City of Louisville | Department of Public Works
COLORADO • SINCE 1878

December 4, 2014

Mr. Ben Wade and Mr. Kevin Reidy
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CWCB – Water Conservation Coordinator
Colorado Water Conservation Board (CWCB)
1313 Sherman St., Room 721
Denver, CO 80203

SUBMITTED BY EMAIL: December 4, 2014

RE: City of Louisville
Draft Water Conservation Plan Submittal

Dear Mr. Wade,

Enclosed is the City of Louisville's draft Water Conservation Plan for review and comment in accordance with State requirements; 37-60-126 C.R.S. The plan is provided in PDF format. Please let us know if a hard copy is needed.

We are committed to the implementation of the measures and programs within the plan with a signature of a staff representative who is authorized to commit resources. Louisville has several Capital Improvement Projects planned, the funding of which, is contingent upon having an approved Water Conservation Plan in place. A timely review of the plan so that our pursuit of funding can continue would be greatly appreciated.

We appreciate your time and attention to this matter. For any questions please contact Dmitry Tepo, P.E. at 303-335-4607 or by email at dmitryt@louisvilleco.gov.

Sincerely,

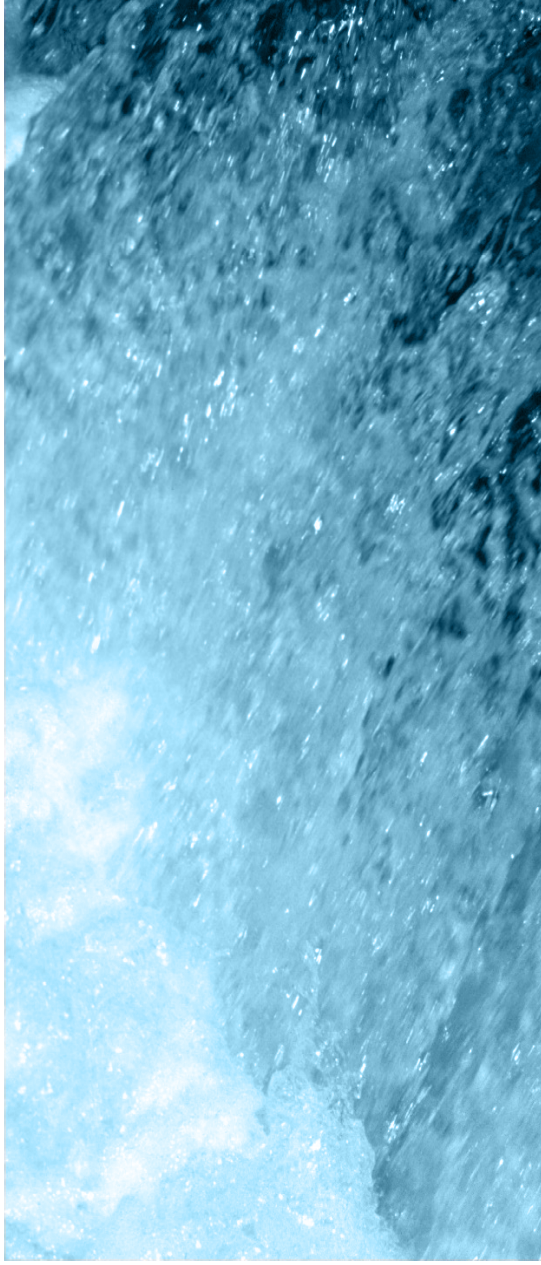
Kurt Kowar, P.E.
Public Works Director

Water Efficiency Plan

Prepared for

City of Louisville
COLORADO • SINCE 1878

January 2015



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DEMAND MANAGEMENT

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Report

Water Efficiency Plan

Prepared for

City of Louisville

January 2015

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Acronyms and Abbreviations

AMI	advanced metering infrastructure
AMR	automated meter reading
AWWA	American Water Works Association
BMP	best management practice
C-BT	Colorado-Big Thompson
cfs	cubic feet per second
CIP	capital improvement plan
CIS	Customer Information System
City	City of Louisville
COMI	commercial-inside
COMO	commercial-outside
CRC	Center for ReSource Conservation
CTC	Colorado Technology Center
CWCB	Colorado Water Conservation Board
°F	degrees Fahrenheit
FRICO	Farmers Reservoir and Irrigation Company
gpcd	gallons per capita per day
HOA	homeowners association
IPPs	Identified Projects and Processes
IRRI	irrigation
IWA	International Water Association
LMC	Louisville Municipal Code
MF	multifamily
MG	million gallons
mgd	million gallons per day
M&I	municipal and industrial
PRSV	pre-rinse spray valve
RESI	residential-inside
RESO	residential-outside
SWSI	Statewide Water Supply Initiative
WTP	water treatment plant
WWTP	wastewater treatment plant

1 Profile Existing Water System

1.1 Overview and Purpose

The City of Louisville (City) is a Colorado municipality covering a service area of 8.50 square miles with an estimated population of 18,771 in 2014 (the population estimated from the 2010 US Census was 18,376). The City, incorporated in 1878, lies in Boulder County roughly 6 miles east of Boulder and 25 miles northwest of Denver. On average the City has 15.5 inches of rain and 275 days of sunshine a year. Mean monthly temperatures range from 29.5 degrees Fahrenheit (°F) in January to 72°F in July. At this time, the City owns, either alone or in conjunction with other governmental entities, approximately 1,700 acres of designated open space.

The residential size of the City is not likely to grow significantly, with an estimated population of 22,145 at full occupation. There is the potential for significant commercial and industrial growth at three main business centers: Centennial Valley, the Colorado Technology Center, and the Phillips 66 campus.

The City has two water treatment facilities with capacity to produce up to 12.1 million gallons per day (mgd) of potable water, potable water storage in the distribution system of 8.5 million gallons, 115 miles of finished water distribution system piping, and 6,784 service taps (as of 2013). The City has a treatment plant to reuse wastewater for irrigation; the treatment capacity of the reuse plant is 2 mgd, although the amount available for reuse varies depending on water rights operations.

1.2 Water Supply and Reliability

The City of Louisville obtains the majority of its water supply from South Boulder Creek through direct flow rights, storage rights, and exchanges. The City is also a participant in Northern Water's Colorado-Big Thompson (C-BT) project and the Windy Gap project. The City also obtains water from Boulder Creek through exchanges and has some storage and direct flow rights on Coal Creek. The City maintains water rights for the municipal water system as well as for agricultural uses. South Boulder Creek rights are transferred ditch rights so there is a lot of supply in the spring. Water supply in the winter is primarily from storage in Harper, Louisville, and Marshall Reservoirs. Summer water supply is augmented with C-BT water to meet peak demand. This augmentation is sometimes required due to algal blooms in the Louisville reservoir that cause water quality issues. A summary of storage water rights is provided in Table 1.

TABLE 1
City of Louisville Raw Water Storage Summary

Storage	Volume (acre-feet)	Notes
Harper Reservoir	715	—
Louisville Reservoir	210	—
Marshall Lake (Louisville Farmers Reservoir and Irrigation Company [FRICO] share, South Boulder and Coal Creek Storage Water, and Foreign Water)	1,020 to 2,540	—
Colorado-Big Thompson Storage	1,447	—
Total raw water storage capacity	3,392 to 4,912	Depending on FRICO share and Marshall

The *2003 Raw Water Master Plan Update* included an analysis of baseline yields of the City's raw water supply system. Determining the water yield is a complex analysis that attempts to account for the details of water rights, including return flow obligations, legal priority of the water right, and conveyance. The master plan estimated the maximum divertible yields from South Boulder Creek range from 2,000 to 4,700 acre-feet each year, and nearly 80 percent of that amount is divertible only during the months of May through July. The Southern Water Supply Project (SWSP) includes C-BT and Windy Gap water. The average available C-BT yield is 1,447[1] acre-feet, with average Windy Gap yield assumed to be zero and a maximum of 900[2] acre-feet. The master plan included many assumed supply and demand scenarios; the *2003 Raw Water Master Plan* estimated that under future conditions the raw water supply system would provide a firm yield of 5,400 acre-feet. Deficits were predicted during drought years but the demand used in the scenarios was very high at 7,120 acre-feet.

The master plan was completed more than 10 years ago. Therefore, it is recommended the City update the plan to incorporate changes since 2003, including improvements to the raw water infrastructure, improved information on water supply from C-BT and Windy Gap, updated demand data, and resiliency to climate variability.

At this time, no major raw water acquisitions are planned by the City. Overall, there is limited raw water storage in the City's system and additional storage would be beneficial. The total raw water storage capacity of 3,392 to 4,912 acre-feet is lower than the City's forecasted annual water consumption (See Section 2.4 Demand Forecast). The storage system would provide approximately 6 months of water at forecasted baseline demands at the lower end of storage volume. The City is planning on continued efficient water use, but additional water rights acquisition will most likely be required.

1.3 Supply-Side Limitations and Future Needs

As mentioned above, the City has water rights along South Boulder Creek, a tributary to the South Platte River. In the most recent Statewide Water Supply Initiative (SWSI) completed in January 2011, the South Platte Basin is one of the basins facing a municipal and industrial (M&I) gap in 2050. The M&I gap is the difference between the projected municipal and industrial water demand and supplies from existing sources and supplies from Identified Projects and Processes (IPPs). The M&I gap for the South Platte Basin is projected to be 36,000 to 170,000 acre-feet per year, depending on the success rate of IPPs (see Table 5-19 of the January 2011 SWSI). The SWSI also noted that from "a regional perspective, the largest gaps occur in the Northern region, consistent with the high levels of current and future demands and urbanization in Boulder, Larimer, and Weld Counties." There is also little to no unappropriated water remaining in the South Platte Basin. Based on the outlook from SWSI efficient water use will need to continue as a component of the City's raw water master planning.

Limitations and future needs for the City's raw water and treated water systems are summarized in Table 2.

TABLE 2
Summary of Supply Side Limitations and Future Needs

Limitation or Future Need	Comments on Limitation or Future Need	How is Limitation or Future Need Being Addressed
Raw water supply	The estimated firm yield from the City's *2003 Raw Water Master Plan* was approximately 5,400 acre-feet. Drought years may result in a deficit.	Efficient water use especially during drought years will be required. Monitor growth of commercial properties that are not yet developed.

[1] 2,067 shares at 0.7 acre-feet/share firm yield.

[2] 9 shares at 100 acre-feet/share.

TABLE 2
Summary of Supply Side Limitations and Future Needs

Limitation or Future Need	Comments on Limitation or Future Need	How is Limitation or Future Need Being Addressed
Raw water storage	The total raw water storage capacity of 1,927 to 3,427 acre-feet is less than the City's current annual water consumption.	Efficient water use to minimize the need for additional raw water storage. Evaluate interconnects and storage projects to increase flexibility of raw water supply system.
Water treatment plant capacity	The City has two water treatment plants with a combined treatment capacity of 13.0 mgd (firm production capacity of approximately 12.1 mgd). There are some limitations on the source water that each plant is able to receive.	Efficient water use to eliminate need for capacity increases at the water treatment plants. Increase flexibility of moving raw water between the two treatment plants.
Wastewater treatment plant (WWTP) capacity to meet future regulations	Current rated WWTP capacity is 3.4 mgd, but future effluent regulations have the potential to impact the plant capacity.	In 2015, the City will start construction of the WWTP upgrades to meet redundancy, ammonia, and nutrient removal regulations. The plant capacity will also be decreased to 2.53 mgd to meet regulations.
Louisville pipeline	The pipeline reliably delivers 5.2 cfs (3.36 mgd) to the Howard Berry WTP and 4.9 cfs to the Louisville Reservoir. May operate at capacity during peak months depending on demand, the amount of water supplied from C-BT, and the amount of divertible water rights.	There are no projects planned to increase capacity of the Louisville pipeline. Blending of raw water sources will be required to meet future demands.
C-BT water pipeline	Pipeline capacity is 4.2 cfs (2.7 mgd). The City has other water supplies, but if more C-BT water was required to meet demand it would be difficult to meet the peak, especially in summer months.	SWSP upsizing is planned to occur within the next 10 years. Blending of raw water sources will be required to meet future demands.
Overall system reliability	Even with multiple water supply options and two treatment plants, the system is still vulnerable to unpredictable events. Interconnects would increase reliability.	The City has potable water interconnects with the City of Lafayette and is currently working on designing an interconnect with the Town of Superior.

Notes:
C-BT = Colorado-Big Thompson
cfs = cubic feet per second
mgd = million gallons per day

2 Water Demand and Historical Demand Management

2.1 Service Area Characteristics

2.1.1 Land Use

Title 17 of the Louisville Municipal Code (LMC) outlines the type of development allowed within the City; the most current plan is summarized in the *Louisville Comprehensive Plan* (May 7, 2013). A map of the City's service area and the 2012 land use map is shown in Figure 1. A summary of land use and built land use is provided in Table 3.

TABLE 3
Land Use Summary

Land Use	Land Percent of Total Land Area	Built Percent of Total Built Area
Agricultural	3.5	0.1
Entertainment	0.2	0.3
Hotel	0.4	1.5
Industrial	5.2	13.5
Large Format Retail	0.5	1.3
Mixed Use Commercial	0.7	1.4
Mobile Home	0.4	0.0
Multi-Tenant Retail	0.6	1.5
Office	3.4	9.1
Open Space/Parks	26.5	0.0
Public Service/Institutional	8.8	1.2
Residential Low Density	26.5	53.9
Residential Medium Density	1.3	3.7
Residential High Density	1.7	6.9
Single Tenant Retail	0.8	1.4
Stand Alone Restaurant	0.3	0.6
Vacant	19.1	3.6

Source: *City of Louisville Comprehensive Plan*, adopted May 7, 2013.

The highest percentages of land use in the City are residential low density and open space/parks, which together make up 53 percent of the total land area in the City. City parks, golf course, and open space total 3,335 acres. The highest percentage of built land use is from residential low density at 53.9 percent, followed by industrial (13.5 percent) and office (9.1 percent). The City estimates that residential land use areas will reach build out in 10 years and the remaining land use areas will take longer to develop.

Vacant or undeveloped land makes up 19.1 percent of the land use area in the City. There are several vacant areas that are eligible for development, although full development of these eligible areas depends on how much the market can actually support. Three large areas that are planned to have future growth for office and industrial uses include the Centennial Valley Business Park, the Colorado Technology Center (CTC), and the Phillips 66 campus. The areas are also designated as special districts by the City's *Comprehensive Plan*. It is important to include the potential impact of these areas on future water demand.

Old Town Overlay District

Refer to Chapter 17.12 in the Louisville Municipal Code
(Section 17.12.050 & Section 17.12.55)

