LEFT HAND WATER DISTRICT

WATER CONSERVATION PLAN

July 2008

Prepared by:

Clear Water Solutions, Inc.
8010 South County Road 5, Suite 105
Windsor, CO 80528

TABLE OF CONTENTS

Executive Summary ES-1
Chapter 1 – Introduction 1
Chapter 2 – Definition of Terms 3
Chapter 3 –Profile Existing Water System 4
Physical Characteristics of the Existing Water Supply System ..4
Sources of Water Supply 9
System Limitations 11
Water Costs and Pricing 15
Current Policies and Planning Initiatives 17
Current Water Conservation Activities 19
Chapter 4 – Water Use and Demand Forecast 21
2007 Water Use 21
Demand Forecast 23
Chapter 5 – Proposed Facilities 33
Proposed Facilities 33
Chapter 6 – Water Conservation Goals 36
Water Conservation Goals 36
Goal Development Process 38
Chapter 7 – Conservation Measures and Programs 39
Water Conservation Measures and Programs 39
Screening Criteria 39
Screening of Conservation Measures and Programs 39
Chapter 8 – Evaluation and Selection 49
Estimated Costs and Water Savings of Conservation Options 49
Comparison of Benefits and Costs 53
Evaluation Criteria 53
Selected Conservation Measures and Programs 56
Chapter 9 – Forecast Modification and Resource Integration 60
Modified Demand Forecast 60
Project Specific Savings 61
Cost Comparison 61
Revenue Effects 62
Benefits of Conservation 62
Chapter 10 – Plan of Implementation and Monitoring 63
Implementation Schedule 63
Public Participation 64
Monitoring and Evaluation 65
Plan Updates and Revisions 65
Plan Adoption and Approval 65
References 66

LIST OF TABLES

Table ES.1 – Combined Water Savings ……ES-2
Table ES.2 – LHWD Implementation Plan ……ES-3
Table 3.1 – LHWD Population ……..5
Table 3.2 – Miles of LHWD Distribution System Pipeline ……7
Table 3.3 – LHWD Taps by Category ……...8
Table 3.4 – LHWD Use by Category ……...9
Table 3.5 – LHWD Water Use per Tap ……...9
Table 3.6 – LHWD Water Sources ……11
Table 3.7 – Current Base Rate Structure Based on Tap Size ……15
Table 3.8 – Current Rate Structure per Customer Category ……16
Table 3.9 – Water Revenue by Customer Category (2002-2007) ……16
Table 4.1 – Current Water Use by Customer Category……21
Table 4.2 – LHWD Historical Water Use Summary ……24
Table 4.3 – TE Projections for LHWD by Customer Category ……25
Table 4.4 – Projected Residential Water Demand ……26
Table 4.5 – Projected Multi-Housing Water Demand ……27
Table 4.6 – Projected Dual System Water Demand ……28
Table 4.7 – Projected Master Meter Community Water Demand ……29
Table 4.8 – Projected Commercial Water Demand ……30
Table 4.9 – Projected Landscape Only Water Demand ……31
Table 4.10 – Projected Total Water Demand ……32
Table 5.1 – Summary of Capital Improvements ……34
Table 5.2 – Summary of Capital Improvement Costs ……35
Table 6.1 – Water Conservation Goals ……37
Table 7.1 – Universal List of Conservation Measures and Programs .40
Table 8.1 – Cost/Savings Analysis ……50
Table 8.2 – Selection of Water Conservation Measures and Programs .54
Table 8.3 – Combined Water Savings of Selected Conservation Measures and Programs ……57
Table 8.4 – Water Conservation Goals Comparison ……59
Table 9.1 – Project Water Specific Savings ……61
Table 10.1 – Implementation Plan……64

LIST OF FIGURES

Figure 3.1 – LHWD Service Area 6
Figure 3.2 – Water Use by Source 10
Figure 3.3 – Price of CBT Units 13
Figure 3.4 – CBT Ownership 14
Figure 3.5 – Left Hand Water District 2007 Revenue 17
Figure 3.6 – LHWD Unaccounted for Losses 20
Figure 4.1 – Current Water Use by Customer Category 21
Figure 9.1 – Comparison of Demand Forecast 60

EXECUTIVE SUMMARY

The Left Hand Water District (LHWD) is a quasi-municipal special district formed by election in May 1990 to provide potable and fire protection water service to customers within the District's more than 130-square mile service area. The District encompasses rural subdivisions and properties in Boulder and southwest Weld Counties and the Town of Frederick west of Interstate Highway 25. LHWD serves close to 20,000 people with Colorado-Big Thompson and Left Hand Ditch Company water.

The mission of LHWD is to provide safe and reliable water to their customers in an economical, efficient and responsible manner now and in the future. Water conservation plays a key role in meeting these water resource planning goals and can provide many benefits toward maintaining supply, infrastructure upgrades and customer satisfaction. In addition, high growth rates on the northern Colorado Front Range are creating more competition for existing water sources and an increased expectation of environmental sustainability.

To meet this water conservation challenge, LHWD has developed a Water Conservation Plan in accordance with the Water Conservation Act of 2004 and to meet the provisions of Colorado Revised Statute section 37-60-126.

Water Conservation Goals

The most successful measures implemented from the District's 1996 Water Conservation Plan include a leak detection program, Xeriscape demonstration garden and classes, and public education. Unaccounted-for losses were reduced by at least 12% and the daily overall water use per capita is down to 198 gallons per capita per day (gpcd). The District's residential per-capita water use is 143 gpcd.

The goal for this Plan is to reduce the overall water use by 10.5% or 712 acre-feet per year. This savings will come from water use categories that were identified through the planning process for potential water savings: Residential, Commercial, Landscape, Master-meter Communities and Unaccounted-for Losses.

Evaluation and Selection of Conservation Measures and Programs

In order to meet the water savings goals, a universal list of water conservation measures and programs were subject to an initial screening, cost-benefit analysis and final screening. To help refine the initial goals established for each category, the final selection of measures and programs were grouped into the same categories and the estimated water savings totaled. Table ES-1 shows the total annual water savings in each category after full implementation of the Plan.

The table also shows the annual cost including lost revenue, which is most of the cost for the water demand oriented measures under Residential, Commercial and Landscape categories. The annual cost for maintaining the program without considering lost revenue is also shown.

Table ES-1 - Combined Water Savings of Selected Conservation Measures and Programs

Conservation Measures and Programs	Estimated Annual Water Savings after full Implementation (gallons)	Estimated Annual Cost (including lost revenue)	Estimated Annual Cost (without lost revenue)
Unaccounted for Losses			
Recycle backwash at WTP	39,262,462	$5,000	$5,000
Improved Leak Detection & Repair Program	23,134,642	$15,000	$15,000
Installing meters in the distribution system to pinpoint leak areas	9,914,847	$15,000	$20,000
Subtotal - Gallons	72,311,951	$35,000	$40,000
Acre-Feet	222		
Residential			
Inclining Block Rate water rate structure	11,178,700	$54,000	$0
Existing Xeriscape Program	498,897	$2,896	$1,000
Landscape & Irrigation system standards for new development	4,010,524	$16,680	$500
Soil amendment ordinance for new landscapes	4,010,524	$16,680	$500
Restrictive covenants ordinance	4,010,524	$16,680	$500
Public education - improvement to website in addition to existing bill stuffers and annual newsletter	33,766,556	$129,713	$1,400
Children's water festivals	16,883,278	$64,156	$0
Send ET irrigation scheduling in water bill, website and spring newsletter	30,783,823	$117,379	$400
Residential audit	14,543,750	$55,755	$489
Rebate for low-flow toilets	4,735,656	$19,995	$2,000
Rebate for high efficiency clothes washers	1,145,224	$6,352	$2,000
Rebate for low-flow faucet	1,950,000	$7,710	$300
Rebate for wind and rain sensors for residential	2,559,700	$11,102	$1,375
Rebate for ET (SMART) sprinkler system controllers	5,119,400	$22,204	$2,750
Subtotal - Gallons	135,196,555	$541,301	$13,214
Acre-Feet	415		
Commercial			
Commercial and Industrial water audits	3,642,883	$15,250	$2,500
Post commercial BMPs on website or as bill stuffers	8,549,826	$51,724	$1,100
Requiring wind and rain sensors for commercial and open space irrigation	2,674,800	$12,039	$0
Subtotal - Gallons	14,867,509	$79,013	$3,600
Acre-Feet	46		
Landscape			
Requiring wind and rain sensors for commercial and open space irrigation	1,644,000	$4,013	$0
Irrigation system audit & improvements for existing irrigation taps	4,712,800	$17,245	$750
Subtotal - Gallons	6,356,801	$21,258	$750
Acre-Feet	20		
Master Meter Communities			
Leak detection program in mobile home parks	1,002,243	$3,007	$0
Leak detection for master meter communities	2,242,830	$6,728	$0
Subtotal - Gallons	3,245,074	$9,735	$0
Acre-Feet	10		
Grand Total - (Gallons)	231,977,890	$686,307	$57,564
Acre-Feet	714		

Implementation Plan

Staff and financial resources are often a limiting factor in implementing a water conservation plan. The District selected the following considerations to establish a reasonable schedule for implementation.

- Conservation in conjunction with already planned projects
- Time and effort involved in establishing the measure or program
- Initial capital investment
- Expected water savings

With these considerations in mind, the measures and programs have been separated into four distinct implementation categories. The implementation plan is shown in Table ES-2.

Table ES-2 – LHWD Implementation Plan

Program	Estimated Cost	Action Required	Resources or Action Required	Start Date
Leak Detection Program				
Improved Leak Detection & Repair Program	$15,000.00	Staff scheduling	Funding	4/1/2009
Installing meters in the distribution system to pinpoint leak areas	$20,000.00	Staff scheduling	Funding	1/1/2010
Leak detection for master meter communities	$8,000.00	Collaboration with HOA's	Cooperation with Communities, funding and staff time	1/1/2011
Leak detection program in mobile home parks	$4,000.00	Collaboration with mobile home parks	Cooperation with Parks, funding and staff time	1/1/2011
Annual Total	$47,000.00			
Audit Program				
Residential water audit classes and kits	$1,289.00	Research and set up	Staff time	1/1/2009
Commercial and Industrial water audits	$2,600.00	Research and set up	Funding	1/1/2009
Irrigation system audit & improvements for existing irrigation taps	$950.00	Research and set up	Funding and staff time	4/1/2009
Requiring wind and rain sensors for commercial and open space irrigation	$100.00	Add to Policies	Staff time	1/1/2009
Landscape & Irrigation system standards for new development	$500.00	Add to Policies	Staff time	6/1/2009
Soil amendment ordinance for new landscapes	$500.00	Add to Policies		6/1/2009
Restrictive covenants ordinance	$500.00	Add to Policies		6/1/2009
Annual Total	$6,439.00			
Public Education Program				
Public education: improvement to website, increase in written material, participation in existing school programs, radio-meter reader checkout and offering WTP tours	$2,650.00	Research and hire web developer	Staff time and funding	4/1/2009
Children's water festivals	$625.00	Research and advertisement	Staff time	1/1/2009
Post commercial BMPs on website and/or as bill stuffers	$1,725.00	Research and obtain material		1/1/2009
Send ET irrigation scheduling in water bill, website and spring newsletter	$400.00	Calculate ET		4/1/2009
Annual Total	$5,400.00			
Rebate Program				
Rebate for low-flow toilets	$2,100.00	Research and set up	Staff time and funding	1/1/2009
Rebate for high efficiency clothes washers	$2,100.00	Research and set up		1/1/2009
Rebate for low-flow faucet	$400.00	Research and set up		1/1/2009
Rebate for wind and rain sensors for residential	$1,475.00	Research and set up	Staff time and funding	4/1/2009
Rebate for ET (SMART) sprinkler system controllers	$2,850.00	Research and set up		4/1/2009
Annual Total	$8,925.00			

Notes: If staff and financial resources allow, measures may be implemented sooner.
Audits and Rebates will be offered first come first serve based on a limited annual budget.
An additional $1,000 per year will be made available for implementation of the Public Education Program

CHAPTER 1 - INTRODUCTION

The Left Hand Water District (LHWD) is a quasi-municipal special district formed by election in May 1990 to provide potable water service to customers within the District's service area. The Left Hand Water Supply Company is the District's predecessor and was formed in the early 1960's. Early on, the Left Hand Water Supply Company was characterized as generally rural and dominated by agricultural land use with few urban and commercial areas. In recent years, the Left Hand Water District has seen portions of its service area rapidly transform into more urban-type development.

The District provides potable and fire protection water to a service area that encompasses approximately 130 square miles. LHWD's boundaries are shown in Chapter 3 on Figure 3.1. The District provides service to approximately 6,267 existing taps. To provide potable water service, the District owns and operates two water treatment plants, multiple treated water storage tanks and pumping stations, as well as approximately 250 miles of transmission and distribution pipelines.

Like other municipalities and water districts along the Colorado Front Range, LHWD is faced with the challenges of meeting water demands associated with the large growth it is experiencing. This growth, coupled with the fact that water is becoming less available and more expensive with time, places a premium on water conservation. The District recognizes the need to conserve water in order to maximize the effectiveness of its currently owned water resources and infrastructure and to delay the need for investments in water purchase and infrastructure expansion or replacement. Most importantly, the District wants to do what it can to preserve water in the region for future generations.

The District relies on two sources of water, shares of capital stock in the Left Hand Ditch Company (LHDC) and the Colorado Big Thompson (CBT) Project. The District owns 2,854 shares of capital stock in LHDC of which only 1,038 shares are available for potable delivery due to Company by-laws. Each share of LHDC entitles the District to direct flow diversions from Left Hand Creek plus diversion of water stored in LHDC reservoirs. LHWD also owns 6,750 units of CBT water. CBT water originates in the Colorado River Basin and is pumped from Lake Granby through the Adam's Tunnel to the east slope near Estes Park. The CBT water is delivered to one of LHWD's water treatment plants via the Boulder Feeder Canal.

Water conservation will be an important part of the District's future. As the District continues to grow, the CBT system will only become more strained as municipalities compete for its water.

As with anything of value, there are challenges associated with water conservation. These challenges include potential lost revenue, potential inequities across socioeconomic classes and the cost of implementation. LHWD recognizes these challenges and is determined to develop a water conservation plan that is fair and feasible. The District has made many proactive conservation efforts to date and will continue this commitment into the future.

CHAPTER 2 - DEFINITION OF TERMS

Acre-foot:	The amount of water it would take to cover one acre of land to a depth of one foot; approximately 325,851 gallons.
Average Day Demand:	Average daily treatment plant production divided by the total tap equivalents served.
BMP:	Best Management Practice
CBT:	Colorado Big Thompson Project
CBT Quota:	The percentage set by the Northern Water Board of Directors each water year which determines the amount of water per unit of CBT, i.e. 70% quota equals 0.7 AF per CBT unit.
CWCWD:	*Central Weld County Water District*
ET Controllers:	Evapo-transpiration controllers adjust the amount of water applied from sprinkler systems based on soil moisture and weather conditions.
GPCD:	*Gallons per Capita per Day*
LHDC:	*Left Hand Ditch Company*
Maximum Day Demand:	The largest amount of water used in a single day.
NISP:	Northern Integrated Supply Project
Northern Water:	Northern Colorado Water Conservancy District
Non-Potable Use:	Water that is not treated and used for irrigation or other uses than potable. LHWD currently does not have a non-potable water supply.
Peak Hour:	The largest amount of water used in a single hour – typically occurs on the Maximum Day.
Phreatophytes:	Species of plants and trees that consume groundwater through their root zones below the

	water table such as Cottonwood and Russian Olive trees.
PIF:	Plant Investment Fee, fee charged to developers for on-going maintenance cost of infrastructure replacement and repair.
Potable Use:	Water that is treated to drinking water standards for domestic use, including residential and commercial use.
TE:	Tap Equivalent, unit of measure used by LHWD to adjust water use for larger taps such as multi-family or commercial, to a single residential tap equivalent of 5/8".
WTP:	Water treatment plant

CHAPTER 3 - PROFILE EXISTING WATER SYSTEM

Physical Characteristics of the Existing Water System

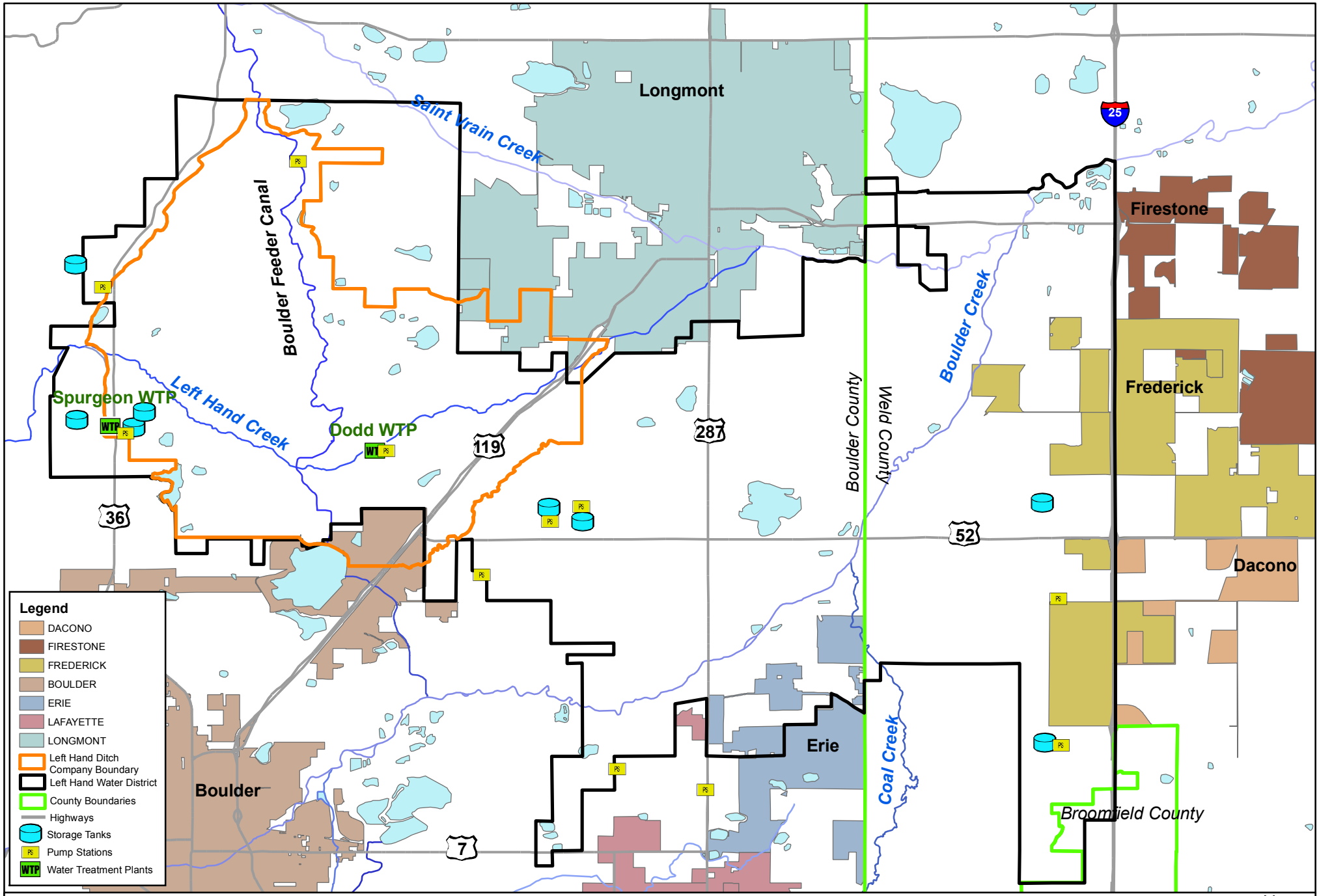
Service Area and Population

LHWD is located north and west of the Denver Metro area. The District encompasses approximately 130 square miles, generally from the foothills near the Boulder-Longmont area east to Interstate 25. LHWD's boundaries lie mainly in Boulder and Weld Counties with a small portion in the City and County of Broomfield. Portions of Frederick, Erie and Broomfield lie within the District boundaries and are served by the District. There are also six non-contiguous areas that are served by the District, five in unincorporated Boulder County and one in Longmont. Central Weld County Water District (CWCWD) is adjacent to LHWD to the east, Longs Peak Water District is adjacent to the north and Little Thompson Water District to the northeast.

