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FORT COLLINS – LOVELAND WATER DISTRICT

2015 MUNICIPAL WATER EFFICIENCY PLAN UPDATE

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EXECUTIVE SUMMARY

The Fort Collins-Loveland Water District (FCLWD *or* District) has provided water services to citizens and businesses since 1961. FCLWD serves an area of over 56 square miles and is located approximately 50 miles north of Denver along the Colorado Front Range as shown in **Figure 1.1a,** Section 1.1. In 2014 the population was estimated to be 42,490. Future residential population is projected to reach approximately 52,725 by 2024.

Fort Collins-Loveland Water District has developed this Municipal Water Efficiency Plan (Plan) update in accordance with the Water Conservation Act of 2004 and to meet the provisions of Colorado Revised Statute section 37-60-126. As part of CRS 37-60-126, a State-approved Plan will qualify FCLWD for continued funding from the Colorado Water Conservation Board (CWCB) and the Colorado Water Resources and Power Development Authority for water supply and delivery projects. The District has made a number of efforts in the last 20 years to improve their water use efficiency and has implemented a number of steps and programs throughout that time. The District looks forward to its continued partnership with CWCB and the State to continuously improve its efficiency and conservation efforts.

The District receives its treated water from the Soldier Canyon Filter Plant, (SCFP) which is jointly owned by the Tri-Districts; FCLWD, North Weld County Water District, and East Larimer County Water District. Water is delivered to the plant from Horsetooth Reservoir which is part of the Colorado-Big Thompson Project. The District can also bring water to the plant through the jointly owned Pleasant Valley Pipeline. The District's distribution system includes storage capacity at SCFP as well as four other storage facilities throughout the system. The system also includes eight pump stations and nearly 400 miles of pipeline.

In 2014, FCLWD's customers utilized approximately 8,417 acre-feet (AF) of treated water. The District is expected to increase its annual water demand through new growth to approximately 14,204 AF of treated water over the planning period which extends to 2024. Water savings from this water conservation planning effort is estimated to save a total of 11,496 acre-feet over the planning period. The savings from this planning effort will make a considerable contribution toward the water supplies needed to serve the 2024 demand.

This report documents FCLWD's water system, past and future water use, and the water efficiency planning process used in accordance with CWCB's Municipal Water Efficiency Plan Guidance Document.

Past and Current Water Efficiency Activities

FCLWD has implemented a variety of water efficiency activities since 1996 when the first Water Conservation Plan was prepared. In a more recent update, the 2008 Water Conservation Plan implemented additional activities. The water efficiency activities that have been historically implemented are shown in **Table ES-1**. Some of the savings from water efficiency activities were able to be quantified and is summarized in **Table ES-2**. The total estimated water savings from the activities listed in Table ES-2 is approximately 914 AF.

Table ES-1: FCLWD's Existing and On-going Water Efficiency Activities

Water Efficiency Activities
Foundational Activities
Metering
Automatic Meter Reading (AMR) and Automatic Meter Infrastructure (AMI) Installation and Operations
Meter Testing and Replacement
Meter Upgrades
Data Collection - Monitoring and Verification
Frequency of Meter Reading
Tracking Water Use by Customer Type
Upgrade Billing System to Track Use by Sufficient Customer Types
Tracking Water Use for Large Customers
Water Use Efficiency Oriented Rates and Tap Fees
Volumetric Billing
Water Rate Adjustments
Frequency of Billing
Inclining/Tiered Rates
System Water Loss Management and Control
Leak Detection and Repair
Recycling WTP filter backwash
Planning
Feasibility Studies
Integrated Water Resources Plans
Master Plans/Water Supply Plans
Targeted Technical Assistance and Incentives
Residential Irrigation Audits (partnering with City of Fort Collins)
Education Activities
Website – Water Conservation Information, link to Water Energy Climate Calculator, and links to Northern Water's Water Conservation webpages

Table ES-2: Water Savings Estimates of Individual Activities

Historical and Current Water Efficiency Activities	Annual Water Savings for Past Five Years (AF)					Total Five-Year Water Savings (AF)	Average Annual Savings (AF)
	2010	2011	2012	2013	2014		
Foundational Activities							
Leak Detection and Repair	6	18	43	29	16	111	22
Recycling WTP Filter Backwash	150	154	193	156	148	801	160
Targeted Technical Assistance and Incentives							
Residential Irrigation Audits (partnering with City of Fort Collins)	0.26	0.26	0.33	0.27	0.25	1.4	0.27
Education Activities							
Total Savings	156	172	236	186	164	914	183

The water savings for the remaining activities, whose savings are not analyzed in **Table ES-2**, are more difficult to quantify or had insufficient data. Therefore water savings of the remaining activities was estimated using demand data to compare historical annual per capita water demands before and after the implementation of the water efficiency activities. **Figure ES-1** shows the annual historical per capita water demands in relation to population. Although water usage varies considerably year to year, there is a clear trend of reduced water use as the District and its customers have made efforts to be more conservative and efficient. Much of the variability can be explained due to temperature and precipitation fluctuations.

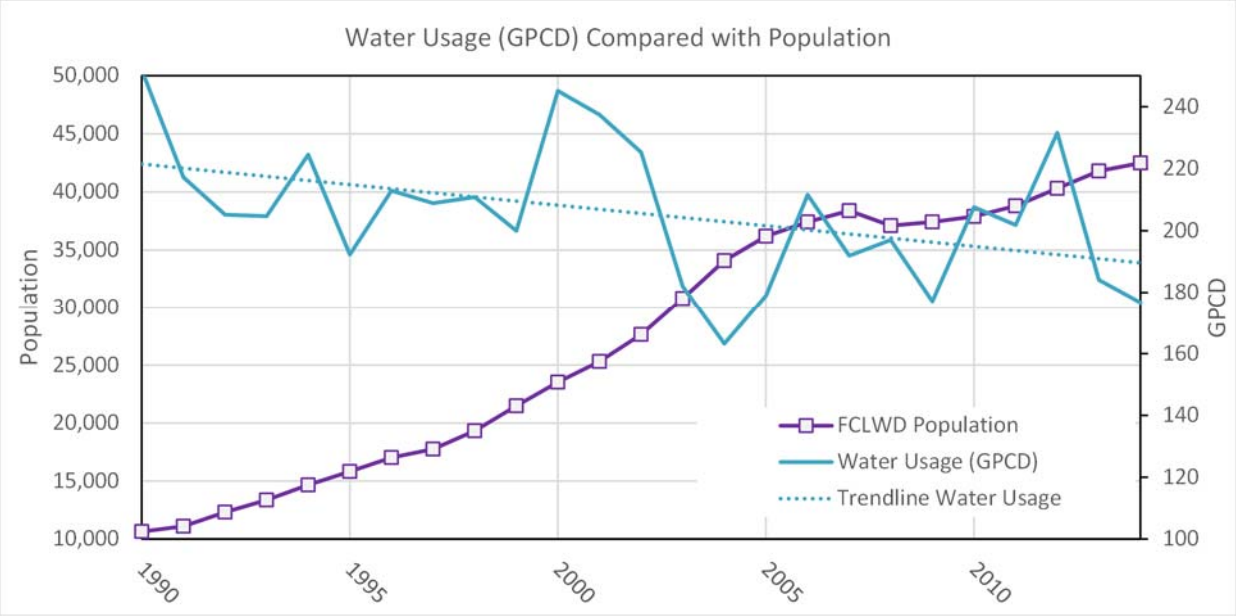

Figure ES-1: Population Compared with Per Capita Water Usage

A preliminary set of goals has been developed prior to the selection of the water efficiency activities to provide a means to screen and evaluate the selected activities. Goals from the District's 2008 Water Conservation Plan have been assessed and incorporated into the new goal development process.

A meeting was initially held with District Staff to discuss water efficiency goals appropriate for FCLWD. The following preliminary goals were established by District Staff:

- In keeping with the savings goal established in FCLWD's 2008 Water Conservation Plan, the targeted water savings goal for this Plan will be to lower the total water use by 10 percent over the ten-year planning period.
- Targeted ten-year water savings goal for the following customer categories were as follows:
    - Residential: 12%
    - Residential Multiuse: 5%
    - Non-Residential: 3%
    - Irrigation: 11%
    - Other: 1%
    - Non-Revenue Water: 10% (i.e. a 10% reduction of current 4.7%)
- Develop a water efficiency program that can be implemented within District staffing constraints and with Staff approval.
- Implement water efficiency activities that are compatible with the community and their District Board representatives.

The success of the stated goals will be measured through monitoring of billing data, screening and evaluating activities that are acceptable to District Staff, and soliciting District Board and community feedback on water efficiency activities.

FCLWD used a four-phase process for selecting and fully evaluating water efficiency activities. The four phases include: 1) assessment; 2) identification; 3) qualitative screening; and 4) evaluation and selection.

The initial screening of the water efficiency activities with District staff resulted in selecting 12 candidate activities for further evaluation. Some of the activities have been combined within their SWSI Levels Framework to assist in evaluation and avoid double counting savings. The second screening was accomplished by evaluating each activity based on the following evaluation criteria: Staff and Board approval, Feasibility for customer base including acceptance and participation, Staff and financial resource limitations, and Legal authority). The following measures were eliminated in the second screening process:

- Pre-Rinse Spray Valve (PRSV) Upgrades
- Time of Day Watering Restrictions

The District may re-evaluate these measures for future planning efforts. The final 10 activities chosen are as follows:

- Meter Testing and Replacement/Meter Upgrades
- System Wide Water Audits
- Automatic Meter Reading (AMR) and Automatic Meter Infrastructure (AMI) Installation and Operations
- Water Efficiency Rate Structure with Regular Updates to Rate Study
- Leak Detection and Repair
- Recycling Water Treatment Plant Filter Backwash
- Master Plans/Water Supply Plans
- Residential Irrigation Audits (partner with Fort Collins)
- Indoor Residential Water Audits (partner with Larimer County Conservation Corps)
- General Educational Activities

Table ES-3 compares the anticipated water savings from the selected activities with the original goals and then adjusts the water savings goals for this Plan update. Over the ten-year planning period, the selected activities could potentially provide an overall water savings of 11,496 acre-feet. The adjusted goals reflect what is believed to be obtainable by FCLWD's Staff. After the goals were adjusted to reflect the expected water savings, the estimated water use reduction is 9.8 percent. Therefore, FCLWD will target an overall reduction from their forecasted water use by 9.8 percent over the planning period because of implementation of this Plan.

Table ES-3: Water Efficiency Goals Comparison

Water Use Categories:	Total Projected Water Use (2015 to 2024)	Reduction Goals for Planning Horizon		Adjusted Reduction Goals for Planning Horizon	
				Total Water Savings from Activities	Resulting Reduction
	(AF)	(%)	(AF)	(AF)	(%)
Residential (Res)	77,199	12.0%	9,264	7,232	9.4%
Residential Multiuse (RMU)	2,635	5.0%	132	86	3.3%
Non-Residential (NonRes)	14,335	3.0%	430	467	3.3%
Irrigation (IRR)	13,098	11.0%	1441	1,087	8.3%
Other	4,290	1.0%	43	24	0.6%
Non-Revenue Water	5,526	10.0%	553	2,602	47.1% (1)
Total Water Production:	117,082				
Total Demand Reduction:			11,862	11,496	
Total Percent Reduction:			10.1%		9.8%

(1) Note: The 47.1% reduction of Non-Revenue Water includes "Recycling Water Treatment Plant Filter Backwash", an activity that happens prior to the metering. Because of this fact, this likely represents a higher percentage than post-metering activities alone.

Implementation and Monitoring Plan

The implementation plan defines the process necessary to carry out the selected water efficiency activities. Monitoring types of demand data can be beneficial in tracking the savings generated from implementing a water efficiency plan. Raw water delivered and treated water produced is monitored at the SCFP on a daily basis. Customer accounts have the capability of being monitored on an hourly basis but are typically monitored on a monthly basis. Other categories of raw and treated water are monitored on a monthly basis. Still other categories are monitored and evaluated on a semi-annual or annual basis.

The demand data which will be collected during the monitoring period of the plan is presented in **Table ES-4**. Terry Farrill (District Engineer) and Kathy Hawkins (Controller, Business Office Manager), will be chiefly responsible for coordinating the implementation of this Plan. They also realize that the most successful Plan is one that involves a team effort from many staff, other key personnel, and sometimes assistance outside of FCLWD's employees.