Mixed Use Zone District Overlay

Refer to Chapter 17.14
in the Louisville Municipal Code

Street Index

80th Street South	C3	Cinnamon Lane	D6	Golden Eagle Way	I2	Lincoln Court	G6	Pinyon Way West	D5	White Violet Way	I3
88th Street South	F9-F10	Circle Drive	G3	Gorham Court	G2	Linden Street West	D4-E4	Plaza Drive	I3	Wild Rose Court	E5
96th Street South	H7-H11	Cleveland Avenue	F5	Grant Avenue	G4-G5	Lock Street	H6	Plum Circle West	D3	Wild Rose Way	E5
104th Street South	K5-K11	Cleveland Avenue South	E6	Grant Court South	G7	Locust Court West	E4	Polk Avenue	E3	Willow Court West	E4
		Cleveland Court	F5	Griffith Street	F4-G4	Lois Circle	G6	Polk Avenue South	E6	Willow Place	C5
Adams Avenue	F4	Cliffrose Lane	F2	Griffith Street West	F4	Lois Court West	D6	Polk Court	E3	Willow Street West	C4-E4
Adams Avenue North	G5	Club Circle	E8	Grouse Court	E6	Lois Drive	G6	Ponderosa Court	E5	Wilson Place	G4
Adams Drive South	G7	Club Place	E8	Grove Court	D4	Longs Peak Drive	G3	Prairie Way	J6	Wyonna Court	G2
Adams Place	F7	Coal Creek Circle	D9	Grove Drive	D5	Lois Way West	E6	Princeton Court West	D7		
Alder Street West	C4-D4	Coal Creek Lane	E8-F7							Yale Court West	D7
Alpine Street	G6	Colorado State Highway 42	H1-H6-L6	Hackberry Street West	E6	Madison Avenue South	E6-7	Quail Circle	E3		
Apple Court	D7	Columbine Court	E5	Harding Court South	E6	Madison Court	E3-E4	Quail Court	E3		
Arapahoe Circle	C5	Conifer Court West	D7	Harper Street	H4, F4-G4	Magpie Lane	H2				
Arapahoe Court	C5	Continental View Drive	C3	Harper Street West	F4	Mahogany Circle West	D7	Raintree Court East	G6		
Arrowhead Court West	E4	Copper Hill Court	C3	Harper Lake Court	D4	Main Street	H3-H6	Raintree Court West	E6		
Arrowhead Street West	E4	*Copper Lane	D8	Harper Lake Drive	D5	*Manor Wood Court	E8	Raintree Lane South	G6		
Arthur Avenue South	I7-I8	Cottonwood Drive	G3	Harrison Court	D3	*Manor Wood Lane	E8	Regal Court	F3		
Ash Court West	E3	County Road	H5-H7	Hawk Court	E4	Maple Court West	C4	Regal Place	F3		
Ash Street West	E3	Courtesy Road North	H4-H5	Hawthorn Court West	F3	Matchless Street	G3	Regal Street	F3		
Aspen Court West	E7	Coventry Lane	E7	Hawthorn Street West	E3	McCaslin Boulevard	C3-C8	Rex Street	H5		
Aspen Way	G7	Crestview Court	D6	Hays Drive	D3	McKinley Avenue	G5, F2	Ridge Place	D8-E8		
Aspen Way West	E7	Crown Circle	G2	Health Park Drive	E9	McKinley Court South	G7	Ridgeview Drive	E3-E4		
Augusta Drive	F8	CTC Boulevard	J6-J8	Hecla Drive	H3-I2	McKinley Park Lane	G4	Rock Rose Court	D5		
Augusta Lane	F8	Cypress Lane	D6	Hecla Drive West	H2-H3	McKinley Place	G4	Roosevelt Avenue	H5-H6		
Azure Way	C3			Hecla Way	I3	Mead Court	G6	Rose Court	I2		
		Dahlia Court West	D7	Hemlock Circle West	D5	Mead Street	H6	Rose Street	H6		
Barbara Street	G6	Dahlia Drive	G7	Hickory Court West	E4	Meadow Court	D5				
Barberry Circle West	D3	Dahlia Street West	D8-E7	Hickory Street West	E4	Meadowlark Lane	G2	Sagebrush Court West	E4		
Barberry Court West	D3	Dahlia Way	G7	Hillside Court	C6	Meeker Court South	D7	Sagebrush Drive West	E4		
Baseline Road	A1-L1	*Diamond Circle	F7	Hillside Lane	C6	Mesa Court	D6	Sagebrush Way	F4		
Beech Place West	E3	*Disk Drive	G11-H11	Honeysuckle Lane	C5	Mesa Point Place	E3	Sandbar Circle West	E6		
Bella Vista Drive	G6-H6	Dillon Road	C8-L9	Hoover Avenue North	F5-F6	Monarch Court	F2	Sandalwood Court West	E4		
Birch Court West	E3	Dogwood Circle	F2	Hoover Avenue South	G6-G7	Monarch Street	F2-G2	Senator Court	G2		
Bluestem	H2	Dogwood Street	J7-K7	Hoover Court	G6	Monroe Court South	G7	Senator Drive	G2		
Blue Star Lane	I3	Dyer Road	B8-C8	Hoptree Court	F5	Monroe Place	G4	Short Court	G4		
Bobolink Court	F2			Hutchinson Street	G5-H5	Mountain View Court	D6	Short Place	G4		
Boxelder Street	J8	Eagle Court	E5			Mt. Evans Court	D5	Short Street	G4-H4		
Buchanan Avenue South	E6-E7	East Street	H5-H6	Infinite Drive	B7	Muirfield Circle	E9	Skyview Court	D6		
Buchanan Circle South	E7	Eisenhower Drive	F3			Muirfield Court	E9	Snowberry Lane	I2		
Buchanan Court South	E6	Eisenhower Drive West	E3	Jackson Circle	F4	Mulberry Street West	D6-E6	South Place	F4		
Buchanan Court	E6	Eldorado Lane	C5	Jackson Court	F4			South Street	G4-H4		
Buckthorn Way	E5	Ella Court	I2	Jackson Drive	F2	Nighthawk Circle	D5	South Boulder Road	C3-L3		
		Elm Street	H5	Jefferson Avenue	G3-G6			South Boulder Road West	C3-F3		
Cactus Court West	E4-E5	Elm Street West	F5-F6	Jefferson Avenue South	G7	Oak Court West	D4	*Springs Cove	F7		
Caledonia Circle	F4	Empire Road	H5-L6	Johnson Avenue	G5	Orchard Court	D7-E7	*Springs Drive	F7		
Caledonia Street	G4-H4	Enclave Circle West	C5	Johnson Street	H6	Orchard Drive	D7- D8	Spruce Circle	E5		
Campus Drive	F10	Enclave Way West	C5	Juniper Court	G7	Orchard Way	E7- E8	Spruce Lane	F5		
Cannon Circle	H3	Estes Way	D5	Juniper Court West	E7	Osprey Court	E5	Spruce Street	F5-H5		
Cannon Street	H4	Evans Avenue	G2	Juniper Street	G7	Owl Court	E5	Spruce Street West	F5		
Carbon Road	H11-J11, I11-J11	Evans Circle	G2			Owl Drive	E5	Spruce Way West	E5	US Highway 36	A7-G12
Carter Avenue South	F7			Kaylix Avenue	H2			Spyglass Circle	E9		
Carter Court South	G6	Fairfield Lane	E7-F7	Kennedy Avenue	D4	Palisade Court South	D7	St. Andrews Lane	F8-E9	Van Buren Court	F6
Catalpa Court	F5	Falcon Court	E5			Paramount Court	G2	Storage Tek Drive	H12	Via Appia	C6-F3
Cedar Place West	E3	Fillmore Avenue South	E6	Lafarge Avenue	H4-H5	Park Lane	H2	Strathmore Street	G3	Via Capri	F3
Cedar Way West	F3	Fillmore Court	E3-E4, E5	Lafayette Street	F4-H4	Parkview Street	H6	Sumac Court	F6	Via Roma	F3
Centennial Drive	F3-F2-G2-G3	Fillmore Place	E4	Lafayette Street West	F4	Paschal Drive	H2-I2	Sunflower Street	C5	Village Road East	C8
Centennial Parkway	C6-C7	Fir Court East	G6	Lakespur Court	I2-I3	Parbois Lane	H5	Summit View Drive	H2	Village Road West	C8
Century Drive	C6-D6	Fir Court West	E6	Lark Avenue South	D7	Peach Court	D8-E8	Sunland Street	G2	Vista Lane	D6
*Century Circle	C6	Fir Way West	E6	Larkspur Court	C5	Pear Court	D8-E8	Sunnyside Circle	G3	Vulcan Street	G2
Century Place	C6-C7	Fireside Street	G3	Larkspur Lane	C5	Peerless Street	G3	Sunnyside Street	G3		
Charles Way	H2	Flatirons Court	D5	Laurel Court West	E3	*Pheasant Run	F3	Sunrise Court	G2	Wagon Way	H2
Cherry Street	I7-J7	Ford Court	D3	Leader Circle	G2	Pierce Avenue South	I7 -I8	Sunset Drive	G3	Walnut Court	F5
Cherry Street West	C7-F7	Ford Place	D4	Lee Avenue	H5	Pikes Peak Court	D5	Sweet Clover Lane	I2	Walnut Lane	F5
Cherrywood Lane	D6	Franklin Avenue	F2	Lilac Circle	G7	Pikes Peak Lane	D5	Sycamore Circle West	E6	Walnut Street	F5-H5
Chestnut Circle West	D7	Franklin Court	F4	Lilac Court	G7	Pinehurst Court	E8	Sycamore Court	F6	Warbler Court South	E6
Chestnut Court West	E7	Front Street	H4-H6	Lilac Court West	E7	Pine Needle Lane	E5	Sycamore Lane West	F6	Washington Avenue	E3-C5
Chestnut Street	G7			Lincoln Avenue	G4-G5	Pine Court West	C5	Sycamore Street West	E6	Washington Avenue South	E6
Choke Cherry Drive West	D3	Garfield Avenue	G2-G5	Lincoln Avenue South	G7	Pine Street West	D5-F5			Welsh Court	E5
Church Lane	E5	Garfield Court	G4	Lincoln Circle	G6	Pine Street	F5-H5	Taft Court	D4	West Street	G6-H6
								Taft Court South	D7		
								Taft Place	D4		
								Tamarisk Court	E4		
								Tamarisk Street West	D4		
								Tanager Court South	D6		
								*Tape Drive	H11		
								Taylor Avenue	I6-K6		
								Taylor Avenue South	I6-I8		
								Trail Ridge Drive	D5		
								Treece Street	H2		
								Treeview Court	E9		
								Troon Court	D4		
								Truman Court	E9		
								Turnberry Circle	D4-E6		
								Tyler Avenue			

Zoning Districts

AO	Administrative Office	RE	Residential Estate
A-OT	Administrative Office Transition	RH	Residential High Density
O	Administrative or Professional Office	RL	Residential Low Density
A	Agriculture	RM	Residential Medium Density
BO	Business Office	R-RR	Residential Restricted Rural
CB	Commercial Business	RR	Residential Rural
CC	Commercial Community	SF-E	Single Family Estate
CN	Commercial Neighborhood	SF-HD	Single Family High Density
I	Industrial	SF-LD	Single Family Low Density
MU-R	Mixed Use Residential	SF-MD	Single Family Medium Density
P-C	Planned Commercial	SF-R	Single Family Rural
P-C/R	Planned Community Commercial Residential	PARK	Parks, Green Spaces, Trail Corridors, Right-of-way
P-I	Planned Industrial	OPEN SPACE	Zoned City Open Space
P-R	Planned Community Residential	OPEN SPACE	Unzoned City Open Space
		OPEN SPACE	Unzoned Joint Owned Space (COL / BOCO / COLAF)

FIGURE 1

2012 ZONING DISTRICT MAP

Planning and Building Safety Department

Robert P. Muckle, Mayor

City of Louisville
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2.1.2 Customer Categories

Water usage is tracked for several customer categories (see Table 4). All customers have water meters and are billed monthly.

TABLE 4
Customer Categories

Category	Code	Description	Metered (Yes/No)	Revenue (Yes/No)
Metered Consumption				
City	CITY	Indoor and outdoor use at City facilities including parks, medians, recreation centers, pools, and golf course. The golf course can be irrigated with raw, reuse, or potable water.	Yes	No (current)[1] Yes (future)
Residential-Inside	RESI	Single-family home, inside City limits, indoor and outdoor use.	Yes	Yes
Residential-Outside	RESO	Single-family home, outside City limits, indoor and outdoor use	Yes	Yes
Multifamily	MF	Multifamily residence, inside and outside City limits.	Yes	Yes
Commercial-Inside	COMI	Commercial, inside City limits, indoor and outdoor use.	Yes	Yes
Commercial-Outside	COMO	Commercial, outside City limits, indoor and outdoor use.	Yes	Yes
Irrigation	IRRI	Dedicated taps for outdoor water use for commercial and homeowners association (HOA) landscaping. Not all commercial users have dedicated irrigation taps for outdoor use.	Yes	Yes
Bulk Water	—	Water for construction use.	Yes	Yes

[1] The City is phasing in charging itself as a water customer. In 2014, the City is paying 25% of water costs, 50% in 2015, 75% in 2017, and full cost in 2017.

The City customer category is currently not billed and is authorized non-revenue water. However the City is phasing in charging itself as a water customer; in 2014, the City is paying 25% of water costs, 50% in 2015, 75% in 2017, and full cost in 2017. Not all commercial establishments have a separate irrigation tap for outdoor water use; the City code provides guidance on how large an area can be before a separate irrigation tap is required.

Construction water is authorized for use through bulk water usage permits and is tracked separately from the main customer categories in Table 4. Bulk water usage is metered using several bulk water meters in the system. The demand depends on the amount of construction each year. Bulk water usage is accounted for in the demand projections in Section 2.4, Demand Forecast. Other authorized uses that are not currently metered or billed (non-revenue) include distribution system flushing, firefighting, and street washing. A majority of water uses are metered and billed. However, the City does not have accurate estimates for this non-revenue water, but the volume of water for these purposes is usually small compared to the total water demand.

The City also has a reuse water system that currently irrigates City properties. Reuse water is used for irrigating Coal Creek Golf Course, Community Park, Louisville Sports Complex, Miner's Field, and the wastewater treatment plant. Reuse water usage is summarized in Section 2.2.2, Reuse Water.

2.2 Historical Water Usage

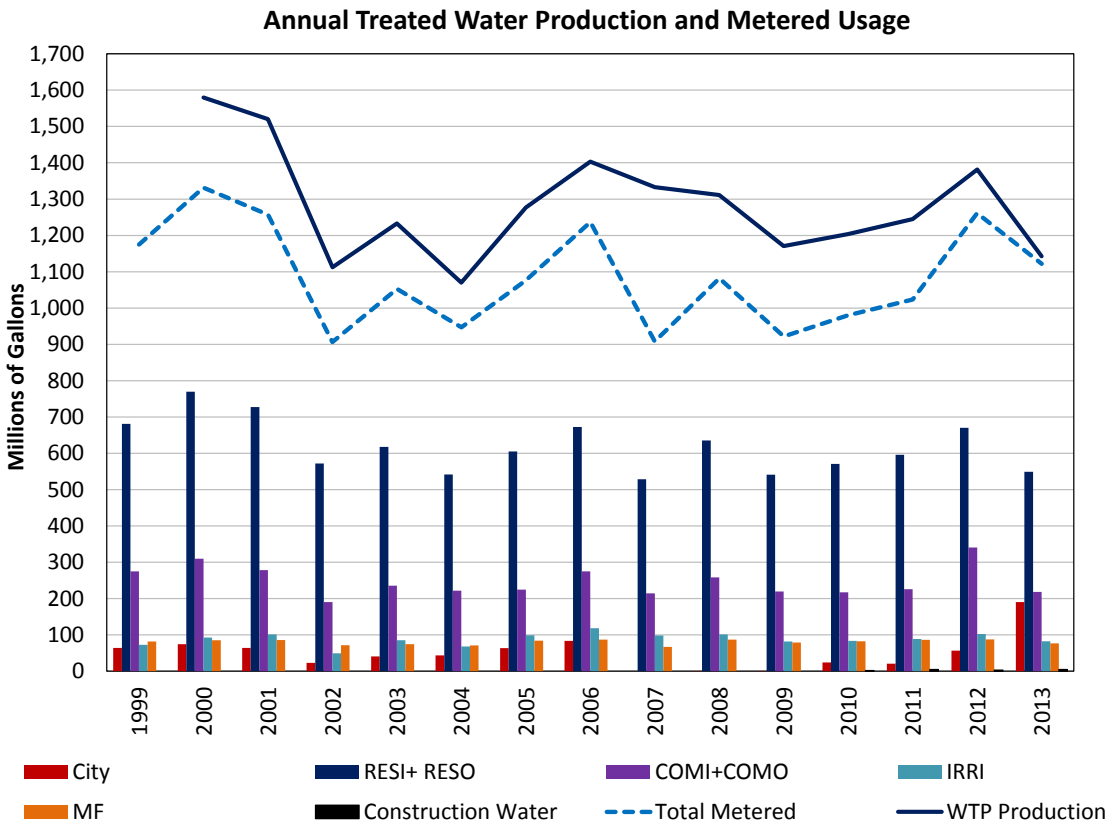
The summary of historical potable water use is summarized into authorized water use and water losses, as discussed in the following subsections.

2.2.1 Authorized Water Use

Authorized uses of water from the City of Louisville include metered water to customers, bulk water permits, and unmetered water for authorized purposes (flushing, firefighting, street washing, etc.). Water used for bulk permits is shown as an authorized use. There are no estimates of unmetered water for authorized purposes, so this water is not accounted for in the authorized use category in this evaluation. In the future, this relatively small number should be quantified so it can be accounted for as authorized unbilled usage. Annual water treatment plant production and authorized water usage for the City's water customers from 1999 to 2013 is summarized in Figure 2.

Demand data prior to 2011 should be interpreted with caution for two main reasons: (1) a portion of the water meters in the system were misclassified in the billing system, and (2) upgrades to the billing system that improved water accounting were complete in 2010.

FIGURE 2
Annual Treated Water Production and Authorized (Metered) Consumption, 1999 to 2013



Water conservation programs and resources have been available from the City for several years. However, in 2002 there was a noticeable decrease in metered water consumption due to a severe drought that year. Since that time, citywide consumption has remained relatively stable, even as the population has increased.

A numerical summary of the last 5 years of authorized water use and water treatment plant production is provided in Table 5. Annual treated water production from 2009 to 2013 ranged from 1,170.81 to 1,381.41 million gallons (MG), or 3,593 to 4,239 acre-feet.

TABLE 5
Summary of Annual Authorized Water Use and Treated Water Production, 2009 to 2013

Year	City[1]	Residential (RESI+RESO)	Multifamily (MF)	Commercial (COMI+COMO)	Irrigation (IRRI)	Authorized[2]	Total Authorized	Treated Water Production
2009	0.43	540.89	79.31	219.59	81.77	—	922.00	1170.81
2010	24.06	570.59	82.41	217.23	83.91	1.74	979.93	1203.65
2011	20.86	596.29	86.46	225.92	89.04	4.82	1023.37	1244.70
2012	56.87	670.06	87.61	340.66	102.60	3.30	1261.11	1381.41
2013	190.17	549.00	77.04	218.42	83.47	4.63	1121.52	1142.53

Notes:
[1] The accounting system for City water usage was not considered reliable until 2013.
[2] Authorized usage represents metered water for bulk water permits.
Units are in millions of gallons.

Analysis of water consumption per customer type shows that residential consumption consistently accounts for almost 50 percent or more of total consumption. Commercial is the second largest consumer, accounting for nearly 25 percent of total production. City, irrigation, and multifamily users make up the remaining 25 percent.

2.2.1.1 Water Losses

The difference in the total treated water production and authorized water use (Figure 3) is considered water loss. Water loss is divided into two categories: (1) real losses (leaks, overflows, unauthorized use, etc.), and (2) apparent losses (accounting and data collection errors). A certain amount of real water loss is inevitable, but utilities can minimize the amount of real water loss with maintenance and leak detection programs. The City of Louisville had apparent losses prior to 2012 when metered water was not being properly accounted for in the billing system. A summary of water loss for the last 5 years is provided in Table 6.

TABLE 6
Water Loss Summary, 2009-2013

Year	Total Authorized (MG)	Treated Water Production (MG)	Water Loss (% of Treated Water Production)
2009	922.00	1170.81	21.3%
2010	979.93	1203.65	18.6%
2011	1023.37	1244.70	18.9%
2012	1261.11	1381.41	8.8%
2013	1122.72	1142.53	1.8%

Note:
MG = million gallons

Prior to 2012, the average annual water loss was 19.8 percent. Water accounting improved in 2012 with the new CIS system and significantly decreased apparent water losses. In 2013, the calculated water loss was very low at 1.8 percent. The City will need to monitor water loss with the new CIS system to establish a baseline level that can be used to measure system improvement or deterioration.

2.2.1.2 Seasonal and Non-seasonal Demands

Indoor water use consists of water used for washing machines, dishwashers, showers, toilet flushing, cooking, and direct consumption. The majority of outdoor water use is assumed to be used for lawn

irrigation. Metered water demands for residential customers includes both indoor and outdoor uses. The irrigation account is water used for irrigation of landscaping at some commercial properties and homeowners associations (HOAs). A summary of season and non-seasonal metered usage is provided in Table 7 from 2013. The portion of water for seasonal and non-seasonal use for each category is used later in the demand forecast (Section 2.4, Demand Forecast).