The population for a water district is difficult to determine because it is comprised of many different governing entities. Census data can be obtained for counties and municipalities, even regions, but not for special districts. To determine the population for LHWD, the number of households was calculated from the tap data and multiplied by the average number of people per household; 2.65 people per household was used for this study and is an average of the Weld County and Boulder County data. The population of the District for the last six years is shown in Table 3.1.

Table 3.1 – LHWD Population

Year	Population
2002	16,321
2003	16,990
2004	17,369
2005	17,925
2006	18,506
2007	19,060



clearWATERsolutions
water rights • planning • engineering

Figure 3.1
Left Hand Water District Service Area

Water Distribution System

The District produces water at two water treatment plants (WTP), the Spurgeon WTP and the Alva Dodd WTP. The Spurgeon plant is the older of the two and has been operating continuously for more than 30 years. It is the primary WTP and was completely rehabilitated from 2000 to 2003. The WTP site consists of the plant, Spurgeon Reservoir for raw water storage and 2.8 million gallons (MG) of treated water tank storage. Spurgeon WTP operates year round at a maximum capacity of 7.5 million gallons per day (MGD). The Spurgeon Plant can treat LHDC water directly and CBT through exchange.

The Dodd WTP was built in 1988 and expanded in 1998. It is a peaking plant and typically operates from May to September. It receives CBT water from the Boulder Feeder Canal and LHDC water from the Williamson Ditch and operates at a maximum capacity of 8.0 MGD. This is the WTP that will eventually be expanded to meet future demand.

The LHWD distribution system has eight treated water storage tanks with a total capacity of 14.88 MG that are located in five of the six primary pressure zones within the system. The system also includes 14 pressure reducing valves to lower pressure between zones. Eleven pump/booster stations are used, in addition to gravity, to move the water through the system.

The treated water flows by gravity or pump stations from the storage tanks through approximately 250 miles of pipelines ranging in diameter from one inch to 30 inches. The breakdown of pipe diameters and mileage are shown below in Table 3.2. The original system was built in the early 1960's to serve a generally rural residential population spread throughout the District. Smaller diameter pipes were used to serve this low density. As the density and consumption of the District's customers grew, major pipeline expansions were added in 1974, 1976-77, 1981, 1996-98, and 2001-2003.

Table 3.2 – Miles of LHWD Distribution System Pipeline

Diameter	Miles
18" and above	16
10" to 16"	55
8"	58
6" and below	120

LHWD has seven interconnections with adjacent water providers, four with CWCWD, and one each with the City of Boulder, Town of Erie and City of Longmont. Water is received by the CWCWD Del Camino interconnect and the Boulder interconnect on a continuous basis by contract to serve developments within LHWD's boundary. This water is accounted for in the produced water tabulation and is billed to those customers. The other interconnections are used for emergency purposes only.

The District performs monthly leak detection by examining pressure charts from all Pressure Release Valve vaults and pump stations, comparing billing volumes to monthly production reports, running “high use” reports on individual customer accounts, and physically walking portions of the system. Repairs are made immediately after investigation and a leak is detected.

Service Connections and Water Demand

In December 2007, the District served water to 6,267 taps. All of the taps are metered and a meter replacement program is in place to completely replace residential meters every ten years and commercial meters every five years. All of the water delivered is treated. There are numerous dual systems in the service area; however, they obtain the non-potable water from a different provider.

The customer categories used by LHWD are Residential, Commercial, Multi-Housing, Dual Systems, Landscape, Master Meter Community, Master Fire Meters, and Hydrant Meters. They also have a category of taps that have been purchased but are not yet installed or in use called minimum billing. The charges for the taps in this category go into effect one year after purchase and are not part of this evaluation. Tables 3.3 and 3.4 show the number of taps and water use for each customer category, respectively. Table 3.5 shows the water use per tap. This information is used to define areas to target for conservation and will be used to track the effectiveness of water conservation in future years.

Table 3.3 – LHWD Taps by Category

Lefthand Water District Taps									
Year	Residential	Commercial	Multi Housing	Dual System	Landscape	Master Meter Community	Master Fire Meters	Hydrant Meters	Total
1997	4902	153	33					8	5096
1998	4975	166	33					8	5182
1999	5000	173	33					8	5214
2000	5085	173	33	6				8	5305
2001	5100	173	33	6				8	5320
2002	5267	198	33	29			3	8	5538
2003	5273	237	34	151			3	8	5706
2004	5296	254	34	211			3	8	5806
2005	5381	264	35	272			3	8	5963
2006	5448	241	28	346	42	9	3	14	6131
2007	5539	248	28	383	43	9	3	14	6267

Notes: The Master Meter Community taps ware in the Multi Housing category until 2006
Landscape accounts were in the commercial category prior to 2006

Table 3.4 – LHWD Water Use by Category

Water Use in 1,000 gallons									
Year	Residential	Commercial	Multi Housing	Dual System	Landscape	Master Meter Community	Master Fire Meters	Hydrant Meters	Total
1997	803,060	122,387	48,230					4,250	977,927
1998	931,143	131,399	65,998					4,250	1,132,790
1999	867,318	138,945	72,381					4,250	1,082,894
2000	1,079,681	153,146	91,557	223				4,250	1,328,857
2001	1,052,677	151,678	99,985	223				4,250	1,308,813
2002	938,217	157,190	87,073	791			333	3,710	1,187,314
2003	877,793	138,773	80,874	4,670			156	1,715	1,103,981
2004	756,873	152,249	81,081	7,818			10	5,803	1,003,834
2005	887,356	165,263	82,634	11,062			50	13,193	1,159,558
2006	1,050,959	181,317	61,467	13,746	14,549	19,061	205	27,285	1,368,589
2007	994,169	163,906	17,473	16,376	32,272	67,668	135	8,340	1,300,339

Note: One of the 2007 Master Meter Community taps was moved from Multi Housing, which is reflected in the water use

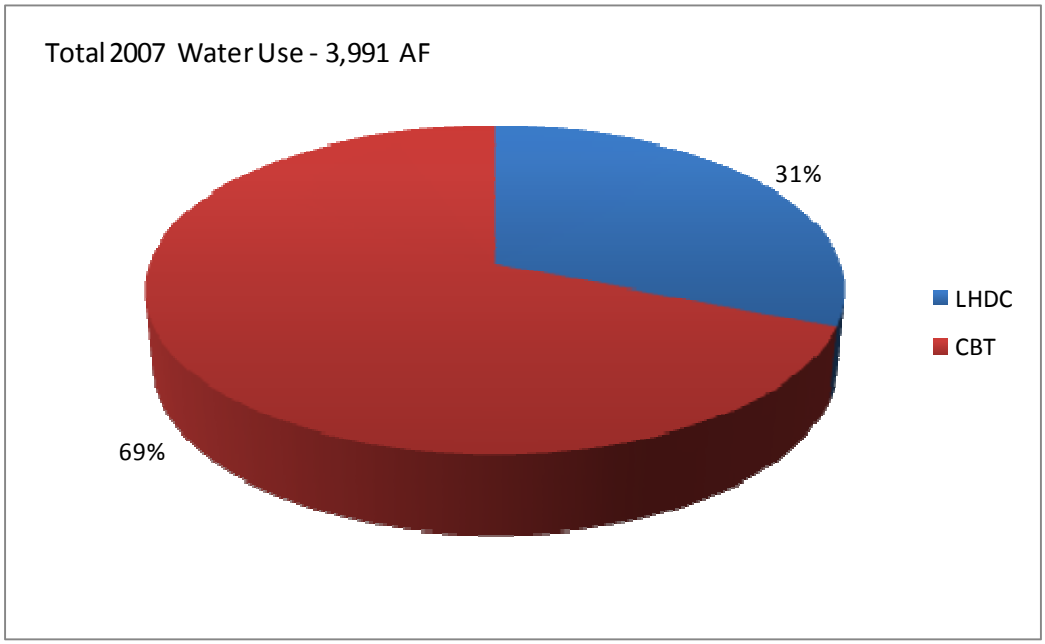
Table 3.5 – LHWD Water Use per Tap

Water Use per Tap in 1,000 gal/tap									
Year	Residential	Commercial	Multi Housing	Dual System	Landscape	Master Meter Community	Master Fire Meters	Hydrant Meters	Total
1997	164	800	1,462					531	192
1998	187	792	2,000					531	219
1999	173	803	2,193					531	208
2000	212	885	2,774	37				531	250
2001	206	877	3,030	37				531	246
2002	178	794	2,639	27			111	464	214
2003	166	586	2,379	31			52	214	193
2004	143	599	2,385	37			3	725	173
2005	165	626	2,361	41			17	1,649	194
2006	193	752	2,195	40	346	2,118	68	1,949	223
2007	179	661	624	43	751	7,519	45	596	207

Sources of Water Supply

The District owns two sources of water supply, LHDC shares and CBT. LHDC shares are delivered from Left Hand Creek to the Spurgeon WTP throughout the year, and the CBT water is delivered to the Dodd WTP via the Boulder Feeder Canal for peak demands during the irrigation season. Water in excess of demand is leased out for agricultural use, first to LHDC shareholders and then to other water users. Figure 3.2 shows the percentage of the total water demand that each source is used to meet.

Figure 3.2 – Water Use by Source



Left Hand Ditch Company

The District owns 2,854 of 16,800 shares of capital stock in LHDC or 17%. LHWD has converted 2,732 of these shares to municipal use, which it delivers through the Spurgeon WTP. The native shares are used for irrigation on a farm owned by the District or rented back to other shareholders. An agreement between LHWD and LHDC prohibits the use of these shares outside the LHDC historic service area, which encompasses most of the western half of the LHWD service area. This limits the number of shares available to LHWD customers to 1,816.

Through its ownership in LHDC and agreement with the Company, the District can purchase a minimum of 500 acre-feet (AF) and up to 1,000 AF of storage per year for its use in any of the LHDC reservoirs. Between direct diversions and storage, each LHDC share yields an average of 1.2 AF per share minus an administrative charge to the District bringing the average yield to 1.02 AF per share. The firm yield is 0.43 AF per share.

Colorado-Big Thompson Project

The CBT Project was built between 1938 and 1957 to divert water from the western slope of Colorado to the Front Range to supplement the region's native water supply. The Project is owned by the Bureau of Reclamation, but operated and managed under contract by the Northern Colorado Water Conservancy District (Northern Water). Its beneficiaries are agricultural, municipal and industrial water users within the Northern Water boundaries, which includes the LHWD service area.

The yield of CBT units is established each year by the Northern Water Board through a quota setting process. The quota is a percent of one acre foot of water per CBT unit. As a supplemental water supply, the CBT Project is operated to bring the annual regional water supply as close to an average water year as possible. Therefore, the quota is typically higher in dry years and lower in wet years when native supplies are more abundant.

In the 51 years the CBT Project has operated (1957 – 2007), the average yield has been 0.74 AF per unit. The yield has never been less than 0.50 AF per unit (50% quota) or more than 1.0 AF per unit (100% quota). LHWD owns 6,750 units of CBT and uses a 50% quota for planning purposes to ensure adequate supply for its customers in all years.

Table 3.6 shows the yield of the District's water sources.

Table 3.6 – LHWD Water Sources

Water Source	Shares/Units	Average Yield (AF/share)	Firm Yield (AF/share)	Average Total (AF)	Firm Total (AF)
Left Hand Ditch Company	1,816	1.02	0.43	1,852.3	780.9
Colorado-Big Thompson	6,340	0.74	0.5	4,691.6	3,170.0
Total				6,543.9	3,950.9

System Limitations

As part of providing an overall perspective, it is appropriate to also provide insight into potential system limitations. Accordingly, major limitations of the water supply components have been provided.

Statewide Water Supply Initiative

In 2003, the Colorado General Assembly authorized the Colorado Water Conservation Board (CWCB) to implement the Statewide Water Supply Initiative (SWSI) as a result of growing pressure on water supplies in Colorado and the 2002 drought. The study identified current and future water demands, available water supplies, and existing and planned water supply projects in eight major river basins in the State.

The study found a statewide water supply gap of 118,200 AF by 2030 between projected demands and fully implemented water supply processes and projects, which is 20% of the 2030 demand. The gap in the South Platte Basin, where LHWD is located, is 90,600 AF or 22% of the South Platte Basin 2030 demand.

This makes pursuit of all possible future water supplies very important to the District, including conservation. The SWSI study highlighted the relationship between water conservation and water in reserve to meet essential demands during periods of drought. For example, water used to irrigate lawns and landscapes can be restricted during periods of drought for use to meet life sustaining demands. This illustrates the importance of having on-going water conservation measures and separate drought restrictions.

Growth

The average growth rate for the District through the ten-year planning period is 4%. This rate is based on planned developments and the planning efforts of the all the entities served by the District reported in the 2006-2007 Treated Water Master Plan. The Southwest Weld County I-25 Corridor Study showed Erie, Frederick and Longmont to have the most impact in this study area and the District's service area boundaries.

Additional water demand for LHWD in Boulder County and the Cities of Boulder and Broomfield will be minimal. While growth tapers down and is expected to reach build out in 2035, water shortage for the District to meet this demand is approximately 7,378 AF and will need to be met through additional purchases, participation in new water supply projects, and conservation.

Unaccounted-for System Losses

Every water distribution system has some degree of system loss. However, with systematic surveillance and repair, the losses can be kept to a minimum. Pipes and connections become more vulnerable with age and can disrupt activities like tying in new connections. The District currently targets these areas of high activity and older infrastructure for leak detection. With the current water balance and pressure reports, consistent surveillance from maintenance personnel, and an aggressive replacement program, system loss has come down from above 20% to an average over the last five years of 8.3% and a 6.5% average for 2006 and 2007.

All water use is accounted for in the system, including temporary uses for construction and fire hydrant flushing. Additional loss is water that is unavailable for use in the system. The District will continue to make an effort to reduce the system losses and increase the efficiency of water distribution.

Future Water Supply

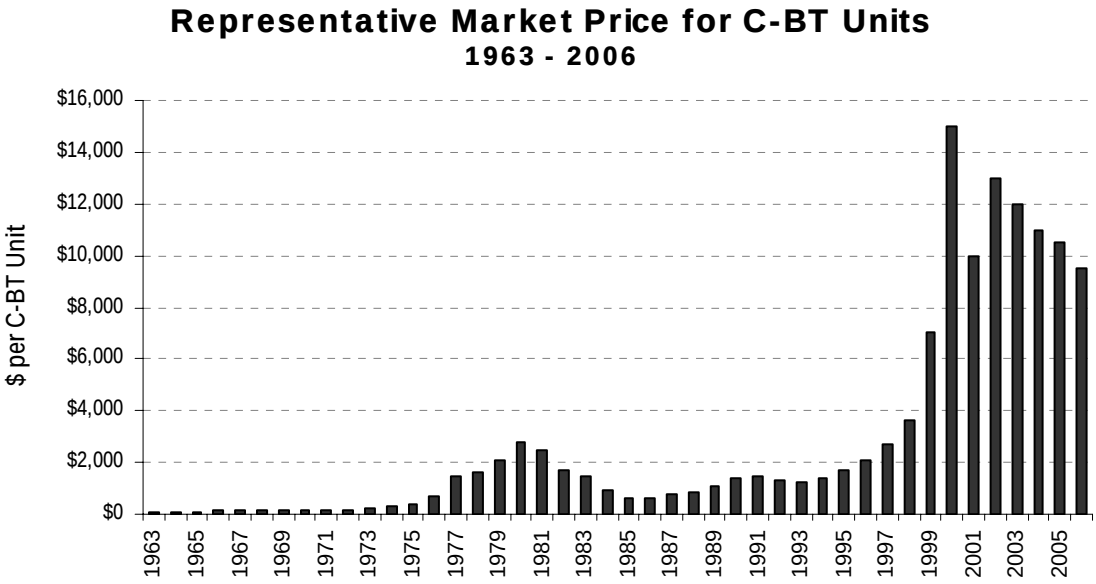
Increasing pressure on water from population growth in the Front Range has driven the price up significantly in the last ten to fifteen years. Water providers need to maintain a balance between revenue generated from its customers and the cost of system operation and maintenance and water acquisition. The main water sources that have been available to the District are CBT and LHDC. Windy Gap water, also managed by

Northern Water, and a new water supply project called the Northern Integrated Supply Project (NISP) are other water sources that will be available.

NISP and the Windy Gap Firming Project are currently in the National Environmental Policy Act (NEPA) permitting process. Construction of these projects will occur only if a permit is obtained from the federal government and all NEPA requirements are satisfied. LHWD is currently participating in NISP and if the project makes it through the permitting process will be obligated to pay for the design and construction costs; these are currently estimated at approximately $10,100 per AF.

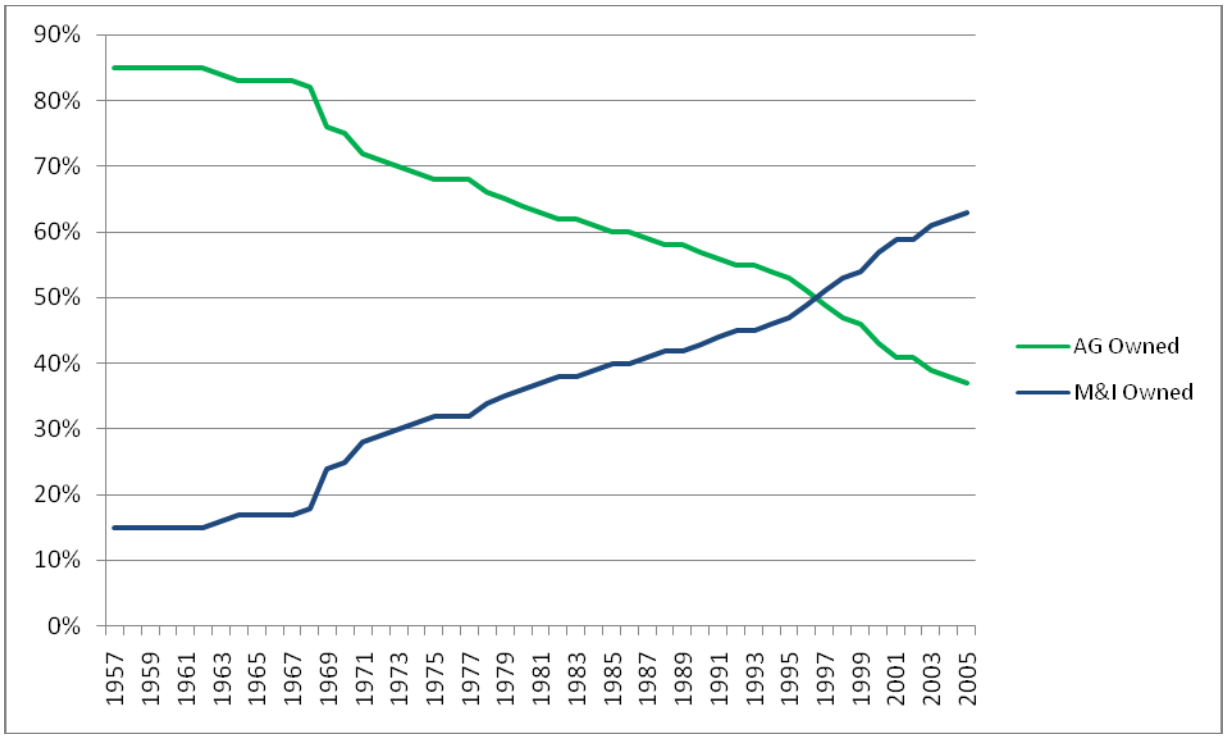
In 1963, CBT water could be purchased for $100 per unit from farmers that felt they had more water than they could use. The current market price is approximately $9,500 per unit or $13,500 per AF assuming a 70% quota. Figure 3.3 shows how the price of CBT units has varied from 1963 to 2006.

Figure 3.3 – Price of CBT Units



CBT water can still be purchased from farmers and ditch companies, but it rarely represents a farmer's surplus water supply. It is usually sold to finance continued agricultural operations, settle an estate or accommodate development of farmland. In 1957, 85% of the CBT units were owned by individual farmers and mutual ditch companies. By the end of 2005, only 35% of the CBT units were owned by individuals and mutual ditch companies. Figure 3.4 shows the transfer of CBT units from agricultural ownership to municipal and industrial ownership over the life of the CBT Project.

Figure 3.4 – CBT Ownership Transfer



At the current rate of acquisition by cities and water districts, it is projected that few if any CBT units will be available for purchase by the year 2015. However, the construction of other regional projects such as the Windy Gap Firming Project and NISP may take some pressure off of the CBT system. If so, CBT supplies could be available through 2025 or 2030.

