City of Lafayette

Water Conservation Plan

May 2009

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Executive Summary

The 2009 Water Conservation Plan supersedes the plan prepared in March 1997 and fulfills statutory requirements under C.R.S. §37-60-126, the "Water Conservation Act of 2004." The goals of this plan are to reduce annual water consumption by 596.4 acre feet per year through reductions in outdoor and indoor water use and to reduce system-wide water loss to 5% for a savings of 232.7 acre feet per year. This plan will be revised in 2016 unless the annual review shows that changes are needed sooner.

Since the drought and water shortages of 1976, the City has developed a comprehensive water conservation program that includes:

- A tiered water rate structure introduced in 1981
- Supply and demand management
- The development review process
- Water-wise landscape construction and maintenance practices
- Public education

Lafayette's current conservation program has reduced both overall water consumption and peak demand as demonstrated by lower water consumption since the drought of 2002. In a study completed in 2007 by Western Resource Advocates,[1] only two Colorado Front Range cities showed lower water use (measured in gallons per capita per day or GPCD) in 2006 than Lafayette: Boulder, with a *system-wide* GPCD of 148; and Colorado Springs, with a *residential* GPCD of 96. Lafayette was not included in that study, but for the same period, Lafayette's system-wide consumption in GPCD was 150 with a residential GPCD of 104.

This plan continues or expands our all of current programs and adds several others in order to meet specific, measurable goals:

1. Reduce total water use in 2016 by 507.4 acre feet through a combination of various demand-side measures.
2. Reduce system-wide water loss to 5% or less per year through improved distribution system efficiency measures and programs.

The City will add several new measures and programs to its existing conservation efforts to accomplish the above goals.

[1] Western Resource Advocates (http://www.westernresourceadvocates.org/index.php) is a nonprofit group dedicated to sustainable management of water, energy and land resources in six western states (Colorado, Utah, Nevada, New Mexico and Idaho). The study referred to is *Front Range Water Meter: Water Conservation Ratings and Recommendations for 13 Colorado Communities, 2007.*

1. **Post-Construction Follow-up to Municipal Code Section 26-19-5[2].** This program would compare actual irrigation use with projected irrigation use in new commercial and residential development. This code requires the use of water efficient design principles in new commercial developments and common areas of residential developments. The effectiveness of this code is assumed, but actual analysis of savings over time has not been verified or quantified. Beginning in 2009, detailed records will be kept regarding water consumption, or any changes or additions to the property or landscaping that affect the demand on the water utility. Projected water savings is 10.2 AFY.
2. **Irrigation System Upgrades.** The second program targets outdoor water use. This program is a rebate program for irrigation system upgrades and will be tied to the current irrigation audit program performed by the Center for Resource Conservation (CRC). This program is dependent upon finding a contractor that can provide turn-key project management. It is anticipated that this program will cost $2,500 annually and save approximately 0.9 AFY.
3. **Improved Water Accounting and System-wide Leak Detection.** Lafayette will perform a yearly AWWA top-down water audit and begin tracking water used for maintenance as well as water lost due to main breaks and leaks. Beginning in 2010, the City's budget will contain money to perform a leak detection survey on City water lines. This program will require the assistance of an outside contractor and is expected to reduce system-wide water loss by 232.7 AFY.
4. **Fixture Replacement.** This program will initially concentrate on City facilities, beginning with the showerheads at the Bob L. Burger Recreation Center and the faucets and toilets, faucets and urinals at City Hall with projected water savings of 4.7 AFY.
5. **Rate Structure Changes to Billing System.** The City will add two more tiers to its current five-tier billing structure. The projected water savings from the addition of these two tiers is 263 AYF.
6. **Water Efficient Commercial Processes.** This program will replace high-use pre-rinse spray nozzles with low-flow nozzles in sit-down restaurants. Annual estimated savings is 6.9 AFY.

The effectiveness of this Conservation Plan depends on the community's response to and participation in our conservation measures and programs. In order for the public buy in to water conservation behavior, it must understand the why and how of water conservation. Further, the City must demonstrate to the public that water conservation programs and measures are paying off. Lafayette will accumulate accurate data, analyze trends between demand and conservation measures, evaluate the effectiveness of individual conservation programs, and share this information with the public through the Public Works Department web pages. This plan will be revised in 2016.

[2] See Appendix A. Section 26-19-5. *Landscaping Regulations and Guidelines.*

Introduction

In response to the drought and water shortages of 1976, the City began to implement a program based on:

1. Reasonable cost
2. Quantifiable water savings
3. Community acceptance

Our strategy has gained the support and participation of the community. It is compatible with our water supply system, water resources management strategy, and community values while controlling costs and fostering conservation.

The following table, based on a study completed by Western Resource Advocates,[3] shows system-wide water use for eleven Front Range Colorado communities in 2006, the warmest year on record in the United States.

Community	Residential Gallons Per Capita Per Day (GPCD)	System-Wide Gallons Per Capita Per Day (GPCD)
Boulder*	134	**148**
Aurora	127	152
Ft. Lupton	143	171
Colorado Springs*	**96**	174
Louisville	119	175
Erie	120	176
Broomfield	111	181
Longmont	132	195
Berthoud	109	203
Loveland	123	203
Denver	137	182

*Low users in each category.

Lafayette's water usage during the same period was:

	Residential Gallons (GCPD)	System-Wide Gallons (GCPD)
Lafayette	104	150

[3] Western Resource Advocates, *Front Range Water Meter: Water Conservation Ratings and Recommendations for 13 Colorado Communities, 2007.*

Lafayette's conservation approach targets both inside and outside water use. Elements of the program include:

- Tiered water rate structure
- Supply and demand management
- Development review Process
- Landscape construction and maintenance practices
- Use of untreated water (taken downstream from Louisville's wastewater treatment plant to irrigate landscaping along Hwy. 287)
- Reuse of Water Reclamation Plant return flows (approximately 60%)
- Public Education

The Table 1 provides a description of each of the measures and programs planned or currently implemented by the City of Lafayette. Current programs and measures will be continued. Table 1A shows the estimated water savings from current conservation programs.

Table 1. Current and Planned Measures and Programs

Conservation Measures / Programs	Continuing / Beginning Date	Description
Landscape and Irrigation Efficiency in Parks		
Drought resistant vegetation Low water use landscapes Scheduling	Continuing	Parks, Open Space and Golf plants drought resistant vegetation, uses low water landscapes when appropriate and irrigates during the evenings and night when evaporation is at its lowest.
Moisture sensors	Continuing	Installation of moisture sensors at all existing parks and at Indian Peaks Golf Course. These sensors will detect precipitation and shut off the irrigation system if it is raining or if maximum moisture levels have been reached.
Evapo-transpiration (ET) controllers	Continuing	Indian Peaks Golf Course has an on-site weather station that monitors weather and calculates evapo-transpiration. A similar system is in place for all Parks landscaping.
Policies Addressing New Parks		
Design/layout Soil preparation Irrigation equipment	Continuing	During the design of any City project, water requirements are evaluated and conservation methods are required.
Water Efficient Fixtures		
Commercial and Residential	January 2010	Replacement of pre-spray nozzles for restaurants
Fixture replacement program	January 2010	Showerheads will be replaced at the Recreation Center. Toilets, urinals and faucets will be replaced at City Hall.
Landscape & Irrigation Efficiency for New Homes and Businesses		
Covers design and layout, soil preparation and irrigation equipment	Continuing / January 2010	Established by Ordinance. Data gathering is currently underway to establish effectiveness of this measure for water conservation.