Monitoring Data	HB 10-1051 Reporting Requirement					Selection			
	Annual	Monthly	Bi-Monthly	Daily		Annual	Monthly	Bi-Monthly	Daily
Total Water Use									
Total treated water produced (metered at WTP discharge)						X	X		X
Total treated water delivered (sum of customer meters)	√					X	X		
Raw non-potable deliveries to SCFP						X	X		X
Reclaimed water produced (metered at WWTP discharge)									
Reclaimed water delivered (sum of customer meters)									
Per capita water use						X	X		
Indoor and outdoor treated water deliveries						X	X		
Treated water peak day produced						X	X		X
Reclaimed water peak day produced									
Raw water peak day produced/delivered									
Non-revenue water	√					X	X		

Monitoring Data *(cont.)*	HB 10-1051 Reporting Requirement					Selection			
	Annual	Monthly	Bi-Monthly	Daily		Annual	Monthly	Bi-Monthly	Daily
Water Use by Customer Type									
Treated water delivered		√				X	X		X
Raw non-potable deliveries									
Reclaimed water delivered									
Residential per capita water use						X	X		
Unit water use (e.g. AF/account or AF/irrigated acre)						X	X		
Indoor and outdoor treated water deliveries						X	X		
Large users						X	X		
Other Demand Related Data									
Irrigated landscape (e.g. AF/acre or number of irrigated acres)						X			
Precipitation						X	X		
Temperature						X	X		
Evapotranspiration						X	X		
Drought index information						X			
Economic conditions						X			
Population						X	X		
New taps						X	X		

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INTRODUCTION

The Fort Collins-Loveland Water District (FCLWD *or* District) has provided water services to citizens and businesses since 1961. FCLWD is located approximately 50 miles north of Denver along the Colorado Front Range as shown in **Figure 1.1a**. The District's population in 1997 was 17,760 and more than doubled to 38,385 people by 2007. From there the District saw a brief decline in 2008 but has experienced a steady growth rate ever since. In 2014 the population was estimated to be 42,490. Future residential population is projected to reach approximately 52,725 by 2024.

The District receives its treated water from the Soldier Canyon Filter Plant, (SCFP) which is jointly owned by the Tri-Districts; FCLWD, North Weld County Water District (NWCWD), and East Larimer County Water District (ELCO). Water is delivered to the plant from Horsetooth Reservoir which is part of the Colorado-Big Thompson (C-BT) Project. The District can also bring water to the plant through the jointly owned Pleasant Valley Pipeline. The capacity of the Treatment Plant is currently at 52 million gallons per day (MGD) with plans to expand.

For this Plan update, FCLWD has completed the five steps of municipal water efficiency planning as outlined in the *Municipal Water Efficiency Plan Guidance Document*; 1) profile of the existing water supply system, 2) profile of water demands and historical demand management, 3) integrated planning and water efficiency benefits and goals, 4) selection of water efficiency activities, and 5) implementation and monitoring plan. The District has made a number of proactive conservation efforts to date and will continue this commitment into the future.

There were several documents reviewed in the development of this plan update including FCLWD's 2008 Water Conservation Plan, 2014 Annual Drinking Water Quality Report, and FCLWD's website pages. There are many acronyms, terms, and terminology that are commonly used in water efficiency and planning, and some additional terms are common in this geographical area; a list of terms and their meanings is included in **Appendix A**.

The District Board of FCLWD is committed to water resource sustainability and water efficiency. The District intends to do its part to preserve water for future generations. Both Staff and the Board understand the needs and benefits to implement long-term water efficiency activities.

SECTION 1.0 – PROFILE OF EXISTING WATER SUPPLY SYSTEM

1.1 Overview of Existing Water Supply System

Service Area

The Fort Collins-Loveland Water District has a service area with the approximate boundaries that are as follows and also shown in **Figure 1.1a**. Much of the northern boundary of the District is bordered by Harmony Road in Fort Collins, although several fingers of the northern boundary extend past Harmony. A large portion of the southern boundary of the District is bordered by 37th Street in Loveland. To the east, the Larimer-Weld County line represents the boundary, and to the west, the foothills are essentially the District's border. The service area incorporates portions of Fort Collins, Loveland, Timnath, and Windsor. The remaining sections of the service area include the rural portions of Larimer County in between the municipal areas. In 1981 an Inter-governmental Agreement was establish to keep the boundaries relatively static. The service area currently covers approximately 56 square miles and has not changed significantly over the last decade.

The Town of Windsor is a wholesale account and is responsible for acquiring its own raw water supplies which they transfer to FCLWD on an annual basis for treatment and delivery. Since Windsor is responsible for its own water planning, it is not part of this planning study.

Due to unique demographics of a water district, the exact population is difficult to determine. Districts like FCLWD are comprised of many different governing entities including portions of cities and towns (as mentioned previously) as well as rural county areas. Census data can be obtained for counties and municipalities, even regions, but data is not available for special districts. To estimate the population for FCLWD, the number of households was calculated from the tap data and multiplied by the average number of people per household; 2.8 people per tap (household) was used for this study. This number represents information provided by District staff as well as demographics from Fort Collins, Loveland, Timnath, Windsor, and Larimer County. The population estimates for the past five years are presented in **Table 1.1a**.

Table 1.1a: District Population for Past Five Years

Year	Population (1)	Growth Rate
2010	37,892	1.3%
2011	38,797	2.4%
2012	40,300	3.9%
2013	41,804	3.7%
2014	42,490	1.6%

(1) Population estimated from number of taps, demographical, and other information available.

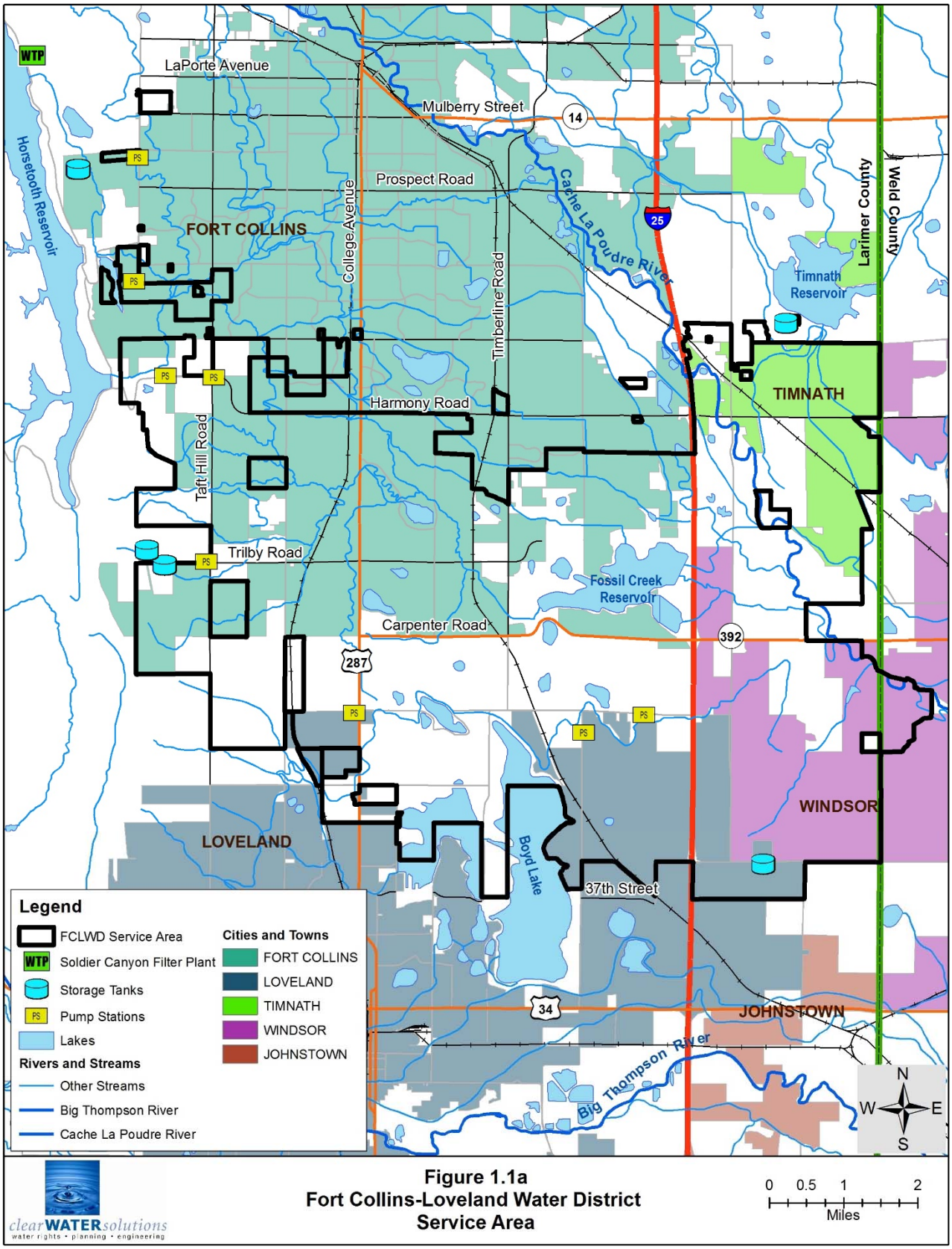

Figure 1.1a: Fort Collins-Loveland Water District Service Area

Water Supply

The District receives its treated water from the SCFP, which is jointly owned by the Tri-Districts of FCLWD, NWCWD, and ELCO. Through this ownership, FCLWD is in a position to participate in cooperative water system projects, which lowers the incremental cost for all participants through economies of scale.

The SCFP is a regional water treatment plant located below the Soldier Canyon Dam on the northeast side of Horsetooth Reservoir (also depicted on **Figure 1.1a**). The capacity of the treatment plant is currently at 52 MGD with plans to expand. Water is delivered to the plant from Horsetooth Reservoir which is part of the C-BT Project. The District can also bring water to the plant through the jointly owned Pleasant Valley Pipeline, which is a an eight mile long, 67-in diameter, raw water supply pipeline shared by the Tri-Districts, Fort Collins, and Greeley.

Along with the Pleasant Valley Pipeline, FCLWD and other water suppliers in the region have worked cooperatively to provide high quality water service to residents of northern Colorado. Other coordinated efforts include gravel pits that the Tri-Districts are partnering with Greeley to purchase and develop for raw water storage. Water is also exchanged year round between the City of Fort Collins water treatment facility and SCFP.

The District's water supply consists of C-BT units and native water rights from diversion off the Cache la Poudre River. The District owns 11,294 units of C-BT water. The C-BT system contains transbasin water that accumulates in the Colorado River Basin and is pumped from Lake Granby through the Adam's Tunnel to the East Slope near Estes Park. Water is then distributed to several Front Range reservoirs. It was constructed by the Bureau of Reclamation between 1938 and 1957 and is maintained by the Northern Colorado Water Conservancy District (Northern Water).

The District owns agricultural water rights that divert water from the Cache la Poudre River. They include shares in several ditch and reservoir companies. The companies, amount owned, average and firm yield are presented in **Table 1.1b**. Many of these water rights are decreed for agricultural uses only, so they are exchanged on an annual basis for C-BT water when possible. When no C-BT water is available for exchange, the water rights are rented for agricultural use. North Poudre Irrigation Company (NPIC) owns 40,000 C-BT units, so its shares include a C-BT portion and a native agricultural portion. The C-BT water is delivered equally to the 10,000 shares within the NPIC system for agricultural, municipal, or industrial use.

In anticipation of the gradual disappearance of available C-BT water, the District committed funds to participate in the previously mentioned Pleasant Valley Pipeline. Construction on the pipeline began in April 2003 and was completed in the spring of 2004. The pipeline takes water from Munroe Gravity Canal to the Fort Collins treatment plant and SCFP.

The various water rights currently owned by the District and the approximate yield of those water rights are listed in **Table 1.1b**.