While LHDC water may still be available for purchase from agricultural users, the growth opportunities within the Ditch Company's service area that lie within the District boundary are limited. Since these shares can only be used in the LHDC service area, they do not further the District's supply in areas where it will be needed.

Infrastructure Limitations

The 2006-2007 Treated Water Master Plan recommends detailed system improvements for current distribution, five, ten, and 20-year upgrades and ultimate build-out. These recommendations are based on existing infrastructure and projected water demand using the projection method described in Chapter 4. The original distribution system that delivered water to rural residents is gradually being replaced either with parallel pipelines or new larger ones.

The current system needs include pipeline upgrades and some additional pumping capacity. Additional water treatment capacity is needed in five, ten, 20 years and at build-out and will take place at the Dodd WTP. Additional treated water storage and

pumping capacity is also needed at those same time increments. Increased water conservation may delay some of these recommended system improvements.

Water Costs and Pricing

All things being equal, reduced water usage will cause a short-term loss in revenue in favor of extending the life of existing infrastructure and water supplies. Conversely, non-efficient use of water may yield short-term increases in revenues and an increased demand on infrastructure and water supplies. Since these decisions involve benefit-cost scenarios, understanding the District's rate structures, water revenues and costs of raw water acquisition is an important part of the planning process.

Rate Structure

The District bills its customers based on tap size. For each tap size, there is a base fee in addition to an inclining-block rate structure based on category and volume of water used. The District's rate structure is shown in Tables 3.7 and 3.8.

Table 3.7 – Current Base Rate Structure Based on Tap Size

Meter Size (Inches)	Base Water Fee per Month
5/8	$21.65
3/4	$21.65
1	$22.60
1 1/2	$30.85
2	$34.05
3	$111.65
4	$134.05
6	$138.60

Table 3.8 – Current Rate Structure per Customer Category

Residential		Commercial		Master Meter		Multi-housing		Landscape	
Rate per 1,000 gallons		**Rate per 1,000 gallons**		**Rate per 1,000 gallons**		**Rate per 1,000 gallons**		**Rate per 1,000 gallons**	
Single System		Single System		Single System					
< 4,000 gal	$3.00	all use	$3.50	all use	$3.00	all use	$3.90	< 50,000 gal	$3.50
4,000 - 20,000 gal	$3.80							>50,000 gal	$6.00
20,000 - 50,000 gal	$4.85								
> 50,000 gal	$6.00								
Dual System		Dual System		Dual System					
< 4,000 gal	$3.00	< 8,000 gal	$3.50	< 8,000 gal*	$3.15				
4,000 - 8,000 gal	$3.80	>8,000 gal	$6.00	>8,000 gal	$6.00				
> 8,000 gal	$13.30								

* Per lot-average based on number of lots served through master meter

Water Revenue

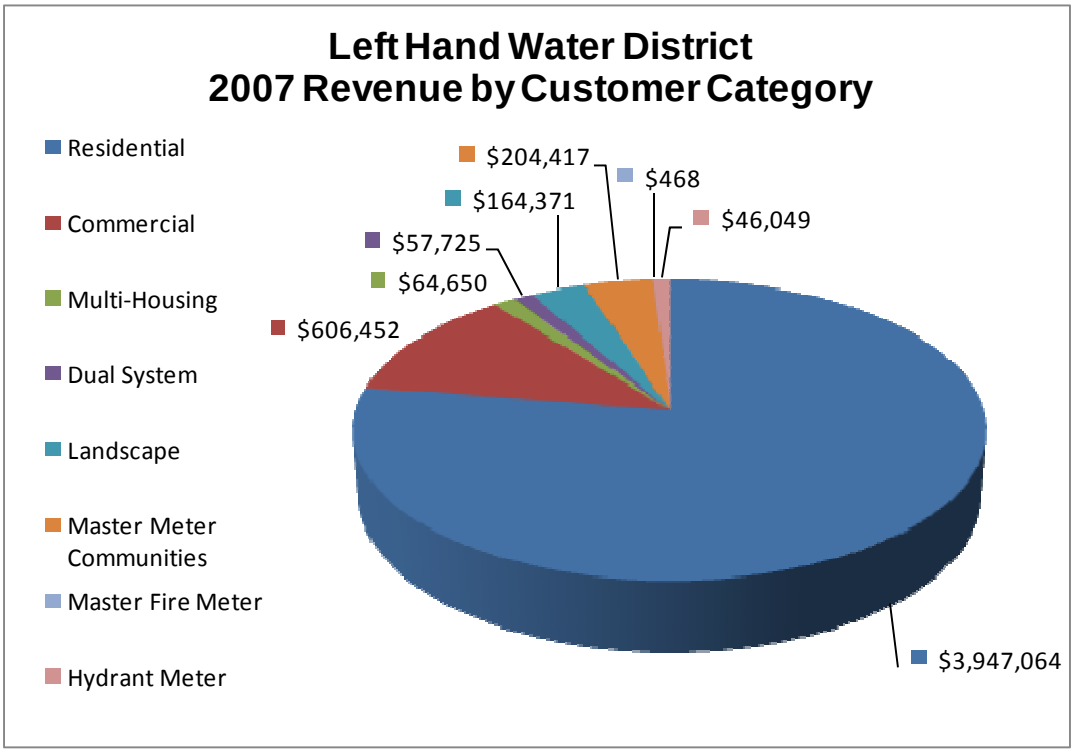
The District separates its water customers into Residential, Commercial, Multi-Housing, Dual System, Landscape, Master Meter Community, Master Fire Meter, and Hydrant Meter. The District's water sales according to these customer categories from 2002 to 2007 are shown in Table 3.9. The District also collects revenue from a cross tie with the Town of Erie, which is not evaluated in this report.

Table 3.9 – Water Revenue by Customer Category (2002-2007)

Customer Category	2002	2003	2004	2005	2006	2007
Residential	$3,069,625	$3,041,664	$2,622,645	$3,292,204	$4,144,691	$3,947,064
Commercial	$544,184	$512,467	$563,278	$611,392	$670,946	$606,452
Multi-Housing	$303,180	$298,099	$300,000	$305,746	$227,428	$64,650
Dual System	$2,102	$13,356	$22,881	$33,471	$46,462	$57,725
Landscape	$0.00	$0.00	$0.00	$0.00	$53,831	$164,371
Master Meter Communities	$0.00	$0.00	$0.00	$0.00	$60,677	$204,417
Master Fire Meter	$1,683	$592	$37	$185	$768	$468
Hydrant Meter	$27,329.00	$9,651	$32,214	$72,247	$152,725	$46,049
Total	**$3,948,103**	**$3,875,829**	**$3,541,055**	**$4,315,245**	**$5,357,528**	**$5,091,196**

To give a graphic perspective, Figure 3.5 shows the operating revenue collected by the District in 2007 by customer category. Approximately 78% of the District's operating revenue comes from its residential customers.

Figure 3.5 – Left Hand Water District 2007 Revenue



Billings and Collections

Billing is performed on a monthly basis and includes all charges. A shut-off notice is sent on past-due accounts that are at a minimum balance of $75.00 and two months past due. The customer then has ten days to pay in full or be subject to a reconnection fee. The District has two billing cycles per month. Billing cycle one is mailed by the 20th of each month and is due by the 11th of the following month. Billing cycle two is mailed by the 2nd of each month and is due by the 21st of the same month.

The District averages 80 shut-off notices per month and ends up interrupting service on approximately 10 accounts per month.

Current Policies and Planning Initiatives

Current Policies

The Board of Directors of LHWD retains full discretion with respect to upgrading and expanding the system based on the ability to serve, technical evaluation and current policy. Policies are in place to ensure the efficient operation of the District in terms of finances, infrastructure and water sources. The following policies directly affect the water use of the customer base under normal and/or drought conditions.

If a customer has a significantly higher bill than normal due to a documented leak, adjustments to the bill will be made upon written request providing that the request includes demonstration of completed repair and will not exceed 60 days. The adjusted rate will reflect a three-month average of the previous year's water use.

Taps are purchased by individuals or subdivision service agreements that require a minimum annual purchase schedule. All purchases are subject to appropriate engineering/technical review fees to avoid risk to the existing system and ensure consistent standards. A refund is available at the discretion of the Board, limited normally to a parcel sold to open space or a minor subdivision that results in fewer parcels, at 80% of the original purchase price upon request. Water rights associated with the tap purchase will be refunded at the price at dedication or current market price, whichever is less.

Raw water or cash-in-lieu is required at the time of tap purchase according to the type of service to be provided. The amounts are established by the District and are reviewed and updated from time to time. The District currently accepts the following water rights:

- CBT units
- Other sources as approved by the Board upon majority vote and physical ability to deliver the water to one of the WTPs – historic use affidavits are required if that use differs from the intended use for Water Court proceedings to change the historic use of the water

Taps are assigned to specific parcels and are classified according to the land use plan of the prevailing entity responsible for the land use. Tap fees consist of a plant investment fee, water requirement fee, any associated line fees and a meter/pit installation fee.

Planning Initiatives

As mentioned previously, LHWD completed a 2006-2007 Treated Water Master Plan in March 2007. This plan focused on infrastructure and system capacity needs to meet future growth. This plan identified capital improvement projects within the District and the timing for those projects using a WaterCAD hydraulic model and specific documentation of the existing distribution system.

The District has participated in the purpose and need evaluation associated in the NISP permitting process discussed earlier in this chapter. This evaluation included a general look at water supplies, projected demands and water conservation activities currently existing for each participating entity. Since NISP is a regional project, the purpose of this evaluation was to show the need for additional water supplies in the region and did not make recommendations for when and where those supplies should be obtained.

LHWD completed a Drought Contingency Plan to counter the effects of the 2002 drought. The goal of this plan is to ensure adequate water delivery to tap holders during time of water shortage and is independent from the Water Conservation Plan. The

drought plan includes four levels of shortage; mild, moderate, severe and extreme with subsequent restrictions for each level. Triggers that indicate the different levels of shortage focus on the projected supply versus average annual demand, amount of water in storage for the winter, total daily demand, and projected demand.

The first stage relies on volunteer restrictions with the following stages relying more and more on mandatory restrictions for residential and commercial customers and the District itself. All levels are accompanied with education sent through mailers and the website.

This Water Conservation Plan is another planning document that will enable the District to systematically plan and implement water conservation measures and track the subsequent water use by its customers.

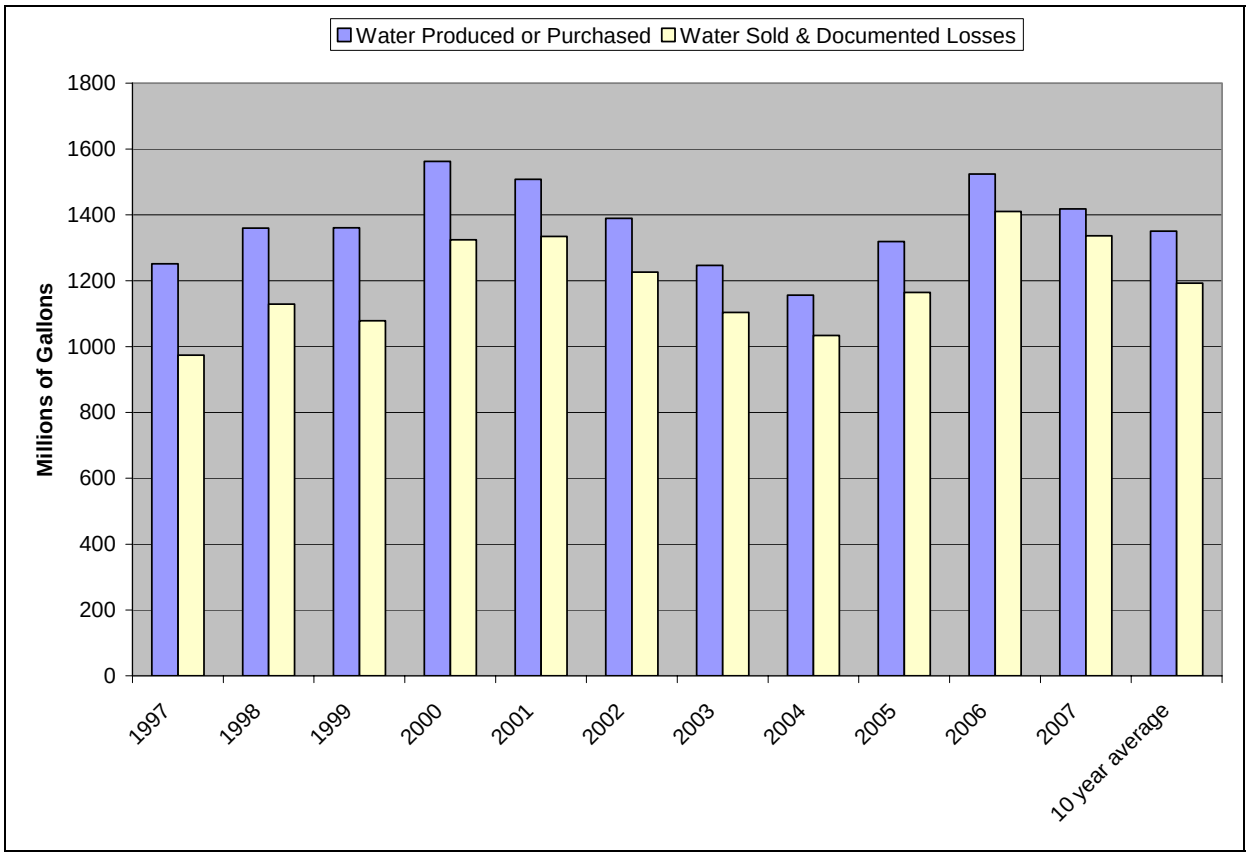
Current Water Conservation Activities

In 1995, the District completed a Water Conservation Plan in accordance with HB1154, which required water providers to develop and implement a plan by July of 1996. Some of the things listed in the plan and that have since been implemented are listed below.

- Demonstration Water-Wise Garden
- Xeriscape Gardening Classes – three or four per year
- Water rates that encourage conservation
- Raw water used for irrigation within the District – on District properties and within "dual system developments"
- Aggressive Leak Detection and Repair Program
- Meter Replacement Program – every five years for commercial and ten years for residential
- Billing software that identifies high use by individual accounts – automatic work order issued to check for leak
- Leak Credit Policy which encourages quick repair on the customer's side of the meter
- Replacement Fund Program – for pipeline and valve leak repair
- Public information in billing and newsletters
- Dry period watering restrictions – voluntary to mandatory depending on severity
- Encouraged modification of landscaping requirements for Boulder County to include low-water use sod, less sod per landscape and xeric and water-wise plants

Implementation of the leak detection and repair measures has brought down the unaccounted for losses from well above 20% to 6.5%. The Xeriscape classes and demonstration garden have been well attended and the public education efforts have initiated an expectation of conservation from the Board and the public in general. The ten-year average total water use per capita is 198 gallons per capita per day (gpcd), which is at or below average for the surrounding area. Figure 3.6 shows the reduction in unaccounted for losses from 1997 to 2007 and the ten year average.

Figure 3.6 – LHWD Unaccounted for Losses



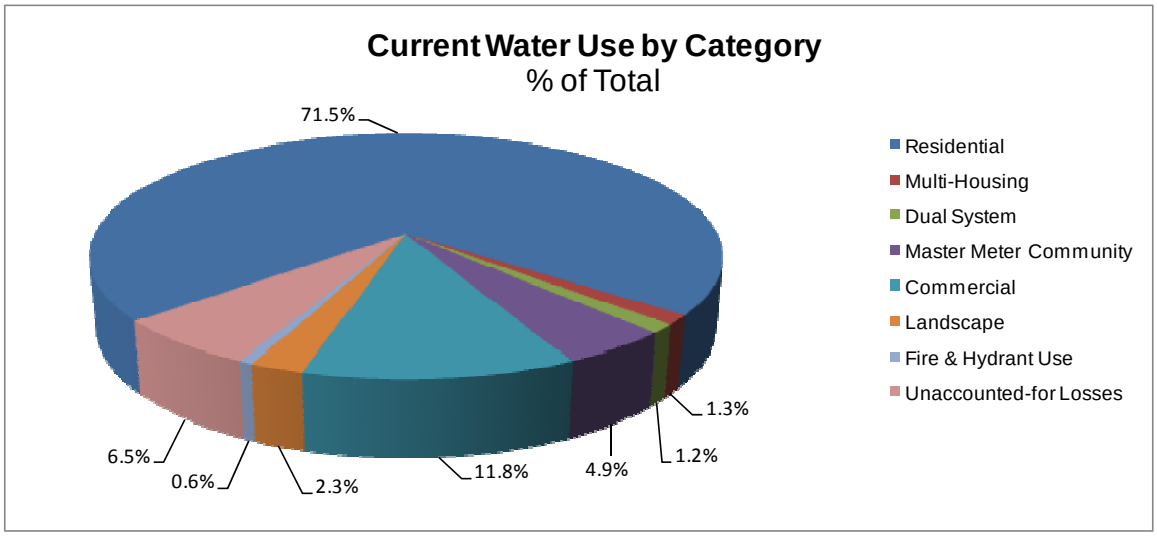
2007 Water Use

The District currently supplied 3,991 acre-feet of potable water in 2007 to customers within Residential, Multi-Housing, Dual System, Master Meter Communities, Commercial and Landscape categories. In order to supply these customers, the District treated approximately 4,270 AF of water to overcome various system losses and leaks. Table 4.1 summarizes the various water uses per customer category. Figure 4.1 shows this same information in graphical form.

Table 4.1 – Current Water Use by Customer Category

Water Use Category	Water Supply (MG)	Water Supply (gallons)	Water Supply (AF)	% of Total
Residential	994.2	994,169,000	3,051	71.5%
Multi-Housing	17.5	17,473,000	54	1.3%
Dual System	16.4	16,376,000	50	1.2%
Master Meter Community	67.7	67,668,000	208	4.9%
Commercial	163.9	163,906,000	503	11.8%
Landscape	32.3	32,272,000	99	2.3%
Fire & Hydrant Use	8.5	8,474,612	26	0.6%
Unaccounted-for Losses	90.9	90,910,000	279	6.5%
Total Produced	**1,391.2**	**1,391,248,612**	**4,270**	**100.0%**
Total Supplied	**1,300.3**	**1,300,338,612**	**3,991**	**93.5%**

Figure 4.1 – Current Water Use by Customer Category



Residential Water Uses

Residential water use, which includes both indoor and outdoor uses, constitutes the largest water use in the District, at 71.5% of all produced water. Residential water use in the District is currently 3,051 AF per year.

The District encompasses a large area within unincorporated Weld, Boulder, and Broomfield Counties. The density of residential development within unincorporated areas tends to be lower than in incorporated areas within these Counties. For this reason, the District has some large-lot residential water users that require more water supply than those with smaller lot sizes. The District currently has over 50 residential customers that consume over 1 AF of water per year.

Multi-Housing Water Uses

Multi-Housing water use in the District is currently 54 AF per year or 1.3% of all produced water.

Dual System Water Uses

Dual system water uses includes the potable (indoor) portion of water supplied to residential communities that receive outdoor (primarily irrigation water) from another non-potable water supplier. Dual system water use in the District is currently 50 AF per year and constitutes approximately 1.2% of the total produced water in the District.

Master Meter Community

Master Meter Community includes mobile home parks and subdivisions that have their own sub-metering and distribution system. The 2007 use for this category is 208 AF, which constitutes 4.9% of the total water produced for the District.

Commercial Water Uses

Commercial water users in the District include office buildings, hotels, schools, retail stores, restaurants, car washes, tree farms or nurseries, and some manufacturing and light industrial facilities. Commercial water use is the second largest water use category in the District at 11.8% of total water produced; current commercial water use in the District is 503 AF per year.

The largest commercial water users in the District include tree farms, car wash and vehicle service centers, schools and municipal facilities, manufacturing facilities, and railroads.

Landscape Uses

The District currently supplies 99 AF of potable water per year to landscape only customers. This accounts for 2.3% of the total water produced. These customers include HOAs and open space areas.

Fire and Hydrant Meter Uses

The District supplies water for firefighting and other temporary uses from hydrants such as construction. Currently, the District supplies 26 AF per year for such uses or 0.6%. This amount is highly variable year to year, depending on demand for temporary use of water from hydrants.

Unaccounted-for Losses

The District currently bills customers for approximately 3,991 AF of water per year, but produces 4,270 AF. The basis for the water billed is the amount of water registered at the customer meters. LHWD must produce additional water at their treatment facilities to account for various system and distribution losses that occur during delivery to customers. On average over the last five years, 8.3% of all water produced by the District at their treatment facilities is lost. In 2006 and 2007 the average loss came down to 6.5%. Unaccounted-for Losses include leakage, firefighting and theft.