Conservation Measures / Programs	Continuing / Beginning Date	Description
Landscape & Irrigation Efficiency for Existing Homes and Businesses		
Rebate program for irrigation system upgrades	January 2012	Rebates for approved rain sensors and shut-off devices, ET controllers or soil moisture sensors. Would require outside contract for administration.
Customer irrigation audit	Continuing	Lafayette provides a free irrigation audit program for all Lafayette utility customers with in-ground irrigation systems. The audit program identifies and provides solutions for irrigation inefficiencies.
Metering & Billing		
Tiered billing structure	Continuing / Additional tiers May 2010	Lafayette bills customers according to a tiered rate structure. The amount per 1000 gallons of usage increases as usage goes up. The City will add two additional tiers to the billing structure to discourage high-end water use.
Billed metered consumption	Continuing	All accounts are metered. Lafayette completed change to radio-read meter reading in 2008.
Meter service connections and meter replacement program	Continuing	All meters will be tested annually and repaired or replaced if necessary.
Plumbing Fixture Replacement	January 2010	Fixtures will be replaced in City facilities: toilets, urinals, and faucets in City Hall; shower heads in the recreation center.
Distribution / Treatment System Efficiency		
Leak detection program	2010	Budget and contract for system-wide leak detection survey.
Improve record keeping of authorized, nonmetered uses	2010	Begin a program to track and estimate unmetered authorized uses such as maintenance, fire-fighting, etc.
Public Education		
Informative and understandable water bill	Continuing	Lafayette's water bill provides each customer with information on how much water was used during the billing cycle as well as water used during the same cycle of the previous year. There is also room on the bill for special announcements.
Xeriscape and turf irrigation classes	Continuing	Free classes on Xeriscape, turf irrigation and related topics are offered each year to all Lafayette water customers on a first-come, first-served basis.
Distribution of educational materials	Continuing	Lafayette uses public access TV (Channel 8), its website, e-mail distribution list, City newsletter and pamphlets to convey water conservation information. Lafayette plans to expand its website coverage of conservation topics.
Additional Regulations & Ordinances		
Water restrictions	Continuing (for drought periods only)	Watering restrictions are currently voluntary, but the City reserves the right to impose irrigation regulation during times of drought or other emergencies.

Table 1A. Current Conservation Activities

Water Conservation Measure & Program	Approximate Current Annual Water Savings (AF)	Implemented	Plan to Continue
Rate Structure	Unable to quantify	1981	Yes
Informative Water Bill	Unable to quantify	2000	Yes
Irrigation Audit Program (1)	1.9	2004	Yes
Xeriscape Seminars	Unable to quantify	2004	Yes
Public Education Programs	Unable to quantify	2004	Yes
Lafayette Comprehensive Plan	Unable to quantify	2003	Yes
Landscaping/Irrigation Requirements	To be determined in this Plan	2004	Yes
Water Shortage Management Plan	Savings only during drought emergency	2000	Yes
Lafayette Parks & Golf Course (2)	344.0	1992	Yes
Water Reuse System (3)	1,478.6	2003	Yes
Distribution System Efficiency (4)	125.3	1999	Yes

(1) Total of single family residents, commercial & HOA audits.
(2) The US 287 Highway landscape irrigation saves 130 a-f annually and is included in this total savings figure and the Water Reuse System Water savings figure.
(3) This is annual savings for 2008 only.

(4) Based on a 3% savings of keeping water meters accurate

Water Conservation Plan

1 Existing Water System Profile

1.1 Physical Characteristics

The City of Lafayette is a small city located in the southeastern portion of Boulder County. The City provides water service to over 8,000 accounts both within the city limits and in adjacent areas. Outside the city limits, the City also provides water to two water districts. The City provides wastewater collection and treatment services to its in-city water customers.

The Baseline Water Treatment Plant (WTP) on the south side of Baseline Road in western Lafayette is currently the only water treatment plant serving Lafayette. This WTP has a current capacity of 13.0 MGD (million gallons/day). The WTP had maximum day demands of 9.6 MGD in 2006 and 2007 and 10.2 MGD in 2008.

The distribution system is divided into three pressure zones: Blue, Orange and Red. The following table, adapted from the Water System Master Plan for the City of Lafayette (Master Plan), developed by McLaughlin Rincon in May 2004, shows the zones, the high and low service elevations, and the demand in each zone for both a "normal" year (2001) and at projected build-out.

Table 2. Distribution System Zones

Zone	High Service Elev. (feet)	Low Service Elev. (feet)	2001 Peak Demand (MGD)	Peak Demand at Build-Out (MGD)
Blue	5450	5280	1.0	3.1
Orange	5320	5145	4.9	7.9
Red	5250	5100	3.1	6.8
		Total Peak Demand	**9.0**	**17.8**

The City of Lafayette's water system is adequate for current demands, but will probably require additional treatment, storage and transmission facilities to provide water service when the City reaches full build-out (the City of Lafayette Comprehensive Plan estimates a population of 35,083 in 2022). Lafayette's estimated population at the end of 2008 was 25,341. In 2008, the total population served by Lafayette's water system, including out-of-city customers, was approximately 27,034 (estimate provided by Community Development Department).

The distribution of the City's water connections and water sales at the end of 2008 is shown in the table on the following page:

Table 3. Water Connections and Sales - 2008

Type of Connection	Number of Connections	Water Sales in Thousands of Gallons	Water Sales in Acre Feet (rounded)
Residential, single-family	7,176	745,784	2,289
Residential, multi-family	463	201,350	618
Commercial	339	156,952	482
Industrial	12	12,029	37
Industrial (Permitted Dischargers)	19	31,563	97
Irrigation	201	182,967	562
Districts	2	30,223	93
Totals	**8,212**	**1,360,868**	**4,176**

1.2 Sources of Water

The City of Lafayette receives snowmelt runoff from South Boulder Creek, Boulder Creek and Coal Creek. This water flows into the Baseline, Waneka and the two Goose Haven reservoirs from nine ditches: Coal Ridge, Davidson, Dry Creek 2, Dry Creek Carrier, Enterprise, Goodhue, Leyner-Cottonwood, Lower Boulder, and South Boulder & Bear Creek.

When needed, Colorado-Big Thompson (CBT) and Windy Gap water is delivered to the Goose Haven #1 Reservoir through the Boulder Feeder Canal, Boulder Reservoir, Boulder Creek Supply Canal, Boulder Creek, and the 75th Street Pipeline.

1.3 Planning for the Future

Since the droughts of 1976 and 2002, the City of Lafayette has aggressively pursued water rights acquisition so that even during times of drought, our customer's can be assured of adequate water supplies to meet basic needs.

In 1997, the City purchased controlling shares of Base Line Reservoir. The City successfully petitioned for inclusion in the Northern Colorado Water Conservancy District, and added raw and potable water storage facilities. Lafayette is also actively involved in the Northern Integrated Water Supply Plan (NISP) and Windy Gap Firming regional water supply projects. The 75th Street Pipeline, begun prior to the 2002 drought, provides a delivery system for the City's South Boulder Creek water rights, as well as water delivered from the Colorado Big Thompson project (CBT), Windy Gap, and NISP. Any new development with a projected total annual water use of five acre-feet or more is required to dedicate units of Colorado Big Thompson water to the City.