TABLE 7
2013 Seasonal and Non-seasonal Metered Water Usage

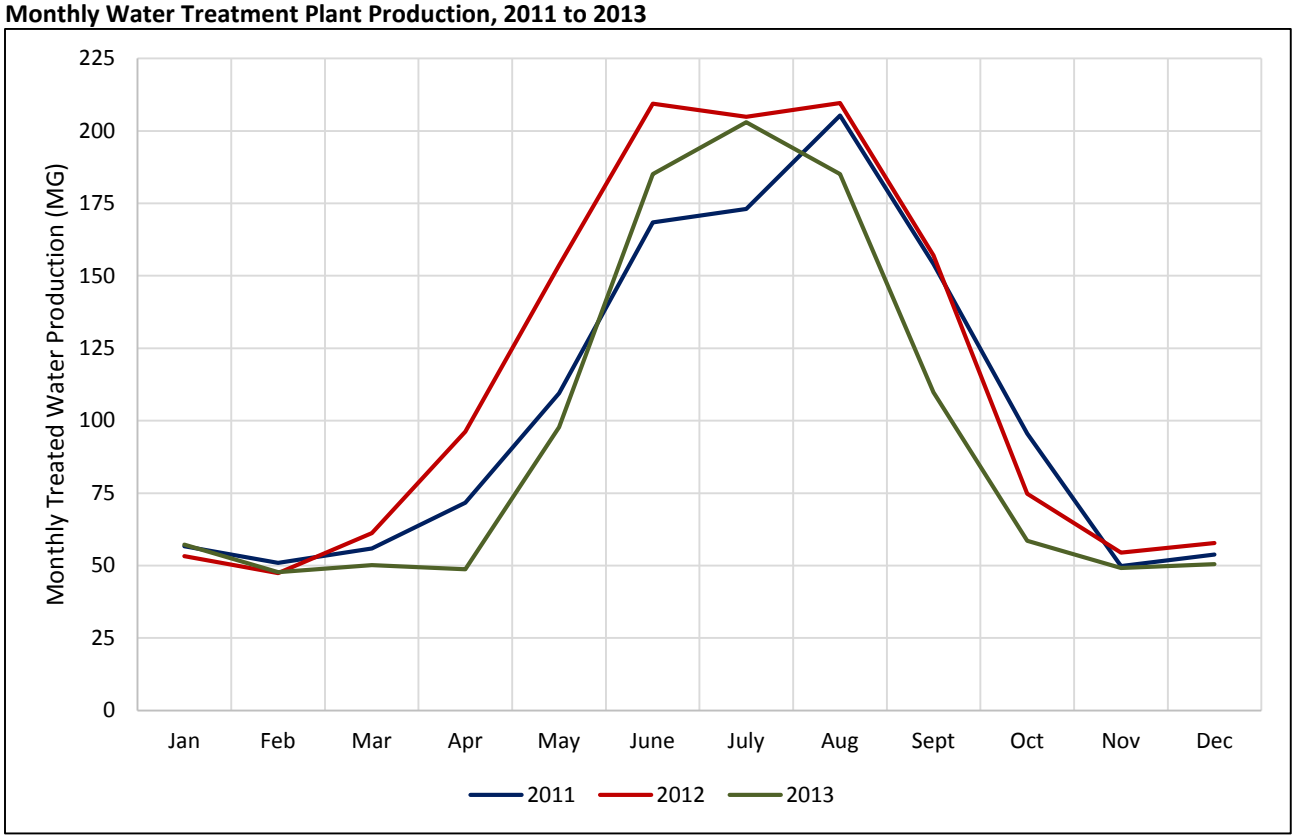
Customer Category	Seasonal (MG)	Non-seasonal (MG)	Seasonal (%)	Non-seasonal (%)
City	135.5	55.6	71%	29%
Commercial (inside City limits)	98.9	119.6	45%	55%
Multifamily	17.0	60.0	22%	78%
Residential (inside City limits)	247.5	299.6	45%	55%
Residential (outside City limits)	1.0	0.95	52%	48%
Irrigation	82.3	0	100%	0%

Note:
MG = million gallons

Monthly water treatment plant (WTP) production also increases from April through October (Figure 3). This is a seasonal pattern which correlates with an increase in consumption due to outdoor water use. Non-seasonal monthly WTP production from November to March is 50 MG per month on average.

Assuming that the non-seasonal production values represent indoor consumption year round, then the increase in WTP production between April and October is for outdoor use, which accounts for approximately 48 percent of total annual water consumption on average.

FIGURE 3
Monthly Water Treatment Plant Production, 2011 to 2013



2.2.1.3 Per Capita Water Usage

Per capita water use is a method of quantifying the volume of water used by a certain population. It can be calculated many ways and used to track efficiency over a large population or more specific customer categories. In this evaluation, the per capita water use is only calculated from 2010 to 2013 because the City's population was adjusted down 6.5 percent in the 2010 U.S. Census; population estimates prior to 2010 were inaccurate, and per capita values for these years would likely be underestimated. Per capita water use from 2010 to 2013 is summarized in Figure 4 and Table 8.

FIGURE 4
Per Capita Water Usage, 2010 to 2012

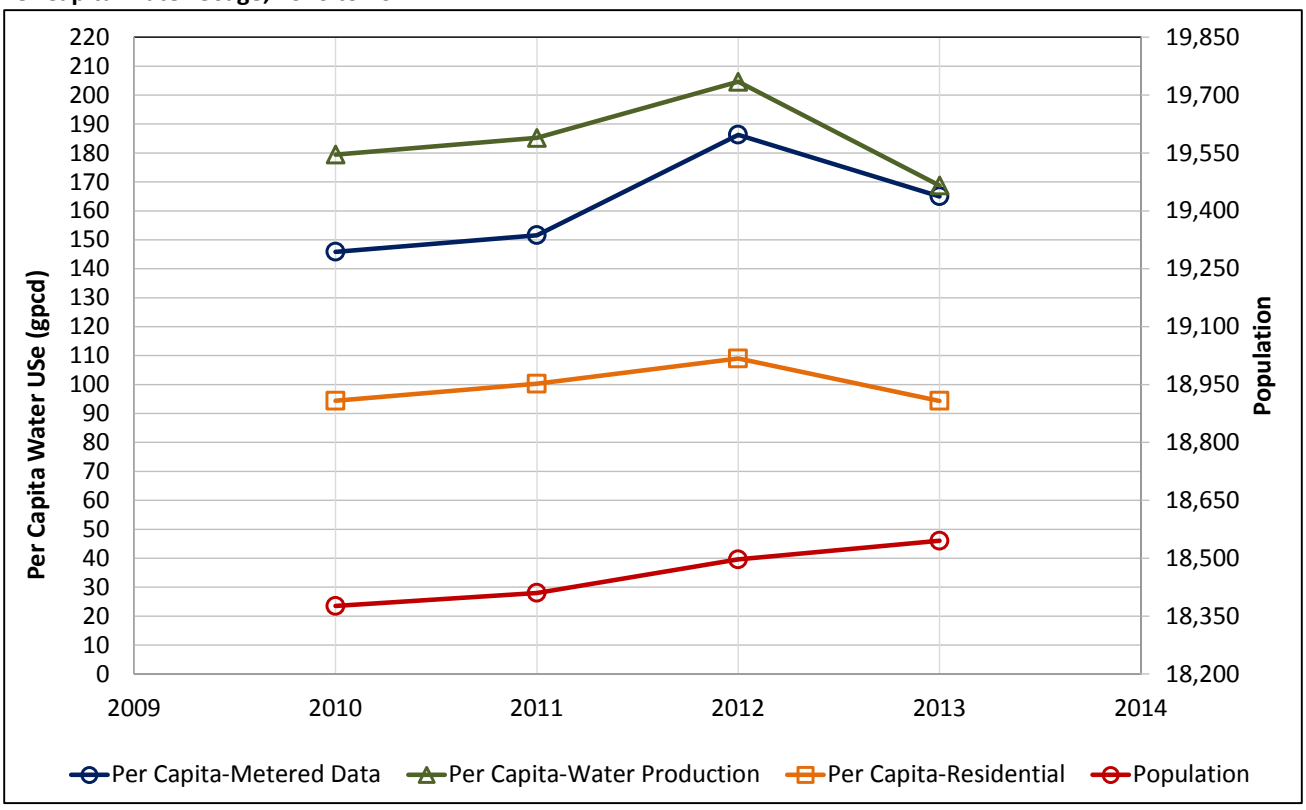


TABLE 8
Per Capita Water Use Summary

Year	Service Area Population[1]	Per Capita – Metered Use (gpcd)	Per Capita – Residential Use (gpcd)[2]	Per Capita – Treated Water Production (gpcd)
2010	18,376	146.7	97.4	179.5
2011	18,410	151.6	101.6	185.2
2012	18,497	186.3	112.2	204.6
2013	18,545	165.0	92.3	168.8

Notes:
[1] Population from Water System Facilities Plan (July 2012). The City's population according to the 2010 U.S. Census was 18,376.
gpcd = gallons per capita per day

Based on metered usage of all the City' customer categories the per capita water usage of the service area population was an average of 162 gallons per capita per day (gpcd) from 2010-2013. An estimate of per capita usage of the residential population was an average of 101 gpcd from 2010 to 2013. This usage number represents the average amount of water required every day for each person in the RESI, RESO, and MF categories. These per capita values do not account for water use that is not metered as part of the billing system (for example, bulk water), real water loss, or apparent water loss. To capture the total amount of water per capita required at the entrance to the system, the water treatment plant production must be used in the calculation. The average per capita water required from the water treatment plant was 185 gpcd from 2010 to 2013.

2.2.2 Estimated Savings from Past Water Conservation

Efficient use of water has been a consistent message from the City's water utility for several years. Over the years, many factors contribute to decreasing per capita water demand, including City water conservation programs, improved metering, continued learned behavior from drought years, and public education. The estimate of savings from water conservation for the City of Louisville was based on the average per capita treated water production from 1999 to 2001 applied to the current 2013 population, and then comparing this result to the actual value from the 2011-to-2013 average. As stated previously, the 2010 U.S. Census adjusted the population to a lower value. Because an overestimate of population will result in underestimating per capita water use, the population was reverse forecasted from 2010 back to 1999 in order to estimate savings already achieved. Per capita values of treated water production were used instead of metered data because customers were not fully metered in 1999.

Based on a gradual increase of savings over time, the total water saved since 1999 is estimated to be 326 MG (1,001 acre-feet). This estimate was calculated as follows: The average per capita treated water production from 1999 to 2001 was estimated at 209 gpcd. When applied to the 2013 population of 18,584, this is an annual treated water production of 1,418 MG. The actual average from 2011 to 2013 was 1,092 MG. The actual treated water produced was approximately 326 MG (1,001 acre-feet) less than the estimated production based on past per capita values.

2.2.3 Reuse Water

The City's wastewater treatment plant (WWTP) has the capability to treat a portion of the water to be reused for irrigation. The reuse plant has a maximum treatment capacity of 2 mgd, but the actual amount of water available for reuse is limited by influent flow to the WWTP and water rights operations. Current average daily flow rates to the WWTP are 1.8 mgd. Reuse water is primarily used for irrigation at Coal Creek Golf Course, Community Park, Sports Complex, Miner's Field, and the WWTP. The average monthly total reuse water produced and the average production per day is summarized in Table 9 based on available historical data beginning in 1994.

TABLE 9
Summary of Reuse Water Production

Month	Average Daily Reuse Water Usage[1] (mgd)	Average Total Reuse Water Usage (MG)
January	0.021	0.67
February	0.0.032	0.98
March	0.055	1.71
April	0.134	4.16
May	0.386	11.96
June	0.589	18.27
July	0.715	22.15
August	0.616	19.10
September	0.421	13.05
October	0.164	5.08
November	0.075	2.33
December	0.020	0.63

Notes:

[1] Usage based on a 10-year average for the Coal Creek Golf Course, a 5-year average for the WWTP and ball fields, and 50 acre-feet of demand for Community Park distributed across the irrigation months.

MG = million gallons

mgd = million gallons per day

Peak demand occurred in July 2013 at 0.715 mgd. Average production from the plant during warmer months from May through September is approximately 0.55 mgd. Total annual production from the plant in 2013 was approximately 100 MG

The City supports maximizing reusable system utilization and the potential exists to increase the supply of reuse water. Several water users have expressed interest in switching to reuse in place of potable water for their irrigation needs. During 2014, the City conducted a study evaluating reuse system expansion. It was found that with the current water rights usage, there is very little spare capacity in the reuse system because the City has a limited amount of reusable water. As a result of that study, Louisville decided to maximize utilization of the system by installing infrastructure that would enable several large users to transition from potable water to reuse supply. This transition is expected to occur within the next five years and is estimated to reduce Louisville's peak demand by 130,000 gpd, and seasonal demand by approximately 12 MG. More reusable water will become available as Windy Gap water starts to get used in the municipal system, which will be done once the Windy Gap Firming Project is completed. Currently, the Windy Gap supply is not utilized because of its unreliability and high cost. Several City parks still use potable water for irrigation, totaling about 66 MG per season. Expanding the reuse system to include additional large water users and City parks could increase the total reuse water used annually to approximately 120 MG. Over a period of 6 months, this would be equivalent to approximately 0.66 mgd.

2.3 Current Demand Management Activities

The City of Louisville is very committed to efficient water use and good environmental stewardship. The activities and programs described in this section were implemented by the City prior to 2014 and water savings have already been achieved from these efforts. A summary of water conservation activities is also provided later in the plan in Table 14, which also has a list of existing activities.

2.3.1 Foundational Activities

2.3.1.1 Water Conservation and Integrated Resources Planning

- The City implements an integrated resources planning approach that fully integrates water conservation into water supply planning processes.
- The City regularly updates their water supply master plan, capital improvement plan, and feasibility studies to ensure a diverse, robust, and resilient water supply.

2.3.1.2 Metering, Water Rates, and Billing Practices

- 100 percent of the City's customers are metered.
- Water use is tracked by various customer categories (residential, multifamily, commercial, irrigation, and city).
- There is monthly volumetric billing for all customers.
- Drive-by advanced metering infrastructure (AMI) with new meters were installed in 2010-2011.
- The City has a goal to replace meters every 10 years.
- Water rates are reviewed annually and adjustments are made to cover utility costs.
- There is an inclining block water rate structure to encourage efficient outdoor water use and other conservation-oriented structures are being considered.
- Commercial water tap fees are charged based on estimated annual demand, which could result in more water-efficient development.
- Separate irrigation meters are required for townhomes and multifamily developments with 5 or more units and are offered for commercial as optional.

2.3.1.3 System Efficiency (Water Loss Control and Pressure Management)

- Leak detection with listening equipment is performed every other year for a portion of the City.
- Water pipeline replacement program is part of the annual operations budget.
- Coal Creek Golf Course is irrigated with raw and reuse water to conserve treated water.
- Louisville Sports Complex and Community Park are irrigated with raw and reuse water to conserve treated water.

2.3.1.4 Monitoring and Evaluation

- Water consumption by large water users are regularly monitored as part of the industrial pretreatment program.
- Billing staff will occasionally flag monthly usage that exhibits an obvious variance from past data or shows a zero reading. The meters are then checked to determine if the reading was due to a broken meter or a leak.
- Water use by customer category is evaluated annually.

2.3.2 Targeted Technical Assistance and Incentives

2.3.2.1 Water Efficient Fixtures-Indoor

- Some City facilities have been upgraded with high efficiency fixtures and appliances, including City Hall (low-flow faucets, low-volume toilets) and the recreation center (low-flow shower heads, ultra-low flush urinals, and a pool cover).

2.3.2.2 Water Efficient Devices-Outdoor

- The vast majority of the City's irrigation systems controls are linked to a master Central Control Irrigation System (CCIS) that can be used to adjust watering times or turn off irrigation when there is a precipitation event.

2.3.2.3 Incentive Programs

- High-efficiency toilet rebate program.
- High-efficiency clothes washer rebate program.
- Drip irrigation system rebate towards cost of equipment.
- Buffalo grass turf rebate.

2.3.2.4 Efficient Water Use/Audits

- Outdoor irrigation efficiency audits offered by Center for ReSource Conservation (CRC) for residential and commercial customers.

2.3.3 Ordinances and Regulations

- Louisville Municipal Code (Title 17) established development Design Standards & Guidelines for commercial, industrial, and mixed use developments that incorporate low-water-use plants and efficient irrigation concepts into the landscape design of each development.
- Water waste ordinance, includes overspray limitations.
- Compliance with Colorado Department of Public Health and Environment's (CDPHE's) Regulation No. 84 limits runoff, ponding, and overspray from areas using reuse water.
- The City's Commercial Development Design Standards and Guidelines include a policy to conserve water by utilizing alternative means for maintaining a suitable landscape environment.
- The City's Open Space Division utilizes soil amendments and low-water plants.

- Louisville Municipal Code established development Design Standards & Guidelines for commercial, industrial, and mixed use developments. Subirrigation of turf areas, minimizing runoff, and use of local and drought-resistant plants are also incorporated in the guidelines.
- New state law phases in sale of only WaterSense[3]-labeled fixtures by 2016.
- City adopted the International Code Council (ICC) *2012 International Building Code* (2012 IBC) that requires new construction and remodels meet these standards.

2.3.4 Public Information and Education

The City communicates about water use and conservation with their customers using the following tools and methods:

- Regular newsletter distributed.
- Water conservation information available on the City's website.
- A Water Committee made up of City Council members; meeting agendas are posted and the public are welcome at any meeting. The purpose of the Committee is to provide information to the City Council about current City utility activities, projects, and water supply.
- Educational opportunities including school tours of water infrastructure facilities.
- Coordinated messaging with other local cities and Boulder County for consumer message and campaign development, particularly in times of drought.
- Instructional workshops for customers on relevant topics such as irrigation efficiency and management.
- Landscape design and maintenance workshops (through the Center for Resource Conservation [CRC]).

2.4 Demand Forecast

2.4.1 Summary

As part of the water efficiency planning process, three distinct water demand forecasts were prepared. First, a baseline demand forecast starting from 2014 and going out to 2032 was prepared. This baseline forecast did not include the impact of water conservation of any kind, even passive water savings, and was developed only to assess the adequacy of future supplies under reasonable worst-case conditions and to demonstrate the impact of anticipated efficiency improvements. Baseline treated water production in 2014 was estimated to be 1,417.7 MG and under the baseline forecast increased by 558.4 MG resulting in treated water production of 1,943.9 MG in 2032.

A second water demand forecast through 2032 includes the impact of passive efficiencies from Colorado legislation, and federal plumbing codes and standards. This forecast estimated that City water production would increase to 1,777.7 MG in 2032, or 166 MG *less* than they would be under the baseline forecast.

A third forecast was prepared that includes the anticipated impact the City's planned water efficiency program measures described in this plan. Under this forecast, water production increases to 1,707.0 MG in 2032. Compared with the original baseline forecast, if the elements of this plan are fully realized, then it is estimated that water demand at 2032 will be reduced by 236.9 MG (0.65 mgd) as result of passive and active water conservation measures in the City.

These forecasts form the core of the Water Efficiency Plan and are the forecasts on which estimated conservation savings are based.

[3] WaterSense is a U.S. Environmental Protection Agency (EPA) partnership program that helps people save water with a product label and tips for saving water around the house. Products carrying the WaterSense label perform well, help save money, and encourage innovation in manufacturing.