Non-potable Water Uses

LHWD currently supplies only potable water to customers, including the Landscape taps. Some of the LHDC shares are used to irrigate District properties and are also leased out to other irrigators in the LHDC system.

Demand Forecast

The 2006-2007 Treated Water Master Plan for the District provides a comprehensive study of the District's service area characteristics and associated water demands for purposes of planning for the District's future infrastructure needs. The report details each area served by the District including unincorporated areas of Boulder and Weld Counties, City of Boulder, City of Longmont, Town of Erie, Town of Frederick, and the City and County of Broomfield. Various sources of information from each municipality and county within the District's boundary were used to project future growth. From the various land use plans and growth rates, future water demand in 2006, 2011 (five-year planning horizon), 2016 (ten-year planning horizon), 2026 (20-year planning horizon), and 2035 (estimated build-out) was determined.

Water demand during these planning horizons is quantified by the number of tap equivalents (TE). A TE is a unit of measure associated with the amount of water used by an individual 5/8-inch meter utilized to serve one single-family detached residence. Non-residential taps are converted to TE's.

The average day water use per TE in the District, as estimated in the 2006-2007 Treated Water Master Plan, is 650 gallons per day per tap (0.73 AF per year). This estimate was determined by dividing the average daily treatment plant production by the total TE's served by the District between 2000 and 2005 plus 6.5% to account for variability in use and provide a factor of conservatism. The basis for this estimate is shown Table 4.2.

Table 4.2 – LHWD Historical Water Use Summary

Year	Average Day Use Treatment Plant (MG)	Active TE served by LHWD	Average Day Use per TE (gals)
2000	4.09	5,538	739
2001	3.90	5,569	700
2002	3.50	5,667	618
2003	3.11	5,718	544
2004	2.89	5,742	503
2005	3.26	5,819	560
Average	**3.46**	**5,676**	**611**

The TE projections in the 2006-2007 Treated Water Master Plan started in 2006. Actual TE numbers and associated water demand for 2006 and 2007 were less than projected. For purposes of this Water Conservation Plan, we left the projections the way they have been calculated. These will be updated at the next Treated Water Master Plan or Water Conservation Plan update.

To determine how many TE's are associated with each of the customer categories a percent of the total number of TE's was calculated. The number of existing TE's for each customer categories in 2006 and 2007 was used for this calculation and the results applied to the total projected TE's. Approximately 80.4% of all TE's are estimated to be Residential, 1.0% Multi-Housing, 3.9% Dual System, 5.5% Master Meter Community, 8.25% Commercial, and 0.9% Landscape. The remaining TE's are associated with fire and hydrant uses, which are not evaluated in this conservation plan.

The total projected TE's and TE's for each customer category are shown in Table 4.3. The water use per TE for each category was obtained by dividing the average of the existing TE's in 2006 and 2007 by the associated water use.

Table 4.3 – TE Projections for LHWD by Customer Category

Year	Total Number of TE's	Residential TE's	Multi-Housing TE's	Dual System TE's	Master Meter Community TE's	Commercial TE's	Landscape TE's
2008	7589.6	6104.9	76.7	296.5	415.1	626.4	69.5
2009	8088.9	6506.6	81.7	316.0	442.4	667.6	74.1
2010	8588.2	6908.2	86.8	335.5	469.7	708.8	78.6
2011	**9087.5**	**7309.8**	**91.8**	**355.0**	**497.0**	**750.0**	**83.2**
2012	9318.7	7495.8	94.1	364.0	509.7	769.1	85.3
2013	9549.9	7681.8	96.5	373.1	522.3	788.1	87.5
2014	9781.1	7867.7	98.8	382.1	534.9	807.2	89.6
2015	10012.3	8053.7	101.1	391.1	547.6	826.3	91.7
2016	**10243.5**	**8239.7**	**103.5**	**400.2**	**560.2**	**845.4**	**93.8**
2017	10608.6	8533.3	107.2	414.4	580.2	875.5	97.1
2018	10973.6	8827.0	110.9	428.7	600.2	905.6	100.5
2019	11338.7	9120.6	114.5	442.9	620.1	935.8	103.8
2020	11703.7	9414.3	118.2	457.2	640.1	965.9	107.2
2021	12068.8	9707.9	121.9	471.5	660.1	996.0	110.5
2022	12433.8	10001.5	125.6	485.7	680.0	1026.1	113.9
2023	12798.9	10295.2	129.3	500.0	700.0	1056.3	117.2
2024	13163.9	10588.8	133.0	514.3	720.0	1086.4	120.6
2025	13529.0	10882.5	136.7	528.5	739.9	1116.5	123.9
2026	**13894.0**	**11176.1**	**140.4**	**542.8**	**759.9**	**1146.6**	**127.2**
2027	14079.1	11324.9	142.2	550.0	770.0	1161.9	128.9
2028	14264.1	11473.8	144.1	557.2	780.1	1177.2	130.6
2029	14449.2	11622.7	146.0	564.5	790.2	1192.5	132.3
2030	14634.2	11771.5	147.8	571.7	800.4	1207.7	134.0
2031	14819.3	11920.4	149.7	578.9	810.5	1223.0	135.7
2032	15004.3	12069.2	151.6	586.1	820.6	1238.3	137.4
2033	15189.4	12218.1	153.5	593.4	830.7	1253.5	139.1
2034	15374.4	12366.9	155.3	600.6	840.9	1268.8	140.8
2035	**15559.5**	**12515.8**	**157.2**	**607.8**	**851.0**	**1284.1**	**142.5**

Projected Residential Water Demand

Table 4.4 shows the projected Residential water demand for the District through build-out. Total residential water usage is projected to reach 8,019 AF by build-out.

Table 4.4 – Projected Residential Water Demand

Year	Residential TE's	Water Use per Residential TE's (gpd)	Residential Water Use (gallons)	Residential Water Use (AF)
2008	6104.9	572	1,274,589,806	3,912
2009	6506.6	572	1,358,441,747	4,169
2010	6908.2	572	1,442,293,688	4,426
2011	**7309.8**	**572**	**1,526,145,629**	**4,684**
2012	7495.8	572	1,564,973,125	4,803
2013	7681.8	572	1,603,800,621	4,922
2014	7867.7	572	1,642,628,117	5,041
2015	8053.7	572	1,681,455,613	5,160
2016	**8239.7**	**572**	**1,720,283,109**	**5,279**
2017	8533.3	572	1,781,589,239	5,467
2018	8827.0	572	1,842,895,370	5,656
2019	9120.6	572	1,904,201,500	5,844
2020	9414.3	572	1,965,507,631	6,032
2021	9707.9	572	2,026,813,762	6,220
2022	10001.5	572	2,088,119,892	6,408
2023	10295.2	572	2,149,426,023	6,596
2024	10588.8	572	2,210,732,153	6,784
2025	10882.5	572	2,272,038,284	6,973
2026	**11176.1**	**572**	**2,333,344,414**	**7,161**
2027	11324.9	572	2,364,422,459	7,256
2028	11473.8	572	2,395,500,503	7,352
2029	11622.7	572	2,426,578,547	7,447
2030	11771.5	572	2,457,656,592	7,542
2031	11920.4	572	2,488,734,636	7,638
2032	12069.2	572	2,519,812,680	7,733
2033	12218.1	572	2,550,890,724	7,828
2034	12366.9	572	2,581,968,769	7,924
2035	**12515.8**	**572**	**2,613,046,813**	**8,019**

Projected Multi-Housing Water Demand

Table 4.5 shows the projected Multi-Housing water demand for LHWD through build-out. Total Multi-Housing water usage is projected to reach 310 AF by build-out.

Table 4.5 – Projected Multi-Housing Water Demand

Year	Multi-Housing TE's	Water Use per Multi-Housing TE (gpd)	Multi-Housing Water Use (gallons)	Multi-Housing Water Use (AF)
2008	76.7	1758	49,199,258	151
2009	81.7	1758	52,435,949	161
2010	86.8	1758	55,672,640	171
2011	**91.8**	**1758**	**58,909,331**	**181**
2012	94.1	1758	60,408,075	185
2013	96.5	1758	61,906,819	190
2014	98.8	1758	63,405,563	195
2015	101.1	1758	64,904,307	199
2016	**103.5**	**1758**	**66,403,051**	**204**
2017	107.2	1758	68,769,472	211
2018	110.9	1758	71,135,893	218
2019	114.5	1758	73,502,314	226
2020	118.2	1758	75,868,736	233
2021	121.9	1758	78,235,157	240
2022	125.6	1758	80,601,578	247
2023	129.3	1758	82,967,999	255
2024	133.0	1758	85,334,420	262
2025	136.7	1758	87,700,841	269
2026	**140.4**	**1758**	**90,067,262**	**276**
2027	142.2	1758	91,266,876	280
2028	144.1	1758	92,466,491	284
2029	146.0	1758	93,666,106	287
2030	147.8	1758	94,865,721	291
2031	149.7	1758	96,065,335	295
2032	151.6	1758	97,264,950	298
2033	153.5	1758	98,464,565	302
2034	155.3	1758	99,664,180	306
2035	**157.2**	**1758**	**100,863,794**	**310**

Projected Dual System Water Demand

Table 4.6 shows the projected Dual System water demand for the District through build-out. Total Dual System water usage is projected to reach 132 AF by build-out.

Table 4.6 – Projected Dual System Water Demand

Year	Dual System TE's	Water Use per Dual System TE (gpd)	Dual System Water Use (gallons)	Dual System Water Use (AF)
2008	296.5	194	20,994,478	64
2009	316.0	194	22,375,650	69
2010	335.5	194	23,756,822	73
2011	**355.0**	**194**	**25,137,994**	**77**
2012	364.0	194	25,777,543	79
2013	373.1	194	26,417,092	81
2014	382.1	194	27,056,642	83
2015	391.1	194	27,696,191	85
2016	**400.2**	**194**	**28,335,740**	**87**
2017	414.4	194	29,345,548	90
2018	428.7	194	30,355,355	93
2019	442.9	194	31,365,163	96
2020	457.2	194	32,374,970	99
2021	471.5	194	33,384,777	102
2022	485.7	194	34,394,585	106
2023	500.0	194	35,404,392	109
2024	514.3	194	36,414,199	112
2025	528.5	194	37,424,007	115
2026	**542.8**	**194**	**38,433,814**	**118**
2027	550.0	194	38,945,718	120
2028	557.2	194	39,457,622	121
2029	564.5	194	39,969,526	123
2030	571.7	194	40,481,429	124
2031	578.9	194	40,993,333	126
2032	586.1	194	41,505,237	127
2033	593.4	194	42,017,141	129
2034	600.6	194	42,529,044	131
2035	**607.8**	**194**	**43,040,948**	**132**

Projected Master Meter Community Water Demand

Table 4.7 shows the projected Master Meter Community water demand for the District through build-out. Total Master Meter Community water usage is projected to reach 346 AF by build-out.

Table 4.7 – Projected Master Meter Community Water Demand

Year	Master Meter Community TE's	Water Use per Master Meter Community TE (gpd)	Master Meter Community Water Use (gallons)	Master Meter Community Water Use (AF)
2008	415.1	363	54,996,875	169
2009	442.4	363	58,614,976	180
2010	469.7	363	62,233,077	191
2011	**497.0**	**363**	**65,851,178**	**202**
2012	509.7	363	67,526,533	207
2013	522.3	363	69,201,889	212
2014	534.9	363	70,877,244	218
2015	547.6	363	72,552,599	223
2016	**560.2**	**363**	**74,227,955**	**228**
2017	580.2	363	76,873,234	236
2018	600.2	363	79,518,513	244
2019	620.1	363	82,163,792	252
2020	640.1	363	84,809,071	260
2021	660.1	363	87,454,350	268
2022	680.0	363	90,099,629	277
2023	700.0	363	92,744,907	285
2024	720.0	363	95,390,186	293
2025	739.9	363	98,035,465	301
2026	**759.9**	**363**	**100,680,744**	**309**
2027	770.0	363	102,021,721	313
2028	780.1	363	103,362,698	317
2029	790.2	363	104,703,675	321
2030	800.4	363	106,044,651	325
2031	810.5	363	107,385,628	330
2032	820.6	363	108,726,605	334
2033	830.7	363	110,067,582	338
2034	840.9	363	111,408,558	342
2035	**851.0**	**363**	**112,749,535**	**346**

Projected Commercial Water Demand

Table 4.8 shows the projected Commercial water demand for the District through build-out. Total Commercial water usage is projected to reach 1,356 AF by build-out.

Table 4.8 – Projected Commercial Water Demand

Year	Commercial TE's	Water Use per Commercial TE (gpd)	Commercial Water Use (gallons)	Commercial Water Use (AF)
2008	626.4	943	215,587,568	662
2009	667.6	943	229,770,512	705
2010	708.8	943	243,953,456	749
2011	**750.0**	**943**	**258,136,400**	**792**
2012	769.1	943	264,703,788	812
2013	788.1	943	271,271,175	833
2014	807.2	943	277,838,563	853
2015	826.3	943	284,405,951	873
2016	**845.4**	**943**	**290,973,338**	**893**
2017	875.5	943	301,342,823	925
2018	905.6	943	311,712,308	957
2019	935.8	943	322,081,793	988
2020	965.9	943	332,451,277	1,020
2021	996.0	943	342,820,762	1,052
2022	1026.1	943	353,190,247	1,084
2023	1056.3	943	363,559,732	1,116
2024	1086.4	943	373,929,217	1,148
2025	1116.5	943	384,298,701	1,179
2026	**1146.6**	**943**	**394,668,186**	**1,211**
2027	1161.9	943	399,924,811	1,227
2028	1177.2	943	405,181,435	1,243
2029	1192.5	943	410,438,059	1,260
2030	1207.7	943	415,694,684	1,276
2031	1223.0	943	420,951,308	1,292
2032	1238.3	943	426,207,933	1,308
2033	1253.5	943	431,464,557	1,324
2034	1268.8	943	436,721,182	1,340
2035	**1284.1**	**943**	**441,977,806**	**1,356**

Projected Landscape Water Demand

Table 4.9 shows the projected Landscape water demand for the District through build-out. Total Landscape water usage is projected to reach nearly 183 AF by build-out.

Table 4.9 – Projected Landscape Water Demand

Year	Landscape TE's	Water Use per Landscape TE (gpd)	Landscape Water Use (gallons)	Landscape Water Use (AF)
2008	69.5	1147	29,097,712	89
2009	74.1	1147	31,011,975	95
2010	78.6	1147	32,926,237	101
2011	**83.2**	**1147**	**34,840,500**	**107**
2012	85.3	1147	35,726,896	110
2013	87.5	1147	36,613,292	112
2014	89.6	1147	37,499,688	115
2015	91.7	1147	38,386,084	118
2016	**93.8**	**1147**	**39,272,480**	**121**
2017	97.1	1147	40,672,043	125
2018	100.5	1147	42,071,605	129
2019	103.8	1147	43,471,168	133
2020	107.2	1147	44,870,730	138
2021	110.5	1147	46,270,293	142
2022	113.9	1147	47,669,855	146
2023	117.2	1147	49,069,418	151
2024	120.6	1147	50,468,980	155
2025	123.9	1147	51,868,543	159
2026	**127.2**	**1147**	**53,268,106**	**163**
2027	128.9	1147	53,977,589	166
2028	130.6	1147	54,687,072	168
2029	132.3	1147	55,396,555	170
2030	134.0	1147	56,106,038	172
2031	135.7	1147	56,815,521	174
2032	137.4	1147	57,525,004	177
2033	139.1	1147	58,234,488	179
2034	140.8	1147	58,943,971	181
2035	**142.5**	**1147**	**59,653,454**	**183**

Total Projected Water Demand

Table 4.10 shows the total projected water demand for LHWD through build-out. Total water usage in the District is projected to reach 11,329 AF by build-out.

Table 4.10 – Total Projected Water Demand

Year	Total Number of TE's	Water Use per Total TE's (gpd)	Total Water Use (gallons)	Total Water Use (AF)
2008	7589.6	650	1,800,632,600	5,526
2009	8088.9	650	1,919,091,525	5,889
2010	8588.2	650	2,037,550,450	6,253
2011	**9087.5**	**650**	**2,156,009,375**	**6,617**
2012	9318.7	650	2,210,861,575	6,785
2013	9549.9	650	2,265,713,775	6,953
2014	9781.1	650	2,320,565,975	7,122
2015	10012.3	650	2,375,418,175	7,290
2016	**10243.5**	**650**	**2,430,270,375**	**7,458**
2017	10608.6	650	2,516,878,488	7,724
2018	10973.6	650	2,603,486,600	7,990
2019	11338.7	650	2,690,094,713	8,256
2020	11703.7	650	2,776,702,825	8,521
2021	12068.8	650	2,863,310,938	8,787
2022	12433.8	650	2,949,919,050	9,053
2023	12798.9	650	3,036,527,163	9,319
2024	13163.9	650	3,123,135,275	9,585
2025	13529.0	650	3,209,743,388	9,850
2026	**13894.0**	**650**	**3,296,351,500**	**10,116**
2027	14079.1	650	3,340,255,931	10,251
2028	14264.1	650	3,384,160,361	10,386
2029	14449.2	650	3,428,064,792	10,520
2030	14634.2	650	3,471,969,222	10,655
2031	14819.3	650	3,515,873,653	10,790
2032	15004.3	650	3,559,778,083	10,925
2033	15189.4	650	3,603,682,514	11,059
2034	15374.4	650	3,647,586,944	11,194
2035	**15559.5**	**650**	**3,691,491,375**	**11,329**

CHAPTER 5 – Proposed Facilities

Proposed Facilities

Potential Facility Needs

Table 5.1 presents a summary of the capital improvements identified in the 2006-2007 Treated Water Master Plan. Each item has been assigned a timeframe for implementation and a cost.

The implementation timeframes indicate the relative degree of urgency associated with each item. Each item was assigned a time period: five-year, ten-year, 20-year, and build-out. It was assumed for this plan that the Del Camino interconnect with CWCWD remains in service through build-out.

Scheduling over a range of years for implementation allows flexible capital improvement planning by allowing adjustment based on availability of funding and human resources. Generally, the timing of implementation is controlled by the priority of the item. More urgent items need to be implemented sooner while lower priority items can be deferred.

Incremental Costs Analysis

The project capital cost from the 2006-2007 Treated Water Master Plan for each item is presented in 2007 dollars and has not been adjusted for inflation in the future scenarios. The estimated project costs for the WTP expansions were published in the 2008 Comprehensive Water System Strategic Plan and are also included.

The estimated project costs for water storage facilities were developed from information provided by storage tank manufacturers and cost data from similar recently constructed projects. The estimated project costs for the pumping facilities were also developed from information provided by manufacturers and cost data from similar recent projects. The estimated pipeline costs were estimated using total project costs from numerous previous pipeline projects that were bid in the last five years. Table 5.2 presents a summary of the capital costs identified for each planning period.

Table 5.1 - Summary of Capital Improvements Expansions

	Existing System Recommendation	5-Year Recommendation	10-Year Recommendation	20-Year Recommendation	Build-out Recommendation
Water Treatment					
Dodd WTP		4 MGD	2 MGD	8 MGD	3.5 MGD
Treated Water Storage					
Andrews Zone		1 MG			
Del Camino Zone		1.5 MG		1.5 MG	
Niwot Zone			4 MG	5 MG	3 MG
Treated Water Pumping					
Joder Pumping Station	Add a third pump				
Somerset Pumping Station	Add a third pump				
95th Street Booster Pumping Station	Add a third pump				
Dodd WTP Pumping Station		3.6 MGD	2.0 MGD	8 MGD	3.5 MGD
Eastern Region Pumping Station			2.3 MGD	2.3 MGD	
Treated Water Transmission and Distribution					
6" diameter pipe (ft)	9,590				
8" diameter pipe (ft)	50,576				
12" diameter pipe (ft)	56,675		5,195	39,720	35,130
16" diameter pipe (ft)		3,500	58,870	2,750	
18" diameter pipe (ft)	9,400				
20" diameter pipe (ft)	16,755		7,530	23,750	
24" diameter pipe (ft)			17,760	37,210	
30" diameter pipe (ft)				28,100	
32" diameter pipe (ft)					28,100

NOTES: 1) Information obtained from Chapter 5 of the 2006-2007 Treated Water Master Plan.
2) Assumes Alternative 1 where Del Camino Cross Tie remains.
3) Eastern Region Pumping Station will require complete upgrade by 10-Year and will require 2.3 mgd of firm capacity.