Table 1.1b: FCLWD Water Supplies

Source	Amount Owned (AF, shares, percent, or units)	Average Yield (AF)	Firm Yield (AF)
Transbasin Water			
C-BT (units)	11,294	7,906	5,647
NPIC (shares)	1,168	3,060	2,336
Native Poudre River Water			
Josh Ames Certificates (AF)	175	175	175
Windsor Reservoir & Canal Co (shares)	37.5	598	598
Jackson Ditch Company (shares)	1.04	210	210
John R Brown Private Ditch (%)	42%	205	205
PVP Junior Water Right (%)	42%	242	0
Larimer Co Canal No. 2 (Non-Potable) (shares)	0.42	14	11
Divide Canal & Reservoir Co Class A (shares)	1,238	2,321	1,399
Divide Canal & Reservoir Co Class B (shares)	41.5	153	92
New Mercer Canal (shares)	0.063	2	2

Key Existing Facilities

The SCFP can treat up to 52 MGD, and there is a total of 9.25 million gallons (MG) of treated water storage at the four other storage facilities throughout the system. The system also includes eight pump stations. The Colorado-Big Thompson Project, as part of its system, has raw water storage; some additional raw water storage is also available to the Tri-Districts in the Overland Trail Ponds. More details will be discussed about the Overland Trail Ponds in Section 1.3.

The District owns and operates a water distribution network of nearly 400 miles of pipeline and associated facilities. The pipelines are well maintained with less than five breaks per year and non-revenue water of less than five percent throughout the system. The District continues to expand within its service area and between 2008 and 2015, the District added over 2,400 taps and 13.5 miles of additional waterline.

The District's maintenance program includes annual flushing of water lines, periodic valve maintenance, and prompt leak repair. The following table shows the miles for each diameter of pipe, ranging from one inch to 48 inches.

Table 1.1c: Water Transmission Pipe Lengths within District Service Area

Pipe Diameter (Inches)	2015 Pipe Length (Miles)
1	0.07
1 ½	0.03
2	1.91
2 ½	0.20
3	13.93
4	22.09
6	67.16
8	155.72
10	20.03
12	61.94
14	9.96
16	5.93
18	13.42
20	4.04
22	1.47
24	9.94
30	3.49
36	4.89
48	0.59
Total	**396.81**

Every service connection on the District's distribution system, regardless of use, is metered. Some accounts are also equipped with a rotating disk, positive displacement meter, and an individual pressure regulator for accurate measurement of the water delivered. Approximately 90 percent of the District customers' meters are equipped with Automatic Meter Infrastructure (AMI) capabilities. All of the system meters are read once a month; this includes hydrant meters used by contractors that buy construction water from the District. The District has set up four billing cycles to distribute the frequency of readings. With the AMI meters, FCLWD is capable of receiving readings up to four times a day; this capability is highly beneficial in researching potential leaks. For example if a customer appears to have a spike in use or if another customer has a steady use throughout the day and night, these may indicate possible problems. The District is confident in the design of the system to account for all water use. The water use monitoring program the District has been using for the past ten years has been an integral part of the efforts to minimize system leakage.

1.2 Water Supply Reliability

The FCLWD is located in Larimer County in the South Platte River Basin where the Statewide Water Supply Initiative (SWSI) 2010 identified a 58 percent gap between water needs and water supplies in the Basin by 2050. Water efficiency is one method the SWSI report identified for meeting this gap.

Water supply reliability is the ability of the District's water supplies to meet the needs of its customers during times of stress. The C-BT Project imports an average of over 200,000 acre-feet (AF) of water each year to many public and private water users along the northern Front Range and northeastern Colorado for agricultural, municipal and industrial uses. The system has approximately 740,000 AF of gross storage and consists of 310,000 units. There is approximately 2.3 times the storage than would be needed to deliver a 100 percent quota. This gives the C-BT system some drought reliability.

In over fifty years of C-BT project operation, the average yield has been 0.73 AF per unit and the commonly used average quota is 70 percent. The yield has never been less than 0.50 acre-feet per unit (50 percent quota) or more than 1.0 acre-feet per unit (100 percent quota). The historical annual quota established by the Northern Water Board is shown on the following **Figure 2.1a**.

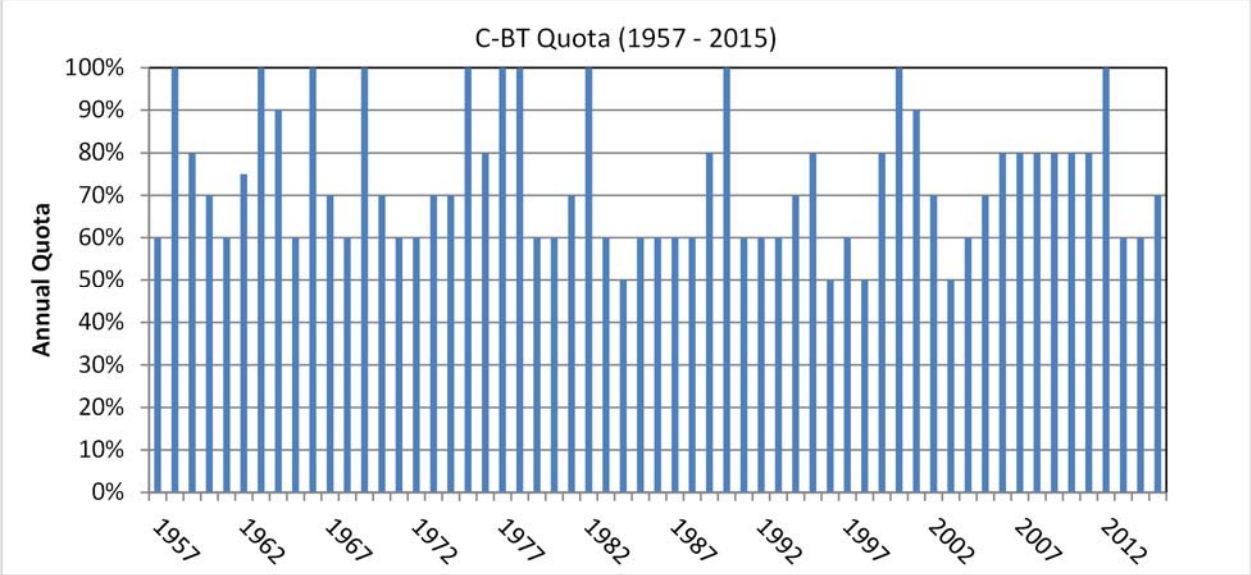

Figure 1.2a: Historical C-BT Quota

Northern Water defines a C-BT carryover program to C-BT Allottees, which allows C-BT owners to carry over unused C-BT from the previous year to the following year. Per the Northern Water's Annual Carryover Program Procedures:

> *The Board and District staff will review the advantages and consequences of the Annual Carryover Program on a continuing basis. While the Board recognizes the Program's benefit to many C-BT Allottees, it may modify or discontinue the Annual Carryover Program at any time.*

Considering this procedure, a 50 percent quota is what most water provider's use as the firm yield for C-BT.

Other Factors that Potentially Impact Water Supply

The C-BT supplies are stored in Lake Granby on the western slope of Colorado. Should a fire occur in the area, water quality would be a major issue for FCLWD and other C-BT Allottees. There is a tremendous amount of beetle kill to trees surrounding Lake Granby, Grand Lake, and the other storage facilities of C-BT. This beetle kill poses a potential increased risk to fire. FCLWD would be vulnerable to SCFP abilities to treat degraded water quality. FCLWD's water supplies would also be vulnerable in an extended drought. The District currently maximizes its carryover each year through Northern Water, but a multi-year drought would likely decrease or eliminate FCLWD's carryover account.

1.3 Supply-Side Limitations and Future Needs

Limitations with C-BT

Current C-BT supplies with other supplemental ditch rights are sufficient to meet FCLWD's water demands. To date, there have not been any potable supply shortages. However, it should be noted that the C-BT system was originally designed as a supplemental supply to native water rights. Each year, the amount of water delivered by the C-BT system (i.e. quota) was set based on demand. For example, in a dry year when water demands are highest, the quota would be set higher (i.e. 100 percent). Conversely, in a wet year, when native supplies are plentiful, the quota would be set lower (i.e. 50 percent). The years 2002 and 2003 were an exception when, for the first time in the system's history, the quota was set based on the limited supply in the C-BT system. To maintain this delicate balance, and to prevent speculative water purchases, Northern Water has set limits on the amount of C-BT water each entity can own in relation to its water demand.

A key limitation with C-BT water is the fact that it is in great demand and is converting from agricultural (AG) use to municipal/industrial (M&I) use rapidly. The transition is illustrated in **Figure 1.3a**. At this current rate of acquisition, it is projected that few (if any) C-BT units will be available by the year 2040. Fairly recently, the oil and gas industry has been taking a significant amount of C-BT water when it goes to the open market. The high demand and limited availability of C-BT water has driven up the price considerably in the last 15 years as can be seen in **Figure 1.3b**. In early 2015, a number of C-BT units sold for $26,000 a piece at an auction. That translates to about $52,000 per AF of firm yield.