2.4.1.1 Climate Variability Impact on Water Supply and Demand

Climate variability has the potential to impact water supply patterns and water demand. Recent climate forecasts indicate the potential for a future warming trend in the region. For example, in 2012 the Water Research Foundation completed a *Joint Front Range Climate Change Vulnerability Study*. All of the scenarios simulated as part of the study showed an increase in annual average temperature ranging from 1 degree to 6 degrees Fahrenheit for 2040. However, the annual percent change in precipitation ranged from -15 percent to +17 percent for 2040. While it is becoming more common to consider the impacts of climate variability on water supply planning the potential impact on water demands are less understood because of the variability of temperature and precipitation forecasts. Because recent water demands were used as the basis for forecasting future water demands, the demand forecasts in this plan already reflect some impact on water demand based on current climate conditions. A sensible approach to water demand forecasting is to regularly update demand projections based on actual current conditions.

The purpose and goal of this document was to prepare a water conservation plan to improve water efficiency under current supply and demand conditions. In order to plan for potential climate variability it is recommended the City complete an analysis of water supply and demand under climate change conditions to determine the adequacy of the City's water supply under a variety of future climate scenarios; such an effort was outside of the scope of work for this water conservation planning effort.

2.4.2 Forecast Development

As part of the preparation of the Water Efficiency Plan, three separate demand forecasts were prepared:

- Baseline forecast (without conservation)
- Passive savings forecast
- Passive and active savings forecast

The baseline forecasting method used historic demand patterns to establish the baseline per capita demand and then increase these demands with population out to 2032 as if the 2014 per capita water-use patterns continue without change to 2032. This is a standard approach to demand forecasting, but it does not take into account the expected impacts of water efficiency.

The second and third forecasts were developed using a more robust approach in which demands were separated out by water-use sector or customer category (for example, residential, commercial, irrigation, etc.), with seasonal and non-seasonal demands (outdoor and indoor) disaggregated for each category. Then a separate demand forecast out to 2032 was prepared for indoor and outdoor demand in each customer category. This allowed the impacts of specific water efficiency measures like high-efficiency toilets and clothes washers to be considered.

2.4.2.1 Population Planning Projections

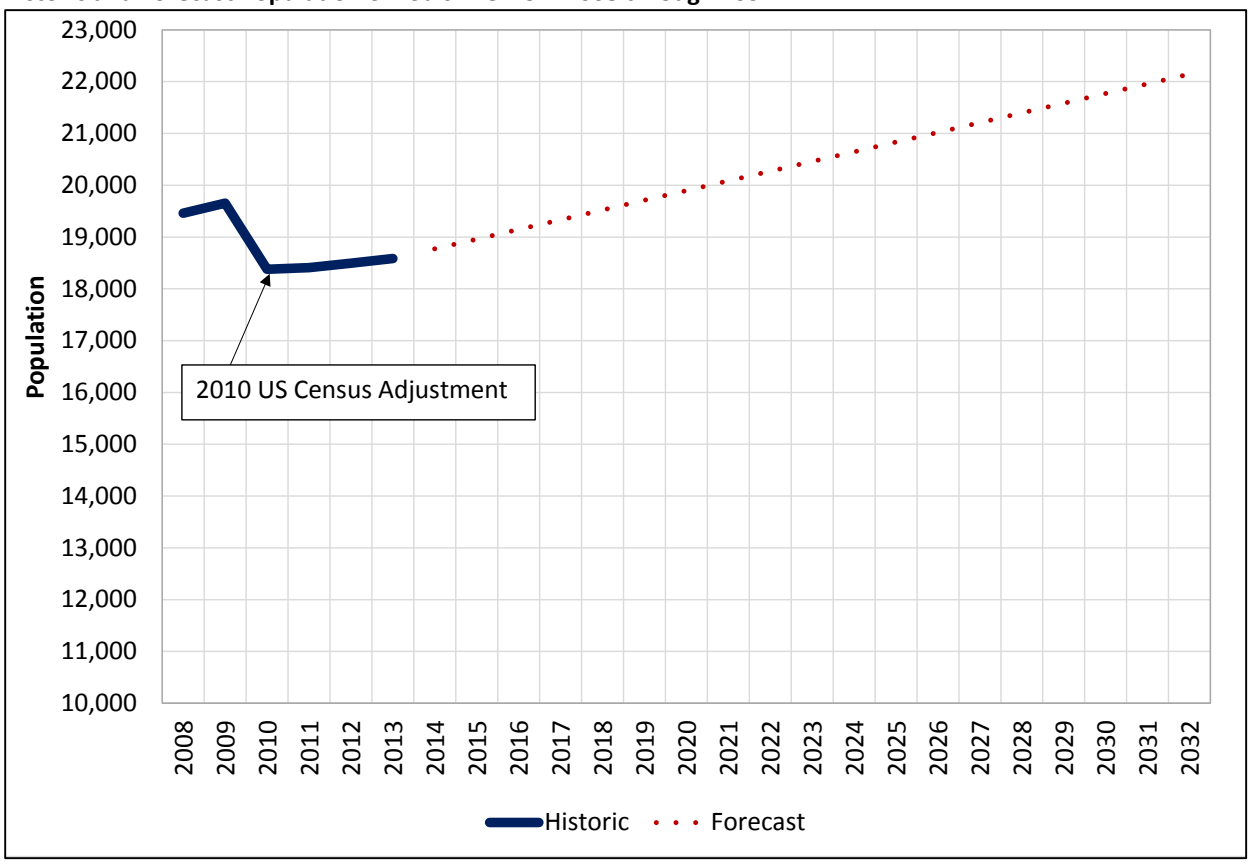
The population served with potable water by the City of Louisville in 2013 was approximately 18,584. Staff have indicated that the City plans to achieve a build out population of 22,145 by 2032. This suggests an average annual growth rate of between 0.75 to 1.0 percent per year. Table 10 shows the population forecast for Louisville from 2015 to 2032. The year 2032 was chosen as a demand forecasting horizon. These data are shown graphically in Figure 5.

TABLE 10

Population Growth Projections from 2008 through 2032

Year	Estimated Population	% Change from Previous Year	Data Source
2008	19,461	—	Water Facilities Master Plan (July 2012)
2009	19,656	1.00	Water Facilities Master Plan (July 2012)
2010	18,376	-6.51	2010 U.S. Census
2011	18,410	0.19	Water Facilities Master Plan (July 2012)
2012	18,497	0.47	Water Facilities Master Plan (July 2012)
2013	18,584	0.47	Water Facilities Master Plan (July 2012)
2014	18,771	1.01	Water Facilities Master Plan (July 2012)
2015	18,959	1.00	Water Facilities Master Plan (July 2012)
2016	19,146	0.99	Water Facilities Master Plan (July 2012)
2017	19,334	0.98	Water Facilities Master Plan (July 2012)
2018	19,521	0.97	Water Facilities Master Plan (July 2012)
2019	19,709	0.96	Water Facilities Master Plan (July 2012)
2020	19,896	0.95	Water Facilities Master Plan (July 2012)
2021	20,083	0.94	Water Facilities Master Plan (July 2012)
2022	20,271	0.93	Water Facilities Master Plan (July 2012)
2023	20,458	0.92	Water Facilities Master Plan (July 2012)
2024	20,646	0.92	Water Facilities Master Plan (July 2012)
2025	20,833	0.91	Water Facilities Master Plan (July 2012)
2026	21,020	0.90	Extrapolation
2027	21,208	0.89	Extrapolation
2028	21,395	0.88	Extrapolation
2029	21,583	0.88	Extrapolation
2030	21,770	0.87	Extrapolation
2031	21,958	0.86	Extrapolation
2032	22,145	0.85	Build-out population of 22,145 in 2032 from Joliette Woodson email 11/20/2013

FIGURE 5
Historic and Forecast Population of Louisville from 2008 through 2032



An analysis of recent water use data was performed to establish a starting point for the water demand forecasts. The minimum, maximum, and average water use for each customer category was calculated for each year from 2009 to 2013. These values were compared to the 2013 value. Engineering judgment was used to select the starting point for each customer category, guided by the intent to start the forecast at a value that was representative of recent demand but not too low or too high. A summary of the metered data for the last 5 years is shown in Table 11 (which was also provided Table 5), as well as a summary of the minimum, maximum, average, and baseline starting values.

TABLE 11
Summary of Annual Authorized Water Use and Treated Water Production, 2009 to 2013

Year	Population	City[1]	Residential (RESI+RESO)	Multifamily (MF)	Commercial (COMI+COMO)	Irrigation (IRRI)	Total Metered[2]
2009	—	0.43	540.89	79.31	219.59	81.77	922.00
2010	18,376	24.06	570.59	82.41	217.23	83.91	984.20
2011	18,410	20.86	596.29	86.46	225.92	89.04	1,018.55
2012	18,497	56.87	670.06	87.61	340.66	102.60	1,257.81
2013	18,584	190.17	549.00	77.04	218.42	83.47	1,116.90
5-year min.	—	0.43	540.89	77.04	217.23	81.77	922.00
5-year max.	.—	190.17	670.06	87.61	340.66	102.60	1,257.81

TABLE 11
Summary of Annual Authorized Water Use and Treated Water Production, 2009 to 2013

Year	Population	City[1]	Residential (RESI+RESO)	Multifamily (MF)	Commercial (COMI+COMO)	Irrigation (IRRI)	Total Metered[2]
5-year avg.	—	58.48	585.37	82.57	244.36	89.12	1,059.89
Baseline Starting Point	18,584	190.17	585.37	82.57	244.36	89.12	1,191.69

Notes:

[1] Starting point for City's baseline forecast is 2013 because the accounting system for City water usage was not considered reliable until 2013.

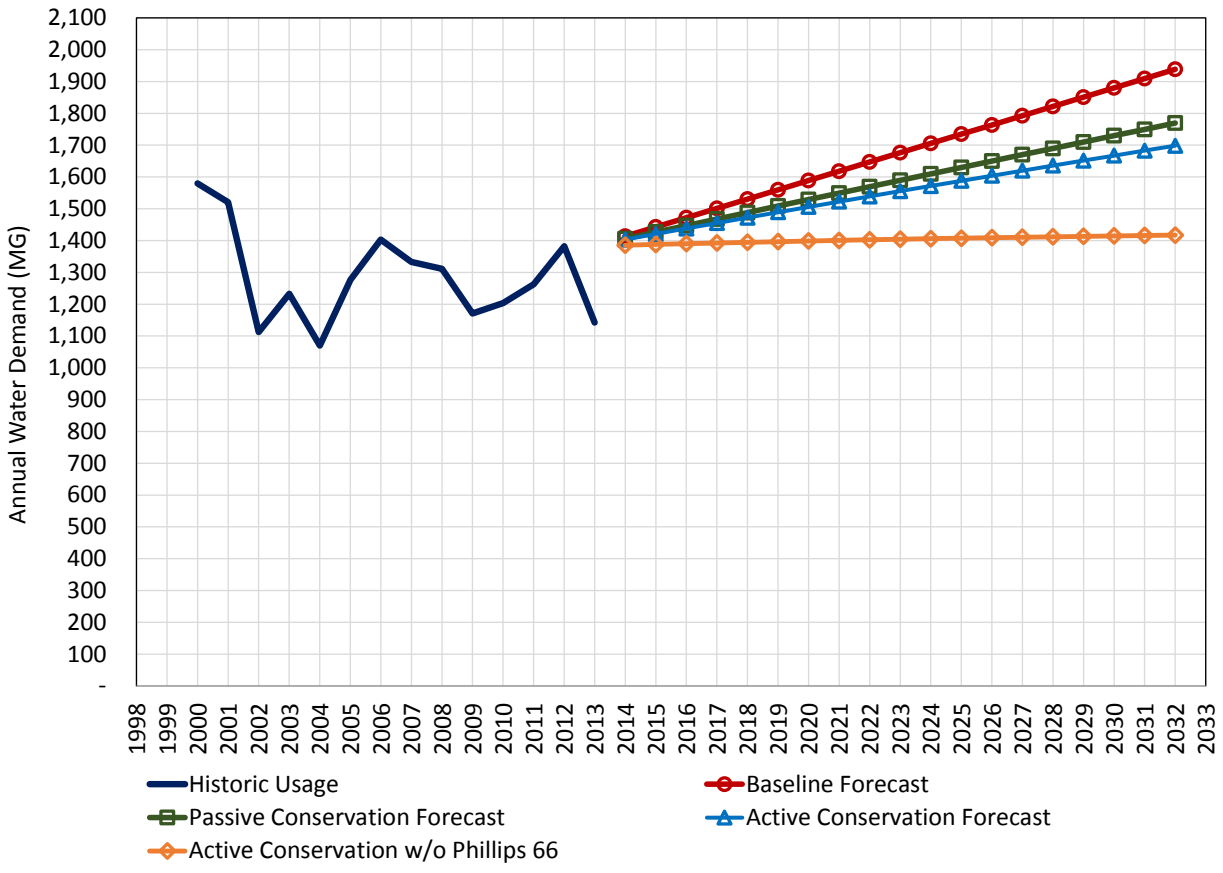
[2] Starting point for total metered water usage is the summation of the starting points of the individual categories.

Units are in millions of gallons.

The total metered water demand for the starting point of forecasting is 1,191.69 MG divided by the 2013 population of 18,584, resulting in a per capita metered usage of 176 gpcd. For the baseline forecast, this per capita value was applied to the forecasted population for each year out to 2032 to calculate the forecasted metered water demand for the baseline forecast.

The three forecasts (baseline, passive, passive and active) form the core of the Water Efficiency Plan and are the forecasts upon which estimated conservation savings are based. Each forecast shows demand starting in 2014 and going through the planning horizon of 2032 (18 years). The results are provided in Figure 6 and further described in more detail in the following sections.

FIGURE 6
Baseline, Passive, and Active Demand Forecasts through 2032



2.4.3 Baseline Forecast

Baseline demands were developed based on a combination of anticipated demographic and land use changes in the City of Louisville. In the baseline forecast all demands (indoor and outdoor) increase proportionally with the population at the current rate of usage. For the residential portion of the water demand, this assumes that new customers joining the system will use water identically to the current customer base. A major assumption for this baseline forecast is for the commercial users where it is assumed that water use at the Phillips 66 property will increase linearly from 0 MG in 2015 to 250 MG in 2032, when the site reaches full occupancy and usage potential.

The fundamental purpose of the baseline forecast is to assess the adequacy of future supplies under reasonable "worst case" conditions (that is, no water efficiency gains) and to demonstrate the anticipated impact of water efficiency in the City from both passive and active conservation programs.

Key assumptions in the baseline forecast are as follows:

- Baseline water use patterns and forecast starting point (Table 11)
- Population forecast (Table 10)
- Water use in all sectors both seasonal and non-seasonal increases proportionally with the population
- Annual bulk water usage of 4.8 MG that does not increase or decrease each year
- Outdoor water use impacts from temperature and precipitation in 2032 are similar to 2014

Baseline treated water production in 2014 was estimated to be 1,413.7 MG and increases by 525 MG, resulting in a total baseline demand of 1,938.4 MG (5,949.72 acre-feet) in 2032.

2.4.4 Passive Conservation Forecast

The passive conservation water demand forecast to 2032 includes the impact of anticipated passive efficiencies from State of Colorado legislation, and federal plumbing codes and standards on a sector-by-sector basis for both indoor and outdoor use. An example of a passive water conservation effort that is accounted for in this forecast would be the passing of Colorado Senate Bill 2014-103, which phases out the sale of low-efficiency lavatory faucets, showerheads, flushing urinals, and tank-type toilets.

Key assumptions in the passive conservation forecast are as follows:

- Baseline water use patterns and forecast starting point (Table 11)
- Population forecast (Table 10)
- Outdoor water use in all use categories increases proportionally with the population
- Outdoor water use impacts from temperature and precipitation in 2032 are similar to 2014
- 1 percent per year decrease in residential indoor (inside and outside City limits) per capita water use (from 47.1 gpcd in 2014 to 39.3 gpcd in 2032), which represents a continuing pattern of the past 15 years
- 1 percent per year decrease in multifamily residential indoor per capita water use, which represents a continuing pattern of the past 15 years
- 0.5 percent per year decrease in per capita commercial indoor (inside City limit) use from ongoing replacement of fixtures, appliances, and equipment and new State of Colorado legislation (Senate Bill 14-103) assuring high-efficiency plumbing in new construction
- 1 percent per year increase in per capita commercial indoor (outside City limit) water use to account for additional growth potential in the sector
- Annual construction water demand of 4.8 MG that does not increase or decrease each year

- Steady increase in water use at the Phillips 66 property from 0 gallons in 2014 to 250 MG at build-out in 2032
- Volume of water loss is held constant at 189 MG, which represents the average water loss from the last 5 years, thus reducing water loss from 15.8 percent in 2014 to 11.9 percent in 2032

The passive forecast estimates that City water demands will increase to 1,769.4 MG (5,430.00 acre-feet) in 2032 which is 169 MG less than the baseline forecast. The passive conservation forecast estimates a 28.3-percent increase in treated water demand over the next 18 years and suggests that more efficient fixtures and appliances could help reduce future demands in the City by 169 MG annually compared with the baseline forecast.

2.4.5 Active Conservation Forecast

The active conservation forecast includes the anticipated impact from the City's planned water efficiency program measures described in this plan (see Section 4, Selection of Water Efficiency Activities).

Key assumptions in the active conservation forecast are as follows:

- Baseline water use patterns and forecast starting point (Table 11)
- Population forecast (Table 10)
- Outdoor water use in all sectors increases proportionally with the population
- Outdoor water use impacts from temperature and precipitation in 2032 are similar to 2014
- 1 percent per year decrease in residential indoor (inside and outside City limits) per capita water use (from 47.1 gpcd in 2014 to 39.3 gpcd in 2032), which represents a continuing pattern of the past 15 years
- 0.5 percent per year decrease in residential outdoor water use (inside and outside City limits) due to the City's water conservation efforts and rate structure
- 1 percent per year decrease in multifamily residential indoor per capita water use, which represents a continuing pattern of the past 15 years
- 0.5 percent per year decrease in multifamily residential outdoor water use due to the City's water conservation efforts and rate structure
- 0.6 percent per year decrease in per capita commercial indoor (inside City limit) use from ongoing replacement of fixtures, appliances, and equipment and new State of Colorado legislation (Senate Bill 14-103) assuring high-efficiency plumbing in new construction
- 0.5 percent per year decrease in commercial outdoor water use (inside City limit) due to the City's water conservation efforts and rate structure
- 1 percent per year increase in commercial water use outside City limit to account for additional growth potential in the sector
- 0.25-percent decrease per year in city/municipal indoor water use from ongoing replacement of fixtures, appliances, and equipment and new Colorado legislation (Senate Bill 14-103)
- Annual construction water demand of 4.8 MG that does not increase or decrease each year
- Steady increase in water use at the Phillips 66 property from 0 gallons in 2014 to 250 MG at build-out in 2032
- Volume of water loss is held constant at 189 MG, which represents the average water loss from the last 5 years, thus reducing water loss from 15.8 percent in 2014 to 11.9 percent in 2032

Treated water demand for the active conservation forecast increases to 1,698.1 MG (5,211.2 acre-feet) in 2032. This is 241 MG less than the original baseline forecast and 71 MG less than the passive conservation forecast. If the elements of this plan are fully realized, then it is estimated that water demand at 2032 will be reduced by 241 MG (0.66 mgd) as result of passive and active water conservation measures.