Table 5.2 – Summary of Capital Improvement Costs

	Existing System Recommendation Costs	5-Year Recommendation Costs	10-Year Recommendation Costs	20-Year Recommendation Costs	Build-out Recommendation Costs
Water Treatment					
Dodd WTP		$15,932,340.00	$15,812,492.00	Not included	Not included
Treated Water Storage					
Andrews Zone	$0.00	$1,500,000.00	$0.00	$0.00	$0.00
Del Camino Zone	$0.00	$0.00	$0.00	$3,000,000.00	$950,000.00
Niwot Zone	$0.00	$0.00	$2,480,000.00	$0.00	$2,280,000.00
Treated Water Pumping					
Joder Pumping Station	$176,820.00	$0.00	$0.00	$0.00	$0.00
Somerset Pumping Station	$464,750.00	$0.00	$0.00	$0.00	$0.00
95th Street Booster Pump Station	$121,000.00	$0.00	$0.00	$0.00	$0.00
Dodd WTP Pumping Station	$0.00	$252,800.00	$143,930.00	$682,682.00	$382,992.00
Eastern Region Pumping Station	$0.00	$0.00	$153,000.00	$79,000.00	$0.00
Treated Water Transmission and Distribution					
6" diameter pipe	$1,348,500.00	$0.00	$0.00	$0.00	$0.00
8" diameter pipe	$5,777,864.00	$0.00	$0.00	$0.00	$0.00
12" diameter pipe	$8,220,300.00	$0.00	$815,615.00	$5,939,000.00	$5,562,810.00
16" diameter pipe	$0.00	$7,302,560.00	$11,433,010.00	$3,688,230.00	$3,157,480.00
18" diameter pipe	$1,442,900.00	$0.00	$0.00	$0.00	$0.00
20" diameter pipe	$2,680,800.00	$0.00	$4,402,440.00	$4,192,600.00	$0.00
24" diameter pipe	$0.00	$0.00	$0.00	$7,287,670.00	$0.00
30" diameter pipe	$0.00	$0.00	$0.00	$7,081,200.00	$0.00
Total Cost	**$20,232,934.00**	**$24,987,700.00**	**$35,240,487.00**	**$31,950,382.00**	**$12,333,282.00**

NOTE:
1) Information obtained from Chapter 6 of the 2006-2007 Treated Water Master Plan and 2008 Comprehensive Water System Strategic Plan.
2) Assumes Alternative 1 where CWCWD Del Camino Interconnect remains.
3) Existing System Recommendation Costs includes the high, medium, and low priorities

CHAPTER 6 – Water Conservation Goals

Water Conservation Goals

Establishing water conservation goals is an iterative process that begins with quantifying the future demand for water based on the current water-use habits and identifying areas where water use can be feasibly and effectively reduced. Reduction of future water demand through water conservation could potentially delay planned water supply acquisition and the need for infrastructure improvements.

The District's total water demand in 2007 was approximately 4,270 AF. As previously discussed, LHWD recognizes the need to further develop its water conservation goals. Within the District, the largest uses are Residential, Commercial, Landscape, and Master Meter Community. The goals established for this Water Conservation Plan are based on the water demands for these customer categories and discussions with District staff. In addition, the District will strive to reduce its Unaccounted-for Losses.

Table 6.1 shows the 2007 water use, the projected average annual water use from 2008 to 2017, the target reduction goal, and the associated amount of water savings for each targeted customer category. By the time the conservation plan is fully implemented, it is estimated that the water usage for the targeted customer categories will be reduced by a total of 644 AF per year.

The total water demand from 2008 to 2017 is 67,617 AF and the savings goals outlined in Table 6.1, below, will result in an overall reduction in water use of 10%.

Table 6.1 – Water Conservation Goals

Water Use Categories:	2007 Water Use (AF)	Average of Projected Annual Water Use (2008 to 2017) (AF)	Reduction Goals for Planning Horizon (%)	Reduction Goals for Planning Horizon (AF)
Residential	3,051	4,786	10%	479
Commercial	503	810	5%	41
Landscape	99	109	12%	13
Master Meter Communities	208	207	5%	10
Unaccounted-for Losses Including Recycling WTP Backwash: (reduction is loss at 6.5% minus loss at 5% plus 5% of ave. production for backwash recycling)	283	440	1.5%	101
Total Demand Reduction:				644
Total Water Production:	4,270	6,762		
Total Percent Reduction:				10%

Residential Water Use

The Residential water use was targeted to be reduced by 10%. This is the District's largest water-use category with the majority of the water being used outdoors. Even though it can be hard to predict the level of participation and resulting success with this category, the District will target a reduction in this category of 10%.

Commercial Water Use

The Commercial category has not historically been targeted for water conservation making this a likely area for water savings potential. LHWD will target a 5% reduction for this category.

Landscape

Landscape irrigation is the most consumptive water use for most water providers. This category will be specifically targeted by the District for water conservation. This category is targeted for a 12% reduction in water use.

Master Meter Community

The Master Meter Community varies in age and some have systems that are aging and could benefit from system maintenance and leak detection. There is potential for water savings in this category if the customers are willing to participate and if funding can be found to help them. The target water savings for this category is 5%.

Unaccounted-for Losses

Unaccounted-for Loss is defined as the difference between the water produced by the District's WTP's and the water registered at the District's customer meters. For the last five years, the loss has averaged 8.3% and in 2006 and 2007 the average loss came down to 6.5%. LHWD's Unaccounted-for water loss of 6.5% is well within the acceptable range for most water systems. However, due to the District's commitment to leak detection and repair to reduce waste, LHWD will strive to reduce system losses to 5%.

Goal Development Process

The goal development process was a collaborative effort between Clear Water Solutions and District staff. Information was gathered from billing records and existing planning documents to properly characterize the system, resources, and water use for the District. Development of this data showed the District's highest use customer categories, seasonal usage, system limitations and losses, and outlined the District's existing conservation measures/programs and their measured effectiveness.

The largest water demand categories were evaluated to determine where potential conservation could be implemented. Once the largest water use categories were identified, Clear Water Solutions met with District staff to discuss water conservation goals and the potential methods to reach those goals. Initial reduction percentages were established and a universal list of measures and programs were compiled for consideration. These goals were based on what had the largest impact and the highest probability of success, considering all factors such as costs, control and public acceptance.

CHAPTER 7 – CONSERVATION MEASURES AND PROGRAMS

Water Conservation Measures and Programs

We developed a universal list of conservation measures and programs. The measures and programs were placed into one of four major categories as an aid to understanding and possible implementation. The four major categories that were considered are Utility Maintenance, Regulatory Controls, Educational Programs, and Rebates and Incentives. The universal list is shown in Table 7.1 with existing measures highlighted in green.

Screening Criteria

The following screening criteria were compiled based on discussions with staff. The criteria were chosen as a general screening to pare down the universal list to a list of measures and programs that the District would evaluate further, including reviewing costs to implement, expected water savings, and loss of revenue from the water savings. Each measure and program in Table 7.1 was screened with the following criteria.

1. System limitations
2. Staff and Board approval
3. Financial implications
4. Public acceptance

Screening of Conservation Measures and Programs

The purpose of the initial screening was to create a list of measures and programs that *would be evaluated further in the planning process* via a cost-benefit analysis. Each measure and program from the universal list is described in detail following Table 7.1. The screening was completed via phone conference with District staff. The resulting decisions are noted on Table 7.1.

Table 7.1 – Universal List of Conservation Measures and Programs

	Conservation Measure or Program	Existing	Further Evaluation	Comment
Supply side measures & programs	**Utility Maintenance Programs**			
	Leak detection & repair program	yes	yes	Target to reduce system loss from 6.5% to 5%.
	Meter testing and replacement program	yes		continue as is
	Recycling WTP filter backwash	yes		continue as is
	Water reuse system	no	no	This will be looked at again for the next water conservation plan update.
	Installing meters in the distribution system to pinpoint leak areas	no	yes	
	Sub-meter mobile home parks	no	yes	We could add this as a policy for new parks only.
	Leak detection for Master Meter Communities	no	yes	This could be combined with a mobile home parks leak detection program.
	Leak detection in mobile home parks	no	yes	Staff is checking current losses on the park that is already sub-metered.
Demand side measures & programs	**Regulatory Controls**			
	Inclining Block Rate water rate structure	yes		continue as is
	25% of lot irrigation restriction in Boulder County	yes		continue as is
	Drought Contingency Plan	yes		continue as is
	Landscape & irrigation system standards for new development	no	yes	These 3 are set up and authorized under the various entities within the District. The District will commit to working with other agencies on water conservation standards and ordinances.
	Restrictive covenants ordinance	no	yes	
	Soil amendment ordinance for new Residential and Commercial landscapes	no	yes	
	Removal of phreatophytes e.g. cottonwoods	no	no	Not acceptable to the public
	Requiring wind and/or rain sensors for commercial and open space irrigation	no	yes	
	Irrigation system audit & improvements for irrigation taps	no	yes	
	Educational Programs			
	Public education - newsletter, bill stuffers, website	yes	yes	The plan is to dedicate a section of the website for water conservation education - including promoting the turf demo at Northern Water.
	Children's water festival	yes	yes	This will be advertised on the website.
	Xeriscape gardening classes	yes		continue as is
	Xeriscape garden demonstration	yes		continue as is
	Billing system that encourages water savings	yes		continue as is
	Post commercial BMPs on website or as bill stuffers	no	yes	This can be posted on new website.
	Send ET irrigation scheduling in water bill	no	yes	This can be calculated based on historic ET averages.
	Designated water conservation officer	no	no	not enough staff
	School education program	no	yes	This will include training current staff and looking at support opportunities from CWCB and Northern Water.
	Rebates and Incentives			
	Sprinkler system audit kit and instructions	no	no	Part of residential audit kit.
	Residential audit kit	no	yes	This could be made available online and will include indoor and outdoor uses.
	Rebate programs for toilets, clothes washers, dishwashers, faucets and showerheads	no	yes	Evaluate separately to see savings for each.
	Xeriscape incentive for all categories	no	yes	As part of rebate program.
	Commercial & Industrial water audits	no	yes	
	Promote Hospitality BMPs	no	no	This will be part of the commercial water audit program.
	Wind and/or rain sensor rebates for residential	no	yes	Consider offering in rebate program for existing residences and/or as a regulatory requirement for developers of new construction.
	Rebates for ET (SMART) sprinkler system controllers	no	yes	
	Distribute pre-rinse spray heads to restaurants & institutions	no	no	Not enough restaurants and institutions to produce enough water savings to be feasible.
	Irrigation system rebate for residential and commercial	no	no	Not enough information at this time to determine success and cost.
	Commercial toilet rebates	no	yes	

Utility Maintenance Programs

- *Leak Detection and Repair Program*
  The District currently monitors water losses both on a system-wide basis and in several specific zones. The Treatment Manager maintains a monthly report that compares the total water produced at the plants to the total billed water usage of all meters in the District. Adjustments are made for the water used at the plants in the treatment process and for any documented system losses that may occur, such as fire hydrant use or system flushing. The loss percentage is reviewed on both a monthly basis and as a running 12 month total.

  Additionally, the District monitors water losses on a monthly basis in its Joder, Del Camino, Erie Pumped, Highway 287 and Boulder zones. These areas of the District have master meters that measure all water flow into the zone, which can then be compared to the total billed usage of all meters in that particular zone. In this way, we can identify a specific area where a leak may be occurring, and concentrate our efforts in that location.

  This is an on-going program that the District has been diligently conducting for over ten years. It has resulted in lowering the distribution system losses from over 20% to an average over the last five years of 8.3% and 6.5% in recent years. The program entails running high and low reports on customers with the billing software and creating weekly pressure charts and monthly node reports from the in-house hydraulic model. Additionally, old lines and areas of high activity are walked by maintenance staff and reports from customers are used to identify and repair leaks.

  This program will continue as is for now. The District would like to decrease the losses even further and is considering improving the program by using a pipe leak detection company to go through the entire system. They would also like to re-test and monitor cathodic protection on the existing 18" steel pipes every five years to guard against leaks. This program upgrade will be evaluated further.

- *Meter Testing and Replacement Program*
  The District recently completed replacing meters in the entire system. The program calls for replacing residential meters every ten years and commercial meters every five years to ensure the most accurate readings. This has also contributed to reducing the unaccounted-for system losses over the last ten years. This is an on-going program that will continue as is.

- *Recycling WTP Filter Backwash*
  WTP filter backwash water is generally equal to approximately 5% of the total water production. The District collects filter backwash water at both of its WTPs and directs it into the raw water reservoirs located at each plant. This program is well established and will continue as is.

- *Water Reuse System*
  None of the water rights that the District currently owns are decreed for reuse. Therefore, this measure will not be considered further at this time. The District can accept Windy Gap water, which is decreed for reuse; however, this water is not readily available and not likely to be added to the water supply any time soon. This measure may be reconsidered at a future date.

- *Installing Meters in the Distribution System to Pinpoint Leak Areas*
  Meters have been installed at strategic locations as water enters into specific zones within the District's transmission system so that discrepancies between water produced and water sold can be better pinpointed to a specific geographic area.

  This measure would involve installing five more meters within the system to make the leak detection program more effective and will be evaluated further.

- *Sub-Meter Mobile Home Parks*
  There are two mobile home parks served by the District, one with 21 sites and the other with 210 sites and a dual system for outdoor irrigation. Only one of the mobile home parks is individually metered. A lack of sub-metering eliminates the responsibility or incentive of most of the home owners to conserve water. The District has no jurisdiction past the master meter, and there is no current indication that the parks would be willing to participate in a metering program.

  The metering would be completed by the privately-owned mobile home parks and possibly subsidized by the District. The District is also evaluating a policy that would require any new mobile home parks that become part of the District to sub-meter. The District will evaluate this measure further.

- *Leak Detection for Master Meter Community*
  The master meter communities consist of two mobile home parks, a couple of State Park areas and five subdivisions. More than half of the five subdivisions operate dual systems and the State Park taps will eventually be moved into the Commercial category. While the District does not have any authority or responsibility for these systems past the master meter, there may be some water savings potential through reducing system losses. The District will evaluate this measure further.

- *Leak Detection in Mobile Home Parks*
  The mobile home parks are relatively old and to the District's knowledge, have never had a formal leak detection program. Preliminary leak detection surveys could be performed within the parks by District staff and/or subcontracted to a third party. Once leaks are pinpointed, the mobile home parks would be responsible for the repair and would benefit by reductions in their water bills. The District would like to evaluate this measure further.

Regulatory Controls

- *Incline Block Rate Water Rate Structure*
  The District uses an increasing block rate structure for water billing. Based on many water conservation studies, this design most effectively encourages efficient water use. LHWD charges higher unit prices to customers who place a higher demand or strain on the water supply system and lower unit prices to customers who use average or below average amounts of water. The primary basis for the charge is the cost or burden imposed on the system.

  The District has used this structure since the 1980's and considers additional rate adjustments annually. The current tiered rates are well structured to encourage water savings. Adjustments will be made to the rates periodically if they are financially feasible and gain Board approval. This measure is already being implemented.

- *25% of Lot Irrigation Restriction in Boulder County*
  While the District's service area within Boulder County doesn't represent a significant area of growth, a regulation has been passed at the County that limits new lots to developing 25% or less of the lot in irrigated landscape. This regulation was a result of a Boulder County planning effort that the District participated in, which encouraged landscape conservation requirements. This measure is already being implemented.

- *Drought Contingency Plan*
  The Drought Contingency Plan establishes the District's authority to declare a drought and mandate watering restrictions according to the severity of the drought and limitation of water supply. This measure is an adopted District policy and will be continued. Water savings will be evaluated during drought periods. However, due to the uncertainty of how often this program will be implemented over the ten-year planning horizon, the water savings will not be counted toward the overall water-savings goals. This is a conservative approach and any associated water savings will be a bonus in addition to those received from the other measures and programs.

- *Landscape and Irrigation System Standards for New Development*
  These kinds of standards are usually enforced in the Land Use Codes for municipalities. They can include the use of Xeriscaping principles such as incorporation of low water-use plants, efficient irrigation systems, and grouping of similar water-use plants in irrigation zones. Certificates of occupancy for new construction are given only after review of the landscape and irrigation system design shows compliance with the standards.

  LHWD policies cannot override policies of other governing entities within the District. Therefore, this measure would be setup and authorized under the

various governing entities within the District. The District will commit to supporting the various standards and ordinances developed by other governing entities and will evaluate this measure further.

- *Restrictive Covenants Ordinance*
  This ordinance "overrides" neighborhood covenants that restrict the use of resource conserving activities such as Xeriscaping and mandate minimum amounts of turf grass. It is difficult to predict participation and quantify water savings with this measure. However, water conservation literature indicates significant savings when water conserving landscape practices are implemented.

  This measure is also setup and authorized under the various governing entities within the District. As above, the District will commit to supporting the various standards and ordinances developed by other governing entities and will evaluate this measure further.

- *Soil Amendment Ordinance for New Residential and Commercial Landscapes*
  This ordinance would require new construction to loosen eight inches of soil and add three cubic yards per 1,000 square feet of an appropriate soil amendment to the top six inches of top soil in the landscaped area. This increases the consistency and efficiency of landscape irrigation significantly and would add to the overall water savings from water conserving landscape practices.

  This measure would be setup and authorized under the various governing entities within the District. The District will commit to supporting the various standards and ordinances developed by other governing entities and will evaluate this measure further.

- *Removal of Phreatophytes, e.g. Cottonwoods*
  Phreatophytes such as large cottonwood trees grow roots into the water table, and if located near a water supply, can consume large amounts of the water supply. Although the removal of phreatophytes would benefit in water savings, there can be significant public resistance to the implementation of this program.

  The District is required to remove Russian Olives, which is a phreatophyte, from their property in Boulder County and will continue to do this; however, the District will not expand this effort or evaluate this measure further.

- *Requiring Wind and/or Rain Sensors for Commercial and Open Space Irrigation*
  Wind and rain sensors temporarily shut off irrigation systems based on pre-established weather conditions, i.e. excessive wind or rain. The system is then returned to the programmed irrigation schedule once the weather becomes more suitable for efficient irrigation. The District will consider requiring commercial businesses and HOA open space areas to install wind and/or rain sensors on existing or new irrigation systems. Therefore, the District will evaluate this measure further.

- *Irrigation System Audit & Improvements for Irrigation Taps*
  As the existing irrigation systems in use at open space and landscaped areas wear out over time, the equipment becomes less and less efficient. As a result, it requires more water to irrigate the same amount of ground. A program could be devised that would require irrigation taps to periodically obtain a system audit and make follow up repairs. The customers could be given some incentive to make improvements to aging systems through subsidized audits or rebates. The District will evaluate this measure further. Information on this measure is available at http://www.conservationcenter.org/.

Educational Programs

- *Public Education – Newsletters, Bill Stuffers, and Website*
  The District periodically provides customers with water conservation tips in water bills, on their website, and at the front desk of their office. This effort began several years prior to submittal of their 1996 Water Conservation Plan and included a Xeriscape program to inform customers of landscape alternatives. The website has generally taken the place of the newsletter, however, a newsletter is still sent out at strategic times to encourage conservation and provide feedback. This program will continue and be evaluated for additional possibilities.

- *Childrens Water Festival*
  Northern Water puts on an annual water festival for fourth and fifth graders in Boulder, Longmont and Greeley. Most of the schools in the LHWD's service area attend one of these festivals and the children take fun water-saving facts back home to their families. This measure will continue and the District will evaluate advertising the festival on their website.

- *Xeriscape Gardening Classes*
  These classes are offered three to four times a year at the District at no cost on a first come first served basis. They are usually given in cooperation with a local landscape expert and are well attended. This measure has been very successful and will continue to take place at the District.

- *Xeriscape Garden Demonstration*
  A demonstration site has been designed and completed at the District's office to show numerous aspects of landscape water use. The site includes Xeriscapes, traditional landscapes, and shows the water requirements and related yearly costs for both using separate water meters. Guided and self tours are offered with a specifically designed pamphlet covering plant types, mulches and sprinkler system fine-tuning. The District will continue to update the site and offer tours and information.

- *Billing System that Encourages Water Savings*

Bills can include information such as water use for the entire previous year, water saving messages, ET scheduling and warning signs if use is up significantly. This needs to be set up in the billing software and is most effective if it can accommodate various message changes. LHWD runs high use reports and issues a work order to check for leaks on reports that show a significant increase in water use. Also, the District has a full-page bill that has room for messages and shows the prior year's water use. This will continue and be evaluated for additional opportunities.