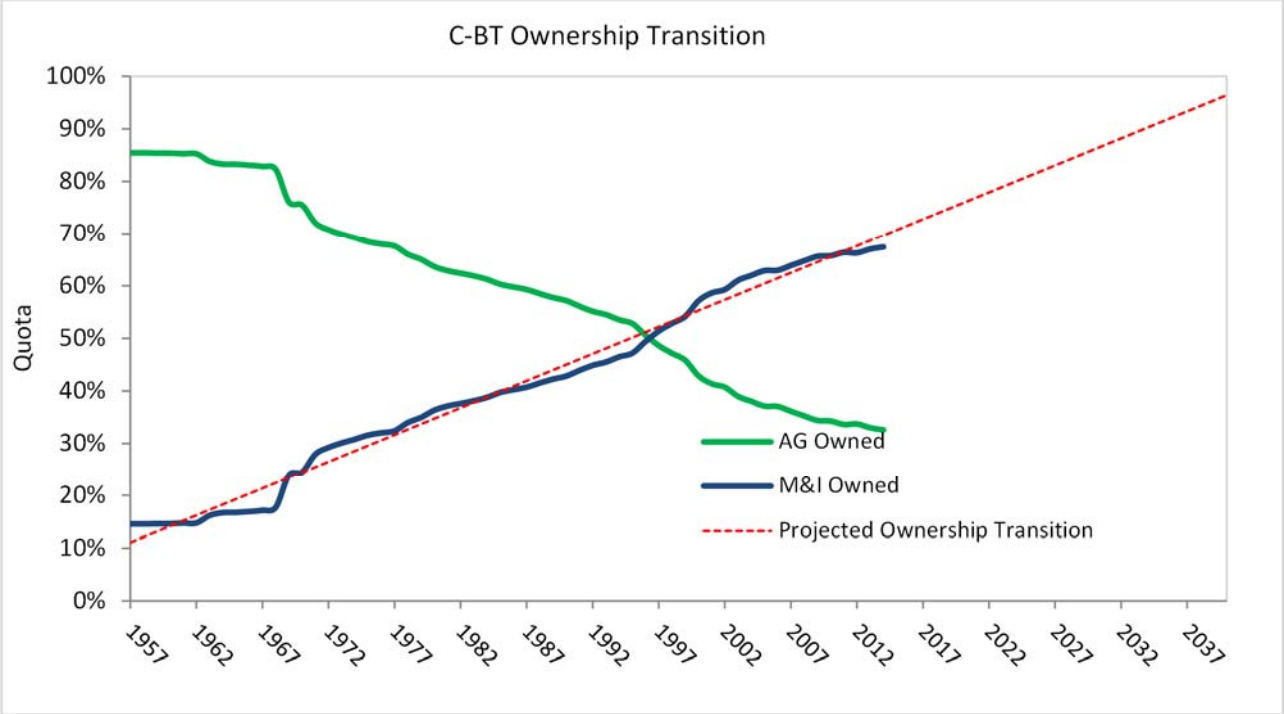

Figure 1.3a: C-BT Ownership Transition (1957 through 2014) and Future Transition

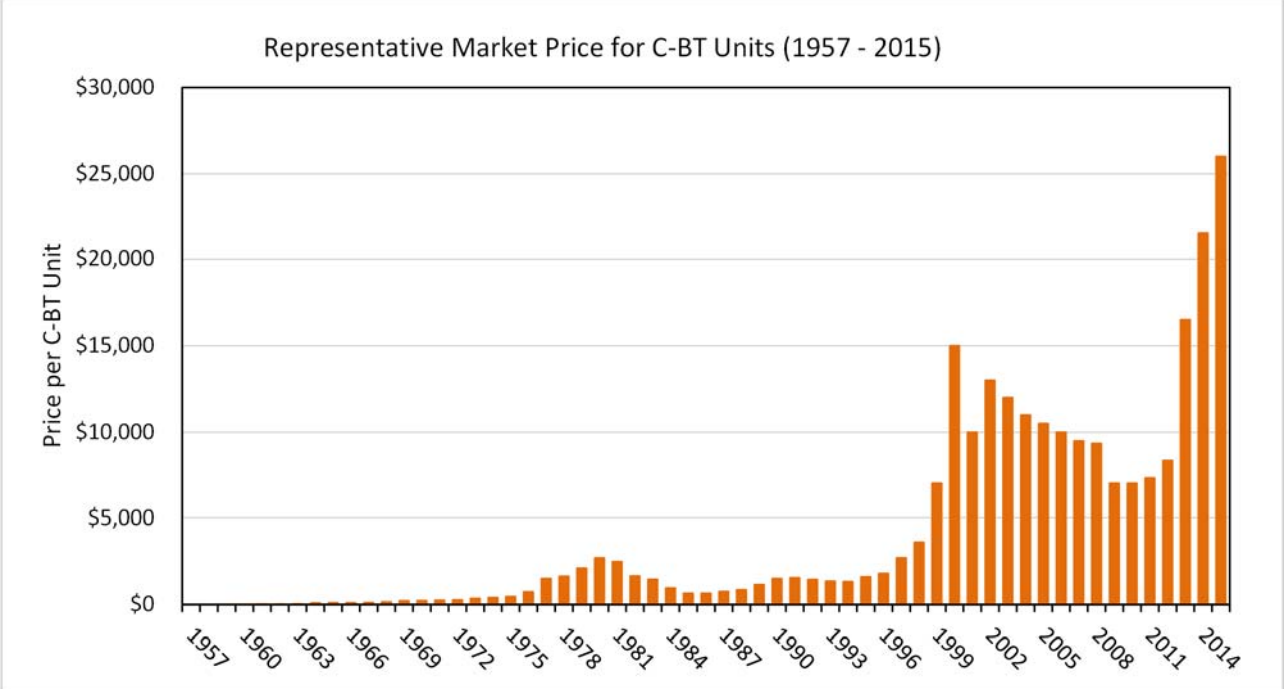

Figure 1.3b: Historical Price for C-BT Units

District System Limitations

Because the SCFP is the sole source of treated water for the District, the District is currently limited to where it can get future supplies from. Only water that can be treated by the SCFP can be acquired unless FCLWD is a part of constructing future water treatment facilities.

Since the majority of the original pipelines from the SCFP to the District were installed between 1962 and 1963 and consist mostly of steel and asbestos concrete, they may need to be replaced in the near future.

Future Needs and Planning Initiatives

A Water Master Plan was completed by the District in 2008. This plan addresses system upgrades for distribution lines, storage tanks and pumping facilities to meet the future demands to build-out. It also suggests water supply needs based on C-BT purchases. In 1996, FCLWD submitted a Water Conservation Plan to the Colorado Water Conservation Board (CWCB) to meet the requirements of the Water Conservation Act of 1991. The plan focused mainly on education practices and reducing system losses. The latest plan completed by the District was the Water Conservation Plan submitted to the CWCB in September 2008.

Raw Water Storage

The District currently has no raw water storage except for that within the C-BT system. Variability in the yield of Poudre basin water rights, both year to year and month to month, will require FCLWD to develop raw water storage for the following purposes: 1) to store water during peak flow months (May, June and July) for use in months when the District's water rights yield little or no water, 2) to store water in years of surplus for use in years when a water supply deficit occurs, and 3) to store the historic return flow component of agricultural water rights converted to municipal use for year-round releases required to meet court-imposed return flow obligations.

To better utilize its Poudre River water rights and increase the yield of those water rights, the Tri-Districts conducted a raw water storage needs assessment in 2005. The results of the study showed that FCLWD would need 6,640 AF of storage at build-out. FCLWD plans to obtain storage capacity at several locations along the Poudre River. The District considered the following criteria when planning these storage project locations: 1) available for diversion at the Pleasant Valley Pipeline, 2) as close as possible to SCFP and 3) downstream of the wastewater treatment facilities that will discharge reusable effluent that FCLWD can claim and capture.

Change of Use

Conversion of FCLWD's Poudre River and transmountain water rights from agricultural to municipal use requires detailed engineering analyses and applications to Water Court. The easiest change cases take at least three to five years before a decree is entered. The more complicated change cases can take as much as ten years and could cost millions of dollars. The engineering analyses required in Water Court applications that change the use of agricultural water focuses on the historical

consumptive use of the crops grown with the water right and return flows resulting from irrigation of those crops. Determination of the consumptive use and identifying the amount, location, and timing of return flows makes change cases increasingly complicated and costly. Within the next few years, additional applications may be submitted to change the use of water rights owned by the District. Even with these potential complications, the District continues to pursue opportunities to acquire additional shares of native Poudre River Water as they become available from ditch companies.

NISP

Northern Water is acting on behalf of FCLWD and 14 other northern Colorado communities and water providers to apply for a federal permit to build the Northern Integrated Supply Project (NISP). NISP is a regional water supply and storage project that will provide the participants with 40,000 AF of new municipal water storage and supply. The planned facilities include Glade Reservoir, Galeton Reservoir, a pumping facility, a pipeline to deliver water for exchange with two irrigation companies, and needed improvements to an existing canal to fill Glade Reservoir. Glade Reservoir will be an off-channel reservoir located near Ted's Place on Highway 287 north of Fort Collins. The reservoir will hold approximately 170,000 AF of water when constructed. Galeton Reservoir will also be an off-channel reservoir located north of the Town of Galeton (approximately 10 miles east of Ault). If the project makes it through the permitting process, FCLWD will be obligated to pay their pro-rata design and construction costs. NISP is currently estimated at approximately $12,500 per AF and provides additional water supply and storage.

Overland Trail Ponds

In 2005, Lafarge West Inc. agreed to sell property it had been mining for a number of years to the District and several other water suppliers (Fort Collins, Greeley, ELCO, and NWCWD). The Lafarge property is located near the Town of LaPorte on the south side of the Poudre River immediately west of Taft Hill Road. Even though Lafarge (now Martin Marietta) no longer owns the property, it continues to mine gravel from the site. The purchasers plan to develop the Lafarge site and several nearby properties into a series of water storage reservoirs. When completed, the Overland Trail Ponds project will store approximately 4,700 AF. Existing and future gravel pits on land owned by the water providers will continue to be sealed and configured to divert water from the Poudre River when it is available. Water stored in the Overland Trail Ponds will be released back to the Poudre to meet return flow obligations, exchanged for water diverted at the Pleasant Valley Pipeline, or pumped to SCFP for treatment. Work on lining the existing gravel pits and installing the necessary infrastructure began in 2008. It will take approximately 20 years before all the property is mined and gravel pits are sealed.

SECTION 2.0 – PROFILE OF WATER DEMANDS AND HISTORICAL DEMAND MANAGEMENT

2.1 Demographics and Key Characteristics of the Service Area

FCLWD provides potable and fire protection water to a service area that encompasses approximately 56 square miles. The District provided service to 16,287 end user taps in 2014. The demographics of the residential base have been continuously changing over the last few decades from rural to more urban and suburban customers. This transition has resulted in much higher landscape irrigation on individual lots as well as in neighborhood open spaces. The population of the District's service area in 2014 was estimated to be 42,490.

The different customer categories within the District's service area are Residential (Res), Residential Multiuse (RMU), Non-Residential (NonRes), Irrigation (IRR), and Other. The majority of the water use in FCLWD is residential development within the growth management areas of the surrounding communities. The various customer categories will be discussed in more details later within Section 2.0. The District's residential categories (Res and RMU) include single-family residences from low to high density as well as multi-family units and mobile homes. Some of the variety of housing, both in the foreground and background, within the District can be seen in **Figure 2.1a**.

Figure 2.1a: Example of Housing within FCLWD Service Area

The Non-Residential customer category includes numerous restaurants, retail and industrial establishments, four nurseries, two dairies, over ten public schools,

over twenty churches, and a cemetery. The District also serves one master meter for use by the Town of Windsor.

The District has six potable water storage tanks throughout its system to provide a reliable supply to its constituents. The District also has a supervisory control and data acquisition (SCADA) system that measures the pressure throughout the system. In the next two years the District plans to install a one to two million gallon, elevated water storage tank at Timnath. This project is anticipated to be completed no later than 2016. They also plan to install a 24-inch water line connection from Ziegler Road north to the Fossil Ridge High School. The District will also be adding several subdivisions to its service area.

2.2 Historical Water Demands

Annual Treated Water

FCLWD received an average of 8,978 AF between 2010 and 2014 of treated water from the Tri-Districts SCFP. **Table 2.2a** shows the annual treated water deliveries made to FCLWD from the SCFP for the last five years.

Table 2.2a: FCLWD Water Delivery

Year	Annual Treated Water Deliveries (AF)
2010	8,830
2011	9,040
2012	11,329
2013	9,205
2014	8,728
Average	***9,427***

Annual Non-Revenue Water

Annual non-revenue water, or unaccounted for water, consists of unbilled authorized uses (e.g. hydrant flushing), apparent losses, and real losses. Apparent losses consist of unauthorized consumption, customer metering inaccuracies, and data handling errors. Real losses consist of leaks in the water distribution system that does not reach the end user.

To estimate FCLWD's non-revenue treated water, we examined the difference in the annual treated water delivery and what was metered at the water taps throughout the District between 2010 and 2014. As presented in **Table 2.2b**, the data shows the non-revenue treated water for FCLWD averaged 445 AF during that time period, which is less than five percent of the treated water delivered from SCFP. This low of loss rate is considered excellent by industry standards.

Annual Treated Water Use by Customer Category

Over 70 percent of the District's treated water goes to residential water users (Residential and Residential Multiuse). However, a significant portion also goes to Non-Residential and Irrigation customers. The District's average water demand for the past five years for each customer category is shown on **Table 2.2b**. The total water usage has ranged from 8,417 to 10,471 AF and averaged 8,982 AF. Also shown in **Table 2.2b** is the total and residential (Residential and Residential Multiuse combined) per capita water use, expressed as gallons per capita per day (GPCD). Residential GPCD is calculated by dividing residential water use (Residential and Residential Multiuse) by the residential population. Total GPCD is calculated by dividing total water use by the residential population. Residential GPCD ranged from 125 to 168 GPCD with an average of 143 GPCD. Total GPCD ranged from 177 to 232 GPCD. These calculations were performed using the total billed usage and population estimates for the District.