If the assumption for water use at the Phillips 66 property is not included in the active forecast the active conservation forecast is 1,417.3 MG (4,349.6 acre-feet) in 2032.

2.4.6 Adequacy of Water Supply and Infrastructure

From the summary in Section 1.2, Water Supply Reliability, the *2003 Raw Water Master Plan* estimated that under future conditions the raw water supply system would provide a firm yield of 5,400 acre-feet. The master plan included many assumptions for supply and demand scenarios and should be updated to reflect more recent water supply and demand data. However, the estimate of firm yield illustrates the importance of water conservation for the City. A summary of the treated water demand forecasts and other infrastructure capacities is provided in Table 12.

TABLE 12
Annual Treated Water Demand Forecast Summary and Raw Water Supply

Forecast Scenario	Demand (MG)	Average Daily Demand (mgd)	Demand (acre-feet)	Notes
Baseline	1,938.4	5.3	5,949.7	—
Passive Conservation	1,769.4	4.9	5,430.0	—
Active Conservation	1,698.1	4.7	5,211.2	—
Active Conservation w/o Phillips 66 Demand	1,417.3	3.9	4,349.6	—
Raw Water Supply Firm Yield	—	—	5,400	Estimated from *2003 Raw Water Master Plan*

Notes:
MG = million gallons
mgd = million gallons per day

In this evaluation, the total demand for treated water ranges from 4,350 to 5,950 acre-feet depending on the level of water conservation and development. The estimated raw water supply firm yield is 5,400 acre-feet from the *2003 Raw Water Master Plan*. The firm yield value will be verified as part of the 2014 Raw Water Master Plan Update project to reflect more recent conditions. However, water conservation will be important for the City in the future to decrease the likelihood of having to find additional raw water sources.

The *2012 Water System Facilities Plan* also forecasted treated water demand for the City. The time frame to build-out and total population were similar to this evaluation. Treated water demands forecasted from the *2012 Water System Facilities Plan* range from 4.4 mgd to 5.1 mgd depending on the method of calculation. These endpoints are similar, but an exact comparison may not be possible. The forecast from this evaluation (Table 12) explicitly includes additional demand for the Philips 66 property and accounts for water loss. It is not clear if these were accounted for in the *2012 Water System Facilities Plan* forecast. Based on calculations from the projections, it seems the per capita metered usage from the *2012 Water System Facilities Plan* ranged from 198 to 225 gpcd, which is slightly higher than the baseline forecast value of 176 gpcd.

The firm water treatment plant production capacity is 12.1 mgd. The estimated volume of total treated water demand, when distributed over an entire year, represents the average demand. However, peak demands have to be met by the water treatment facilities and peak-day demands are usually used to size water treatment facilities. The City's *2012 Water System Facilities Plan* evaluated peak-day factors: The

average from 2003 to 2010 was 2.59 and the 75th percentile value was 2.68. To be slightly conservative, the 75th percentile factor was used for this evaluation. A summary of hypothetical peak-day demands for each forecast is summarized in Table 13 and shown graphically in Figure 7. Table 13 includes two peak-day scenarios: one where the peaking factor is applied to the average demand, and a second where the peaking factor is only applied to the metered demand and not to the portion of demand from construction water and estimated water loss.

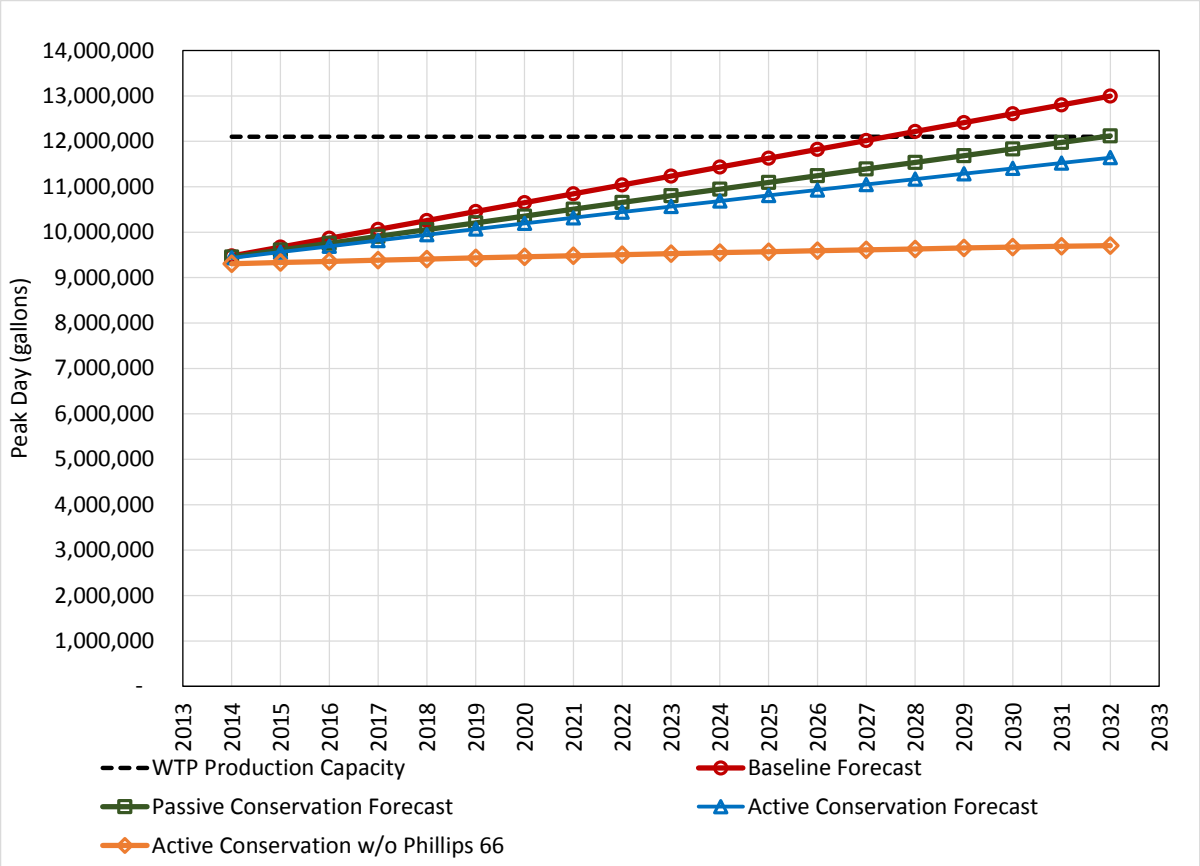
The baseline forecast estimates a peak-day demand of 14.2 mgd which is greater than the treatment plant production capacity. The water treatment plant production capacity of 12.1 mgd is close to meeting the peak-day demand for the active conservation forecast of 12.6 mgd and meets the demand for the active conservation forecast without the Phillips 66 demand. Depending on development, the peak demands at build out will be close to the treatment plant capacity, but could be managed with water efficient measures targeted at decreasing peak demand.

TABLE 13
Estimated Peak-Day Demand and Water Treatment Plant Capacity

Forecast Scenario	Average Daily Demand (mgd)	Peaking Factor (PF)	Estimated Peak-Day Demand (mgd)	Estimated Peak-Day Demand w/ Selective PF[1] (mgd)	Notes
Baseline	5.3	2.68	14.2	13.0	75th percentile peaking actor from 2012 Water System Facilities Plan
Passive Conservation	4.9	2.68	13.1	12.1	75th percentile peaking actor from 2012 Water System Facilities Plan
Active Conservation	4.7	2.68	12.6	11.6	75th percentile peaking actor from 2012 Water System Facilities Plan
Active Conservation w/o Phillips 66 Demand	3.9	2.68	10.5	9.7	75th percentile peaking actor from 2012 Water System Facilities Plan
Water Treatment Plant Production Capacity	—	—	12.1	12.1	WTP treatment capacity is 13.0 mgd which is approximately 12.1 mgd of water produced at the effluent.

Note:
[1] Peaking factor (PF) selectively applied to metered demand only and not to the portion of demand from construction water and estimated water loss.
mgd = million gallons per day

FIGURE 7
Treated Water Demand Peak Forecast and Water Treatment Plant Capacity



3 Integrated Planning and Water Efficiency Benefits and Goals

3.1 Water Efficiency and Water Supply Planning

Integrated resources planning is implemented by the City in its planning process; new water supplies as well as water conservation are considered when planning to meet future demand. Over the years the City has expanded its water supply portfolio beyond South Boulder Creek to include C-BT and Windy Gap water. The City's most recent water master plan, the *2012 Water System Facilities Plan*, incorporated water conservation into the demand forecasting methodology. Efficient water use the by the City and its customers will be important to increasing the reliability of the supply when the City is built out. The summary table (Table 2) from Section 1.2, Water Supply and Reliability is repeated here.

TABLE 2 (REPEAT)
Supply Side Limitations and Future Needs Summary

Limitation or Future Need	Comments on Limitation or Future Need	How is Limitation or Future Need Being Addressed
Raw water supply	The estimated firm yield from the City's *2003 Raw Water Master Plan* was approximately 5,400 acre-feet. Drought years may result in a deficit.	Efficient water use especially during drought years will be required. Monitor growth of commercial properties that are not yet developed.
Raw water storage	The total raw water storage capacity of 1,927 to 3,427 acre-feet is less than the City's current annual water consumption.	Efficient water use to minimize the need for additional raw water storage. Evaluate interconnects and storage projects to increase flexibility of raw water supply system.
Water treatment plant capacity	The City has two water treatment plants with a combined treatment capacity of 13.0 mgd (firm production capacity of approximately 12.1 mgd). There are some limitations on the source water that each plant is able to receive.	Efficient water use to eliminate need for capacity increases at the water treatment plants. Increase flexibility of moving raw water between the two treatment plants.
Wastewater treatment plant (WWTP) capacity to meet future regulations	Current rated WWTP capacity is 3.4 mgd, but future effluent regulations have the potential to impact the plant capacity.	In 2015, the City will start construction of the WWTP upgrades to meet redundancy, ammonia, and nutrient removal regulations. The plant capacity will also be decreased to 2.53 mgd to meet regulations.
Louisville pipeline	The pipeline reliably delivers 5.2 cfs (3.36 mgd) to the Howard Berry WTP and 4.9 cfs to the Louisville Reservoir. May operate at capacity during peak months depending on demand, the amount of water supplied from C-BT, and the amount of divertible water rights.	There are no projects planned to increase capacity of the Louisville pipeline. Blending of raw water sources will be required to meet future demands.
C-BT water pipeline	Pipeline capacity is 4.2 cfs (2.7 mgd). The City has other water supplies, but if more C-BT water was required to meet demand it would be difficult to meet the peak, especially in summer months.	SWSP upsizing is planned to occur within the next 10 years. Blending of raw water sources will be required to meet future demands.

TABLE 2 (REPEAT)
Supply Side Limitations and Future Needs Summary

Limitation or Future Need	Comments on Limitation or Future Need	How is Limitation or Future Need Being Addressed
Overall system reliability	Even with multiple water supply options and two treatment plants, the system is still vulnerable to unpredictable events. Interconnects would increase reliability.	The City has potable water interconnects with the City of Lafayette and is currently working on designing an interconnect with the Town of Superior.

Notes:
C-BT = Colorado-Big Thompson
cfs = cubic feet per second
mgd = million gallons per day

Efficient water use will need to be a consistent practice and message from the City in order to address future water supply needs. Maintaining the integration of efficient water use into raw water resource planning will be critical. Efficient water use to reduce peak-day demands may defer or eliminate the need for a new water treatment facility or a significant upgrade to the existing plants. Efficient water use also results in decreased flow to the wastewater treatment plant; while this helps limit costly expansion to the facility, it also lowers the amount of water available for reuse. The City's operation and maintenance plan and capital improvement plan (CIP) are updated annually and will need to be integrated with results from water supply planning so the appropriate infrastructure is in place to achieve the goals.

3.2 Water Efficiency Goals

The end goals of the water efficiency plan were established with staff from the City's Public Works Department, including the director, engineers, and operators. Goals were established based on the knowledge of the system limitations, areas needing improvement, and underutilized resources. A summary of the City's water efficiency goals is provided in Table 14.

TABLE 14
Summary of Water Efficiency Goals

Goal	Approach	Measurement
Total annual water savings of 10 percent below baseline forecast at build out (600 acre-feet).	Water efficiency activities identified in this plan.	• Annual water treatment plant production • Per capita treated water production.
Account for all Water	Meter water that is currently authorized and unmetered for City use. Conduct AWWA Manual M36 water audit.	• Monthly water use be category with separate category for bulk water • Per capita metered • Per capita residential • Complete AWWA Manual M36 audit
Decreased peak-day demand at build-out to less than 13 mgd.	Water efficiency activities identified in this plan targeted to outdoor water use; increase reuse water distribution.	Daily water treatment plant production.

4 Selection of Water Efficiency Activities

4.1 Summary of Selection Process

The process of selecting water efficiency activities took place during several meetings with the City's Public Works staff. The conservation measures included in this plan were selected using the following process:

- City staff and the consulting team assembled a list of all water demand management measures implemented by the City in recent years.
- Consulting team consolidated and organized the list of activities and selected a number of additional measures for consideration. Only measures that were cost-effective best practices and that could be implemented effectively using existing staff resources were included.
- City staff and the consulting team met and reviewed all existing and potential measures and selected measures to carry through for inclusion in the plan.
- Consulting team prepared an internal Draft Water Efficiency Plan in July 2014.
- City staff reviewed the draft and modified conservation planning measures.
- The consulting team prepared a Draft Final Water Efficiency Plan in August 2014 for public review.
- Public comments collected during a 60-day review period from September 10, 2014 to November 10, 2014.
- A final draft was prepared in November 2014 for review by CWCB. There were no comments and the plan was approved by CWCB on January 6, 2015.

Many of the water efficiency activities that have already been implemented by the City will continue. Because of the established water efficiency goals (Table 13), many of the new water efficiency activities considered targeted efficient outdoor water use to decrease the peak demand.

The City of Louisville has a strong commitment to water conservation, but does not have a full-time water conservation coordinator. A key decision factor when considering water conservation programs for implementation were measures that can be effectively implemented using existing staff resources. The water conservation measures included in this plan have been selected to ensure effective ongoing water demand management in the City in the coming years and continuity with previous water conservation efforts.

The identification and screening of water efficiency activities is summarized in Table 15.

TABLE 15

City of Louisville

Identification and Screening of Water Efficiency Activities

Water Efficiency Activities	Existing Activity	Continue Activity	Implement New Activity	Other Notes
Foundational Activities				
Staff				
Water Conservation Coordinator	No		Yes	City will designate an existing staff member as the water conservation coordinator.
Planning				
Integrated Water Resources Plans	Yes	Yes		
Master Plans/Water Supply Plans	Yes	Yes		Update the 2003 Raw Water Master Plan
Capital Improvement Plans	Yes	Yes		Updated annually.
Feasbility Studies	Yes	Yes		
Metering, Water Rates, Billing				
Automatic Meter Reading Installation and Operations	Yes			Drive by AMR
Meter Replacement	Yes	Yes		
Meter Upgrades	Yes	No		Meters were updated in 2010-2011; do not need to be upgraded again in the time frame of this plan.
Volumetric Billing	Yes	Yes		
Monthly Meter Reading and Billing	Yes	Yes		
Track Water Use by Customer Categories	Yes	Yes	Yes	Add categories for bulk water and authorized use.
Inclining Block Rates	Yes	Yes	Yes	City plans to evaluate the rate structure to see if more efficiency can be encouraged for outdoor irrigation.
Separate Irrigation Meters-Commercial	Yes	Yes	Yes	This is currently optional; not all commercial users have a separate meter. Consider mandatory for large customers.
Separate Irrigation Meters-HOAs	Yes	Yes		
Separate Irrigation Meters-Multifamily with 5+ Units	Yes	Yes		
Water Budgets	No		No	A Water Rate Study was performed in 2013; feedback from the public did not support water budgets at this time.
Informational Water Budgets	No		Yes	
Tap Fees with Water Use Efficiency Incentives	Yes	Yes		
System Efficiency				
Leak Detection Repair Program	Yes	Yes		Performed every other year.
Water Line Replacement Program	Yes	Yes		Ongoing annual maintenance program.
System Wide Water Audit	No		Yes	Perform water audit in accordance with AWWA M36 method
Phreatophyte Eradication	Yes	Yes		
Reuse Water System	Yes	Yes		Increase distribution of reuse water.
Monitoring and Evaluation				
Monitor Water Use of Large Customers	Yes	Yes		Large water users are monitored as part of the Industrial Pretreatment Program.
Monitor Irregular Water Use	Yes	Yes		Billing software alerts if there is a deviation in water use.
Annual Water Use Tracking by Customer Category	Yes	Yes		
Update Conservation Plan	No		Yes	Every 5 to 7 years to meet CWCB requirements.
Report Water Use to CWCB	No		Yes	Annually
Targeted Technical Assistance				
Water Efficient Fixtures-Indoor				
Low Flow Faucets	Yes	Yes		Installed at City Hall, expand to other facilities in the future.
Low Volume Toilets	Yes	Yes		Installed at City Hall, expand to other facilities in the future.
Low Flow Shower Heads	Yes	No		Installed at Recreation Center. No need to continue except for replacement.
Ultra-Low Flush Urinals	Yes	Yes		Installed at City Hall, expand to other facilities in the future.
High Efficiency Pre-Rinse Spray Nozzles	No		Yes	
Water Efficient Devices-Outdoor				
Weather-Based Irrigation Controller - City Facilities	Yes	Yes		

TABLE 15

City of Louisville

Identification and Screening of Water Efficiency Activities

Incentives				
Weather-Based Irrigation Controller	No		Yes	
Soil Sensors	No	No		Technology still being developed.
HE Clothes Washer Rebate	Yes	No		Potential to phase this out based on new State requirements for water efficient fixtures.
Low Volume Toilet Rebate	Yes	No		Potential to phase this out based on new State requirements for water efficient fixtures.
Drip Irrigation System Rebate	Yes	No		Outdated rebate offer with limited participation.
Dishwasher Rebate	No		No	Industry standards are adequate, natural replacement will occur.
Garden in a Box	No		Yes	Offered through Center for ReSource Conservation (CRC)
Buffalo Grass Turf Rebate	Yes		Yes	
Efficient Water Use (Audits)				
Outdoor Water Audits-Residential	Yes	Yes		Offered through Center for ReSource Conservation (CRC)
Outdoor Water Audits-Commercial	Yes	Yes		Offered through Center for ReSource Conservation (CRC)
Indoor Water Audits-Commercial	No		Yes	Offered through Center for ReSource Conservation (CRC)
Ordinances and Regulations				
Water Waste Ordinance/Limit Overspray	Yes		Yes	
Soil Amendments	No	No		Significant time commitment to inspect and verify amendments.
Time of Day Watering Restrictions	No		Yes	These are currently voluntary unless the City is in a Stage 2 Drought or greater. Implement these hours at all times.
Low Water Plants in Medians of Right of Ways	Yes	Yes		
Landscape Training and Certification	No		No	Significant time commitment. Rely on State or regional effort.
Green Building Requirements	Yes	Yes		
Regulation 84 for Reuse Water	Yes	Yes		
Commerical Water Use-Car Wash Regulations	No		Yes	Reach out to local car washes.
Coordinated Message with Local Cities	Yes	Yes		Coordinated effort with local cities to establish Best Management Practices (BMPs)
Education and Outreach				
Newsletter	Yes	Yes		
City Water Conservation Website	Yes	Yes		
K-12 Teacher and Classroom Education Programs	Yes	Yes		Tours of water facilities
Customer Surveys	Yes	Yes		
Water Committee	Yes	Yes		Comprised of City Council members, meetings open to public.
Targeted Water Commitees	Yes	Yes		When required, create a public member committee to provide input.
Landscape Design and Maintenance Workshops	Yes	Yes		

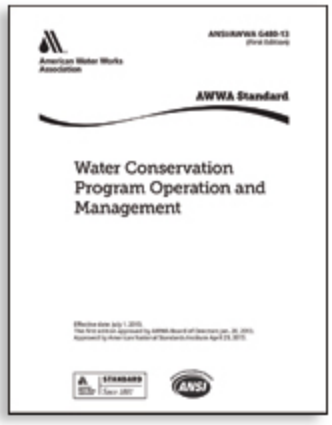
4.2 Demand Management Activities

4.2.1 Foundational Activities

4.2.1.1 Water Conservation Staff

The City does not have a dedicated staff member for water conservation, but they will identify a conservation coordinator as one point of contact for customers with questions about water conservation. City staff members including Dmitry Tepo, Kurt Kowar, and Joliette Woodson will assist with plan implementation.