- *Post Commercial BMPs on Website or as Bill Stuffers*
  BMPs regarding commercial businesses can be posted on the District's website or sent out as bill stuffers to help encourage commercial water users to conserve. The Northern Colorado Action Plan for Industrial, Commercial, and Institutional Water Conservation report and other sources contain examples of BMPs that could be presented on a website or as a bill stuffer. The District will evaluate this measure further.

- *Send ET Irrigation Scheduling in the Water Bill*
  ET irrigation schedules using historical averages of weather data can be prepared by the District prior to the irrigation season and sent out to all customer categories to reference when programming their irrigation systems. Northern Water has tools on their website that can aid with this calculation. The schedule could be printed on the bill at the beginning or duration of the irrigation season or included as a bill stuffer. The District will evaluate this measure further.

- *Designated Water Conservation Officer*
  A water conservation expert can provide valuable information to customers that are interested in conserving water and investigate conservation strategies on a full time basis. Some of the surrounding municipal entities have added designated water conservation officers to their staff including the City of Boulder. LHWD customers can currently call Boulder's conservation officer with general questions. At this time, the District has established the core staff positions they need to operate effectively and efficiently and will not consider adding this position. Specific inquiries will continue to be handled by existing staff.

- *School Education Program*
  There are numerous educational resources, including curriculum and materials for teaching school children about water supply, use, and conservation. When kids learn about conservation, they take the message home and share it with their families. The Colorado Foundation for Water Education has a list of resources and links of educational materials for teachers on their website at http://cfwe.org/SchoolPrograms. The District will evaluate this program further.

Rebates and Incentives

- *Sprinkler System Audit Kit and Instructions*
  Sprinkler system audit kits can include all the necessary supplies, instructions and worksheets for monthly ET irrigation scheduling and sprinkler head evaluation. These could be made available at the District office for interested customers. Information on sprinkler systems audits will be included in the Residential Audit Kits or educational programs proposed. The District is not interested in distributing this specific kit at this time and will not evaluate this measure further.

- *Residential Audit Kits*
  Self-guided residential audit kits can be designed to include items such as leak detection tablets, surveys, and sprinkler testing cones. Instructions for conducting the audit and evaluating the results can give residential customers insight and direction on how they can save water and money. The guidance offered in the instructions could lead the customer to take part in other conservation programs offered, including rebates. The District will evaluate this measure further.

- *Rebate Program for Toilets, Clothes Washers, Dishwashers, Faucets, and Showerheads*
  This program would provide rebates to residential users who purchase low-flow or high-efficiency toilets, clothes washers, dishwashers, faucets, and showerheads. These are the rebate programs with which surrounding entities have found the most success. Rebates for the selected fixtures would be in the range of those provided by surrounding water providers. The District will evaluate this measure further.

- *Xeriscape Incentive for All Categories*
  This rebate program would apply to all customer categories and can be offered for new and existing developments. Rebates could be offered on Xeric plants purchased or on square footage of conversion from high water use landscape to Xeriscape. Design of the Xeric landscape is another area that could be subsidized by the District either by offering design service or a rebate. The District will evaluate this measure further. Information can be found at http://www.conservationcenter.org/for-cities.htm.

- *Commercial and Industrial Water Audits*
  Commercial customers are often the highest water users and have been an area of increasing focus for water conservation. Most commercial customers will participate in a water audit if they know it could identify ways to reduce their operating costs over the long term. Water audits can be performed by a third party consultant and is an effective way to educate businesses on how they can save water. The District will evaluate this measure further.

- *Promote Hospitality BMPs*
  BMPs for the hospitality industry include signage at hotels asking guests to consider reusing their towels or table cards at restaurants asking guests to request water. There are many BMPs available that take planning and coordination to obtain. The District could provide assistance in accessing a chosen number of these BMPs.

  The District believes that this measure will be covered in the water audits and will not evaluate it further.

- *Wind and/or Rain Sensor Rebates for Residential*
  Like wind and rain sensors for parks and open spaces, residential sensors shut off irrigation systems based on pre-established weather conditions. Rebates can be offered for these sensors to encourage home owners to install them on their existing systems. The District will evaluate this measure further.

- *Rebates for ET (SMART) Sprinkler System Controllers*
  Smart controllers for sprinkler systems use real-time weather data or a soil moisture sensor to determine an irrigation schedule. These controllers can be programmed to accommodate different zones with varying landscapes. Smart controllers are the most efficient surface irrigation technology. Rebates could be offered in a similar range that surrounding entities are providing. The District will evaluate this measure further.

- *Distribute Pre-Rinse Spray Heads to Restaurants and Institutions*
  This is a measure that other entities have found successful if the target market is large enough. It involves a pre-rinse step that reduces the amount of total wash water needed in the dishwashers. The District is not interested in pursuing this as a separate measure, but will address it in the commercial audits. This measure will not be evaluated further.

- *Irrigation System Rebate for Residential and Commercial*
  Rebates could be offered for new residential and commercial customers or for older lots to install automated sprinkler systems. Hand watering can be effective, although over-watering frequently occurs due to the high level of focus required (i.e. the sprinkler has to be moved manually and residents often forget to move sprinklers resulting in over-watering). The District has a substantial number of older lots that could save water if automated sprinkler systems were installed. Due to uncertainties associated with this measure and the District's preference toward other measures, the District will not evaluate this measure further at this time.

- *Commercial Toilet Rebates*
  This measure entails providing rebates to commercial users to replace toilets and urinals with low-flow models. It would be a good way to target some of the higher water-use commercial accounts in the area, including a hotel and manufacturing park. The District will evaluate this measure further.

Estimate Costs and Water Savings of Conservation Options

For this cost-benefit analysis, some of the costs and water savings were combined between similar measures. However, most of the measures were evaluated individually to provide a more detailed analysis, so LHWD could make better decisions on which measures and programs to implement. For the final selection of measures and programs to implement, the water savings and costs may be combined further.

For some measures and programs, water savings can vary significantly. Because of this, it is important to develop an understanding of the magnitude of typical indoor and outdoor uses and the contribution of each to total demand. Discussions with staff and review of historic data help us to understand what kind of water savings and participation we may expect for certain measures. However, it is difficult to accurately estimate all water savings and the actual result may differ from these estimations.

Many resources were used to estimate water savings including Amy Vickers Handbook of Water Use and Conservation, studies and papers from California and Arizona, local studies available from the American Water Resource Association (AWRA), the Environmental Protection Agency (EPA), Western Resource Advocates, information from Colorado municipalities, and the CWCB website.

For each measure and program, Table 8.1 shows the set up and on-going costs, expected participation, the annual water savings after full implementation of the measure, the total water savings over the ten-year planning horizon, the annual implementation cost including lost revenue, the implementation cost over the ten-year planning horizon including lost revenue, and the cost per 1,000 gallons saved. Table 8.1 ranks each measure based on the cost per 1,000 gallons saved and includes the assumptions used for each measure/program. The costs shown in this table are in today's dollars and have not been adjusted for future inflation.

A detailed explanation of each column is included below the table. Existing measures were not evaluated unless we identified additional savings through upgrading or expanding that existing measure. We assumed that water savings from existing measures have been realized in the last five years and that additional new savings would be above current water use.

Table 8.1 – Cost/Savings Analysis of Conservation Measures and Programs

	Conservation Measure or Program	Total Cost to Left Hand: Rebate (B)	Total Cost to Left Hand: One time Set up Labor (C)	Total Cost to Left Hand: Annual Labor (D)	Total Cost to Left Hand: Annual Materials (E)	# of Units per Year (F)	Gallons Saved per Unit per Year (G)	Estimated Annual Water Savings after full Implementation (gallons) (H)	Estimated Total Water Savings over Planning Period (gallons) (I)	Annual Revenue Loss Related to Water Savings ($3.00 to $3.80/1,000 gallons[2]) (J)	Estimated Annual Cost (G)	Estimated Total Cost over Planning Period including Set-up (K)	Cost per 1000 Gallons Saved (L)	Rank (M)	Assumptions and Calculations
Supply side measures & programs	**Programs**														
	Improved Leak Detection & Repair Program			$15,000				23,134,642	231,346,419	$0	$15,000	$150,000	$0.65	2	Leak detection and installing meters in strategic locations will provide savings of 0.3% of annual production over 3 years for a 1.5% total reduction in unaccounted-for losses (6.5% to 5%). Savings are split 70% for leak detection and 30% for meters, but will be combined as one program. Use average projected production for planning period (2008-2017).
	Installing meters in the distribution system at 5 locations to pinpoint leak areas			$10,000		2		9,914,847	99,148,465	$0	$20,000	$60,000	$0.61	1	
	Leak detection program in mobile home parks		$4,000					1,002,243	10,022,430	$3,007	$3,007	$34,067	$3.40	4	Assume annual 5% savings of Mobile Home Park use after implementation.
	Leak detection for master meter communities		$8,000					2,242,830	22,428,302	$6,728	$6,728	$75,285	$3.36	3	Assume annual 5% savings of 2007 Master Meter Community use after implementation.
	Sub-meter new mobile home parks		$200			1	900	900	9,000	$3	$3	$227	$25.22	26	No new pads are planned within the water conservation planning period (2008 to 2017). For this analysis assume one new pad per year and savings of 2% of average use per pad (45,000 gal). Cost is for new policy set up.
Demand side measures & programs	**Regulatory Controls**														
	Landscape & Irrigation system standards for new development			$500				4,010,524	40,105,237	$15,240	$15,740	$157,400	$3.92	10	LHWD will support the following: Both Boulder and Weld Counties encourage or require a similar form of these 3 measures in their building permit review. Longmont and Boulder require all three of these measures and Broomfield recommends them. Assume a 5.5% savings of ave. planning pd. new outdoor use (ave. outdoor use from 2002-2007 is 52% of total use) will be split between these 3 measures. Cost is for staff time to review policies.
	Soil amendment ordinance for new landscapes			$500				4,010,524	40,105,237	$15,240	$15,740	$157,400	$3.92	10	
	Restrictive covenants ordinance			$500				4,010,524	40,105,237	$15,240	$15,740	$157,400	$3.92	10	
	Requiring wind and rain sensors for commercial and open space irrigation		$100			22		4,318,800	25,592,325	$15,116	$15,116	$151,258	$5.91	15	Assume 5% water savings on all irrigation and 45% of commercial tap use is for outdoor irrigation[1]. Assume participation is 54% of the projected commercial taps per year (ave. of 29) and all of the projected irrigation taps (ave. of 6) over the planning pd. Cost is for sensor and staff time to set up program (split with res. program).
	Irrigation system audit & improvements for existing irrigation taps		$200		$75	10	109,600	4,712,800	39,236,800	$16,495	$17,245	$172,648	$4.40	13	Assume 10 of 43 existing irrigation taps are targeted per year for a 20% savings[1] of ave. irrig tap use of 548,000 gal per tap. Studies show water savings of 20-50%. Set up cost is split between Irrigation and commercial audit programs. Audits performed by 3rd party .

Conservation Measure or Program	Total Cost to Left Hand: Rebate (B)	Total Cost to Left Hand: One time Set up Labor (C)	Total Cost to Left Hand: Annual Labor (D)	Total Cost to Left Hand: Annual Materials (E)	# of Units per Year (F)	Gallons Saved per Unit per Year (G)	Estimated Annual Water Savings after full Implementation (gallons) (H)	Estimated Total Water Savings over Planning Period (gallons) (I)	Annual Revenue Loss Related to Water Savings ($3.00 to $3.80/1,000 gallons[2]) (J)	Estimated Annual Cost (G)	Estimated Total Cost over Planning Period including Set-up (K)	Cost per 1000 Gallons Saved (L)	Rank (M)	Assumptions and Calculations
Educational Programs														
Public education - improvement to website in addition to existing bill stuffers and annual newsletter		$1,250	$400	$1,000			19,733,220	197,332,197	$74,986	$76,386	$765,112	$3.88	8	Assume 3% savings[4] of average projected residential and commercial water use in planning period; split evenly between public education, children's water festivals and posting commercial BMPs. Cost of website update is split 1/2 for public education, 1/4 for water festivals and 1/4 for BMPs on website.
Children's water festivals		$625					19,733,220	197,332,197	$74,986	$74,986	$750,487	$3.80	6	
Post commercial BMPs on website or as bill stuffers		$625	$200	$900	24		19,733,220	197,332,197	$69,066	$90,866	$909,288	$4.61	14	
Send ET irrigation scheduling in water bill, website and spring newsletter			$400				30,783,823	307,838,228	$116,979	$117,379	$1,173,785	$3.81	7	ET scheduling is sent in May water bill. Assume 3% savings of projected outdoor water use (52%) of residential and commercial accounts.
School education program		$1,500	$800				8,441,639	84,416,390	$32,078	$32,878	$330,282	$3.91	9	Assume 0.5% savings of projected residential water use. Cost is for training and staff time.
Rebates and Incentives														
Residential audit		$800		$3	163		14,543,750	80,236,750	$55,266	$55,755	$558,353	$6.96	16	Online instruction can be set up in website update. Estimate that by 2017, 20% of residential accounts will have participated (1,625). Assume annual participation of 163 and 5% savings of ave. household use (179,000 gal).
Rebate for low-flow toilets	$50	$100			40	11,839	4,735,656	26,046,108	$17,995	$19,995	$200,055	$7.68	20	Estimate 40 participants per year up to 400 of pre-1994 homes. Savings based on 5.1 flushes per person per day[1]. Saving 2.4 gal per flush (4.0 gal ave flush rate - 1.6 gal conservation flush rate[1]) and 2.65 people per household. Cost for program development split between all rebate measures. Old toilets cannot be resold.
Rebate for high efficiency clothes washers	$100	$100			20	5,726	1,145,224	6,298,732	$4,352	$6,352	$63,619	$10.10	23	Estimate 20 participants per year up to 200. Savings based on 0.37 loads per person per day[1]. Saving 16 gal per load (43 gal/load ave. rate - 27 gal/load conservation rate[1]) and 2.65 people per household.
Rebate for high efficiency dishwashers	$50	$100			25	629	157,178	864,480	$597	$1,847	$18,573	$21.48	25	Annual savings is based on a 4.5 gallon per load dishwasher vs. a 10 to 12 gpl dishwasher, 0.1 loads per day per person and 2.65 people per house[1]. Estimate 25 participants per year up to 250.
Rebate for low-flow faucet	$5	$100			60	6,500	1,950,000	10,725,000	$7,410	$7,710	$77,200	$7.20	17	Average water savings of 6,500 gal. per household per year for 1.5 gpm faucets[1] (1.5gpm vs. 2.75gpm). Estimate 30 participants per year up to 300 of pre-1997 homes (4,900) and 2 faucets per home.

Conservation Measure or Program	Total Cost to Left Hand: Rebate (B)	One time Set up Labor (C)	Annual Labor (D)	Annual Materials (E)	# of Units per Year (F)	Gallons Saved per Unit per Year (G)	Estimated Annual Water Savings after full Implementation (gallons) (H)	Estimated Total Water Savings over Planning Period (gallons) (I)	Annual Revenue Loss Related to Water Savings ($3.00 to $3.80/1,000 gallons[2]) (J)	Estimated Annual Cost (G)	Estimated Total Cost over Planning Period including Set-up (K)	Cost per 1000 Gallons Saved (L)	Rank (M)	Assumptions and Calculations
Rebate for low-flow showerhead	$5	$100			25	1,700	425,000	2,337,500	$1,615	$1,740	$17,500	$7.49	19	Average water savings is 1,700 gallons per household per year for 2.5 gpm showerheads[1]. Estimate 25 participants per year up to 250.
Xeriscape incentive for all categories	$125	$100			50	1,862	930,800	5,119,400	$3,258	$9,508	$95,178	$18.59	24	Design assistance of $0.50 per square footage of Xeriscape installed up to $125. Estimate 50 accounts will participate per year up to 500. Study shows water savings of 20-50%[1]. Assume 20% of outdoor use (52% of Ave. 1997 to 2007 residential use per tap; 179,000gal/tap).
Rebate for wind and rain sensors for residential	$25	$100			55	4,654	2,559,700	14,078,350	$9,727	$11,102	$111,119	$7.89	22	Estimate appr. 1% of existing 2007 taps participation per year up to 550 homes. Assume 5% savings of outdoor use (52% of 179,000 gal/tap).
Rebate for ET (SMART) sprinkler system controllers	$50	$100			55	9,308	5,119,400	28,156,700	$19,454	$22,204	$222,137	$7.89	21	Estimate appr. 1% of existing 2007 taps participation per year up to 550 homes. Assume 10% savings of outdoor use (52% of ave 179,000 gal/tap).
Commercial toilet rebate	$50	$100			15	9,125	1,368,750	7,528,125	$4,791	$5,541	$55,506	$7.37	18	Average savings per toilet for commercial accounts is 25 gpd[3]. Estimate 15 participants per year up to 150.
Commercial and Industrial water audits		$100		$500	5	74,300	1,486,000	20,432,500	$5,201	$7,701	$77,110	$3.77	5	Assume 10% savings of total use. (ave. comm. use of 743,000 gal per tap from 1997 to 2007). Target 5 companies per year starting with highest users up to 20 companies. Audit will be performed by third party contractor.

Notes: 1 Based on "Handbook of Water Use and Conservation" by Amy Vickers
2 Based on current water rate for Left Hand - $3.80/1,000 gal. for residential, $3.00/1,000 gal. for master meter and $3.50/1,000 gal. for commercial and landscape
3 Based on "Handbook of Water Use and Conservation" by Amy Vickers - analysis of water billing records for non-residential sites in the Metropolitan Water District of Southern California
4 Based on AWWA M52 and Liturature Review by Bobbie Klein, et. al.

Column Explanations:
(B) A rebate provided upon approval of customer application
(C) Labor involved in set up program or measure
(D) Labor involved each year for operation of measure or program
(E) Materials needed each year for each unit if listed or for the whole measure or program
(F) Number of accounts expected to participate and resulting units or audits needed
(G) Gallons of water saved per unit as a result of participating in the program or measure
(H) Total water savings seen in a year from the measure or program
(I) Total water savings seen over entire ten year planning period; could be based on increasing water demand or a fixed use per account
(J) Revenue the District will not be paid if the water savings occur, based on first level of water rate of targeted customer or second level for residential
(K) Total cost to implement and operate measure or program over entire ten year planning period, including annual operation, one time set up costs and annual revenue lost due to water savings
(L) Cost per 1000 gallons saved = total cost over 10 year period divided by total water saved over 10 year period
(M) Ranks the measures and programs according to the price per 1000 gallons of water saved, lowest to highest

Comparison of Benefits and Costs

Comparing the measures and programs according to the water savings and implementation costs gives us a good start to the selection process, but is not always the only criteria for selection. The cost-benefit analysis can also help determine how implementation of conservation measures/programs will be phased in to stay within a planned annual water conservation budget. To determine the rank for each measure and program, the first step was to divide the total cost per 1,000 gallons over the ten-year period by the total water saved over the ten-year period to obtain a unit cost. The measures were then ranked from the lowest unit cost to the highest as can be seen in Table 8.1.

The top four measures are supply-side efforts that involve leak detection. The fifth is commercial and industrial audits and the sixth through ninth ranked measures fall in the public education category. The tenth ranked measure is a tie between the three regulatory landscape standards for future customers. These top ten measures are all things that the District has considered to some degree in the past and is interested in expanding.

Evaluation Criteria for Selection of Measures and Programs to Implement

The goal of a successful water conservation plan is to have measures and programs that can be reasonably implemented and will continue to provide satisfactory service to the customers. With this in mind, the criteria for selecting the final measures and programs for implementation were compiled through review of the cost-benefit analysis with staff. Staff identified *staff availability* as a key criterion for implementation selection. Other criteria were identified as a result of the discussions and ranking of each measure and program. The final set of selection criteria is as follows:

- Staff availability
- Amount of water savings
- Expected participation and interest
- Cost of implementation
- Overall rank in cost-benefit analysis

Table 8.2 lists the measures and programs, their rank from the cost-benefit analysis, the District's decision, and the reason for selecting or rejecting the measure or program.