The *2004 Water System Master Plan* for Lafayette proposes future improvements to the water system based on population and use assumptions at build-out. Future improvements include an additional 2 MG Red Zone tank in the southern portion of the city, a peaking water treatment plant of up to 6 MGD, and an additional 2 MG Blue Zone tank. Since Lafayette's growth, per ordinance, is limited to a maximum of 200 new single-family

units per year, the exact year of build-out is not known. Our existing facilities are sufficient for current demand.

1.4 Water Billing

The City bills all water customers monthly for water utility services. The utility bill consists of the following components:

- A fixed fee for storm drainage
- Wastewater fee – a fixed monthly charge plus a volume charge based on the customer's average winter water usage (November – January)
- Water use fee – A fixed monthly service charge (based on tap size) plus a tiered volume charge based on water usage

1.5 Water Rates

Lafayette was the first city in Colorado to use a tiered or increasing block water rate structure. In this rate structure, the unit price for water increases in steps as the volume consumed increases.

The following table shows the current water rates for residential customers with a 5/8" water meter. These rates represent the last of a four-year series of increases beginning in 2003, which increased the rates a total of 41% over that period. Residential customers located outside the city limits of Lafayette pay double the in-city rates. Customers are also billed a fixed water service charge.

Table 4. Current Water Rates

Residential Water Service Charge	**$9.15**
Plus Usage:	
1,000 – 5,000	$1.91 / kgal
6,000 – 10,000	$2.44 / kgal
11,000 – 15,000	$3.20 / kgal
16,000 – 20,000	$4.26 / kgal
21,000 and above	$5.79 / kgal
Residential Wastewater Service Charge	**$7.62**
Plus Usage:	
Tier One – 0 to 5,000	$0.79 / kgal
Tier Two – 5,000 – 10,000	$0.86 / kgal
Tier Three – 11,000 and above	$0.93 / kgal

This rate structure sends a strong message to customers about the value of the water they are using and the dollar benefits of conservation. It is also very effective in encouraging conservation and reducing peak flows

Both monthly residential and nonresidential wastewater charges are based on the average water consumption during the months of November, December and January. In March,

the rate is adjusted for the following 12 months. This gives customers an incentive to reduce indoor water use.

Non-residential wastewater service charges are higher than those for residential customers as shown in the table.

Table 5. Non-Residential Wastewater Charges

Basic Monthly Charge	Tier One* (per 1,000 gallons)	Tier Two* (per 1,000 gallons)	Tier Three* (per 1,000 gallons)
$10.75	$0.98	$1.32	$1.56

*Tier One – 0 to 10,000 gallons per month
Tier Two – 11,000 to 20,000 gallons per month
Tier Three – 21,000 gallons per month and above

1.6 Development Fees and Utility Tap Fees

The dedication of water rights occurs with the platting of properties and is based on proposed use. For nonresidential uses, water rights may be dedicated at the time of platting or can be deferred until the issuance of a building permit. The amount of water rights dedication for nonresidential uses is based on projected annual water use based on the planned use of the property.

Residential Water Rights Dedication

Single-Family Dwelling	0.75 acre-feet per unit
Multi-Family Dwelling, including duplexes	0.375 acre-feet per unit
Accessory Dwelling / Apartment	0.25 acre-feet per unit

Nonresidential Water Rights Dedication

In most nonresidential subdivisions, water rights dedication is required at the time the building permit is issued. The water rights dedication amount is based on the proposed land use and the projected annual water use.

Any development with a projected total annual use of five acre-feet or more is required to dedicate units of Colorado Big Thompson (CBT) water. Developments with a projected total annual water use of less than five acre-feet may pay a cash in-lieu fee, subject to approval by the Director of Public Works. The cash in-lieu fee is subject to periodic change based on the market value fluctuation of CBT units. If the projected number of CBT units results in a fraction, the total number of CBT units is rounded up to the next whole number.

Acre-foot Yield per CBT Share

One CBT share yields 0.7 acre-feet of water

Cash-in-Lieu Fee

$12,000 per acre-foot. Along with the dedication of water rights, developments are required to pay a Windy Gap/Northern Integrated Supply Project (NISP) Supplemental Water fee for each acre-foot of water dedicated.

Windy Gap/Northern Integrated Supply Project (NISP) Supplemental Water Fee
$5,021 per acre-foot of dedicated water

Nonresidential water meter sizes are determined using the plumbing code flow rates. Continuous flow rates are used for irrigation applications. Meters are installed by the City of Lafayette.

Table 6. Non-Residential Utility Tap Fees

Water Meter Size	Maximum Peak Flow (GPM)	Allowable Continuous Flow (GPM)	Meter Fee	Water Tap Fee	Wastewater Fee
5/8"	20	1-10	$300	$7,800	$5,300
¾"	30	11-15	$330	$9,360	$6,360
1"	50	16-25	$370	$13,026	$8,851
1-1/2"	100	26-50	$585	$25,974	$17,649
2"	160	51-80	$754	$41,574	$28,649
3"	320	81-320	$2,162	$83,226	$56,551
4"	500	321-500	$3,155	$130,026	$88,351
6"	1000	501-1000	$5,843	$259,974	$176,649

Residential Utility Tap Fees

Water Service Fee

Single family with 5/8" water meter		$ 7,800
Single family with a ¾" water meter		$ 9,360
Duplex dwelling (2 unit multi-family)		$14,625
Multi-family dwelling	$7,800 per structure plus	$ 4,290 per unit
Accessory dwelling		$ 4,290

Wastewater Tap Fee

Single family with 5/8" water meter		$ 5,300
Single family with ¾" water meter		$ 6,360
Duplex dwelling		$ 9,940
Multi-family dwelling per unit	$5,300 +	$ 2,870 per unit
Accessory dwelling		$ 2,870

2 Water Use and Demand

2.1 Historic Usage

Population, land use, climate conditions, drought awareness, and conservation efforts affect water usage within the city. The table below shows water use per capita for the Lafayette since 1997. This table shows a reduction in per capita water usage in 2003 following the 2002 drought, further reduction in 2004, followed by increases in 2005 and 2006, a particularly hot dry summer. Water use fell again in 2007 and 2008.

Table 7. Historic Usage (GPCD)

City of Lafayette Gallons per Capita per Day (GPCD)		
Year	**Total System GPCD**	**Residential GPCD**
1997	130	108
1998	148	119
1999	134	106
2000	150	118
2001	151	118
2002	104	85
2003	130	98
2004	119	89
2005	133	94
2006	150	104
2007	139	98
2008	138	97

Given all the variables in water use, it is difficult to quantify the amount of water savings attributable to individual conservation efforts. Water use in 2002 was at its lowest due to drought awareness—restrictions on outdoor use, widespread regional news coverage and local customer educational efforts. Beginning in January 2002, water rates were increased 9% each year over a four-year period, a total compounded rate increase of 41% over the four-year period. That, combined with other conservation programs, has prevented our residential GPCD from rising to pre-drought levels. In 2008, our residential GPCD was 18% below residential usage in 2001 while our total system GPCD was 9% below the 2001 GPCD.