Table 2.2b: Annual Treated Water Use by Customer Category

Customer Category	2010	2011	2012	2013	2014	*Average*
	Values in AF unless otherwise noted					
Residential	6,010	5,927	7,382	6,041	5,719	***6,216***
Residential Multiuse	194	199	220	219	229	***212***
Non-Residential	1,111	1,135	1,263	1,106	1,156	***1,154***
Irrigation	1,040	1,072	1,266	923	971	***1,055***
Other	365	339	340	341	342	***345***
Total Billed	8,720	8,671	10,471	8,630	8,417	***8,982***
Non-Revenue	110	369	859	575	311	***445***
Total Population	37,892	38,797	40,300	41,804	42,490	
Residential GPCD (1)	146.2	141.0	168.4	133.7	125.0	***142.8***
Total GPCD	205.4	199.5	231.9	184.3	176.9	***199.6***

(1) Residential and Residential Multiuse combined

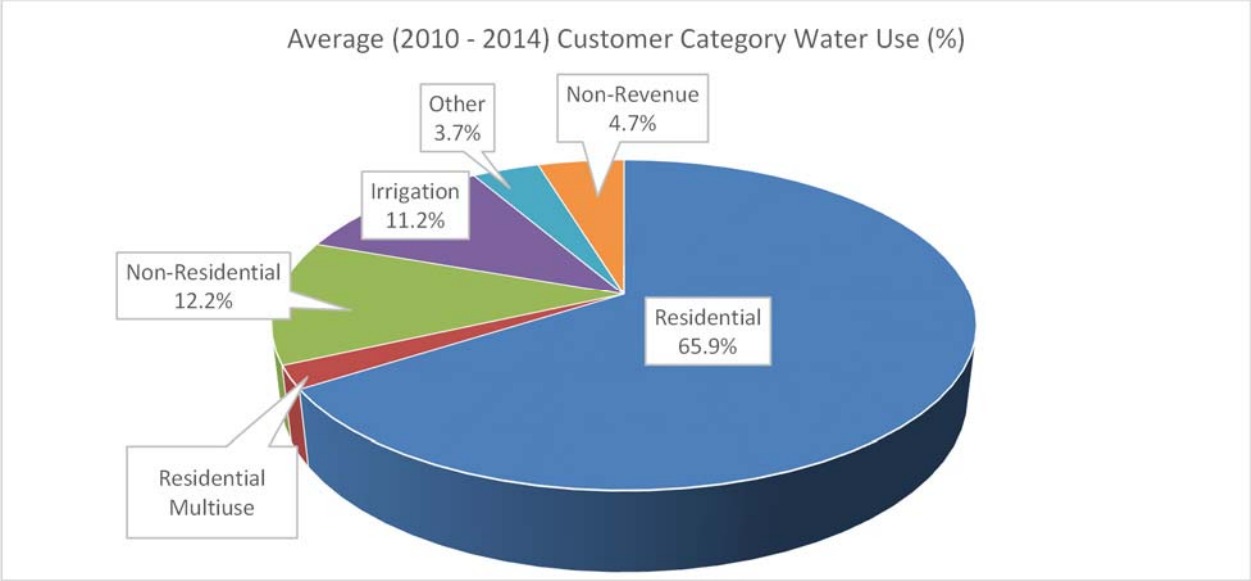

Figure 2.2a: Raw Water Usage (average of 2010 – 2014).

Figure 2.2a breaks out the water usage per category as an average percentage of the total raw water use for 2010 – 2014. It shows residential water use (Residential and Residential Multiuse) makes up over 68 percent of the total usage. Non-Residential and Irrigation combined make up nearly a quarter of the total usage at 12.2 percent and 11.2 percent respectively.

Residential

Residential water use includes both indoor and outdoor use. This customer category is typically single-family homes and constitutes the largest water use in the District at 65.9 percent of all raw water supplied. Residential water use in the District averaged 6,216 AF per year from 2010 – 2014.

Residential Multiuse

Residential Multiuse typically describes those residential communities that are made up of multiple dwellings within one structural unit. Examples of this might be apartment complexes and condominium units. Residential Multiuse also includes several master meter communities; master meter communities include mobile home parks and subdivisions that have their own sub-metering and distribution systems. Residential Multiuse water use in the District averaged 212 AF per year for 2010 – 2014 or 2.3 percent of all raw water supplied.

Non-Residential

Non-Residential water users in the District include office buildings, hotels, schools, retail stores, restaurants, car washes, nurseries (or tree farms), dairies, and some manufacturing and light industrial facilities. Non-Residential water use is the second largest water use category in the District and averaged 1,154 AF per year (2010 – 2014) which constituted 12.2 percent of the raw water supplied. Under the Non-Residential category, the District also supplies water for firefighting and other temporary uses such

as construction and special events from the various hydrants in the service area. These temporary uses can be highly variable year to year, and much of it depends on demand for short-term use of water from hydrants.

Some of the largest Non-Residential water users in the District are dairies, nurseries, car washes and vehicle service centers, schools and municipal facilities, manufacturing facilities, and railroads.

Irrigation

During the years from 2010 through 2014, the District supplied an average 1,055 AF per year of potable water to Irrigation accounts. This accounted for 11.2 percent of the total raw water supplied. These customers are typically Home Owner Associations (HOAs), parks, and open space areas.

Other

The master meter for the Town of Windsor is the primary user that falls under the Other category. Eight additional taps are available within the Other category and are occasionally used for various purposes. The District supplied an average of 345 AF per year (2010 – 2014) for such uses or 3.7 percent of the total raw water supplied.

Annual Non-Revenue Water

Every water distribution system has some degree of system loss. However, with the systematic surveillance and repairs, the losses can be kept to a minimum. With the current water balance and pressure reports, consistent surveillance from maintenance personnel, unaccounted system losses in the District are very low compared to other water providers of a similar size. Annual non-revenue water consists of unbilled authorized uses, documented system losses, and unaccounted losses. On average, from 2010 through 2014, 4.7 percent of the portion of water dedicated to the District at the SCFP was lost. Even though this loss percentage is already fairly low, the District will continue to make an effort to reduce the system losses and increase the efficiency of water distribution.

Indoor and Outdoor Demands

The indoor and outdoor use was estimated using the total usage per month for the last several years of data (2010 through 2014). The total monthly water use between the first of November and the end of February was assumed to be only associated with indoor use. This total divided by the number of days in the months from November through February was calculated as the average indoor use per day. The indoor use for the other months of the year (March through October) was calculated as the average indoor use per day multiplied by the days per month. The outdoor monthly use was assumed to be the difference between the total monthly use and the indoor monthly use. **Figure 2.2b** is a chart breaking-out the estimated average monthly indoor and outdoor water use. Over the years averaged, FCLWD customers consumed approximately 62.7 percent of the water for outdoor uses.

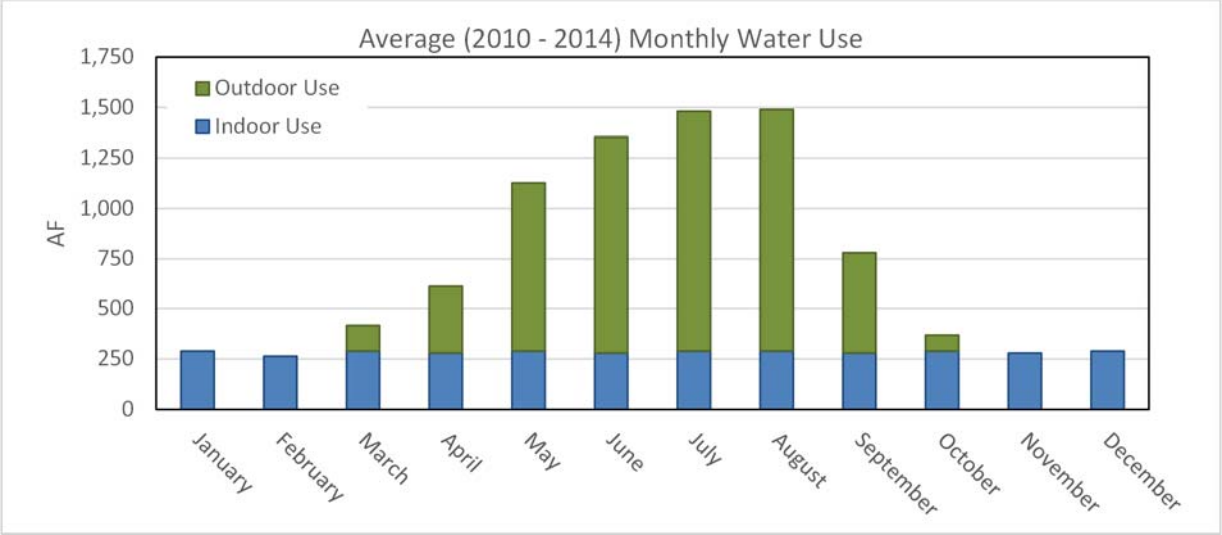

Figure 2.2b: Average Monthly Indoor and Outdoor Water Use

2.3 Past and Current Demand Management Activities and Impact to Demands

The initial estimated water savings goal for this Plan was to lower the total water use by 10 percent. The District revisited and revised this goal, as necessary, as it further analyzed the potential water savings that corresponded to the development of this Plan update.

Current Water Efficiency Measures

The District has several current and on-going water efficiency activities, some of them have existed for a long time, and others were implemented after the 2008 Municipal Water Efficiency Plan. **Table 2.3a** lists the existing and on-going water efficiency activities. Some of the savings from water efficiency activities were able to be quantified and is summarized in **Table 2.3b**. A brief description of those quantifiable activities is included after **Table 2.3b**.

Table 2.3a: FCLWD's Existing and On-going Water Efficiency Activities

Water Efficiency Activities
Foundational Activities
Metering
Automatic Meter Reading (AMR) and Automatic Meter Infrastructure (AMI) Installation and Operations
Meter Testing and Replacement
Meter Upgrades
Data Collection - Monitoring and Verification
Frequency of Meter Reading
Tracking Water Use by Customer Type
Upgrade Billing System to Track Use by Sufficient Customer Types
Tracking Water Use for Large Customers

Water Efficiency Activities *(cont.)*
Water Use Efficiency Oriented Rates and Tap Fees
Volumetric Billing
Water Rate Adjustments
Frequency of Billing
Inclining/Tiered Rates
System Water Loss Management and Control
Leak Detection and Repair
Recycling WTP filter backwash
Planning
Feasibility Studies
Integrated Water Resources Plans
Master Plans/Water Supply Plans
Targeted Technical Assistance and Incentives
Residential Irrigation Audits (partnering with City of Fort Collins)
Education Activities
Website – Water Conservation Information, link to Water Energy Climate Calculator, and links to Northern Water's Water Conservation webpages

Table 2.3b: Water Savings Estimates of Individual Activities

Historical and Current Water Efficiency Activities	Annual Water Savings for Past Five Years (AF)					Total Five-Year Water Savings (AF)	Average Annual Savings (AF)
	2010	2011	2012	2013	2014		
Foundational Activities							
Leak Detection and Repair	6	18	43	29	16	111	22
Recycling WTP Filter Backwash	150	154	193	156	148	801	160
Targeted Technical Assistance and Incentives							
Residential Irrigation Audits (partnering with City of Fort Collins)	0.26	0.26	0.33	0.27	0.25	1.4	0.27
Education Activities							
Total Savings	156	172	236	186	164	914	183

Recycling WTP filter backwash

Water treatment facilities like SCFP most commonly use carbon filters to remove organic solids from water in the treatment process. These filters become less efficient over time because of the solids collecting in them. Water is flowed backward through the filters periodically to remove the solids and restore the efficiency of the filters. The SCFP collects all of this backwash water in settling ponds adjacent to the plant. After settling, this water is drained from the top of the settling ponds and returned to the filter plant for treatment. Approximately 1.7 percent of the total water production is recycled

backwash water that has been treated. Estimated water savings from this activity are included in **Table 2.3b**.

Leak Detection & Repair Program

The current leak detection program at FCLWD uses customer AMI meters, pressure reducing vaults, SCADA, and the billing database to track water use and leaks in the system. All billed water is compared monthly to water produced at the filter plant to determine overall differences. Each customer meter is programmed to send alerts for high or low use compared to normal; these alerts help identify leaks past the customer taps or malfunctions of the meters themselves.

All known leaks in the distribution lines are repaired immediately. Leaks found on customer service lines are reported to the customer. All new and replacement water lines are pressure tested after installation to ensure that they meet established guidelines for water loss. Distribution lines are replaced on an as-needed basis. The District maintains more than 30 pressure reducing vaults which reduce the main line pressures thereby reducing the chance for leaks in the distribution system. SCADA monitors the flows throughout the system including the pipelines, pressure reducing valves, and tanks. Estimated water savings from this activity are included in **Table 2.3b**.

Residential Irrigation Audits (partnering with City of Fort Collins)

For the past five years, FCLWD has been partnering with the City of Fort Collins to offer its customers that are within the City Limits to be able to benefit from this service. According to the City's website, "Free sprinkler system assessments will be conducted by Fort Collins Utilities from June through August for residents of single-family homes or homeowners associations. Home assessments last up to two hours and are designed to help participants water more efficiently, resulting in healthier lawns and reduced water use." Estimated water savings from this activity are included in **Table 2.3b**.

Water Savings Estimates Using Demand Data

Despite the resources available to estimate water savings, the savings of some activities, such as those that are highly dependent on human behavior (e.g. public education programs) are much more difficult to quantify and, in many cases, cannot be estimated with reasonable accuracy. Additionally, data was not collected for all the activities listed. For the activities that we were unable quantify, demand data was used to estimate savings.