4.2.1.2 Water Conservation and Integrated Resources Planning



"*Integrated resources planning (IRP) is a comprehensive planning effort that incorporates water conservation programs as another option for meeting future needs*" (*CWCB 2010 Best Practices Guidebook*). The City of Louisville implements a rigorous, integrated resources planning approach that fully integrates water conservation into water supply planning processes as exemplified by previous master plans and the development and approval of this plan. The *2014 Louisville Water Efficiency Plan* is a CWCB-approved water conservation plan prepared by CH2M HILL and WaterDM that meets or exceeds all Colorado planning requirements (Attachment 3).

The City of Louisville practices integrated water resources planning through its other water resource planning efforts as well. The City regularly updates their water supply master plan, capital improvement plan, and feasibility studies including the anticipated impacts of water conservation to ensure a diverse, robust, and resilient water supply. It is recommended the City update the *2003 Raw Water Master Plan* with more recent information on water supply and demand.

4.2.1.3 Metering, Water Rates, and Billing Practices

The City of Louisville's metering, water rates, and billing practices all adhere to established best practices for water conservation as described in the following paragraphs.

Metering and Testing. In the City, 100 percent of customers with taps are metered and all customers are billed volumetrically based on their actual consumption. The City is equipped with a drive-by automated meter reading (AMR) system. New meters were installed across the service area in 2010-2011. Water meters in Louisville are tested and replaced based on AWWA recommendations and protocols.

Billing Practices and Water Rates. Customers are billed monthly using an inclining block rate structure described in the Rate Structure – Landscape Efficiency paragraph below. Water rates are adjusted regularly to ensure sufficient revenue is collected to operate the water utility. The rates were most recently updated on May 1, 2014. These rates are included in Attachment 2. A revised conservation oriented rate structure which could include customer-specific water budgets is currently under consideration. The City will also bill volumetrically for sewer service, starting in 2015.

Customer Categorization. The City has classified all customers in the water system based on the type or category of building/account: residential, multifamily, commercial, irrigation, and city. Water use is regularly tracked by customer category. To improve water accounting it is recommended the City begin to track bulk water and authorized uses as categories.

Rate Structure – Landscape Efficiency. The most significant contributor to overall landscape efficiency in Louisville is the City's increasing block rate water billing structure (Attachment 1) that results in significantly higher bills for customers who use more water. Most frequently this type of inclining block rate structure impacts customers that irrigate their landscape excessively, because it is designed to send a price signal to customers with abnormally high water use during any monthly billing period. The City's increasing block rate structure provides financial incentive for customers adopt water wise landscaping practices. The City plans to maintain the efficiency components of the water rate structure and plans to evaluate strengthening the water rate structure, while encouraging healthy landscapes.

Separate Irrigation Meters (Submetering). Louisville requires separate irrigation services for certain townhome and multifamily developments. Currently separate irrigation meters are required for HOAs and multifamily residences with more than five units, and are optional for commercial buildings. This is an important best practice that provides better accounting of irrigation demands and offers the opportunity for utilizing landscape water budgets based on the irrigated area. The City will be considering implementing mandatory irrigation taps for large commercial customers as part of this plan.

Tap Fees. The City's tap fee structure for new development includes efficiency incentives for builders/ developers. This is an important best practice that ensures new customers join the City's water system at a high level of water efficiency, eliminating the need for future retrofits. Under the existing tap fee structure, a lower tap fee can be secured by a builder/developer if proven water efficiency is incorporated into development plans.

Landscape Water Budgets. The City recently completed a rate study (*2013 Rate Evaluation*) where water budgets were considered as an alternative. A number of implementation concepts were considered including informational water budgets and a water budget-based rate structure. Currently, a new water rate structure has not been adopted and the Water Committee and the City Council will revisit changing this structure in late 2014. At a minimum, the City plans to implement informational water budget information that would be available on customer water bills for comparison to actual usage.

4.2.1.4 System Efficiency (Water Loss Control and Pressure Management)

The City of Louisville strives to maintain a high level of water system efficiency within its distribution system and seeks to reduce water loss whenever and wherever possible. The City works to control apparent losses with accurate metering and regular meter testing, as well as assuring that all customers are metered and billed for the water they use.

Leak Detection. The City implements a regular leak detection and repair program for the water system. A private leak detection contractor is hired every other year to bring listening equipment to the City and to search for water main leaks in designated areas of the City. If a leak is detected, the City has a repair crew ready to dig up the pipe and repair the leak.

Water Line Replacement. The City has implemented an ongoing program as part of regular annual maintenance to replace old water lines throughout the City. In this program, the City designates a specific section (or sections) of water lines for replacement each year. Through this process, the entire distribution network is

replaced and upgraded over time. The current focus of this program is the old downtown area, an area with the oldest pipes.

System Wide Water Audit. The City has identified some gaps in the collection of water use data, such as bulk water and authorized unmetered use. The City is planning to perform an annual implementation of the International Water Association (IWA)/AWWA water loss audit method described in AWWA Manual M36. This best practice is a method of auditing and water loss tracking for utilities where real and apparent losses are evaluated and quantified. Cost and benefit considerations are used to help decision makers select the most appropriate next steps for water loss control. Implementing an annual system water audit would be an important step forward for the City.

Reuse Water System. The City has a reuse water treatment plant. Maximizing the use of reuse water for irrigation will offset the demand on treated water. The City plans to increase use of reuse water; the golf course that was destroyed during the flood is being rebuilt with a reuse water distribution system for irrigation.

4.2.1.5 Monitoring and Evaluation

The City of Louisville implements the following monitoring and evaluation efforts to ensure water efficiency goals are met.

High-Demand Customers. The City monitors demands among the largest users in the system as part of the Industrial Pretreatment Program and investigates usage that deviates from previous patterns.

Irregular Water Use. The City's billing staff occasionally detect changes in total water use from month to month. The City is able to identify these locations and follow up to determine the cause of the increase or decrease. These fluctuations are usually due to an undetected water leak or a meter malfunction.

Annual Water Use. Total annual water use is evaluated annually for each customer category. Information from this data helps track the progress of efficient water use.

Evaluation. The City plans on updating the Water Efficiency Plan every 5 to 7 years to meet the CWCB requirements. They will also report water demand data annually to the CWCB under the rules established in House Bill 1051.

4.2.2 Targeted Technical Assistance and Incentives

4.2.2.1 Incentives

Rebate Programs. The City of Louisville currently offers four rebates to customers with an annual budget of approximately $5,000 each year (see Table 16).

TABLE 16
City of Louisville 2014 Water Efficiency Rebate Offerings

Category	Rebate Amount	Rebate Maximum	Approved Product
Turf Type Buffalo Grass	$0.25 per square foot	$75.00	Type "609" Legacy
Drip Irrigation Systems	50% of purchase price	$50.00	Any major manufacturer. Drip piping/connectors only; installation or "sprinkler" costs are not covered.
High-Efficiency Clothes Washers (1 rebate per customer every 5-year period)	$75.00	$75.00	Models meeting CEE Standards (see list)
Toilets (1 rebate per customer every 5-year period)	$25.00 each (limit 3 per household)	$75.00	Any 1.5- or 1.6-gallon water saver toilet

The City is phasing out the toilet and clothes washer rebates in the coming years because of Colorado's new state law mandating a transition to water efficient fixtures in the marketplace. Colorado's new state law, SB14-103, requires that as of September 1, 2016, all tank-type toilets, urinals, faucets, and showerheads sold in Colorado will meet the same flow requirements as WaterSense-labeled plumbing fixtures. This law is expected to advance indoor water efficiency in both the residential and nonresidential settings. New construction in Colorado after 2016 should come equipped with high-efficiency fixtures. Retrofits completed after 2016 will include high-efficiency toilets, showers, urinals, and faucets. Louisville understands that this new law significantly reduces the need for water providers to incent customers to purchase high-efficiency fixtures and is planning to phase out their rebate incentive program as a result. The City is also planning to phase out the drip irrigation system rebate because these parts are now readily available from local home improvement stores and there is very limited participation.

In support of shifting the focus of incentives to outdoor watering efficiency the City is planning to maintain the buffalo grass rebate and increase the amount to $1.00 per square foot up to a maximum of $150. The City will also consider adding a rebate for weather-based irrigation controllers up to $100 each. It is important that controllers are WaterSense® labeled to be eligible for the rebate. Soil sensors are also an option but these are more complicated and technology is still improving.

Garden in a Box. The City would like to add the Garden in a Box offered by CRC to the incentive program for residential customers. The program will help educate the public on water efficient landscaping and make it easy for them to implement in their own yard.

4.2.2.2 Water Efficient Fixtures-Indoor

Water Efficient Fixtures – Indoor. In recent years the City has upgraded municipal buildings including City Hall with high efficiency fixtures and appliances. Low-flow faucets, low-volume toilets, and ultra-low-volume urinals are installed at City Hall. Low-flow shower heads were installed at the Recreation Center. This process will continue wherever practical.

High-Efficiency Pre-Rinse Spray Nozzles. To supplement indoor commercial water audits the City is also considering providing high-efficiency pre-rinse spray valves (PRSVs) to local restaurants and cafeterias. PRSVs (see photo to the right) are a proven effective method for reducing water and energy demands in the food service industry.

4.2.2.3 Water Efficient Devices-Outdoor

Central Irrigation System Control. All the City's irrigation systems can be controlled from a central irrigation control system. Watering can be adjusted based on rainfall. The City will evaluate if the central irrigation control system can be further improved through the inclusion of weather-based technology including rain sensors, soil sensors, and ET-based control.

Rain Sensors. The City's irrigation system is not yet linked to rain or soil moisture sensors. The City is considering this technology so the system will automatically adjust to real time rainfall conditions. The potential for reducing water use through implementation of these technologies will be explored.

4.2.2.4 Efficient Water Use – Audits

Indoor Commercial Water Audits. The City already contracts with CRC to conduct landscape irrigation audits. CRC now offers non-residential indoor audits as well and the City is considering adding this service starting in 2016.

Irrigation Efficiency Audits. Improving the efficiency of landscape irrigation and particularly the efficiency of automatic irrigation systems is and will continue to be an important focus of the City's conservation program. The City contracts annually with the CRC to offer free irrigation efficiency audits to interested residential and commercial customers. CRC provides Louisville with an inexpensive and effective way to

offer effective water conservation programs targeted at the areas of greatest need. CRC audits typically include:

- Evaluation of irrigation system performance
- Adjustment of heads to correct for over-spray
- Discussion of appropriate irrigation scheduling with the customer
- Inspection of rain sensors (if installed)

4.2.3 Ordinances and Regulations

Water Waste Ordinance. The City has an approved water waste ordinance that is enacted during times of drought. As part of this ordinance, the City can mandate time-of-day watering restrictions when necessary and has the authority to issue fines and penalties for overspray, wasteful irrigation practices, and time of day violations.

Watering Ordinance. Except in times of drought the City does not have mandatory watering times in place for customers. The City could implement mandatory watering hours during a time of drought as outlined in the *2013 Drought Management Plan*.

Green Building Code. Effective March 31, 2014, the City of Louisville adopted the 2012 International Building Code (2102 IBC).

Landscape Regulations. Louisville's commercial landscape regulations help ensure that new landscapes in the City are water efficient. The CDPHE's Regulation No. 84 prohibits excess runoff from areas irrigating with reuse water.

Regulation No. 84 – Reclaimed Water Control Regulation. The City's reuse water system complies with the Regulation No. 84 that includes requirements for irrigation efficiency to minimize overspray, ponding, and runoff of reuse water.

Soil Amendment Requirements. The City's Open Space Division utilizes soil amendments and low-water plants, but there are no plans to expand the soil requirement to others because the required inspection to verify the requirements is too labor-intensive for the City's current staff.

Commercial Car Wash Regulations. The City is considering reaching out to local car washes to work with them to implement regulations to increase water efficiency. Some of the measures could include recycling of water for new facilities or retrofitting devices for existing facilities to increase water efficiency.

4.2.4 Information and Education

The City encourages the adoption of water wise landscaping practices and efficient irrigation through customer education and information offerings including bill stuffers, brochures, and the City's web site.

Available Information. The City's web site had information on water conservation, water rates, and the City's incentive programs.

Communication. The City distributes a newsletter via mail to inform customers of relevant information for efficient water use and notify customers of upcoming workshops.

Education. The City gives tours of the water facilities for educational purposes. The City also offers instructional workshops for customers on relevant topics such as irrigation efficiency and management.

Water Committee. The City has a Water Committee that is made up of City Council members. They meet two to three times a year to discuss water related issues the City is facing. These meetings are open to the public. Targeted water committees are formed when needed to address specific topics. These committees can be a combination of Council members and the public.

5 Implementation and Monitoring Plan

5.1 Implementation Plan

Many of the programs that the City currently has to encourage efficient water use will continue. A summary of the activities planned for implementation is provided in Table 17. A list of estimated annual costs is provided in Table 18 for planning purposes.

The City plans to implement the following 11 new activities in the next several years:

- Identify a single person as the water conservation coordinator for the City
- Provide customers with theoretical informational water budgets on the monthly bill for comparison to actual use or implement a conservation-oriented water rate structure
- Perform a system-wide water audit in conformance with AWWA Manual M36
- Update this Water Efficiency Plan every 5 to 7 years
- Report water use to CWCB to meet State requirements
- Distribute high-efficiency spray nozzles to local restaurants
- Evaluate the installation of weather-based irrigation controllers for the City's irrigation systems
- Add weather-based irrigation controller rebate for customers
- Add Garden in a Box (offered by CRC) to the incentives for local residential customers
- Add indoor water audits for commercial customers (offered by CRC)
- Evaluate adding mandatory time-of-day (or day-of-week) watering restrictions even when not in a drought
- Reach out to local car washes to establish regulations for efficient water use

In addition to the new activities that the City will consider, the City plans to modify the following three activities:

- Track water use by customer category and add categories for bulk water and authorized uses
- Evaluate if a more aggressive inclining block rate structure would encourage further efficient outdoor water use
- Have a mandatory requirement for separate irrigation taps for large commercial customers

The City will consider removing the following four activities from the program:

- Meters were updated in 2010-2011; they do not need to be upgraded again in the time frame of this plan
- Low-flow shower heads were already installed at the recreation center; therefore, no new heads are needed except for replacement
- High-efficiency clothes washer rebate (potential to phase this out based on new State requirements for water-efficient fixtures and industry standards)
- Low-volume toilet rebates (potential to phase this out based on new State requirements for water-efficient fixtures and industry standards)
- Drip irrigation system rebates

TABLE 17

City of Louisville

Water Efficiency Activity Implementation Summary

Water Efficiency Activities	Existing Activity	Continue/Start/ Modify Activity	Implementation Time Frame	Other Notes
Foundational Activities				
Staff				
Water Conservation Coordinator	No	Yes	Immediately	City will designate an existing staff member as the water conservation coordinator.
Planning				
Integrated Water Resources Plans	Yes	Yes	Continue Ongoing	
Master Plans/Water Supply Plans	Yes	Yes	Continue Ongoing	Update the 2003 Raw Water Master Plan
Capital Improvement Plans	Yes	Yes	Continue Ongoing	
Feasbility Studies	Yes	Yes	Continue Ongoing	
Metering, Water Rates, Billing				
Automatic Meter Reading Installation and Operations	Yes	Yes	Continue Ongoing	
Meter Replacement	Yes	Yes	Continue Ongoing	
Volumetric Billing	Yes	Yes	Continue Ongoing	
Monthly Meter Reading and Billing	Yes	Yes	Continue Ongoing	
Track Water Use by Customer Categories	Yes	Modify	w/in 1 year	Add categories for bulk water and authorized use.
Inclining Block Rates	Yes	Modify	2 to 3 years	Evaluate the rate structure to see if more efficiency can be encouraged for outdoor irrigation.
Separate Irrigation Meters-Commercial	Yes	Modify	2 to 3 years	This is currently optional for commerical. Consider mandatory for large customers.
Separate Irrigation Meters-HOAs	Yes	Yes	Continue Ongoing	
Separate Irrigation Meters-Multifamily with 5+ Units	Yes	Yes	Continue Ongoing	
Informational Water Budgets	No	Yes	3 to 5 years	
Tap Fees with Water Use Efficiency Incentives	Yes	Yes	Continue Ongoing	
System Efficiency				
Leak Detection Repair Program	Yes	Yes	Continue Ongoing	
Water Line Replacement Program	Yes	Yes	Continue Ongoing	
System Wide Water Audit	No	Yes	1 to 2 years	Perform water audit in accordance with AWWA M36 method
Phreatophyte Eradication	Yes	Yes	Continue Ongoing	
Reuse Water System	Yes	Yes	Continue Ongoing	Increase distribution of reuse water.
Monitoring and Evaluation				
Track Water Use of Large Customers	Yes	Yes	Continue Ongoing	Large water users are tracked as part of the Industrial Pretreatment Program.
Track Irregular Water Use	Yes	Yes	Continue Ongoing	Billing software alerts if there is a deviation in water use.
Annual Water Use Tarcking by Customer Category	Yes	Yes	Continue Ongoing	
Update Conservation Plan	No	Yes	5 to 7 years	Every 5 to 7 years to meet CWCB requirements.
Report Water Use to CWCB	No	Yes	Continue Ongoing	Annually
Targeted Technical Assistance				
Water Efficient Fixtures-Indoor				
Low Flow Faucets	Yes	Yes	Continue Ongoing	Installed at City Hall, expand to other facilities in the future.
Low Volume Toilets	Yes	Yes	Continue Ongoing	Installed at City Hall, expand to other facilities in the future.
Ultra-Low Flush Urinals	Yes	Yes	Continue Ongoing	Installed at City Hall, expand to other facilities in the future.
High Efficiency Pre-Rinse Spray Nozzles	No	Yes	2 to 3 years	
Water Efficient Devices-Outdoor				
Weather-Based Irrigation Controller - City Facilities	Yes	Yes	2 to 3 years	