2.2 Projected Potable Water Demand at Build-Out

Based on projected development (based on land use and number of acres or units) taken from Lafayette's Comprehensive Plan, the table below estimates Lafayette's water demand at build-out. This table is reproduced on the following page from the *2004 Water System Master Plan* developed by McLaughlin-Rincon.

Table 8. Projected Potable Water Demands at Build-Out

	Acres or Units	Acre-Ft./Acre or Unit	Average Acre-Ft. per Year	Allowed Treatment Loss of 1.50%	Dry Year Design
Parks	112	3.00	336	341	355
Single Family	8,097	0.50	4,048	4,109	4,264
Multi-Family	6,123	0.25	1,531	1,554	1,613
Office	365	1.04	379	385	400
Institutional/Public	204	1.03	210	214	222
Retail	447	1.61	719	730	758
Industrial	706	0.40	282	287	298
Total			**7,505**	**7,620**	**7,910**

During dry years, inside building potable demands are not expected to increase significantly. Assuming strict irrigation conservation practices, dry year irrigation demand would increase approximately 8 percent. This results in a dry-year design potable requirement of approximately 7,910 acre-feet.

3 Proposed Facilities

Lafayette will experience slow growth within the next few decades because of growth restrictions currently in place. Developers are required to dedicate water rights to the City based on predetermined projected uses as described in *Section 1.6 Development Fees and Utility Tap Fees*. Potable transmission lines will be built as needed as development continues and will depend upon rate of development.

Land acquisition is currently underway at the Goose Haven Reservoir complex to increase storage of non-potable and raw water.

The goals for water treatment storage outlined in the *Water System Master Plan* (May 2004, prepared by McLaughlin Water Engineers) include:

- Providing adequate pressures during fire and peak hour flow in all areas of the system.
- Providing multiple points of treated water input into the distribution system to reduce the size of transmission lines required and add reliability if tanks are taken out of service for maintenance.
- Maintaining the largest amount of storage in the higher zones in order to reduce operational costs and ensure water delivery to all water zones if a portion of any supply point is taken out of service.

In order to provide for the above, proposed changes to the system include an additional 2 MG Red Zone storage tank in the southern part of the City, a peaking water treatment plant of up to 6 MGD and an additional 2 MG Blue Zone tank.

These recommendations are based assumptions regarding peak day demands on Lafayette's water system based on historical data and projected customer use. In 2001, existing development exerted a design maximum daily demand of approximately 9.85 MGD. The Water Master Plan applied the same unit demands to projected growth to estimate future daily demand. Using this data, The Water Master Plan projects peak day demand during an average year at 17.0 MGD. Future improvements to the water system are based on these numbers. Our current Water Treatment Plant has a production capacity of 13.0 MGD and a total of 13 MG of potable water storage.

4 Conservation Goals

1. **Annual Water Use Reduction.** In 2008, Lafayette water users consumed 4,176 AF of water. It is anticipated that by 2016, when this Water Conservation Plan will be updated, the City will save 596.4. The main focus of this plan is on reducing outdoor water consumption while a smaller portion targets indoor water use. This will result in a 12.7% reduction in overall water consumption in 2016. This is detailed in Section 7.
2. **Reduce System-Wide Water Loss to 5% or Less.** Unaccounted for water loss reached a high of 13.2% in July 2008 based on water sales vs. water production numbers. In September 2008, water loss was at 12.3%, falling to 8.5% in May 2009. Three major leaks were repaired during this timeframe. Reducing system-wide water loss from 8.5% to 5% would save 232.7 AF annually.

5 Conservation Measures and Programs

5.1 Rate Structure and Billing System

Section 120-58 of the Code of City Ordinances provides for a tiered rate structure. The City initiated this rate structure in April 1981. The City was the first city in the state to use this structure, which has a higher cost per gallon for higher water usage. The last increase was introduced incrementally from 2003 to 2006. Over that period, billing rates increased a total of 41%. Lafayette currently has 5 tiers plus a fixed service charge. (See Section 1.5.)

A small percentage of water users are not discouraged from high water use by current fifth tier rates. To discourage these customers from excessive use, the City plans to add two more tiers to its water billing structure. Currently, approximately 9% of single family households use about 20% (351 AF) of total water above the fifth tier. By adding a sixth and seventh tier to the rate structure, water use above the 5th tier will be reduced by 263 AFY by 2016.

Table 8. Implementation Schedule – Addition of Two Tiers to Current Billing Structure

Beginning Date	Completion Date	Required Action
January 2010	May 2010	Council approval

5.2 Informative Water Bill

The water bill gives current usage and usage from the previous year. The City also notifies water customers if a sudden spike in water use is recorded on their water meter. Water customers are then encouraged to locate possible leaks in their system. If the customer discovers a leak and produces proof of timely repairs, their water bill is adjusted.

5.3 Irrigation Audit Program

Since 2004, the City has partnered with the Center for ReSource Conservation to provide free irrigation audits for all Lafayette utility customers with in-ground irrigation systems. This program identifies irrigation inefficiencies. The auditor checks soil type, root depth and sprinkler pressure, and advises participants how to adjust water schedules, identify broken sprinkler lines and heads, adjust head types and spacing, and determine suitable pressures for the irrigation system. Irrigation audits are offered on a first-come/first-served basis during the irrigation season. Between 2004 and the end of the 2008 irrigation season, 483 residential properties, three commercial properties, and nine HOA's had participated in this program. Estimated water savings from the audits is 1.9 AFY and future water savings are expected to remain the same. Lafayette will continue the program by funding 140 irrigation audits per year.

5.4 Rebates for In-Ground Sprinkler System Upgrades

In conjunction with the Irrigation Audit Program, Lafayette will offer rebates of $20-$25 for in-ground sprinkler system upgrades beginning in 2012 assuming that an organization is found that will administer the program. This program is contingent upon having sufficient funding available to both provide a limited number of rebates and to contract with a company that could administer the program. Components that might be covered by the rebate program are approved rain sensors, ET controllers, and moisture sensors. These components would reduce watering by approximately 2% per year. If the City funded 100 rebates per year, the cost at $25 would be $2500 for the rebates with a savings of approximately 0.9 AF per year.

Table 9. Implementation Schedule – Rebates for Sprinkler System Upgrades

Beginning Date	Completion Date	Required Action
January 2012	May 2012	Council approval of contract with administrator to implement program

5.5 Xeriscape Seminars

Together with the Center for ReSource Conservation, the City offers a series of free classes each summer covering xeric principles, planning and implementation, soil enhancement, and efficient turf irrigation. These seminars are available to all Lafayette water customers on a first-come, first-served basis. Most recently, the City participated in WaterWise Seminar Week in partnership with the Center for ReSource Conservation and other Boulder County cities. This enabled us to offer a classes on more topics to more participants. The topics covered included Introduction to Xeriscaping, Landscaping for Conservation, Plants for Xeriscapes and Sustain-iscapes, Edible Xeriscaping, Renovating an Existing Landscape to Xeriscape, Drip Irrigation, and Water Wise Wildlife Gardening.

5.6 Other Public Outreach

The City currently uses several means to disseminate conservation information. These methods include television via our government channel, the City's website, the City's quarterly newsletter, and various sites where conservation pamphlets are available (City Hall, Public Works Department, and Library). These tools have proven to be effective means for distribution of information to customers. Lafayette plans to expand the current program.