Related to the activities listed in both **Table 2.3a** and **2.3b**, **Figure 2.3a** illustrates an overall water efficiency trend: The population of FCLWD has had a steady increase over the past 15 years; although the GPCD water usage has varied considerably year to year, the per capita usage has had a downward trend. Much of the variability in the water usage can easily be linked to the trends in the climate; as a comparison, both the average yearly temperature and total precipitation is shown for the same years in **Figure 2.3b**. The downward trend in usage, however, is a clear indication of the water savings that has occurred through both passive and active saving efforts.

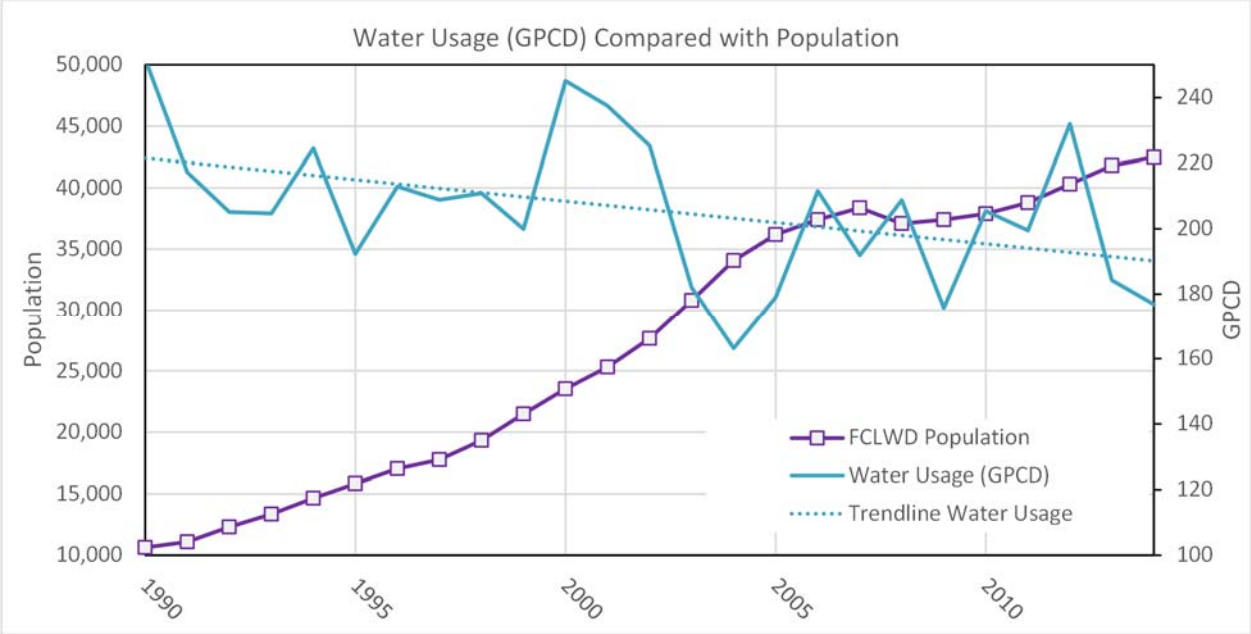

Figure 2.3a: Population Compared with Per Capita Water Usage

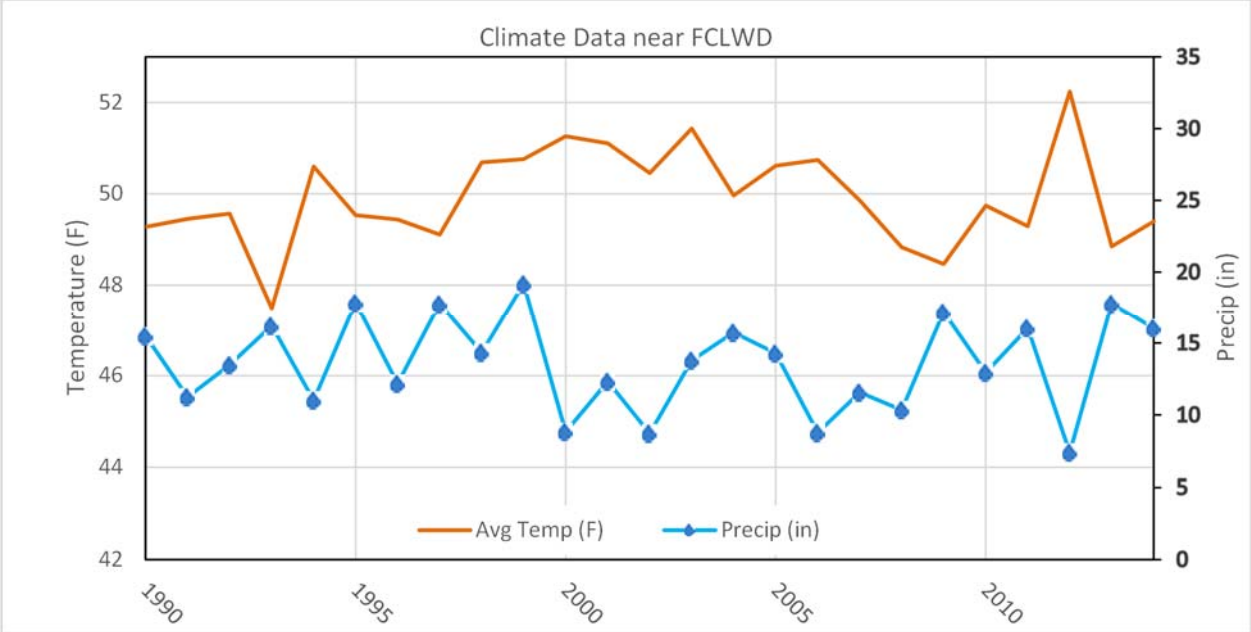

Figure 2.3b: Climate Data for Comparison with Water Usage

2.4 Demand Forecasts

Population projections were determined from tap data and multiplied by the average number of people per household; 2.8 people per tap (household) was used for these calculations and was provided by District staff. Per household data was estimated from

city and county demographics and other information available. **Table 2.4a** shows the estimated population for the last five years, current year, and the next ten years. **Figure 2.4a** further illustrates the past population and future growth of the District. An exact population count is difficult to obtain since census data is not collected for special districts.

District staff estimated a population of 42,490 for 2014 within their service area. Future growth rates were obtained from staff and indicate a steady growth rate of approximately 391 service taps per year, which equates to an average growth rate from 2015 to 2025 of around two percent.

Table 2.4a: FCLWD's Population Growth
(*Previous 5 years and 10 year future projection)*

Year	Population	Growth Rate
2010	37,892	1.3%
2011	38,797	2.4%
2012	40,300	3.9%
2013	41,804	3.7%
2014	42,490	1.6%
2015	43,385	2.1%
2016	44,423	2.4%
2017	45,461	2.3%
2018	46,499	2.3%
2019	47,536	2.2%
2020	48,574	2.2%
2021	49,612	2.1%
2022	50,650	2.1%
2023	51,688	2.0%
2024	52,725	2.0%
2025	53,763	2.0%

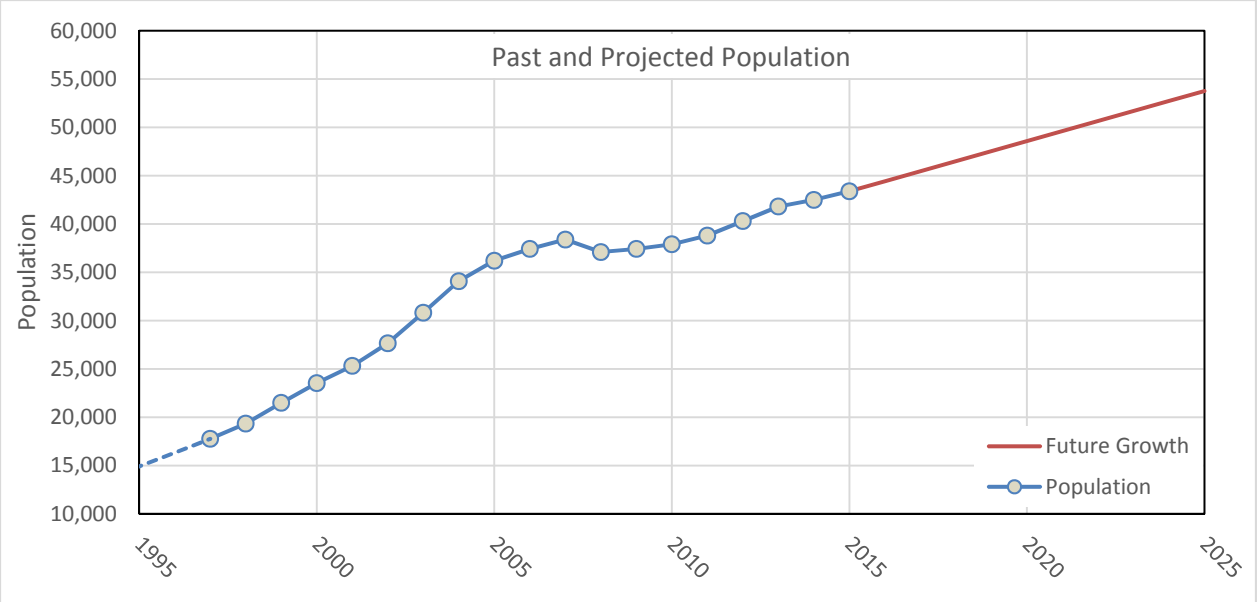

Figure 2.4a: FCLWD Population and Future Growth

A conservative estimate was developed by the District staff based on the general growth trend of the District during the recent recession and economic recovery. A moderate growth rate is expected for the next few years as the economy continues to recover from the recent recession. There are limitations to water demand projections, and it is important to recognize that external factors such as growth rate can impact the projections. Projections are intended to be approximate forecasts that demonstrate general trends and not to be interpreted as exact targets or absolute predictions of what will occur.

As part of this Plan, a baseline demand forecast has been estimated. The baseline is unchanged from current use patterns, and therefore the baseline does not incorporate any future water conservation or efficiency activities. The demand forecast is shown in **Table 2.4b**; the majority of the treated water is anticipated to continue to be used by the residential category as shown in **Table 2.4c**. Steady growth and therefore demand is anticipated in all categories with similar percentages representing each customer category. Estimations for population and demand projections were determined from information and input provided by FCLWD, the FCLWD Master Plan, and the Regional Water Cooperation Committee Study. Full build-out is not anticipated during the next 10 years; a steady increase in demand is predicted until around 2024 where demand is anticipated to taper off due to water tap fees, higher water cost, and other factors.

Table 2.4b: Demand Projections

Year	Population	Total Taps	Total Treated Water Demand (AF)
2015	43,385	16,343	9,456
2016	44,423	16,734	9,956
2017	45,461	17,125	10,457
2018	46,499	17,516	10,958
2019	47,536	17,907	11,458
2020	48,574	18,298	11,959
2021	49,612	18,689	12,460
2022	50,650	19,079	12,960
2023	51,688	19,470	13,461
2024	52,725	19,861	13,957
2025	53,763	20,252	14,204

Table 2.4c: Demand Projections for Customer Categories

Year	Total Treated Water Demand	Residential	Residential Multiuse	Non-Residential	Irrigation	Other
	100%	65.9%	2.3%	12.2%	11.2%	3.7%
	(AF)	(AF)	(AF)	(AF)	(AF)	(AF)
2015	9,456	6,235	213	1,158	1,058	346
2016	9,956	6,565	224	1,219	1,114	365
2017	10,457	6,895	235	1,280	1,170	383
2018	10,958	7,225	247	1,342	1,226	401
2019	11,458	7,555	258	1,403	1,282	420
2020	11,959	7,885	269	1,464	1,338	438
2021	12,460	8,215	280	1,525	1,394	456
2022	12,960	8,546	292	1,587	1,450	475
2023	13,461	8,876	303	1,648	1,506	493
2024	13,957	9,202	314	1,709	1,561	511
2025	14,204	9,366	320	1,739	1,589	520

3.1 Water Efficiency and Water Supply Planning

Forecasted Modified Water Demands

A modified demand forecast that includes the impacts of the proposed water efficiency activities is shown in **Figure 3.1a** and summarized in **Table 3.1a**. Under the revised forecast, it is estimated that total demands for FCLWD in 2025 will be about 3,854 AF greater than they were in 2014. By the end of the planning period, it is estimated that FCLWD will see a savings of 1,396 AF annually. This represents 1,396 AF of savings over not continuing current activities or implementing any new activities. FCLWD plans to accomplish this level of water efficiency by continuing successful programs already implemented (e.g., Recycling WTP Backwash) and implement new programs (e.g., Residential Indoor Audits). Projected water savings is expected to be seen by a steady reduction of per capita use. Overall treated water demand, however, will continue to increase.