TABLE 17

City of Louisville

Water Efficiency Activity Implementation Summary

Incentives				
Weather-Based Irrigation Controller	No	Yes	2 to 3 years	Includes soil sensor, rain sensor, WaterSense certified
Garden in a Box	No	Yes	1 to 2 years	Offered through Center for Resource Conservation (CRC)
Buffalo Grass Turf Rebate	Yes	Yes	Continue Ongoing	
Efficient Water Use (Audits)				
Outdoor Water Audits-Residential	Yes	Yes	Continue Ongoing	Offered through Center for Resource Conservation (CRC)
Outdoor Water Audits-Commercial	Yes	Yes	Continue Ongoing	Offered through Center for Resource Conservation (CRC)
Indoor Water Audits-Commercial	No	Yes	1 to 2 years	Offered through Center for Resource Conservation (CRC)
Ordinances and Regulations				
Water Waste Ordinance/Limit Overspray	Yes	Yes	Continue Ongoing	
Time of Day Watering Restrictions	No	Yes	1 to 2 years	
Low Water Plants in Medians of Right of Ways	Yes	Yes	Continue Ongoing	
Green Building Requirements	Yes	Yes	Continue Ongoing	
Regulation 84 for Reuse Water	Yes	Yes	Continue Ongoing	
Commerical Water Use-Car Wash Regulations	No	Yes	3 to 5 years	
Coordinated Message with Local Cities	Yes	Yes	Continue Ongoing	Coordinated effort with local cities to establish Best Management Practices (BMPs)
Education and Outreach				
Newsletter	Yes	Yes	Continue Ongoing	
City Water Conservation Website	Yes	Yes	Continue Ongoing	
K-12 Teacher and Classroom Education Programs	Yes	Yes	Continue Ongoing	Tours of water facilities
Customer Surveys	Yes	Yes	Continue Ongoing	
Water Committee	Yes	Yes	Continue Ongoing	Comprised of City Council members, meetings open to public.
Targeted Water Commitees	Yes	Yes	Continue Ongoing	When required, create a public member committee to provide input.
Landscape Design and Maintenance Workshops	Yes	Yes	Continue Ongoing	

The estimated annual costs for several water efficiency activities are provided in Table 18. Costs have been estimated for activities that have tangible costs such as rebates and water audits. Costs have not been estimated for activities that involve staff time such as establishing ordinances and providing educational outreach; it is assumed these activities will be completed by the designated conservation coordinated as time allows each year. The costs in Table 18 are in addition to the regular operation and maintenance costs that the City already budgets for to maintain pipelines, replace meters, and detect and repair leaks in the distribution system.

TABLE 18
Suggested Annual Budget for Water Efficiency Activities

Water Efficiency Activity	Quantity	Unit Cost	Annual Budget	Notes
System Wide Water Audit	1	$10,000	$10,000	Perform every 1 to 2 years.
High-Efficiency Pre-Rinse Spray nozzles	20	$100	$2,000	-
Weather-Based Irrigation Controller – City Facilities	1	$500	$500	Only include in budget until large City facilities are equipped.
Weather-Based Irrigation Controller Rebate	20	$100	$2,000	$100 rebate; adjust budget each year based on demand from customers
Garden In A Box	20	$50	$1,000	$50 rebate; Typical cost for a box from CRC is $100
Buffalo Grass Turf Rebate	10	$150	$1,500	$1/sf up to $150 maximum
Outdoor Water Audits-Residential	1	$3,000	$3,000	Lump sum to CRC.
Outdoor Water Audits-Commercial	1	$3,000	$3,000	Lump sum to CRC.
Indoor Water Audits-Commercial	1	$5,000	$5,000	Lump sum to CRC.
Total Estimated Annual Budget for Rebates, Incentives and Audits	**-**	**-**	**$28,000**	
Other Annual Costs to Consider:				
Water Conservation Coordinator	200 hrs	$80/hr	$16,000	A new staff member is not required so this is not a new cost. The information is provided to give an expectation of effort required.
Other Periodic Costs to Consider:				
Update Water Conservation Plan	1	$30,000 to $40,000	$30,000 to $40,000	Every 5 to 7 years.

5.2 Monitoring Plan

Monitoring and verification of program effectiveness will be conducted through a combination of tracking efforts to measure the value of the activities being implemented by the City. Of course, some of the proposed water conservation activities such as general customer education and increased water rates will not be measured directly. However, for some of the activities, such as the commercial audits and rebates, tracking individual customer water use will be performed to monitor water efficiency and track customer water use.

The monitoring and verification efforts that the City proposes to initiate include the following:

- Daily, monthly, and annual water treatment plant production
- Monthly water use by each customer category
- Residential, metered, and treated water production per capita values

6 Adoption, Public Review, and Approval

6.1 Public Review Process

A draft of the Water Efficiency Plan was made available to the public for a 60-day public review period from September 10, 2104 to November 10, 2014. Comments were received from the public and updates were made to the plan. A summary of public comments and proof of posting date is provided in Attachment 2. If changes were made to the plan in response to a comment it is noted in the summary. The City thanks the public for their interest and meaningful comments on the plan.

6.2 Efficiency Plan Approval and Adoption

The plan has been approved by City Staff. It was submitted to CWCB for review in November 2014; there were no additional comments and the plan was approved by CWCB in January 2015. The plan will be brought to City Council for formal approval and adoption.

6.3 Plan Review and Update

The City will summarize the findings of the monitoring and verification efforts and provide a briefing to the Water Committee once a year. The City will use these data as the basis for formally updating the Water Efficiency Plan once every 7 years, as required by the CWCB. The plan will be updated by the end of 2021.

6.4 Compliance with State Planning Requirements

A summary of the plan's compliance with State planning requirements is provided in Attachment 3.

ATTACHMENT 1

City of Louisville Water Rate Structure

City of Louisville Water Rates (Effective May 1, 2014)

Residential Accounts (up to 1" meter size)	
Gallons	**Rate**
Zero - 5,000	$12.32 (minimum monthly charge)
5,001 - 20,000	$12.32 for the first 5,000 gallons, plus $3.55 for each additional 1,000 gallons (or fraction thereof)
20,001 - 30,000	$65.57 for the first 20,000 gallons, plus $8.84 for each additional 1,000 gallons (or fraction thereof)
30,001 - 40,000	$153.97 for the first 30,000 gallons, plus $9.55 for each additional 1,000 gallons (or fraction thereof)
40,001 - 50,000	$249.47 for the first 40,000 gallons, plus $10.20 for each additional 1,000 gallons (or fraction thereof)
50,001 and over	$351.47 for the first 50,000 gallons, plus $10.88 for each additional 1,000 gallons (or fraction thereof)

Commercial and Irrigation Accounts (up to 3/4" meter size)	
Gallons	**Rate**
Zero - 20,000	$12.32 (minimum monthly charge), plus $3.55 for each 1,000 gallons (or fraction thereof)
20,001 - 30,000	$83.32 for the first 20,000 gallons, plus $8.84 for each additional 1,000 gallons (or fraction thereof)
30,001 - 40,000	$171.72 for the first 30,000 gallons, plus $9.55 for each additional 1,000 gallons (or fraction thereof)
40,001 - 50,000	$267.22 for the first 40,000 gallons, plus $10.20 for each additional 1,000 gallons (or fraction thereof)
50,001 and over	$369.22 for the first 50,000 gallons, plus $10.88 for each additional 1,000 gallons (or fraction thereof)

Commercial, Irrigation, and 2 Unit Multifamily Accounts (1" meter size)	
Gallons	**Rate**
Zero - 40,000	$24.63 (minimum monthly charge), plus $3.55 for each 1,000 gallons (or fraction thereof)
40,001 - 60,000	$166.63 for the first 40,000 gallons, plus $8.84 for each additional 1,000 gallons (or fraction thereof)
60,001 - 80,000	$343.43 for the first 60,000 gallons, plus $9.55 for each additional 1,000 gallons (or fraction thereof)
80,001 - 100,000	$534.43 for the first 80,000 gallons, plus $10.20 for each additional 1,000 gallons (or fraction thereof)
100,001 and over	$738.43 for the first 100,000 gallons, plus $10.88 for each additional 1,000 gallons (or fraction thereof)

Commercial, Irrigation, and 3-6 Unit Multifamily Accounts (1.5" meter size)	
Gallons	**Rate**
Zero - 80,000	$36.96 (minimum monthly charge), plus $3.55 for each 1,000 gallons (or fraction thereof)
80,001 - 120,000	$320.96 for the first 80,000 gallons, plus $8.84 for each additional 1,000 gallons (or fraction thereof)
120,001 - 160,000	$674.56 for the first 120,000 gallons, plus $9.55 for each additional 1,000 gallons (or fraction thereof)
160,001 - 200,000	$1,056.56 for the first 160,000 gallons, plus $10.20 for each additional 1,000 gallons (or fraction thereof)
200,001 and over	$1,464.56 for the first 200,000 gallons, plus $10.88 for each additional 1,000 gallons (or fraction thereof)

Commercial, Irrigation, and 7-11 Unit Multifamily Accounts (2" meter size)	
Gallons	**Rate**
Zero - 160,000	$49.20 (minimum monthly charge), plus $3.55 for each 1,000 gallons (or fraction thereof)
160,001 - 240,000	$617.20 for the first 160,000 gallons, plus $8.84 for each additional 1,000 gallons (or fraction thereof)
240,001 - 320,000	$1,324.40 for the first 240,000 gallons, plus $9.55 for each additional 1,000 gallons (or fraction thereof)
320,001 - 400,000	$2,088.40 for the first 320,000 gallons, plus $10.20 for each additional 1,000 gallons (or fraction thereof)
400,001 and over	$2,904.40 for the first 400,000 gallons, plus $10.88 for each additional 1,000 gallons (or fraction thereof)

Commercial, Irrigation, and 12-26 Unit Multifamily Accounts (3" meter size)	
Gallons	**Rate**
Zero - 320,000	$98.56 (minimum monthly charge), plus $3.55 for each 1,000 gallons (or fraction thereof)
320,001 - 480,000	$1,234.56 for the first 320,000 gallons, plus $8.84 for each additional 1,000 gallons (or fraction thereof)
480,001 - 640,000	$2,648.96 for the first 480,000 gallons, plus $9.55 for each additional 1,000 gallons (or fraction thereof)
640,001 - 800,000	$4,176.96 for the first 640,000 gallons, plus $10.20 for each additional 1,000 gallons (or fraction thereof)
800,001 and over	$5,808.96 for the first 800,000 gallons, plus $10.88 for each additional 1,000 gallons (or fraction thereof)

Commercial, Irrigation, and 27-47 Unit Multifamily Accounts (4" meter size)	
Gallons	**Rate**
Zero - 640,000	$197.10 (minimum monthly charge), plus $3.55 for each 1,000 gallons (or fraction thereof)
640,001 - 960,000	$2,469.10 for the first 640,000 gallons, plus $8.84 for each additional 1,000 gallons (or fraction thereof)
960,001 – 1,280,000	$5,297.90 for the first 960,000 gallons, plus $9.55 for each additional 1,000 gallons (or fraction thereof)
1,280,001 – 1,600,000	$8,353.90 for the first 1,280,000 gallons, plus $10.20 for each additional 1,000 gallons (or fraction thereof)
1,600,001 and over	$11,617.90 for the first 1,600,000 gallons, plus $10.88 for each additional 1,000 gallons (or fraction thereof)

Commercial, Irrigation, and 48+ Unit Multifamily Accounts (6" meter size)	
Gallons	**Rate**
Zero – 1,280,000	$394.24 (minimum monthly charge), plus $3.55 for each 1,000 gallons (or fraction thereof)
1,280,001 - 1,920,000	$4,938.24 for the first 1,280,000 gallons, plus $8.84 for each additional 1,000 gallons (or fraction thereof)
1,920,001 – 2,560,000	$10,595.84 for the first 1,920,000 gallons, plus $9.55 for each additional 1,000 gallons (or fraction thereof)
2,560,001 – 3,200,000	$16,707.84 for the first 2,560,000 gallons, plus $10.20 for each additional 1,000 gallons (or fraction thereof)
3,200,001 and over	$23,235.84 for the first 3,200,000 gallons, plus $10.88 for each additional 1,000 gallons (or fraction thereof)

ATTACHMENT 2

Public Review Supporting Documentation

Following is a summary of all comments received by the City of Louisville during the Public Review period from September 10, 2014 to November 10, 2014. If changes were made to the plan it has been noted in the response.

Comment 1: Can reuse water be extended to commercial irrigation?

Response: The quality of reuse water Louisville produces does allow commercial users and HOAs, but at this point, Louisville doesn't have the water rights to accommodate additional reuse customers. Most water rights the City owns are single use, and once they are used in the municipal system and treated by the wastewater treatment plant, they must be returned to the waterways where they originated. Only a small portion of the City's rights allow being reused multiple times. During the golf course reconstruction, there were several supply taps added that will be brought online in the near future, but the City is water rights limited after that point.

Comment 2: I'd like to see more education/outreach on xeriscaping. The City may want to reach out to local nurseries and landscapers to promote plants that require less water. The report says that the City has education on landscaping methods, but I haven't see any info on that and it's not obvious where to find such information (not easily found on the website).

Response: The City partners with the Center for ReSource Conservation to conduct sprinkler system audits and a Water-Wise Landscape Seminar. As part of this project, we will review the website to make sure information is easy to find. The City is also planning to participate in CRC's garden in a box program.

Comment 3: Because the City bills for water, the City may want to experiment with methods of providing social pressure to reduce water consumption on the water bills. Water bills provide an easy comparison between this year and last year, but not with how the household compares with other households. I would like to see some grading of a household's water use with comparable households. For example, the water bill could grade a resident A to F for how well the resident conserves water. Or, perhaps something softer like Gold, Silver, Bronze. Or provide percentile information. I think this would give residents a better understanding of how much they consume water. If the City wanted to be systematic about this, the City could do this grading for half the residents and not do anything for the other half, and then see if this information affected consumption. The City could get a CU prof to coordinate this project and then the CU prof can publish a paper and the City could get free publicity from that study.

Response: The City conducted a utility rate study last year, which determined adequacy of rates (how much people pay) and rate structures (how charges are incurred). This work was done with a citizen task force, which made the ultimate recommendations. The task force recommended a water budget structure, which is widely viewed as the most conservation oriented of the structures typically used by water providers. The Council initially did not believe this rate structure was justified, but agreed to further consider it for the future. This conversation will be continuing over the next year to determine which structure will be implemented. As part of this discussion, the Council already expressed interest in providing an educational component on utility bills. If the City adopts the water budget structure, staff will have to gather information such as landscaped area and indoor water consumption, which will make the type of comparison you are asking about possible. If this structure is not implemented, staff will have to evaluate what kind of educational information can be provided.

Comment 4: The section on climate change's impact on water use is disappointing. No one expects the water plan to have a completely accurate prediction of the future, so the "crystal ball" comment is completely unnecessary and a little patronizing. One possible expectation from climate change is wilder swings in rainfall -- sometimes more flooding, sometimes longer droughts. We should be able to understand how prepared the City is for a more extreme event, which could be based on so many standard deviations from the historical average. The current "plan" on how to deal with climate change is not helpful -- "regularly update and refine demand projections based on actual current conditions." Isn't this something that should be done in the absence of climate change? How is this plan for climate change different? What does it even mean?

Response: For a municipality of Louisville's size, regularly updating forecast projections and working with other municipalities to share knowledge and observations would be our ongoing preparations. With Louisville's staff and resources, we would not be able to stay on the cutting edge of the climate change research. However, when we are working with a world-class consultant, such as CH2M Hill, we should get a summary of most current data. I will ask CH2 to provide more detail in that section. You are correct, the City is always evaluating its capacity to respond to droughts. Louisville currently owns more water rights than what is required for serve its population, but if the demands outstrip supply, the City already has tools to manage that by declaring the various drought stages and purchasing supplemental water supplies. Additional information was added to the plan in Section 2.4.1.1.

Comment 5: Section 4.2.2.3: What does the City have to consider with rain sensor/weather-based irrigation technology before making a decision? Section 5.1 shows some contradiction with weather-based irrigation. The City is going to add a rebate for this technology for customers, but the City still has to evaluate the controllers for the City's systems. If it's cost effective for customers and worth the City to pay customers to install these controllers, shouldn't these be cost effective for the City?

Response: That could use some clarification. Having spoken to the Parks and Open Space Departments in the past, I believe they would like to install rain sensors, but it is a question of priority when it comes to spending their budget. Until recently, City Departments did not pay utility bills, so there was no financial incentive for them to conserve water, although I believe they are mindful of their water consumption. I expect that a stronger emphasis on water efficiency will emerge with phasing in water charges. Additional information was added to the plan in Section 4.2.2.3.

Comment 6: While I support a single person as the water conservation coordinator for the City, I'm concerned that the report says a new staff member is not required (Table 18). Is this work going to displace other work normally done by staff? Or were these duties done by several people in the past so the idea would be that we could just reallocate resources? If so, how many employees were doing the water conservation coordinator duties in the past year?

