fee to the customer's water bill as stated in the table below.

All violations would allow for a reasonable grace period prior to the next violation being recorded allowing for mail delivery and system corrections. Failure to pay charges will result in suspension of water service.

	OFFENSE				
Meter type/size	2nd	3rd	4th	5th	Subsequent
Residential	$50	$100	$250	$500	Water Shut off
1" or less	$100	$200	$500	$1,000	Water Shut off
1-1/2" or greater	$600	$1,200	$3,000	$6,000	Water Shut off

Appendix D: Centennial Water and Sanitation District Board Approval

CENTENNIAL WATER AND SANITATION DISTRICT
BOARD COMMUNICATION

DATE	SUBJECT	AGENDA NUMBER
10/27/2008	REVISED WATER CONSERVATION PLAN	CWSD 162

INITIATED BY JON KLASSEN

STAFF RECOMMENDATION

Adopt Resolution No. 08-162 with the following action:

Approval of the Revised 2007 Water Conservation Plan.

BACKGROUND

In April 2008 the District submitted the water conservation plan to the Colorado Water Conservation Board for review and approval. The CWCB did not approve the plan as written and provided the District with suggested modifications. Staff has revised the water conservation plan to include the elements suggested by the CWCB. This revised plan fulfills the requirements of HB 1365 and provides the District with a plan to evaluate and implement water conservation measures and programs in order to decrease water use.

Ongoing monitoring of the success of the water conservation program as detailed in this plan will allow the District to add or delete measures or programs that prove to be inconsistent with the goals of the District. This plan will be formally reviewed and revised once every five years from the date of adoption.

FINANCIAL DETAILS

No financial impact at this time.

CENTENNIAL WATER AND SANITATION DISTRICT

RESOLUTION NO. 08-162

WHEREAS, water is one of our most precious resources, and water conservation planning is a vital component of water supply management; and,

WHEREAS, Centennial provides water and wastewater services to the planned community of Highlands Ranch.

WHEREAS, a draft of Centennial Water Conservation Plan has been made available to the public, a public hearing was held, and comments have been incorporated in the final plan; and

WHEREAS, the 2007 Water Conservation Plan conforms to Colorado Revised State Statute §37-60-126; and,

NOW, THEREFORE, BE IT RESOLVED, That the Revised 2007 Water Conservation Plan be approved and adopted as submitted.

Adopted this 27th day of October, 2008

Ayes 4 Nays 0 Abstained 0 Absent 1

Certified by John D Hendrick, Secretary