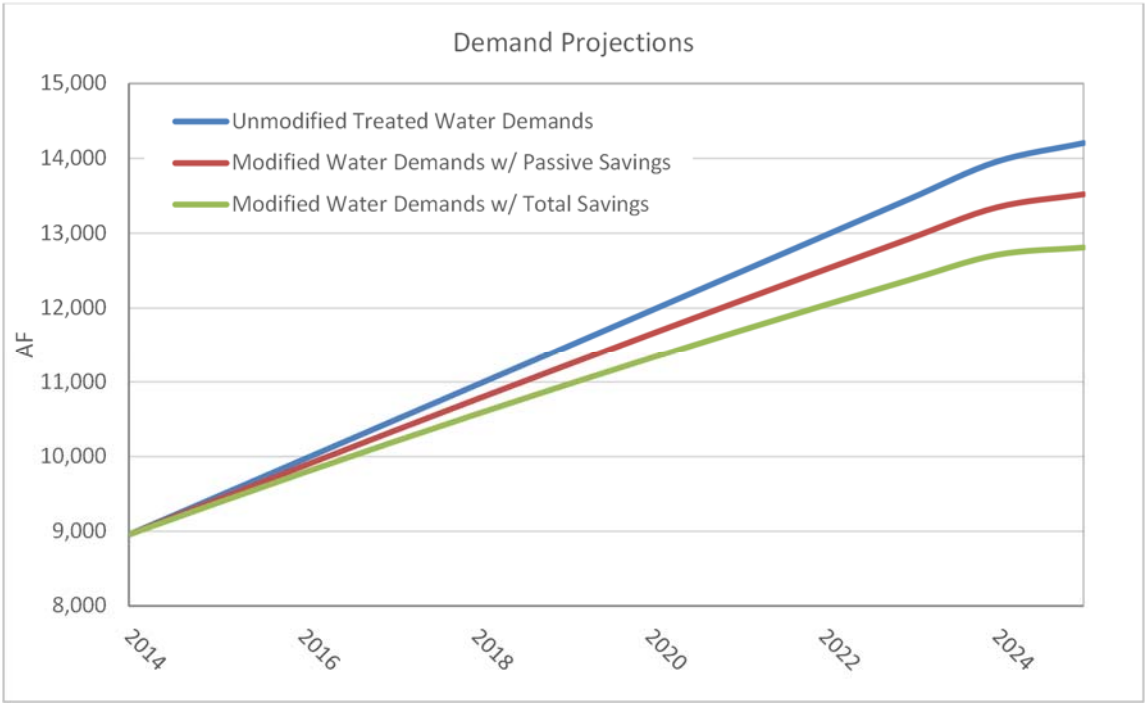

Figure 3.1a: Demand Projections with Modified Demands

Table 3.1a: Demand Projections – Unmodified and Modified

Year	Unmodified Treated Water Demands (AF)	Treated Water Demand with Passive Savings (AF)	Treated Water Demands with Combination Savings (AF)
2014	8,955	8,955	8,955
2015	9,456	9,414	9,371
2016	9,956	9,869	9,779
2017	10,457	10,319	10,177
2018	10,958	10,765	10,566
2019	11,458	11,207	10,947
2020	11,959	11,644	11,318
2021	12,460	12,077	11,681
2022	12,960	12,506	12,034
2023	13,461	12,930	12,379
2024	13,957	13,344	12,710
2025	14,204	13,519	12,809
Savings		4.8%	9.8%
Increase use from 2014	5,249	4,564	3,854
Difference from Unmodified		685	1,396

3.2 Water Efficiency Benefits

Water efficiency planning is very important to FCLWD. The value of this water efficiency planning effort may include multiple benefits that will impact future water facilities and supply acquisitions. Conserving water will reduce demands and free up water supplies for increased growth and development. Additional water available will help cover shortages in droughts or other emergency situations; these benefits become even more valuable if a storage component is included. Smaller future demands will also help delay the need to purchase additional water supplies. An immediate benefit could come in the way of treatment costs; FCLWD will save on SCFP treatment costs if their overall water consumption is reduced.

3.3 Water Efficiency Goals

Water efficiency goals are intended to lay out a set of targeted objectives that if accomplished, will result in the identified benefits. A preliminary set of goals have been developed prior to the selection of the water efficiency activities to provide a means to screen and evaluate the selected activities. Goals from the District's 2008 Water Management Efficiency Plan have been assessed and incorporated into the new goal development process.

A meeting was initially held with District staff to discuss water efficiency goals appropriate for FCLWD. The following preliminary goals were established by District Staff:

- In keeping with the savings goal established in FCLWD's 2008 Water Conservation Plan, the targeted water savings goal for this Plan will be to lower the total water use by 10 percent over the ten-year planning period.
- The targeted ten-year water savings goal for the following customer categories were as follows:
    - Residential: 12%
    - Residential Multiuse: 5%
    - Non-Residential: 3%
    - Irrigation: 11%
    - Other: 1%
    - Non-Revenue Water: 10% (i.e. a 10% reduction of current 4.7%)

- Develop a water efficiency program that can be implemented within District staffing constraints and with Staff approval.
- Implement water efficiency activities that are compatible with the community and their District Board representatives.

The success of the stated goals will be measured through monitoring of billing data, screening and evaluating activities that are acceptable to District Staff, and soliciting District Board and community feedback on water efficiency activities.

SECTION 4.0 – SELECTION OF WATER EFFICEINCY ACTIVITIES

4.1 Summary of Selection Process

FCLWD used a four-phase process for selecting and fully evaluating water efficiency activities. The four phases include: 1) assessment; 2) identification; 3) qualitative screening; and 4) evaluation and selection.

Assessment, Identification and Qualitative Screening

Using the analysis performed and presented in Section 2.3, the District identified areas where water efficiency could be enhanced. With the water saving success of the Recycling WTP filter backwash and very low non-revenue water due to an aggressive system evaluation and leak detection process, the District would like to continue these activities. In addition to these activities, FCLWD generally wants to focus on activities that assist with meeting their water efficiency goals.

We utilized Worksheets D-G from the Municipal Water Efficiency Plan Guidance Document to identify a list of water efficiency activities that are generally compatible with FCLWD's needs. A copy of Worksheets D-G can be found in **Appendix B** of this report. Other Worksheets from the Guidance Document utilized within the production of this Plan are also included in **Appendix B**.

The list of activities evaluated are organized according to the SWSI Levels Framework. The SWSI Levels Framework was developed as a component of the 2010 SWSI update to organize water efficiency activities into a model that assists municipalities in prioritizing and selecting activities. The framework may be represented as a cylinder consisting of the following four categories in **Figure 4.1a**.

SWSI Levels Framework includes the following levels of water efficiency activities:

- **Foundational Activities** – Focus on system operations and water efficiencies, are under FCLWD's direct control and can improve the effectiveness of the planning effort by ensuring sufficient metering and data tracking.
- **Targeted Technical Assistance and Incentives** – Covers activities that FCLWD and their customers can do to improve existing water efficiency.
- **Ordinances and Regulations** – Includes regulatory activities designed to encourage water efficiency.
- **Education Activities** – Educate the public on the benefits of water efficiency, inform customers on how they can reduce their water usage, and publicize water efficiency activities that FCLWD is implementing.

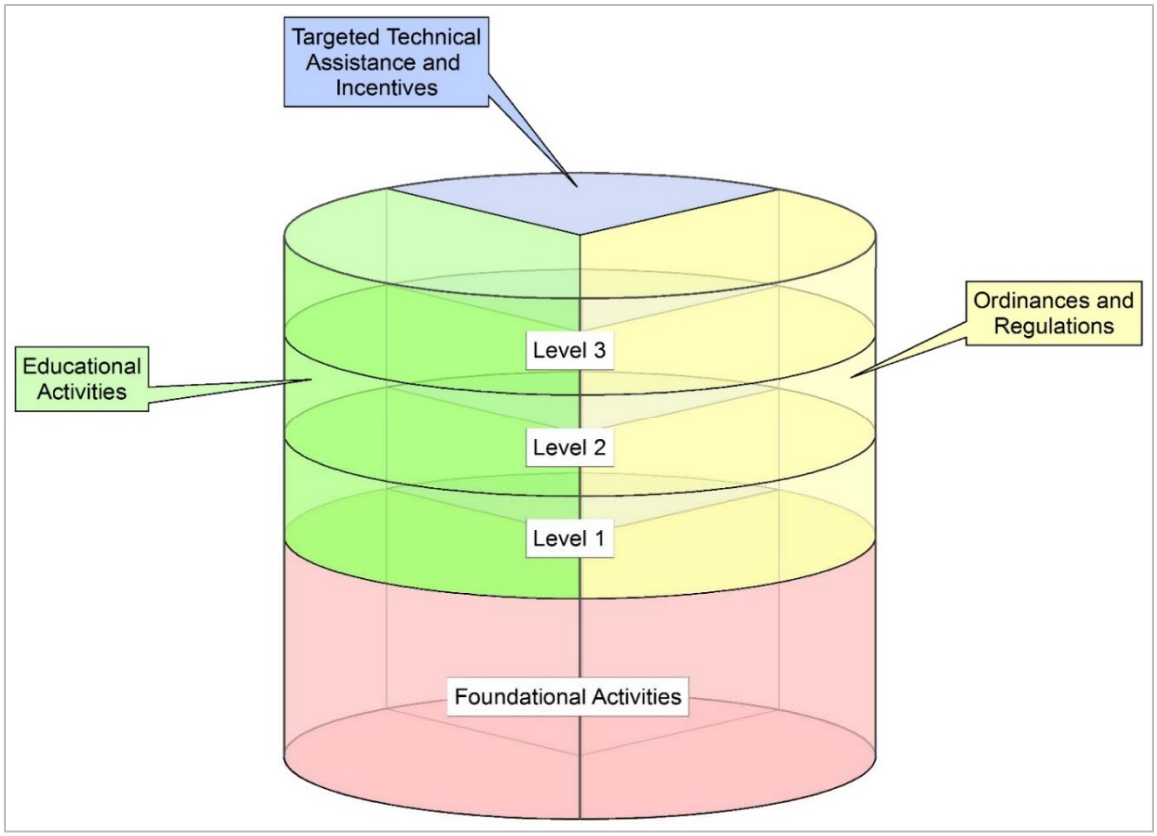

Figure 4.1a: SWSI Levels Framework

Further discussion regarding the SWSI Levels Framework are provided in subsequent sections.

District staff developed qualitative screening criteria used to screen the preliminary list of activities. The screening criteria include: 1) Staff and anticipated Board approval; 2) Anticipated customer acceptance and participation; 3) Staff and financial resource limitations; 4) Legal authority (i.e. ordinances that District is unable to enforce). Activities not meeting the screening criteria were eliminated. The specific reason for elimination of activities can be found in Worksheets D-G, located in **Appendix B**.

Evaluation and Selection

The evaluation and selection phase of the selection process involved development of evaluation criteria, evaluation of the activities, and selection of the final activities for implementation. The evaluation criteria were similar to the screening criteria and included:

- Staff and Board approval
- Feasibility for customer base
    - Acceptance and participation
- Staff and financial resource limitations
- Legal authority

4.2 Evaluation of Candidate Activities

The initial screening of the water efficiency activities with District staff resulted in selecting 12 candidate activities for further evaluation. Eliminated activities may be evaluated with future planning efforts. Some of the activities have been combined within their SWSI Levels Framework to assist in evaluation and avoid double counting savings. The benefits and costs of the initially selected measures and programs are shown in **Table C1** in **Appendix C**. Details about the cost-benefit evaluation and information about each measure can be found in the following section with further detail available in **Appendix D**. The following activities were evaluated during the cost-benefit analysis.