- **Website –** Lafayette plans to increase the amount of information on its website to include more information on: the benefits of conservation; gardening topics such as mulching, proper irrigation techniques, and soil amendments; a self-conducted indoor water audit; and links to other pertinent information. Our goal is to provide a new water conservation news item each month.
- **Newsletter –** Include water conservation information in each issue of the City's newsletter.
- **Water Conservation Pamphlets –** Lafayette will continue to seek out high-quality information on water conservation to pass on to its customers.

In addition to the Xeriscape seminars, in 2002 the City initiated an aggressive program to educate customers on water supply, water rates, and the importance of water conservation. The program's elements included public forums, seminars, the website, the **City Update**, videos on Channel 8 (our government channel), and mailings. Free brochures dealing with various aspects of water conservation are available at the kiosk on the main level of City Hall and in the Public Works Department.

5.7 Lafayette Comprehensive Plan (2003)

The **2003 Lafayette Comprehensive Plan** was developed through a cooperative effort of citizens, business and property owners, the Citizen Advisory Committee, the Planning Commission and City Council, City staff, and a consultant team. The plan serves as a

guide for current and future public decisions, especially the distribution and intensity of development, the location of future land uses, including public facilities and open space, and requested zoning changes.

The plan sets forth several goals and policies dealing with the conservation of environmental resources. The water conservation policies (J.2.1, J.2.2 and J.2.5) support conservation through the following activities:

- Public education
- Supply management
- Demand management
- Landscape construction and maintenance practices
- Development review process
- Use of untreated water or reclaimed water for irrigation in areas where such application will not pose health concerns (e.g., Hwy 287 landscaping)

5.8 Landscaping and Irrigation Requirements – New Construction

In March 2004, the City passed new landscaping regulations and guidelines. These became Section 26-19-5 of the **City of Lafayette Municipal Code**. In Section 26-19-5, residential property developers and commercial property owners are required to use water efficient design principles to facilitate water conservation. This section of the code covers annual water budget, sprinkler system design, flow rate, type of plants, turf types, use of mulch and so forth. Total annual water use in the landscaped area may not exceed 15 gallons per square foot.

All land development plans are to be submitted with a landscape plan than meets the requirements of this code. This code applies to development plans for subdivision; however permit applications for individual single-family homes do not require landscape plans.

The code is modeled on accepted water-wise landscaping principles and addresses the following:

- Landscape planning and design
- Appropriate plant selection
- Size of turf areas
- Grouping plants according to their water needs
- Soil preparation
- Use of mulch
- Irrigation system design

The water use determinations made at the time of development are necessarily approximate. For the ordinance to be fully effective, frequent adjustments to irrigation systems must be made after the irrigation system is installed. At the time of this plan, the City is preparing a database to enable us to compare predicted water use with actual water use over time. Beginning in 2010, we will monitor the actual (metered) use of dedicated irrigation taps in both residential and nonresidential developments covered by this code and compare that with the water use determinations made at the time of development. We will also visit the sites to see if any changes from the original landscape plans have been made that would affect water consumption.

Table 10. Implementation Schedule – Comparison of Actual Use to Predicted Use in New Landscapes

Beginning Date	Completion Date	Required Action
January 2010	January 2012	Detailed analysis

5.9 Plumbing Fixtures

Prior to this plan, the City of Lafayette's conservation plan did not specifically address plumbing fixture efficiency beyond enforcement of International Plumbing Code requirements for new construction. This plan includes a retrofit plan for selected City facilities.

Beginning in 2010, the showerheads in the Bob L. Burger Recreation Center will be replaced first, followed by the lavatory faucets, toilets and urinals in City hall. Based on the assumptions and estimates in the tables below, replacing these fixtures will result in a water savings of 4.7 AF per year.

Table 11. Showerhead Retrofit - Bob L. Burger Recreation Center

	# Heads	GPM	Total Showers / Day	Shower Length (Min)	Gallons / Day	Days / Year	Use / Year Gallons
Current	14	3.0	700	5	10,500	340	3,570,000
Retrofit	14	1.75	700	5	6,125	340	2,082,500
Daily Savings					4.375		
Annual Savings Gal							1,487,500
Annual AF Savings							4.6

Table 12. Faucet Retrofit - City Hall

	# Faucets	Uses / Person / Day	Total Staff	Rated Flow GPM	Est. Gal / Day	Days / Year	Gallons / Year
Current	10	3	31	1.5	34.9	260	9,068
Retrofit	10	3	31	0.8	18.6	260	4,836
Daily Savings					16.3		
Annual Savings							4.232
Annual AF Savings							0.01

Table 13. Toilet Retrofit - City Hall

	Uses/Day	# Employees	Gallons / Flush	Gallons / Day	Days / Year	Yearly Savings Gallons
Current Men	1	14	2.5	35	260	9,100
Current Women	3	17	2.5	127.5	1.2260	33,150
Retrofit Men	1	14	1.28	17.9	260	4,659
Retrofit Women	3	17	1.28	65.3	260	
Daily Savings				79.3		
Annual Savings						20,618
Annual AF Savings						0.06

Table 14. Urinal Retrofit - City Hall

	Uses / Day	# Male Employees	Gallons / Flush	Gallons / Day	Days / Year	Gallons / Year
Current	3	14	1.5	63.0	260	16,380
Retrofit	3	14	0.5	21.0	260	5,460
Daily Savings				42.0		
Annual Savings						10,920
Annual AF Savings						0.03

Table 15. Fixture Retrofit in City Facilities Implementation Schedule

	Beginning Date	Completion Date	Required Action
Showerheads	January 2010	May 2010	Purchase and install
Toilets & Urinals	May 2010	September 2010	Purchase and install
Faucets	September 2010	December 2010	Purchase and install

5.10 Water Shortage Management Plan

In August 2001, the City of Lafayette developed a **Water Shortage Management Plan**[4] as a guide to respond to possible short- or long-term water shortages. This plan is intended to be used by staff, management, and elected officials to implement a voluntary or mandatory water rationing plan in the event of a water shortage or a below normal spring run-off. An internal staff group meets regularly each year between March and June to evaluate snow pack, reservoir storage, projected water demand and carry-over storage. Based on their analysis, the group recommends possible courses of action to the City Administrator and City Council.

In response to the drought of 2002, Lafayette's City Council adopted the following emergency provisions based on the authority of Lafayette's **Water Shortage Management Plan:**

- Sprinkler systems at City parks were rescheduled to apply ½″ of water per week. Landscaped medians irrigation was turned off or severely restricted.

[4] See Appendix B.

- Waneka Lake recreation activities were cancelled, the fish were removed by the state, and the water was transferred to the Goose Haven reservoir complex for future use.
- The golf course also reprogrammed their sprinkler system to ½″ per week. All irrigation to native and rough areas was eliminated. Decorative ponds were not filled. Flower plantings were eliminated and greens and fairways were cut higher to minimize evaporation.
- Goose Haven Pump Station was modified to use poorer quality raw water to stretch water supplies.
- A plan was developed to supply untreated non-potable water to the golf course and US Hwy 287 for irrigation.
- Only ½″ of water was allowed on all lawn areas per week.
- The City was divided into zones and each zone was given one specific day to water lawns within a two-hour period.
- The cost of water in the upper two tiers was raised.
- All non-essential uses of water were banned and fines were imposed for violations. Fines were also imposed on customers in the highest water tier. Repeated violations of high water use or non-essential water use resulted in installation of flow restriction devices.