Table 8.2 – Selection of Conservation Measures and Programs

Conservation Measure or Program	Rank	Final Selection	Criteria for Selecting of Rejecting Measure or Program
Utility Maintenance Programs			
Improved Leak Detection & Repair Program	2	yes	Unaccounted for losses have been narrowed down to 6.5 % in 2006 and 2007. Continued reduction to 5% is something the District is very interested in achieving.
Installing meters in the distribution system to pinpoint leak areas	1	yes	
Leak detection program in mobile home parks	4	maybe	This is a high potential water savings area, however, since the savings is past the Districts area of authority and responsibility there would need to be sufficient interest from the meter customers.
Leak detection for master meter communities	3	maybe	
Sub-meter new mobile home parks	26	no	There aren't any existing plans for new mobile parks so no real potential for water savings. However, the District is still going to add sub-metering to their policy for new taps.
Regulatory Controls			
Landscape & Irrigation system standards for new development	10	yes	The entire District service area lies within one of these governing boundaries whom have already set up regulations. The work load for the District mainly consists of knowing the current regulations when reviewing tap applications and the savings potential is high.
Soil amendment ordinance for new landscapes	11	yes	
Restrictive covenants ordinance	12	yes	
Requiring wind and rain sensors for commercial and open space irrigation	15	yes	This is an area of high potential water savings and is something the District is interested in implementing.
Irrigation system audit & improvements for existing irrigation taps	13	yes	This measure didn't rank very high due to a conservative estimation of water savings. The potential water savings is high and will be pursued.
Educational Programs			
Public education - improvement to website in addition to existing bill stuffers and annual newsletter	8	yes	A website update would add an efficient way to distribute a lot of information and enhance public perception of the district.
Children's water festivals	6	yes	These have been very successful and will be fully supported.
Post commercial BMPs on website or as bill stuffers	14	yes	These will be sent in a packet to new customers and posted on the website.
Send ET irrigation scheduling in water bill, website and spring newsletter	7	yes	This is a high potential for water savings
School education program	9	no	This program is currently in place and will probably not show additional water savings, however, the District will participate if the opportunity arises.
Rebates and Incentives			
Residential audit	16	yes	An online version will be provided on the website as well as hard copy kits in the office. This is a high savings potential area.
Rebate for low-flow toilets	20	yes	This fixture has shown success for other entities so will be part of the rebate program.
Rebate for high efficiency clothes washers	23	yes	This appliance has also shown success with other entities and will be part of the rebate program.
Rebate for high efficiency dishwashers	25	no	Not enough guaranty of participation.

Conservation Measure or Program	Rank	Final Selection	Criteria for Selecting of Rejecting Measure or Program
Rebate for low-flow faucet	17	yes	High potential for water savings. Will be part of rebate program.
Rebate for low-flow showerhead	19	no	Possibility of lack of participation due to low rebate amount.
Xeriscape incentive for all categories	24	no	Not enough staff availability for now and high cost.
Rebate for wind and rain sensors for residential	22	yes	High potential for water savings. Will be part of rebate program.
Rebate for ET (SMART) sprinkler system controllers	21	yes	High potential for water savings. Will be part of rebate program.
Commercial toilet rebate	18	no	Low flow toilets may be part of a water reduction plan from a commercial water audit. A large number of commercial accounts have few toilets and can take advantage of the regular toilet rebate.
Commercial and Industrial water audits	5	yes	The water savings potential is high and will be pursued.

Selected Conservation Measures and Programs

In Chapter 6, conservation goals were established for five customer categories: Residential, Commercial, Landscape, Master Meter Community and Unaccounted-for Losses. Goals of 10%, 5%, 12%, and 5% were established for each of the first four categories, respectively. In addition, LHWD will target a 1.5% further reduction in Unaccounted-for Losses, bringing the losses to 5%. The selected conservation measures and associated water savings were arranged within the targeted customer categories to more easily compare the savings to the original goals. Table 8.3 shows the water savings for the selected measures combined in each of these categories.

The annual savings after full implementation of the water conservation measures in Table 8.3 were sub-totaled for each category. These savings were compared to the original goals set in Chapter 6. As mentioned earlier, water conservation goal setting is an iterative process; original goals are established, conservation measures are evaluated and selected based on appropriate criteria, and the resulting water savings are compared to the original goals.

When the resulting water savings were first compared to the original goals, the water savings fell short. The calculated water savings were conservative because most all of the original assumptions were on the conservative end of the expected range of water savings. The assumptions were re-evaluated while making sure to avoid double counting savings from different measures. Also, one measure (rebate for faucets) that had originally been screened out was re-added to help meet the goal for the Residential category. Residential customers were targeted for higher savings because that is the largest customer category for the District. However, since the District has had on-going conservation practices and education in place for a significant amount of time, we believe there will not be as much savings potential as originally thought. Therefore, the target goal for this category was lowered.

Water conservation in the Commercial category is a new area of potential water savings for the District. The water savings from the selected measures matched the original goal fairly well. Implementation of these measures will provide valuable insight into the water savings potential in this category.

The Landscape category was originally identified as having high water savings potential. The results of the water savings calculations for this category showed a higher percent reduction than the original goal, so the goal for this category was increased.

Table 8.3 – Combined Water Savings of Selected Conservation Measures and Programs

Conservation Measures and Programs	Estimated Annual Water Savings after full Implementation (gallons)	Estimated Total Water Savings over Planning Period (gallons)	Annual Revenue Loss Related to Water Savings ($3.00 to $3.80/1,000 gallons)	Estimated Annual Cost	Estimated Total Cost over Planning Period including Set-up	Cost per 1000 Gallons Saved	Assumptions and Calculations
Unaccounted for Losses							
Recycle backwash at WTP	39,262,462	392,624,616	$0	$5,000	$50,000	$0.13	Recycling WTP backwash will continue to save 5% of water produced. Savings shown are those over savings in 2007.
Improved Leak Detection & Repair Program	23,134,642	231,346,419	$0	$15,000	$150,000	$0.65	Estimate savings of 0.3% of annual production until full implementation for a 1.5% total reduction in unaccounted-for losses (6.5% to 5%) within 5 years. Savings are split 70% for leak detection and 30% for meters, but will be combined as one program. Use average projected production for planning period (2008-2017).
Installing meters in the distribution system to pinpoint leak areas	9,914,847	99,148,465	$0	$20,000	$60,000	$0.50	
Subtotal - Gallons	72,311,950	723,119,500		$40,000	$260,000		
Acre-Feet	222	2,219					
Residential							
Inclining Block Rate water rate structure	11,178,700	111,787,000	$54,000	$54,000	$540,000	$4.83	New Surcharge in rate structure for water use over allotment. Estimate 30% reduction of total water use 56 water users in high water use area.
Existing Xeriscape Program	498,897	4,988,969	$1,896	$2,896	$28,958	$5.80	Assume 10% participation of new residences and 15% savings on outdoor use in planning period.
Landscape & Irrigation system standards for new development	4,010,524	40,105,237	$15,240	$15,740	$157,400	$3.92	Assume a 5.5% savings of ave. planning pd. new outdoor use (ave. outdoor use from 2002-2007 is 52% of total use) will be split between these 3 measures. Cost is for staff time to review policies.
Soil amendment ordinance for new landscapes	4,010,524	40,105,237	$15,240	$15,740	$157,400	$3.92	
Restrictive covenants ordinance	4,010,524	40,105,237	$15,240	$15,740	$157,400	$3.92	
Public education - improvement to website in addition to existing bill stuffers and annual newsletter	33,766,556	197,332,197	$128,313	$129,713	$1,298,379	$6.58	Assume 2% reduction of average residential use.
Children's water festivals	16,883,278	197,332,197	$64,156	$64,156	$642,190	$3.25	Assume 1% reduction of average residential use.
Send ET irrigation scheduling in water bill, website and spring newsletter	30,783,823	307,838,228	$116,979	$117,379	$1,173,785	$3.81	ET scheduling is sent in May water bill. Assume 3% savings of ave. projected outdoor water use (52%) of residential and commercial accounts.
Residential audit	14,543,750	80,236,750	$55,266	$55,755	$558,353	$6.96	Online instruction can be set up in website update. Estimate that by 2017, 20% of residential accounts will have participated (1,625). Assume annual participation of 163 and 5% savings of ave. household use (179,000 gal).
Rebate for low-flow toilets	4,735,656	26,046,108	$17,995	$19,995	$200,055	$7.68	Estimate 40 participants per year up to 400 of pre-1994 homes. (See Table 8.1 for savings assumptions)
Rebate for high efficiency clothes washers	1,145,224	6,298,732	$4,352	$6,352	$63,619	$10.10	Estimate 20 participants per year up to 200. (See Table 8.1 for savings assumptions)
Rebate for low-flow faucet	1,950,000	10,725,000	$7,410	$7,710	$77,200	$7.20	Average water savings of 6,500 gal. per household per year for 1.5 gpm faucets[1] (1.5gpm vs. 2.75gpm). Estimate 30 participants per year up to 300 of pre-1997 homes (4,900) and 2 faucets per home.
Rebate for wind and rain sensors for residential	2,559,700	14,078,350	$9,727	$11,102	$111,119	$7.89	Estimate appr. 1% of existing 2007 taps participation per year up to 550 homes. Assume 5% savings of outdoor use (52% of 179,000 gal/tap).
Rebate for ET (SMART) sprinkler system controllers	5,119,400	28,156,700	$19,454	$22,204	$222,137	$7.89	Estimate appr. 1% of existing 2007 taps participation per year up to 550 homes. Assume 10% savings of outdoor use (52% of ave 179,000 gal/tap).
Subtotal - Gallons	135,196,555	1,105,135,943	$525,268	$538,482	$5,387,994		
Acre-Feet	415	3,392					

Conservation Measures and Programs	Estimated Annual Water Savings after full Implementation (gallons)	Estimated Total Water Savings over Planning Period (gallons)	Annual Revenue Loss Related to Water Savings ($3.00 to $3.80/1,000 gallons)	Estimated Annual Cost	Estimated Total Cost over Planning Period including Set-up	Cost per 1000 Gallons Saved	Assumptions and Calculations
Unaccounted for Losses							
Commercial							
Commercial and Industrial water audits	3,642,883	33,690,767	$12,750	$15,250	$152,601	$4.53	Target 5 companies per year starting with highest users up to 20 companies. Top 13 companies ave. annual use from 2005 to 2007 is 66,418,333. Average use per comm. tap from 2002 to 2007 is 743,000. Assume 5% savings of annual use for top 13 taps and 7 taps at ave use. Audit will be performed by third party contractor.
Post commercial BMPs on website or as bill stuffers	8,549,826	85,498,255	$32,489	$33,589	$336,518	$6.06	Assume 3% reduction in average commercial use.
Requiring wind and rain sensors for commercial and open space irrigation	2,674,800	14,711,400	$9,362	$9,362	$120,465	$6.37	Assume 5% water savings on all irrigation tap use and 45% (outdoor) of commercial tap use . Assume participation is 54% of the projected commercial taps per year (ave. of 29) and all of the projected irrigation taps (ave. of 6) over the planning pd. Cost is for sensor and staff time to set up program (split with res. program).
Subtotal - Gallons	14,867,509	133,900,422	$54,601	$58,201	$609,584		
Acre-Feet	46	411					
Landscape							
Requiring wind and rain sensors for commercial and open space irrigation	1,644,000	9,042,000	$5,754	$5,754	$40,155	$6.37	Assume 5% water savings on all irrigation tap use and 45% (outdoor) of commercial tap use . Assume participation is 54% of the projected commercial taps per year (ave. of 29) and all of the projected irrigation taps (ave. of 6) over the planning pd. Cost is for sensor and staff time to set up program (split with res. program).
Irrigation system audit & improvements for existing irrigation taps	4,712,800	39,236,800	$16,495	$17,245	$172,648	$1.49	Assume 10 of 43 existing irrigation taps are targeted per year for a 20% savings [1] of 548,000 gal per tap. Studies show water savings of 20-50%. Set up cost is split between Irrigation and commercial audit programs. Audits performed by 3rd party.
Subtotal - Gallons	6,356,800	48,278,800	$22,249	$22,999	$212,803		
Acre-Feet	20	148					
Master Meter Communities							
Leak detection program in mobile home parks	1,002,243	10,022,430	$3,007	$3,007	$34,067	$3.40	Assume annual 5% savings of Mobile Home Park use after implementation.
Leak detection for master meter communities	2,242,830	22,428,302	$6,728	$6,728	$75,285	$3.36	Assume annual 5% savings of Master Meter Community use after implementation.
Subtotal - Gallons	3,245,073	32,450,733	$9,735	$9,735	$109,352		
Acre-Feet	10	100					
Grand Total - (Gallons)	231,977,888	2,042,885,398	$611,853	$669,417	$6,579,733	$3.22	
Acre-Feet	712	6,269					

The resulting goals after revising the calculation of water savings differ slightly from the goals established in Chapter 6. Table 8.4 compares the anticipated water savings from the selected measures with the original goals.

Table 8.4 – Water Conservation Goals Comparison

Water Use Categories:	2007 Water Use (AF)	Average of Projected Annual Water Use (2008 to 2017) (AF)	Reduction Goals for Planning Horizon (%)	Reduction Goals for Planning Horizon (AF)	Water Savings from Selected Programs (AF)	Resulting Reduction (%)
Residential	3,051	4,786	10%	479	415	8.7%
Commercial	503	810	5%	41	46	5.6%
Landscape	99	109	12%	13	20	17.9%
Master Meter Communities	208	207	5%	10	10	4.8%
Unaccounted-for Losses Including Recycling WTP Backwash: (reduction is loss at 6.5% minus loss at 5% plus 5% of ave. production for backwash recycling)	283	440	1.5%	101	222	3.3%
Total Demand Reduction:				644	712	
Total Water Production:	4,270	6,762				
Total Percent Reduction:				10%	10.5%	

Based on these calculated estimated water savings, the final goals for this water conservation planning horizon were adjusted and are as follows:

- Residential: 8.7%
- Commercial: 5.6%
- Landscape: 18%
- Master Meter Community: 5%
- Unaccounted-for Losses: additional 1.5%

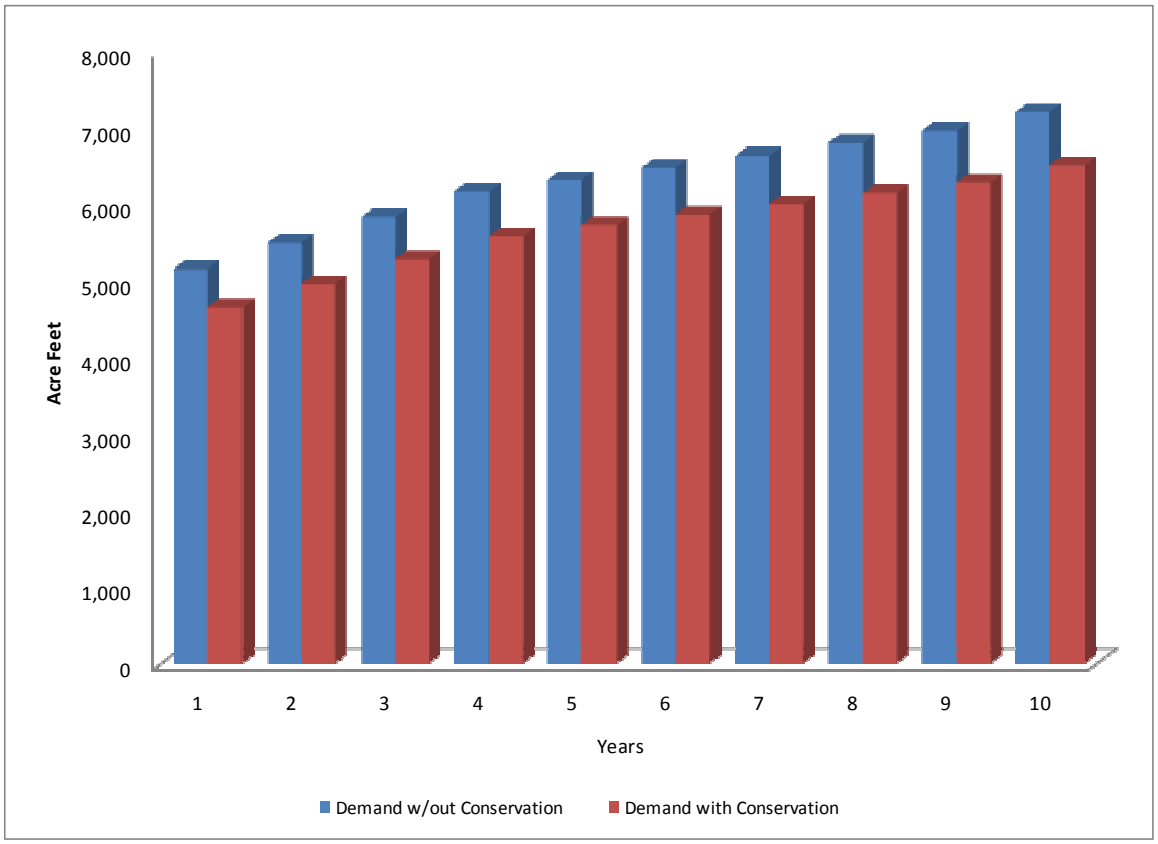
These goals provide an overall reduction in water use of 712 AF per year or 10.5% over the planning period.

CHAPTER 9 – FORECAST MODIFICATION AND RESOURCE INTEGRATION

Modified Demand Forecast

The demands for Residential, Commercial, Landscape, and Master Meter Community with and without water conservation are shown in Figure 9.1 for the ten-year planning horizon associated with this Water Conservation Plan. Savings associated with Unaccounted-for Losses are also considered. The water use with conservation is based on a savings of 8.7% for Residential, 5.6% for Commercial, 18% for Landscape, 5% for Master Meter Community, and 1.5% for Unaccounted-for Losses.

Figure 9.1 – Comparison of Demand Forecast with and without Conservation



The total water saved will be 712 AF per year and will reduce the total demand for the planning period by 10.5%.

Project Specific Savings

An annual savings of 712 AF equates to an average day demand of 0.64 MGD. A peaking factor of 2.8 was derived in the 2006-2007 Treated Water Master Plan and is used to determine peak day demand and to size the recommended infrastructure upgrades. Using this factor, a delay to capacity upgrades can be estimated based on the amount of water saved from conservation. Table 9.1 shows the recommended capital improvement upgrades and costs in the planning horizon and the amount of money that could be saved by delaying the upgrades.

To simplify this analysis, it was assumed that the capacity increases and associated costs all occur at Year 10. Since the upgrades are actually recommended in five and ten year increments, this analysis may slightly over estimate the cost savings. However, for the scope of this report the analysis is adequate.

Table 9.1 – Project Specific Water Savings

Proposed Capacity Increases Within 10-year Planning Horizon	Recommended Capacity Upgrades within 10 Years (MGD)	Upgrades Breakdown per Year (MGD)	Possible Delay (years)	Associated Costs for Upgrades within 10 Years	Present Value if Built in 10 Years	Present Value if Built in Delayed Year	Cost Savings[1]
Dodd WTP	6	0.6	3.0	$31,744,832	$23,621,136	$21,616,686	$3,115,193
Storage	5	0.5	3.6	$3,980,000	$2,961,494	$2,662,544	$422,438
Pumping at Dodd WTP	6.6	0.66	2.7	$396,730	$295,204	$272,560	$37,322
Pumping Eastern Region	2.3	0.23	7.8	$153,000	$113,846	$90,404	$24,234
						Total	**$3,599,187**

Notes: 1. Water Conservation Programs - A Planning Manual, AWWA Manual M52, pg. 77, formula (4-11)

While these capital improvement projects (CIPs) may still occur as scheduled due to other circumstances, the potential cost savings can illustrate the value to the District for implementing this Water Conservation Plan.

Cost Comparison – Water Acquisition and Capital Improvements vs. Water Conservation

The cost to acquire water supplies and infrastructure to meet projected demands can be calculated and shown as a cost per 1,000 gallons similar to each of the water conservation measures and programs. Considering that tap fees cover the cost of water acquisition and infrastructure repair and replacement, a cost comparison can be made.

Tap fees for a new service connection to the District include a Plant Investment Fee (PIF), water acquisition fee, meter/pit installation fee, and a line fee. This reflects infrastructure costs related to treatment and transmission as well as the current price to acquire water. The current tap fee equates to $85.68 per 1,000 gallons.

By 2017, the water savings is anticipated to be 712 AF from the projected demands or 232 MG. At $85.68 per 1,000 gallons, the cost of the infrastructure and water acquisition to provide the water saved would be approximately $20.0 million. The cost to acquire the water alone at the average current price of $9,500 per CBT unit ($13,500 per AF) is $9.7 million.

Table 8.3 shows that the overall unit cost for the entire plan by the end of the planning horizon is $3.22 per 1,000 gallons and the highest priced measure that was selected is $10.10 per 1,000 gallons. It also shows that the total cost of the conservation plan over the ten years including lost revenue is $6.6 million. The cost of the Plan without considering lost revenue is $57,500.