Response: This plan was compiled with the requirement that all conservation programs be handled by existing staff. CH2's recommendation is that one staff member be the point of contact for conservation issues. Currently, conservation issues are handled by two staff members who would have to shift workloads to accommodate that recommendation. If staff determines that cannot be done, other options would be evaluated, such as hiring more staff or cutting conservation programs.

Comment 7: Table 1 does not appear to include CBT storage which comes with CBT water. The Marshall Lake storage volume appears to ignore the foreign water storage right. If these two components of storage are included in table 1 the available storage would be noticeably greater.

Response: The following information was added to Table 1: Colorado-Big Thompson: 1,447 acre-feet. Staff verified that all storage accounts have been included in the Marshall storage number. The storage total was updated.

Comment 8: Page 1-2, the maximum divertible yields are noticeable less than my recollection of the potential from the City's basin water rights, if all rights are diverted at the maximum volumes allowed.

Response: The annual yield from South Boulder Creek is 3,000-5,100 acre-feet/year.

Comment 9: In Table 2 there is mention of the WWTP, water supply limits and system reliability. It is not clear why this material is in a water conservation plan.

Response: The WWTP flow is related to the capacity of the reuse system, and the State requires information on existing infrastructure.

Comment 10: Tables 15 and 17 are very good summaries. They will make monitoring and updating the conservation plan straightforward.

Response: Thank you

Following is proof the plan was posted for Public Review on September 10, 2014 and instructions were provided for how to submit comments.

Figure 1 – Notice of Draft Water Efficiency Plan for Public Comment

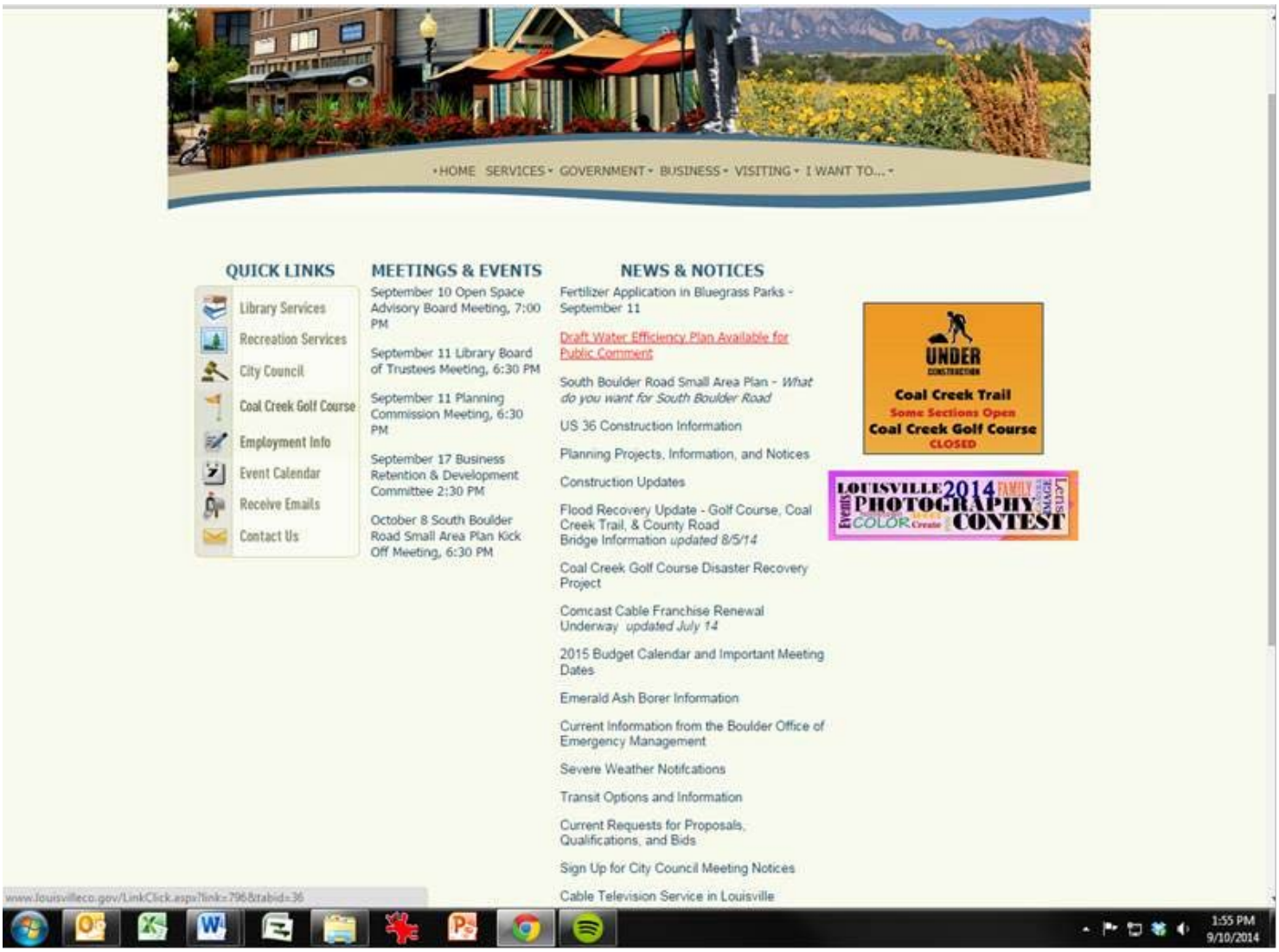
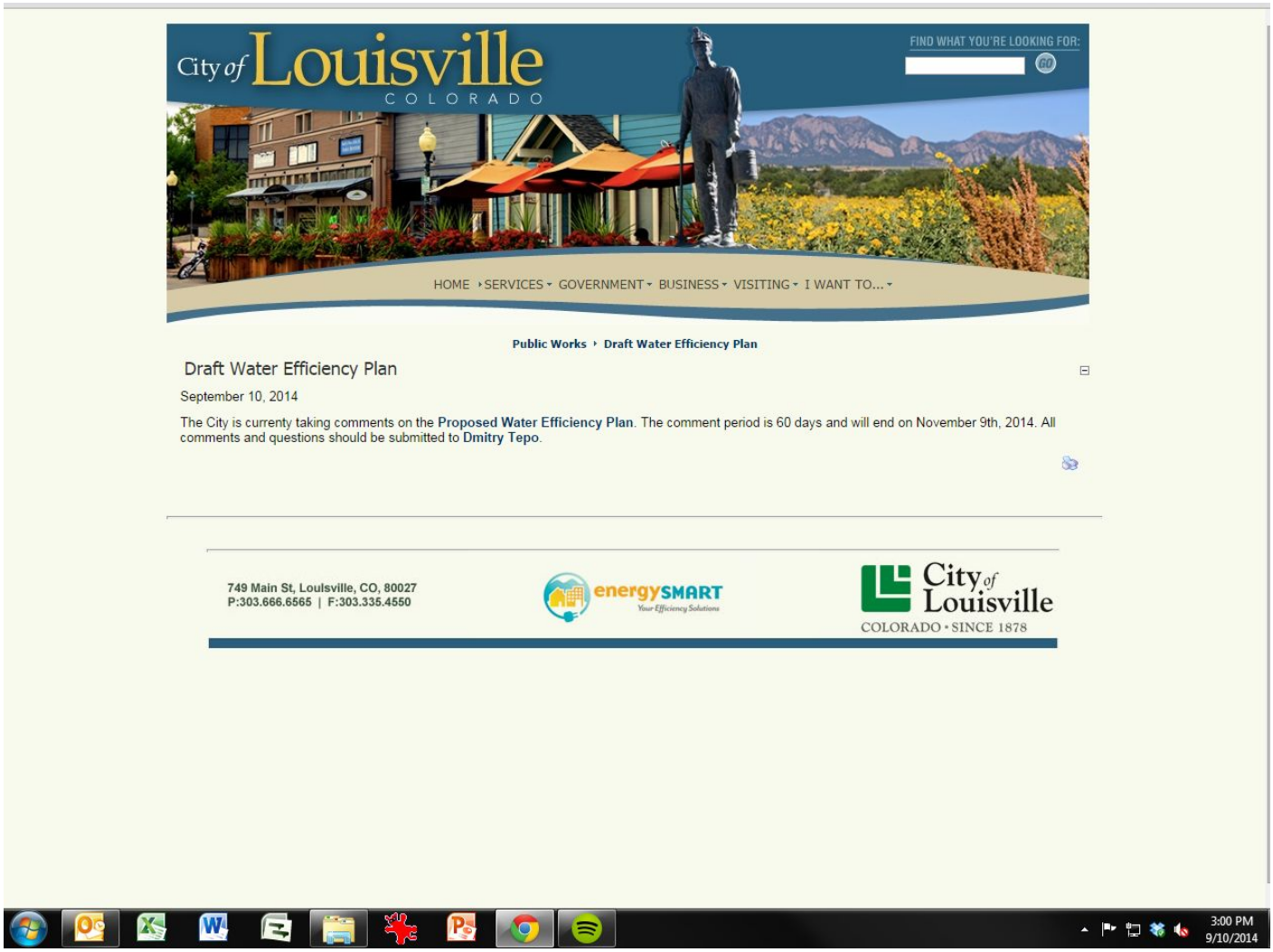


Figure 2 – Link to Plan and Email Address



ATTACHMENT 3

Compliance with State Requirements

Compliance with State Planning Requirements

Colorado Revised Statute § 37-60-126 requires a covered entity to develop, adopt, make publicly available, and implement a water conservation plan that will encourage its domestic, commercial, industrial, and public facility customers to use water more efficiently. Key elements that must be fully evaluated in development of the plan are listed as follows:

1. Water-saving measures and programs including: (I) water-efficient fixtures and appliances; (II) water-wise landscapes; (III) water-efficient industrial and commercial water-using processes; (IV) water reuse systems; (V) distribution system leak identification and repair; (VI) information and education; (VII) conservation oriented rate structure; (VIII) technical assistance; (IX) regulatory measures designed to encourage water conservation; (X) incentives to implement water conservation techniques including rebates.
2. Role of conservation in the entity's supply planning.
3. Plan implementation, monitoring, review, and revision.
4. Future review of plan within 5-7 years.
5. Estimated savings from previous conservation efforts as well as estimates from implementation of current plan and new plan.
6. A 60-day minimum public comment period (or other time period based on local ordinance).

The following section of the plan details the City of Louisville's compliance with this statute.

City of Louisville Compliance

The City of Louisville developed this conservation plan in order to comply with C.R.S. § 37-60-126. Each element of compliance is documented below.

1. Consideration of specific conservation measures

(I) ***Fixture and appliances*** – The City actively promotes the installation of water efficient fixtures and appliances through their regular conservation education efforts. City facilities have been upgraded with high-efficiency fixtures and appliances, including City Hall (low-flow faucets, low-volume toilets) and the recreation center (low-flow shower heads, ultra-low flush urinals, and a pool cover). The City currently offers a high-efficiency toilet rebate and clothes washer rebate, but both will be phased out in the coming years because of changes to the state and federal regulations that mandate water efficient products at the retail level. A new Colorado law passed in 2014 will phase in mandatory sale of WaterSense labeled toilets and showerheads. The City is planning to implement a high-efficiency pre-rinse spray valve installation program in the coming years.

(II) ***Water wise landscape*** – The City actively promotes water wise landscaping practices through their regular conservation education efforts and conservation-oriented rate structure. Outdoor irrigation efficiency audits are offered by the Center for Resource Conservation (CRC) for residential customers. The City has design standards and guidelines for commercial customers that incorporate low-water-use plants and efficient irrigation. The City encourages the installation of water wise landscapes through buffalo grass rebates and a new rebate program for weather-based irrigation controllers. The City irrigates a significant number of properties using reuse water and will continue to seek new opportunities for reuse water irrigation.

(III) ***Commercial, Industrial and Institutional (CII) measures*** – The City actively promotes CII water conservation through their regular conservation education efforts and conservation-oriented rate structure. The City plans to implement a commercial audit program through the Center for ReSource

Conservation, targeted at high demand customers. As part of this effort the City will install high efficiency pre-rinse spray valves (where appropriate) in commercial kitchens.

(IV) ***Water reuse systems*** – The City's wastewater treatment plant (WWTP) has the capability to treat a portion of the water to be reused for irrigation. Reuse water is primarily used for irrigation at Coal Creek Golf Course, Community Park, Sports Complex, Miner's Field, and the WWTP. The City is actively working to expand use of reuse water.

(V) ***Water loss and system leakage reduction*** – The City of Louisville strives to maintain a high level of water system efficiency within its distribution system and seeks to reduce water loss whenever and wherever possible. The City works to control apparent losses with accurate metering and regular meter testing, as well as assuring that all customers are metered and billed for the water they use. The City implements a regular leak detection and repair program for the water system. A private leak detection contractor is hired every other year to bring listening equipment to the City and to search for water main leaks in designated areas of the City. If a leak is detected, the City has a repair crew ready to dig up the pipe and repair the leak. The City plans to implement an annual M36 Water Loss Control audit beginning in 2015.

(VI) ***Information and public education*** – A key component of the City's water conservation efforts is public education and information. The City regularly provides information to customers about ways to conserve water and avoid water waste through flyers and bill stuffers and the utility web site. The City also maintains conservation materials and information that are available upon request. The City communicates about water use and conservation with their customers using the following tools and methods:

- Regular newsletter distributed.
- Water conservation information available on the City's website.
- A water committee made up of City Council members; meeting agendas are posted and the public are welcome at any meeting. The purpose of the committee is to provide information to the City Council about current City water activities.
- Educational opportunities including school tours of water infrastructure facilities.
- Instructional workshops for customers on relevant topics such as irrigation efficiency and management.
- Landscape design and maintenance workshops (through the Center for Resource Conservation [CRC]).

(VII) ***Water rate structure*** – The City currently bills its customers on a monthly basis using a conservation-oriented increasing block rate structure (described in Attachment 1). This conservation oriented rate structure was updated in 2014.

(VIII) ***Technical assistance*** – The City obtained a grant from CWCB for this plan and contracted with CH2M HILL Engineers, Inc. and WaterDM to develop the plan.

(IX) ***Regulatory measures*** – The City relies on the following regulatory measures to improve water use efficiency:

- Louisville Municipal Code (Title 17) established development Design Standards & Guidelines for commercial, industrial, and mixed use developments that incorporate low-water-use plants and efficient irrigation concepts into the landscape design of each development.

- Water waste ordinance, includes overspray limitations.
- Voluntary time-of-day watering restrictions.
- Compliance with Colorado Department of Public Health and Environment's (CDPHE's) Regulation No. 84 limits runoff, ponding and overspray from areas using reuse water.
- Soil amendment practices for City's Open Space.
- Louisville Municipal Code established development Design Standards & Guidelines for commercial.

(X) ***Incentives*** – The City has offered rebates for many water efficiency products in the past. Under this plan the City will offer rebates for buffalo grass, Garden-in-a-box, weather-based irrigation controllers, and high-efficiency pre-rinse spray valves.

2. Role of conservation in raw water supply planning

This water conservation plan represents the City of Louisville's most comprehensive effort to integrate water conservation into water supply planning. Through this plan, the City has established that their raw water supply is sufficient to meet future growth.

3. Plan implementation, monitoring, review, and revision

The City monitors water use on a regular basis and will continue to do so. The City produces monthly and annual demand reports for each customer sector and the system as a whole and keeps close track of demand. The City will review and update this water conservation plan every five to seven years. During this review, progress towards achieving the stated conservation goals will be evaluated.

4. Future review of plan within seven years

The City will review and update this water conservation plan every seven years or as needed.

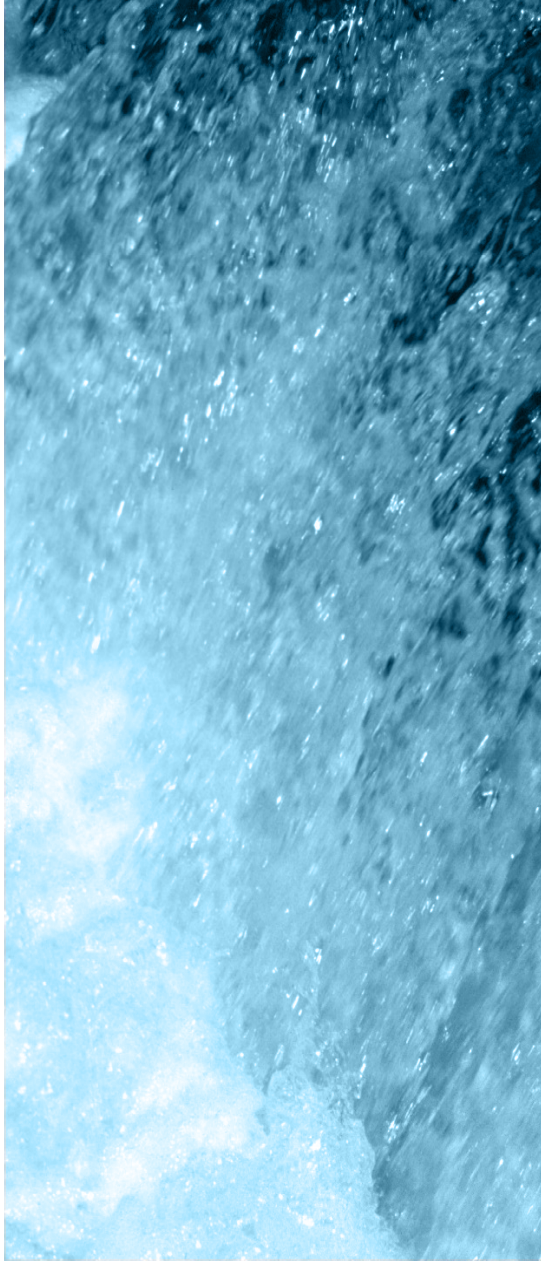
5. Estimated savings from previous conservation efforts and current plan

Past savings: Based on a gradual increase of savings over time the total water saved since 1999 from demand management is estimated to be 326 MG (1,001 acre-feet).

Future savings: If the elements of this plan are fully realized, then it is estimated that water demand at 2032 will be reduced by 241 MG (0.66 mgd) as result of passive and active water conservation measures.

6. Public comment period

As per state statute, the City of Louisville conducted a 60-day public comment period of this water conservation plan. The public comment period began on September 10, 2014 and was concluded on November 10, 2014. Citizens and interested parties were invited to comment via legal advertisement and web site posting. The plan was posted on the City's web site and hard copies were made available at public offices. Upon completion of the public comment period, the conservation plan will be submitted to CWCB for review. After CWCB review and approval the plan will be finalized and adopted by City Council.



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