These steps enabled us to provide a minimum amount of water in storage for the following year and resulted in a 75% reduction in outdoor landscape irrigation for all water customers.

5.11 City-Owned Properties

The City of Lafayette promotes water conservation in the planning and development of new City-owned landscape projects, such as parks, building grounds and golf courses. Ordinance 16-19-5 establishes policies for low water use landscapes and efficient irrigation. During the design of any project, water requirements are evaluated by the Public Works Department and conservation measures are required.

The Water Fund financed CIRRUS, a state-of-the-art irrigation system that monitors the irrigation system 24 hours a day. Complex databases insure accurate control over the parks and each microenvironment on the golf course. This system has its own on-site weather station that monitors the weather and calculates evapo-transpiration rate (ET). The CIRRUS system saves the Indian Peaks Golf Course 192 acre-feet annually compared to manual watering rates.

The various parks are metered and are supplied treated water. The landscape irrigation along U.S. Hwy. 287 is from Coal Creek. This raw water supply is part of Lafayette's water reuse system and saves 130 acre feet of fresh water annually.

In Colorado, the two phreatophytes of greatest concern are the tamarisk and the Russian olive. Both of these are considered invasive species. These non-native phreatophytes and other invasive species are eradicated per Boulder County and City of Lafayette policy.

However, City policy requires replacement of trees removed with equivalent caliper-inches of new trees. Some of the trees in Lafayette are designated "historical." These include phreatophytes (e.g., cottonwoods) that cannot be removed for environmental and wildlife habitat reasons.

5.12 Water Reuse Systems

To optimize the City's raw water system, the City built an irrigation pump station that takes water from Coal Creek downstream from Louisville's wastewater treatment plant to irrigate the landscaping on U.S. Highway 287. Most of this water (130 AF annually) is technically reuse of Lafayette's wastewater, exchanged upstream on Coal Creek. To make further use of the return flows from the Water Reclamation Plant (WRP), Lafayette also takes 1,349 AF of water from Boulder Creek by exchange and stores it in the Goose Haven reservoirs. Lafayette currently reuses about 60% of its WRP return flows.

The City also has a conceptual design for a pipeline between the Water Reclamation Plant and the Goose Haven Reservoir complex to store water owned by Lafayette and released from the WRP. This would maximize the full use of return flows from the WRP.

5.14 Distribution System Efficiency

The City of Lafayette employs many measures that contribute to distribution system efficiency. Among them are:

- Hydrant inspection – Inspections performed during city-wide flushing program. Malfunctioning hydrants are scheduled for immediate repair. Beginning in 2009, hydrants will be inventoried for inclusion in the utility GIS system
- Valve exercising and inspection – Beginning in 2009 we will begin inventorying all valves for our utility GIS system. Valves will be cleaned and exercised and repaired or replaced as necessary.
- Meter repair and replacement – Meter testing, repair and replacement is ongoing. Beginning 2009, all meters above 1-1/2 inches will be tested and repaired or replaced every three years.
- Pressure reduction valves (PRV) –Lafayette main lines have pressure reducing valves at the interconnects between pressure zones. PRV's are visited monthly, tested regularly, and repaired if necessary. PRV's are also installed in select meter pits. These are tested regularly.
- In 2008, the Public Works department contracted with an outside firm for GIS mapping of the distribution system. Beginning in 2009, water main break information will be tied in with our GIS system

In May 2009, our unaccounted for water loss (based on water sales vs. production) was 8.5%. Using the sales vs. production numbers, our unaccounted for water loss peaked at 13.2% in July 2008, but has fallen consistently each month since. During that period, the City found and repaired three major leaks in the distribution system. The unaccounted for water loss figures cited above include water used for fire fighting, street cleaning,

sanitary line jetting, and water line flushing. It also includes water lost due to main breaks.

To better understand our unaccounted for water loss, Lafayette will perform a yearly top down water audit as recommended by the American Water Works Association (AWWA) Water Loss Control Committee and will keep year-to-year records of the performance indicators. This will enable the City to better determine how efficiently the system is operating and where the losses might be. Data collected will include:

- Leak repair summaries
- Line flushing and maintenance reports
- Estimates of water used for fire fighting and training

Beginning in 2010, Lafayette will contract for a leak detection survey to locate actual water losses in our distribution system. Assuming that Lafayette can reduce system-wide water loss from the current 8.5% to 5% through a leak detection survey, the utility will save 232.7 acre-feet annually.

Table 16. Proposed Implementation Plan for Supply-Side Water Loss Control

Proposed Measure / Program	Beginning Date	Completion Date	Notes
AWWA water audit	October 2009	Ongoing	Yearly audit
Leak detection survey	March 2010	Ongoing	Annual budget
Analysis and tracking of non-account water for maintenance, fire, etc.	September 2009	Ongoing	Ongoing

5.15 Water Efficient Industrial and Commercial Processes

Commercial and industrial users in Lafayette account for approximately 15% of all water used. The 370 users in these categories use approximately 615.45 AF. Of these users, 31 are industrial and 339 are commercial. Most of the facilities that fall under the commercial/industrial categories are retail or office buildings. Commercial and industrial facilities are eligible to participate in our irrigation audit program for in-ground irrigation systems (see section 5.3).

Twenty-two accounts are billed as restaurants. Of those, nine are sit-down restaurants. Annual water use in these restaurants ranges from 1.16 AF to 4.58 AF per year per restaurant, which in some cases includes water used for irrigation. Pre-rinse spray nozzles are available for approximately $125 each. These nozzles could be replaced in the nine sit-down restaurants for $1,125.00. Assuming nine units at 240 minutes of use per unit, at a savings of 3.76 gpm (5 gpm – 1.24 gpm) used 275 day per year, the total annual savings would be 2,233,440 or 6.9 AF per year.

Table 17. Implementation Plan for Pre-Rinse Nozzle Replacement

Beginning Date	Completion Date	Notes
January 2010	December 2010	Meet with restaurants and purchase appropriate nozzle

6 Evaluation of Selected Measures and Programs

Conservations measures and programs currently implemented by Lafayette will be continued.

Table 18. Conservation Measures and Programs Evaluated

Demand-Side Measures	Already Implemented?	Evaluated in Plan?	Comments
Water-efficient fixtures and appliances			
Toilets	No	Yes	Replacing City Hall fixtures.
Urinals	No	Yes	Replacing City Hall fixtures
Showerheads	No	Yes	Replacing fixtures in Recreation Center
Faucets	No	Yes	Replacing City Hall fixtures
Washing machines	No	Yes	Costs to City prohibitive at this time
Indoor audits	No	Yes	Not currently available. Self-conducted audits will be available on website.
Landscape efficiency			
Low water use landscapes	Yes	Yes	Program will be continued
Drought-resistant vegetation	Yes	Yes	Program will be continued
Efficient irrigation	Yes	Yes	Program will be continued
Equipment	Yes	Yes	Program will be continued
Scheduling	No	Yes	Program will be implemented during drought or if irrigation reduction does not meet plan goals
Industrial and commercial efficiency			
Water-efficient processes	Yes	Yes	Industrial and commercial use addressed by irrigation audit program.
Cooling equipment efficiency	No	No	Not applicable to Lafayette industries.
Supply-Side Measures			
Water reuse systems	Yes	Yes	The City reuses 60% of its water reclamation plant return flows or 1,479 AF.
Removal of phreatophytes	Yes	Yes	Removed per Boulder County and City policy.
Distribution system efficiency	Yes	Yes	The City employs various means to enhance distribution system efficiency. New to this plan is a system-wide leak detection survey
Leak repair	Yes	Yes	Leak detection and repair will be enhanced through a distribution system audit