Revenue Effects

Due to the planned water conservation efforts, the potential annual operating revenue could be reduced by approximately $612,000 after all programs have been fully implemented. However, impacts to operating revenues should be offset by the structuring of water rates, as well as decreased costs related to water acquisition and capital construction.

The District maintains a sophisticated water rate model and can respond to changes in revenues to maintain rates that reflect the cost of service to its customers.

Benefits of Conservation

Between the cost savings from delaying CIPs and the comparison of water conservation to the price of tap fees, it is easy to see that water conservation is a cost-effective way to meet part of the projected water demand for the District. Other benefits with the Water Conservation Plan may be qualification for implementation grant money and lower customer water rates. Funding for the plan could come from increased tap fees and water rates. Since the plan is directed toward new growth and existing customers, the success of the plan is not completely dependent on new growth.

The majority of the future water demand will still be met by expensive water supplies like CBT and NISP participation, but the total requirement for new water will be less than projected according to the success of this Water Conservation Plan.

CHAPTER 10 – PLAN OF IMPLEMENTATION AND MONITORING

Implementation Schedule

All of the proposed water conservation measures and programs will require staff resources for planning and coordination before implementation. This will require some strategy in implementing the most beneficial measures first. Considerations in the implementation of the Water Conservation Plan are:

- Conservation in conjunction with already planned projects
- Time and effort involved in establishing the measure or program
- Initial capital investment
- Expected water savings

With these considerations in mind, the measures and programs have been separated into four distinct programs. Parts of each program can be implemented each year over the next three or four years starting in 2009. The leak detection program for the mobile home parks will require collaboration with the HOA and will be implemented according to their schedule.

The soonest possible approval of the Water Conservation Plan will be in the latter part of 2008. Research and set up of programs can begin upon approval and implementation of the selected measures will begin in 2009. The Audit and Rebate Programs will be set up first and be ready to implement in 2009. The education improvements will begin in 2009 and continue throughout the planning period. Likewise, research for each program will occur prior to the start date. The rest of the schedule is shown in Table 10.1.

The selected measures have been grouped into four programs to ease implementation and allow for easier monitoring set up. Looking at the water use per tap, as shown in Chapter 3, is one way to monitor water use per customer category. District population can be tracked according to tap equivalents and published people per household values. The GPCD can then be tracked from year to year to monitor progress.

Table 10.1 – Implementation Plan

Program	Estimated Cost	Action Required	Resources or Action Required	Start Date
Leak Detection Program				
Improved Leak Detection & Repair Program	$15,000.00	Staff scheduling	Funding	4/1/2009
Installing meters in the distribution system to pinpoint leak areas	$20,000.00	Staff scheduling	Funding	1/1/2010
Leak detection for master meter communities	$8,000.00	Collaboration with HOA's	Cooperation with Communities, funding and staff time	1/1/2011
Leak detection program in mobile home parks	$4,000.00	Collaboration with mobile home parks	Cooperation with Parks, funding and staff time	1/1/2011
Annual Total	$47,000.00			
Audit Program				
Residential water audit classes and kits	$1,289.00	Research and set up	Staff time	1/1/2009
Commercial and Industrial water audits	$2,600.00	Research and set up	Funding	1/1/2009
Irrigation system audit & improvements for existing irrigation taps	$950.00	Research and set up	Funding and staff time	4/1/2009
Requiring wind and rain sensors for commercial and open space irrigation	$100.00	Add to Policies	Staff time	1/1/2009
Landscape & Irrigation system standards for new development	$500.00	Add to Policies	Staff time	6/1/2009
Soil amendment ordinance for new landscapes	$500.00	Add to Policies		6/1/2009
Restrictive covenants ordinance	$500.00	Add to Policies		6/1/2009
Annual Total	$6,439.00			
Public Education Program				
Public education: improvement to website, increase in written material, participation in existing school programs, radio-meter reader checkout and offering WTP tours	$2,650.00	Research and hire web developer	Staff time and funding	4/1/2009
Children's water festivals	$625.00	Research and advertisement	Staff time	1/1/2009
Post commercial BMPs on website and/or as bill stuffers	$1,725.00	Research and obtain material		1/1/2009
Send ET irrigation scheduling in water bill, website and spring newsletter	$400.00	Calculate ET		4/1/2009
Annual Total	$5,400.00			
Rebate Program				
Rebate for low-flow toilets	$2,100.00	Research and set up	Staff time and funding	1/1/2009
Rebate for high efficiency clothes washers	$2,100.00	Research and set up		1/1/2009
Rebate for low-flow faucet	$400.00	Research and set up		1/1/2009
Rebate for wind and rain sensors for residential	$1,475.00	Research and set up	Staff time and funding	4/1/2009
Rebate for ET (SMART) sprinkler system controllers	$2,850.00	Research and set up		4/1/2009
Annual Total	$8,925.00			

Notes: If staff and financial resources allow, measures may be implemented sooner.
Audits and Rebates will be offered first come first serve based on a limited annual budget.
An additional $1,000 per year will be made available for implementation of the Public Education Program

Public Participation

Since LHWD has had a conservation program in place since 1996, the public has become familiar with the conservation concept and activities. The Districts public education program has contributed to this level of awareness. For this water conservation planning process, the public is notified of the 60-day comment period from May 19, 2008 to July 17, 2008 and how to submit comments. The plan will be available on LHWD's website and in its office for review. Written comments and responses to those comments will be included in Appendix C.

Monitoring and Evaluation

Monitoring the success of this Water Conservation Plan includes measuring water use as well as money spent on the selected conservation measures and programs. LHWD currently measures water use in its customer categories that have been targeted for water savings and will continue to collect that necessary data to measure success. Per-tap or tap equivalent usage can be calculated for each of the categories. Participants in the rebate and audit programs can be recorded and individual accounts tracked for specific water reductions.

Expenditures for conservation will be documented by District staff and reported to the Board on a regular basis. This will be valuable information in evaluating the benefit-cost ratio and to validate the success of implementing the selected conservation measures and programs. Since the programs will be implemented in phases, there will be time to evaluate and establish the appropriate method to monitor success of each program and measure.

Plan Updates and Revisions

The required schedule for updating the Water Conservation Plan is seven years. The progress towards achieving the water savings goals will be monitored on an annual basis by the District. LHWD will update this plan prior to seven years if implementation and actual water savings deviate too much. This deviation may be caused by several factors including higher than expected growth, less than anticipated participation and the inability to implement the plan due to lack of funding.

Plan Adoption and Approval

After the public comment period, the comments will be incorporated into the planning document as well as any additional revisions. The LHWD Board will adopt the Plan at the Board meeting on August 14, 2008 and the Plan will be submitted to CWCB following the Board Meeting.

CWCB will provide written notification of approval, conditional approval or disapproval within 90 days of submittal. Conditions for conditional approval or disapproval will be addressed if necessary.

REFERENCES:

American Water Works Association, 2006. Water Conservation Programs – A Planning Manual, Manual of Water Supply Practices M52.

The Brendle Group, June 2006. Northern Colorado Action Plan for Industrial, Commercial, and Institutional (ICI) Water Conservation.

Integra Engineering, March 9, 2007. Left Hand Water District 2006-2007 Treated Wter Master Plan.

Klien, Bobbie, Kenney, Doug, Lowrey, Jessica, and Goemans, Chris. Factors Influencing Residential Water Demand: A Review of the Literature (Updated 1/12/07).

Left Hand Water District, 2008. Comprehensive Water System Strategic Plan.

Left Hand Water District, District Policies.

Left Hand Water District, Drought Contingency Plan for the Left Hand Water District.

Left Hand Water District, Evaluation of Trends and Forecasts for Growth.

Left Hand Water District, 1996. Water Conservation Plan.

The Sear-Brown Group, March 1998. Left Hand Water District Eastern Region Wter Transmission Master Plan.

U.S. Environmental Protection Agency, 2007. Cases in Water Conservation: How Efficiency Programs Help Water Utilities Save Water and Avoid Costs.

U.S. Environmental Protection Agency, August 6, 1998. WATER CONSERVATION PLAN GUIDELINES , Appendix B.

Vickers, Amy, 2001. Handbook of Water Use and Conservation : Home, Landscapes, Business, Industries, Farms. WaterPlow Press, Amherst, MA.

Water Conservation Alliance of Southern Arizona, 2003. Evaluation and Cost Benefit Analysis of Municipal Water Conservation Programs.

Western Resource Advocates, 2006. Water in the Urban Southwest.

APPENDIX A

Public-Review Process

The Lefthand Water District held its public-review period from May 19, 2008 through July 17, 2008. Notification was posted in the Longmont Daily Times-Call and the Boulder Daily Camera on May 19, 2008 and the Left Hand Valley Courier on June 10, 2008 of the review period and that a draft plan would be available for the public to review at the LHWD office and on the LHWD website. The Water Conservation Plan was also posted as an item for public comment at the July 10, 2008 Board meeting.

Following is notification affidavits from the newspapers, the posting in the Left Hand Valley Courier and minutes from the July 10, 2008 Board Meeting.

Excerpt from LHWD July 10, 2008 Board Meeting Minutes:

The Board of Directors of the Left Hand Water District, meeting as the Board of the District and of the Left Hand Water Activity Enterprise, held their regular meeting on July 10, 2008, at the District offices, 6800 Nimbus Road, Longmont, Colorado. The meeting was called to order by Bob Juhl at 9:00 a.m.

SUBJECT: PUBLIC COMMENT

A Public Hearing was held regarding the 2008 Water Conservation Plan to allow for comments. No public was present to be heard. An implementation plan and list of proposed measures such as audits, incentives, rebates with an emphasis on educating our customers was discussed. Adoption of the plan is scheduled for August 14, 2008.

AFFIDAVIT OF PUBLICATION

DAILY TIMES-CALL

State of Colorado
County of Boulder

I, the undersigned agent, do solemnly swear that the DAILY TIMES-CALL is a daily newspaper printed, in whole or in part, and published in the City of Longmont, County of Boulder, State of Colorado, and which has general circulation therein and in parts of Boulder and Weld Counties; that said newspaper has been continuously and uninterruptedly published for a period of more than six months next prior to the first publication of the annexed legal notice of advertisement, that said newspaper has been admitted to the United States mails as second-class matter under the provisions of the act of March 3, 1879, or any amendments thereof, and that said newspaper is a daily newspaper duly qualified for publishing legal notices and advertisements within the meaning of the laws of the state of Colorado; that a copy of each number of said newspaper, in which said notice of advertisement was published, was transmitted by mail or carrier to each of subscribers of said newspaper, according to the accustomed mode of business in this office.

That the annexed legal notice or advertisement was published in the regular and entire edition of said daily newspaper once; and that one publication of said notice was in the issue of said newspaper date May 19 ,2008 .

Agent

Subscribed and sworn to before me this 20th day of May ,2008 .

Notary Public

FEE $ 21.12

ROXANNE HAGERMAN NOTARY PUBLIC STATE OF COLORADO

My Commission Expires 12/04/2010

Public Notice

Left Hand Water District (LHWD) has completed a draft Water Conservation Plan. The goal of the plan is for LHWD to develop strategies and programs for efficient and sustainable water use. LHWD completed a Water Conservation Plan in 1995. The existing conservation efforts from the 1995 Plan include:

- Demonstration Water Wise Garden
- Xeriscape Gardening Classes
- Water rates that encourage conservation
- Raw water used for irrigation within the District
- Aggressive leak detection and repair program
- Deferred Maintenance Program is collected from rates
- Public information in billing and newsletters
- Dry period watering restriction voluntary to mandatory depending on severity
- Encouraged modification of landscaping requirements for Boulder County to include low water use sod, less sod per landscape and xeric and water wise plants

Before finalizing the water conservation plan, LHWD welcomes input from its customers. LHWD shall have a 60-day public review period beginning the date of this notice through July 17, 2008. A complete draft copy will be kept at LHWD's office located at 6800 Nimbus Road, Longmont for you to review. LHWD will also post the plan on its website at www.lefthandwater.org.

All written comments are due to Kim Lane, Assistant Secretary, Board of Directors, prior to July 17, 2008 at P.O. Box 210, Niwot, CO 80544-0210 or may be dropped off at the office located at 6800 Nimbus Road.

Published in the Times-Call, Longmont, Colorado on May 19, 2008.

Proof of Publication/Invoice
(General – One Publication)

STATE OF COLORADO
COUNTY OF BOULDER

Tammie Fosterman, of lawful age, being first duly sworn upon oath deposes and says:

1. That she is the Financial Services Representative of Boulder Publishing, Inc., and has personal knowledge of all the facts set forth in this affidavit and is a competent person to certify that the facts stated herein are accurate and she hereby certifies:

That The Daily Camera is a public daily newspaper of general circulation as defined by law and is printed and published wholly in the City of Boulder, County of Boulder and State of Colorado: That it has been admitted to the United States mails as second class matter under the provisions of the Act of Congress of March 3, 1879, and amendments thereto: And that it is a legal newspaper duly qualified to publish legal notices of advertisement which are required to be published in said City of Boulder and said County of Boulder or both.

2. That The Daily Camera is duly qualified to publish the annexed public notice, which is a full, true and correct copy of the original thereof, and the same was published in The Daily Camera on the 19th day of May.

Further affiant sayeth not.

TAMMIE FOSTERMAN

Subscribed and sworn before this 21st day of May, A.D. 08. Witness my hand and official seal.

Notary Public

Publication Fee/Amount Due $ 40.92

Account Number: 102857

Ad Number 5418141

The Prairie Mountain Publishing Company LLC
dba The Daily Camera
P.O. Box 4579
Boulder, CO 80306-4579

2500 Public Notice 2500 Public Notice 2500 Public Notice

PUBLIC NOTICE

Left Hand Water District (LHWD) has completed a draft Water Conservation Plan. The goal of the plan is for LHWD to develop strategies and programs for efficient and sustainable water use. LHWD completed a Water Conservation Plan in 1995. The existing conservation efforts from the 1995 Plan include:

- Demonstration Water-Wise Garden
- Xeriscape Gardening Classes
- Water rates that encourage conservation
- Raw water used for irrigation within the District
- Aggressive leak detection and repair program
- Deferred Maintenance Program - collected from rates
- Public information in billing and newsletters
- Dry period watering restriction-voluntary to mandatory depending on severity
- Encouraged modification of landscaping requirements for Boulder County to include low-water use sod, less sod per landscape and xeric and water-wise plants

Before finalizing the water conservation plan, LHWD welcomes input from its customers. LHWD shall have a 60-day public review period beginning the date of this notice through July 17, 2008. A complete draft copy will be kept at LHWD's office located at 6800 Nimbus Road, Longmont for you to review. LHWD will also post the plan on its website at www.lefthandwater.org.

All written comments are due to Kim Lane, Assistant Secretary, Board of Directors, prior to July 17, 2008 at P.O. Box 210, Niwot, CO 80544-0210 or may be dropped off at the office located at 6800 Nimbus Road.

Published in the Camera on May 19, 2008 - 5418141

LHVC June 2008

The Water We Drink

By Karen Copperberg
KarenC@lhvc.com.

Have you been wondering lately how clean your water is? Well, you aren't alone. As you might have noticed in recent news articles, many municipal water systems have run into trouble.

The recent salmonella contamination in Alamosa occurred because that city did not practice chlorination. Left Hand Water District, which serves the majority of the *Courier*'s readership, regularly disinfects with chlorine.

In fact, chlorine is added to the water again at a booster pump near Erie, since that is farther from the main entry and sanitation point, and requires additional chlorine at that distance to attain the optimum of 1 ppm.

According to Hank Schmidt, Water Treatment Manager for Left Hand Water District, we are lucky to be close to headwaters, mostly (Lake Isabella and Carter Lake),. Source water there, all surface rivers and lake water, is at lower risk to be contaminated by pharmaceuticals, another worry you may have read about.

While those tests are not currently required, and since Left Hand Water was not considered to be at high risk for contamination by pharmaceuticals, it was not part of the study on pharmaceuticals in the water supply.

Schmidt said that while Left Hand Water is not able to rule out the possibility of pharmaceuticals, they are likely to be present in only minimal, and probably negligible, amounts.

Left Hand Water compiles an annual water quality report. While the report is annual, some of the test data in the current report is from 2005, because some tests are only required every three years.

Cryptosporidium, microbial bacteria capable of causing disease, is addressed in the water report. The water company is required to put a disclaimer explaining the disease-causing capabilities, even though only small amounts were detected in the raw water and none was found in the finished water.

The cleanup of mines in the mountains capable of leaching undesirable metals and contaminants into our water is an ongoing concern. Volunteers to monitor the water draining into Lefthand Creek are being sought by the Lefthand Watershed Oversight Group.

The creek drains an 85 square mile area in unincorporated Boulder County, and provides some of the drinking water for our district. The approximately 18,000 residents and agricultural producers fed by the creek via Left Hand Water include tap holders as far as I-25 in Weld County.

In other district news, Corey D. Heil, Bo Shaffer and Paul Schlagel were re-elected to four-year terms on the board of directors May 6. Each ran unopposed. Voters also passed a ballot issue extending term limitations on directors from eight to 12 years.

For the current water quality report and other information about Left Hand Water, see ***www.lefthandwater.org.***

For information about the Lefthand Watershed Oversight Group, see ***www.lwog.org.***

A diagram of the treatment process used by Left Hand Water is available online at the Courier's website, ***www.lhvc.com,*** *courtesy of Left Hand Water.*

Left Hand Water District (LHWD) has completed a draft Water Conservation Plan. The goal of the plan is for LHWD to develop strategies and programs for efficient and sustainable water use. Before finalizing the water conservation plan, LHWD welcomes input from its customers. LHWD shall have a 60-day public review period beginning the date of this notice through July 17, 2008. A complete draft copy will be kept at LHWD's office located at 6800 Nimbus Road, Longmont for you to review. LHWD will also post the plan on its website at www.lefthandwater.org.

APPENDIX B

LHWD Board Plan Adoption

RESOLUTION OF THE LEFT HAND WATER DISTRICT
REGARDING ADOPTION OF A WATER CONSERVATION PLAN

RESOLUTION 2008-05

Whereas, the Board of Directors of the Left Hand Water District ("District") recognizes the importance of conserving water and improving water use efficiency; and

Whereas, under the Colorado Revised Statute 37-60-126 prompted by the Water Conservation Act of 2004, water providers delivering over 2,000 acre feet or more per calendar year are required to develop, adopt, and make publicly available and implement a water use efficiency plan; and

Whereas, a Draft Water Conservation Plan ("Plan") that describes the role of water use efficiency plans in the District's water supply planning was presented for review and comment at the Board meeting held on May 15, 2008 and

Whereas, a public notice announcing the availability of the Plan for review and comment was published and the Plan was publicly available for a period of not less than sixty (60) days and public was invited to be heard at the Board meeting held on July 10, 2008; now, therefore,

BE IT RESOLVED, that the Board of Directors of the Left Hand Water District hereby adopts the Water Conservation Plan attached hereto as Exhibit "A" and incorporated herein by reference.

Passed and adopted at a regular meeting of the Board of Directors of the Left Hand Water District held this 14th day of August, 2008.

By: _____
Bob Juhl, President

ATTEST:

_____
Ned Swaeby, Secretary

APPENDIX C

Public Comments and Response

Lefthand Water District held its public-review period from May 19, 2008 through July 17, 2008. We provided notice in the Longmont Daily Times-Call and the Boulder Daily Camera on May 19, 2008 and the Left Hand Valley Courier on June 10, 2008 that a draft plan would be available for the public to review at the LHWD office. We also posted the entire draft plan on our District website. The 60-day review period is completed, and we received only a few written comments on the plan, but have had several informal comments via phone to employees.

The Water Conservation Plan was also posted as an item for public comment at the July 10, 2008 Board meeting. Although no public attended the meeting, the Board gave valuable input to the staff in a wide-ranging discussion. All board members are also customers of the District. Emphasis from the Board was on the Audit Program, Rebate Program, Education Program and wind and rain sensors for irrigation systems and providing customer access to the radio-read meters. Appropriate revisions were made to the Plan to accommodate the comments from the Board members.

The public comments are summarized as follows with a bulleted response after each comment.

The majority of requests for the plan have been to institute rebates, and to do so soon, before the 2011 anticipated in the plan.

- Revisions were made to the implementation plan to start the Rebate Program in January of 2009.

Water irrigation audits are also an item that has drawn positive comments and requests from the public to be included in the plan.

- The Audit Program has also been moved ahead and scheduled to start in January of 2009.