Demand-Side Measures	Already Implemented?	Evaluated in Plan?	Comments
Temporary transfers from agriculture	**NA**	**NA**	
Source optimization			
Conjunctive use	NA	NA	NA
System integration with other utilities	Yes	Yes	Lafayette currently has interconnects with both Louisville and Erie to employ in emergencies
Demand-Side Programs			
Education/information dissemination	Yes	Yes	Through website, newsletter, pamphlets, open houses, and Channel 8 (public access TV)
Public education	Yes	Yes	Water-wise planting and watering classes
Water-saving demonstrations	No	Yes	Lafayette has insufficient staff to implement at this time
School programs	No	Yes	Lafayette does not have sufficient staff to offer this routinely. Programs are presented upon request.
Informative & understandable water bill	Yes	Yes	Continuing program
Water bill inserts	Yes	Yes	Continuing program
Technical Assistance	Yes	Yes	Irrigation system water audits
Customer water use audits	Yes	Yes	Irrigation system water audits
Targeted at large users	No	Yes	Excessive users are targeted by our planned addition of 5th and 6th tiers to our billing rate structure.
Targeted at large landscapes	Yes	Yes	Irrigation system water audits available to all customers.
Water conservation expert available	Yes	Yes	Limited to irrigation audits and seminars in conjunction with Center for ReSource Conservation. City cannot fund a position at this time.
Rate structures & billing systems designed to encourage efficiency	Yes	Yes	Five tier water rate structure. Will be expanded to seven tiers to discourage high-end water use.
Volume billing	Yes	Yes	Included in tiered water rate structure.
Tiered rate structure	Yes	Yes	Five tiers will be expanded to seven to discourage high-end water use.
Monthly billing	Yes	Yes	Monthly billing will be continued
Regulations/Ordinances			
Addressing fixtures & appliances	Yes	Yes	Current Municipal Code requires IPC requirements for new construction.
Time of sales upgrades	No	No	Not covered by ordinance.
Addressing landscaping	Yes	Yes	Ordinance 26.19 which covers new all development
Water waste prohibition	No	Yes	Enforced only during drought
Watering restrictions	No	Yes	Enforced only during drought

Demand-Side Measures	Already Implemented?	Evaluated in Plan?	Comments
Incentives			
Rebates	No	Yes	Toilet and washing machine rebates put on hold because of staff and budget considerations
Give-aways	No	Yes	Flow-restricting pre-rinse valves for restaurants
Supply-Side Programs			
Distribution System Efficiency			
Leak identification	No	Yes	Leak detection audit
Meter source water	No	No	Source water measured per legal requirements
Meter service connections	Yes	Yes	All service connections are metered
Meter testing & replacement	Yes	Yes	Ongoing program – will be done in-house beginning in 2009
Improved water accounting	No	Yes	Improved accounting using AWWA water loss control audit
Analysis of non-account water	Yes	Yes	Improved accounting using AWWA water loss control audit
System-wide pressure management	Yes	Yes	Ongoing
Pressure-reducing valves	Yes	Yes	PRV's installed at connections between pressure zones and in meter pits in high pressure areas

6.1 Rebate Programs and Replacement Programs

Lafayette does not have the financial resources to provide rebates for plumbing fixtures or appliances at this time. However, based on our calculations, a rebate program could reduce GPCD by a significant amount and will be reconsidered on a limited basis should the resources become available. The biggest savings would come from a toilet fixture rebate, which would draw from a larger sample of Lafayette's population than a washing machine rebate program. The plumbing fixtures in select City facilities will be replaced in selected City facilities (see Section 5.9).

Plumbing Fixture Rebates: A toilet replacement program targeting all homes built prior to 1980 would replace approximately 7,474 toilets. It is assumed that these toilets use 4.5 gallons per flush or more while a low-flush toilet can use as little as 1.2 gallons per flush. Total replacement is an unrealistic goal for the period of this plan for financial and logistical reasons. A more realistic program would be a $100 rebate offered for 30 toilets per year. The cost to the City would be $3,000 and would save 505,890 gallons per year for a total of 1.6 AF per year for 30 replacements. This assumes 3.5 people per house with four uses per day per person.

Appliance Rebates: An older washing machine uses approximately 40.9 gallons per load. A high efficiency front-loading machine uses approximately 16.7 gallons less. A $75 rebate program for 20 washers per year would cost $1500 and would save

approximately 0.14 AF per year, assuming 0.37 loads per day used 365 days per year. It is difficult to estimate the savings to Lafayette over the period of this plan because washing machines are not permanent fixtures and would most likely be moved if a property changes hands.

6.2 Indoor Water Audits

The American Water Works Association estimates that 13.7% of indoor daily water use is wasted through leaks. Lafayette's yearly indoor residential water usage is approximately 92 AF. Residential leaks are therefore responsible for a yearly indoor water loss of 12.6 AF across the system.

Indoor water audits would be an effective way to address this problem and educate customers. They would also benefit all participating water customers.

The Center for ReSource Conservation is interested in offering an indoor residential in the future. Lafayette does not have the staff or resources to offer such a program on its own. However, information regarding how to conduct a residential indoor self-audit will be advertised on our utility bills and available on our website and at the Public Works Department by the first quarter of 2010.

7 Demand Forecast Modification

The water savings for many of the currently-employed water conservation measures cannot be quantified with any degree of accuracy. It should be noted, however, that water use records from 2002 until 2008 do demonstrate a downturn in both residential GPCD and total system GPCD since 2001.

Table 19. Water Savings from Current Measures

2001 GPCD Total System	2001 Residential GPCD	Avg Total System GPCD Since 2002		Avg Residential GPCD Since 2002	
		Avg	% Change	Avg	% Change
151	118	130	-14	95	-19

Water use in 2002 was at its lowest due to drought awareness—widespread regional news coverage and local customer educational efforts. Beginning in January 2002, water rates were increased 9% each year over a four-year period, a total compounded rate increase of 41% over the four-year period. That, combined with other conservation programs, has prevented our residential GPCD from rising to pre-drought levels.

In 2008, Lafayette water users consumed 4,176 AF of water. Assuming that 100 single-family homes and 10 commercial establishments will be built each year (1 commercial = 3 single-family homes), the annual water use in 2016 would be approximately 4,696 AF. This number has been adjusted to take into account water conservation measures already

in place. The additional measures and programs outlined in this plan would further reduce water consumption as follows:

2016 Estimated Water Use*	**=**	**4,696.0**	**AF**
Reductions:			
Outdoor Landscape Design	=	71.4	AF
City Facility Water Fixture Retrofit	=	4.7	AF
Irrigation Audits	=	13.2	AF
Irrigation System Rebates	=	4.5	AF
6^{th} & 7^{th} Rate Tier	=	263.0	AF
Leak Detection	=	232.7	AF
Restaurant Pre-Spray	=	6.9	AF
Cumulative Savings by 2016	**=**	**596.4**	**AF**
2016 Modified Water Use	**=**	**4099.6**	**AF**
Total Reduction	**=**	**12.7 %**	

*Number adjusted to include savings from existing water conservation measures and programs: approximately 344 AF from upgrades to irrigation systems in parks and 126 AF from ongoing meter testing.

7.1 Estimated Future Water Savings

Table 20. Estimated Future Water Savings

Conservation Measure / Program	Estimated Water Savings by 2016 Based on Projected Demands (AF)	Assumptions	Calculation of Annual Savings
Water Efficient Fixtures and Appliances			
Commercial and Residential			
Toilets	0.06	See Table 13 – imbedded in demand after installation	See Table 13
Urinals	0.03	See Table 14 – imbedded in demand after installation	See Table 14
Showerheads	4.60	See Table 11 – imbedded in demand after installation	See Table 11
Faucets	0.01	See Table 12 – imbedded in demand after installation	See Table 12
Landscape and Irrigation Efficiency			
City Parks and Indian Peaks Golf Course			
Drought-resistant vegetation Low water use landscapes Moisture sensors ET controllers	344 (total)	Assumes that historical savings will continue and no additional parks will be built – savings already imbedded in demand estimates	Using actual historical use, assume that this represents a 35% savings over manual watering, actual savings can be calculated
New Homes and Businesses			
Design and layout Soil preparation Irrigation equipment	71.6	Landscape criteria is no more than 2' of water per sq ft represents 33% savings assuming 3' typical application. Based on household use of outdoor water, see below, there is a savings of 0.099 AFY per SF home. Assumes 100 new homes per year and 10 new businesses per year and 3 businesses equal one SF home in outdoor water use.	(100 SF x 0.099 AF x 7 years) + (10/3 Bus x 0.099 AF x 7 years)

Conservation Measure / Program	Estimated Water Savings by 2016 Based on Projected Demands (AF)	Assumptions	Calculation of Annual Savings
Existing Homes and Businesses			
Rebates for irrig. upgrades	4.5	Estimated water use 0.75 AFY for single-family home, 60% of yearly use for outdoors, 2% savings for 100 homes	100 homes x 0.45 AFY (60% of 0.75 AFY) x 2% anticipated savings x 5 years
Customer irrigation audits	13.2	Estimated outdoor water use for single-family home 0.45 AFY (see above), 3% anticipated savings for 140 homes continuing over life of plan	140 homes x 0.45 AFY (60% of 0.75 AFY) x 3% anticipated savings x 7 years
Restaurants – pre-rinse nozzles	6.9	Nine sit-down restaurants x 240 min. per day x 275 days per year. Old nozzles use 5 gpm and new nozzles use 1.24 gpm for a savings of 3.76 gpm – imbedded in demand projections after installation	9 x 240 x 275 x (5-1.24)
Water Reuse System			
Exchange of wastewater return flows	1,479	60% of 2.2 MGD return flows are used annually – savings already imbedded in demand projections	0.6 x 2.2 MGD x 365 days per year / 325,851 gallons per AF
Tiered Rate Structure			
Add 6th and 7th tier during summer irrigation season	263	Currently, about 9% of SF households use est. 20% (351 AF) of total water above tier 5. Adding 6th and 7th tiers assumes that only 1% of households will use 5% of total water above 5th tier – imbedded in demand projections after approval (2010 est.)	351 AF x (20% - 5%) / 20%
Distribution System Efficiency			
Perform acoustic leak surveys to reduce unaccounted for water	233	Reduce system losses from 8.5% to 5% - imbedded in demand projections after survey conducted (2010 est.)	Based on current production of 1,516 MG with 8.5% loss: at a 5% loss, production would be 1,440 MG. Savings is difference between production numbers.
Water meter testing	126	A 3% annual savings based on historical water sales – savings already imbedded in demand projections	Assume 4,200 annual AF sales

7.2 Project Specific Savings – Capital Projects

Future project savings depend on our ability to create and sustain a community culture of water conservation. Our projected water savings from conservations measures and programs based the calculations in Table 20 would be approximately 597.3 AF over the life of the plan. It is assumed these savings would continue well beyond.

The **2004 Water System Master Plan** projected Lafayette's build-out dry year demand (7,910 AF) and peak day demand (17.8 MGD) on certain assumptions, which may no longer be true. The conclusions of that plan were partly based on historic data between collected between 1995 and 2001 by customer usage by category. Between 2002 and 2008, Lafayette's average yearly consumption was down 14%.

If the water conservation measures and programs introduced in this plan succeed, our total GPCD over the next seven years will continue to fall. If the decrease in GPCD is assumed, it is conceivable that our yearly consumption in seven years will yield a far different outcome than predicted in the *2004 Water System Master Plan*. Lafayette's Though the capital projects recommended in the *2004 Master Plan* remain part of our

long-term planning, they may not be necessary. Success of the conservation plans and programs, together with growth limitation will provide Lafayette with sufficient time to thoroughly capital projects, their costs and the necessity, before embarking on a project.

7.3 Conservation and Potential Revenue Effects

Water revenues are driven only in part by the amount of water used by customers. There are significant and rising costs associated with the procurement, treatment and distribution of water. Water rates must reflect the true value of the water and will be raised if necessary to meet operational expenditures, but it is highly unlikely that the rates will be raised because of conservation measures and programs. An effective water rate structure, such as the City's current tiered rate structure, can simultaneously promote water conservation and assure our water utility of stable revenues.

8 Implementation Plan

The measures and programs will be implemented according to the summary and scheduling information given in Section 5 and summarized in Table 1.

8.1 Public Participation in Conservation Plan Implementation

The Water Conservation Plan was submitted for public comments during a 60-day review period in the summer of 2008. At that time, it was announced in the Summer 2008 (June 1, 2008) **City Update** mailed to everyone in our zip code (80026) and posted on the City's website. It was also available for review in the Public Works Department at City Hall. The plan was then presented to Council for their consideration and was approved on May 19, 2009. After review by the State of Colorado changes were made to the plan. The plan was again submitted for public comment during a 60-day review period beginning September 17 and ending November 16, 2009. (See Appendix C.)

9 Program Evaluation and Revision

Lafayette will revise this plan by June 2016. In preparing this plan, the City was hampered by incomplete information regarding the actual water savings of existing programs. The changes made to this plan and the amount of information tracked will make it easier to evaluate the effectiveness of our conservation efforts and to see if our goals are on track. The information evaluated and analyzed will include:

- Monthly customer usage by customer category (information Lafayette has tracked 1995)
- Daily water treatment and water reclamation production
- Weather patterns
- Water supply

- Monthly water billing information
- Irrigation records from Parks, Open Space and Golf
- Allowed variance in meter accuracy
- Water used for maintenance and other non-revenue uses
- Water lost due to leaks and breaks (real loss)
- Water used for fire fighting
- Unaccounted for water (monthly)
- Annual costs of each conservation measure and program
- Population data
- Feedback from the public

A full analysis of the above information will be completed yearly and areas of success and areas requiring improvement will be identified. The annual analysis will alert us to areas of concern. Should these concerns warrant revisions to this conservation plan prior to the end of the required seven-year timeframe, the plan will be revised. The revised plan will examine the effectiveness of existing measures and programs and will evaluate additional measures programs for inclusion in the updated plan.

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