Foundational Activities

- Meter Testing and Replacement/Meter Upgrades
- System Wide Water Audits
- Automatic Water Meter Reading Installation and Operations
- Water Efficiency Rate Structure with Regular Updates to Rate Study
- Leak Detection and Repair
- Recycling Water Treatment Plant Filter Backwash
- Master Plans/Water Supply Plans

Targeted Technical Assistance and Incentives

- Residential Irrigation Audits (partner with Fort Collins)
- Indoor Residential Water Audits (partner with LCCC)
- Pre-Rinse Spray Valve (PRSV) Upgrades

Ordinances and Regulations

- Time of Day Watering Restrictions

Educational Activities

- Bill Stuffers
- Newsletter
- Newspaper Articles
- Mass Mailings
- Website updates

Comparison of Costs and Benefits

As shown in **Table C1**, **Appendix C**, the estimated cost for the evaluated activities varied from $0.01 per 1,000 gallons for the *"Recycling WTP Filter Backwash"* to $26.33 per 1,000 gallons for the *"Meter Testing and Replacement/Meter Upgrades".*

4.3 Selection of Activities for Implementation

The second screening was accomplished by evaluating each activity based on the evaluation criteria discussed in Section 4.1. (Staff and Board approval, Feasibility for customer base including acceptance and participation, Staff and financial resource

limitations, and Legal authority). The following measures were eliminated in the second screening process:

- Pre-Rinse Spray Valve (PRSV) Upgrades
- Time of Day Watering Restrictions

The District may re-evaluate these measures with future planning efforts. Details about the final 10 activities chosen can be found in the following descriptions.

Foundational Activities

- **Meter Testing and Replacement/Meter Upgrades**
  Existing meters are tested periodically for leaks and accuracy and are replaced with upgrades as necessary. Faulty meters account for apparent losses (i.e. losses due to meter inaccuracies) and real losses (also known as physical losses).

- **System Wide Water Audits**
  By utilizing System Wide Water Audits and paired with other measures (e.g., Metering), FCLWD identifies unmetered and unbilled treated water uses in order to assess where losses are occurring and how losses can be addressed. These losses are considered non-revenue water.

- **Automatic Meter Reading (AMR) and Automatic Meter Infrastructure (AMI) Installation and Operations**
  As early as 2007 FCLWD began retrofitting their customer meters with AMI meters. These new meters allows the district to monitor customer usage more easily and provide real-time data. Usage is automatically and manually monitored and noted when water usage shows spikes (either high or low). Nearly 100 percent of FCWLD customer's meters have been upgraded to AMR capabilities. Approximately 90 percent of those meters have already been transitioned to an AMI system. The District hopes to continue transition the remaining 10 percent to the AMI meters. Currently the AMI system is set up to communicate data to FCLWD offices and not directly to the customers. Future plans may include adding necessary software to add the customer interaction, but there are no specific steps in place right now.

- **Water Efficiency Rate Structure with Regular Updates to Rate Study**
  Water rates for the District are based on the traditional objectives in rate structure design including: 1) basing the rates on the actual cost of service, 2) providing adequate and stable revenues, 3) providing fairness or equitability among customer classes and volume users, and 4) ease of implementation and administration.

  The rates for the District, effective January 2015, are shown in **Tables 4.3a** and **4.3b**. These rates are adequate for the current level of water use within the

District. However, an increase in water conservation will produce a direct reduction in revenue.

The most effective way to encourage efficient water use is through rates. In 2003, temporary drought rates were implemented to try to reduce water usage by 20 percent. The drought rates included a base rate and four inclining tiers. As part of this conservation effort, the District's rate structure will be evaluated to consider potential water savings and lost revenue due to conservation. FCLWD is continuously evaluating its rate structure. Staff are currently studying whether a fourth or even a fifth tier may be warranted for high usage customers and those customers who frequently exceed their estimated water usage.

Table 4.3a: Tiered Rate Structure for FCLWD (Not in City of Fort Collins)

Fort Collins – Loveland Water District *(Not in City of Fort Collins Service Area)* Monthly Water Service Rates Effective Effective January 1, 2015				
Water Tap Size	Minimum Charge per Month	per 1,000 gallons (0 - 8,000 gallons)	per 1,000 gallons (8,001 - 15,000 gallons)	per 1,000 gallons (15,001 gallons or more)
5/8" & 3/4"	$13.40	$1.56	$2.21	$2.97
1"	$19.53	$1.56	$2.21	$2.97
1.5"	$34.70	$1.56	$2.21	$2.97
2"	$53.00	$1.56	$2.21	$2.97
3"	$101.80	$1.56	$2.21	$2.97
4"	$203.60	$1.56	$2.21	$2.97
Mobile Home Parks, Motels, Apartments & other Multi-Unit dwellings will be billed for the number of units in this manner:				
Number of Units X	$13.40	$1.56	$2.21	$2.97

Table 4.3b: Tiered Rate Structure for FCLWD (in City of Fort Collins)

(City of Fort Collins Service Area) Monthly Water Service Rates Effective January 1, 2015				
Water Tap Size	Minimum Charge per Month	per 1,000 gallons (0 - 8,000 gallons)	per 1,000 gallons (8,001 - 15,000 gallons)	per 1,000 gallons (15,001 gallons or more)
5/8" & 3/4"	$13.40	$2.73	$3.57	$4.40
1"	$19.53	$2.73	$3.57	$4.40
1.5"	$34.70	$2.73	$3.57	$4.40
2"	$53.00	$2.73	$3.57	$4.40
3"	$101.80	$2.73	$3.57	$4.40
4"	$203.60	$2.73	$3.57	$4.40
Mobile Home Parks, Motels, Apartments & other Multi-Unit dwellings will be billed for the number of units in this manner:				
Number of Units X	$13.40	$2.73	$3.57	$4.40

- **Leak Detection and Repair**
  As mentioned in Section 2.3, the current leak detection program at FCLWD uses customer meters, pressure reducing vaults, SCADA and the billing database to track water use and leaks in the system. All known leaks in the distribution lines are repaired immediately. All new and replacement water lines are pressure tested after installation to ensure that they meet established guidelines for water loss. The District maintains more than 30 pressure reducing vaults which reduce the main line pressures thereby reducing the chance for leaks in the distribution system.

- **Recycling Water Treatment Plant Filter Backwash**
  As mentioned in Section 2.3, water is flowed backward through the filters periodically to remove the solids during the filter cleaning process. The SCFP collects all of this backwash water in settling ponds adjacent to the plant. After settling, this water is drained from the top of the settling ponds and returned to the filter plant for treatment.

- **Master Plans/Water Supply Plans**
  FCLWD plans to continue developing, updating, and evaluating these types of plans (i.e. Master Plans, Water Supply Plans, Capital Improvement Plans, and Water Efficiency Plans) that will improve its overall water efficiency and help plan for future use. As indicated in Section 1.3, FCLWD has a long history of implementing these types of plans. The District first submitted a water conservation plan to CWCB in 1996 to meet the requirements of the Water Conservation Act of 1991 and has continued with various other plans in the years that followed.

Targeted Technical Assistance and Incentives

- **Residential Irrigation Audits (partner with Fort Collins)**
  For the past five years, FCLWD has been partnering with the City of Fort Collins to offer its customers that are within the City Limits to be able to benefit from this service. According to the City's website, "Free sprinkler system assessments will be conducted by Fort Collins Utilities from June through August for residents of single-family homes or homeowners associations. Home assessments last up to two hours and are designed to help participants water more efficiently, resulting in healthier lawns and reduced water use." Estimated water savings from this activity are included in **Table 2.3c**.

- **Indoor Residential Water Audits (partner with LCCC)**
  FCLWD hopes to partner with Larimer County Conservation Corps (LCCC) to encourage it customers to be better educated and aware of their water and energy use. Through that education and awareness, the goal will be to help customers reduce their water and energy consumption.

  LCCC offers free Home Efficiency Assessments which include a basic inspection for FCLWD customers utilizing City Fort Collins Utilities or Loveland Water and Power for power. These assessments include inspections of home insulation, appliances, windows, *toilets*, and heating/cooling system. More importantly, LCCC staff may install appropriate efficiency measures based on a home's needs. These products may include: *water conserving showerheads and aerators*, smoke/carbon monoxide detectors, clotheslines, CFL bulbs, programmable thermostats and *high-efficiency toilets*. In addition customers are educated about water and energy efficiency practices and services.

Educational Activities

- General Educational Activities encompass a wide variety of media and may include: Bill Stuffers, Newsletters, Newspaper Articles, Mass Mailings, Website (water efficiency and other information), and Social Networking (e.g., Facebook). For ease of evaluating and avoiding overlap of the costs and benefits, these activities were combined into the one category. FCLWD hopes to make a much stronger effort to communicate and educate its customers. FCLWD realizes that other activities will be better received and utilized if its customers understand the objectives and motivations behind the decisions and changes.

The 10 selected water efficiency activities and associated water savings were arranged within the targeted customer categories to more easily compare the anticipated savings to the original goals. Some of the measures contribute savings to more than one category. **Table 4.3c** shows the water savings for the selected activities, sub-totaled for each category.

Table 4.3c: Combined Water Savings of Selected Water Efficiency Activities

Conservation Measures and Programs	Estimated Annual Water Savings (MG)	Estimated Total Water Savings over Planning Period (MG)
Non-Revenue Water		
Meter Testing and Replacement/Meter Upgrades	0.5	5
System Wide Water Audits	1.8	18
Automatic Water Meter Reading Installation and Operations	9.0	90
Leak Detection and Repair	9.0	90
Recycling Water Treatment Plant Filter Backwash	64.1	641
Master Plans/Water Supply Plans	0.5	5
Subtotal - MG	**84.8**	**848**
Acre-Feet	**260.2**	**2,602**
Residential (Res)		
Automatic Water Meter Reading Installation and Operations	50.3	503
Water Efficiency Rate Structure with Regular Updates to Rate Study	125.8	1,258
Master Plans/Water Supply Plans	6.3	63
Residential Irrigation Audits	0.5	26
Indoor Residential Water Audits	0.1	4
Time of Day Watering Restrictions	0.2	2
Education Activities (Combined areas)	50.3	503
Subtotal - MG	**233.2**	**2,356**
Acre-Feet	**715.7**	**7,232**
Residential Multiuse (RMU)		
Automatic Water Meter Reading Installation and Operations	0.4	4
Water Efficiency Rate Structure with Regular Updates to Rate Study	0.9	9
Master Plans/Water Supply Plans	0.2	2
Education Activities (Combined areas)	1.3	13
Subtotal - MG	**2.8**	**28**
Acre-Feet	**8.6**	**86**
Non-Residential (NonRes)		
Automatic Water Meter Reading Installation and Operations	2.3	23
Water Efficiency Rate Structure with Regular Updates to Rate Study	9.3	93
Master Plans/Water Supply Plans	1.2	12
Education Activities (Combined areas)	2.3	23
Subtotal - MG	**15.2**	**152**
Acre-Feet	**46.6**	**466**

Conservation Measures and Programs *(cont.)*	Estimated Annual Water Savings (MG)	Estimated Total Water Savings over Planning Period (MG)
Irrigation (IRR)		
Automatic Water Meter Reading Installation and Operations	4.3	43
Water Efficiency Rate Structure with Regular Updates to Rate Study	21.3	213
Master Plans/Water Supply Plans	1.1	10.7
Residential Irrigation Audits	0.4	23.3
Education Activities (Combined areas)	6.4	64.0
Subtotal - MG	**33.5**	**354**
Acre-Feet	**102.8**	**1,087**
Other		
Automatic Water Meter Reading Installation and Operations	0.28	2.8
Water Efficiency Rate Structure with Regular Updates to Rate Study	0.00	0.0
Master Plans/Water Supply Plans	0.35	3.5
Education Activities (Combined areas)	0.14	1.4
Subtotal - MG	**0.8**	**8**
Acre-Feet	**2.4**	**24**
Grand Total - (MG)	***370***	***3,746***
Acre-Feet	***1,136***	***11,496***

These savings were compared to the original goals set in Section 3. **Table 4.3d** compares the anticipated water savings from the selected activities with the original goals and then adjusts the water saving goals for this Plan.

Over the ten-year planning period, the selected activities provide an overall estimated water savings of 11,496 acre-feet. The adjusted goals reflect the goals believed to be obtainable by FCLWD's Staff. After the goals were adjusted to reflect the expected water savings, the estimated water use reduction is 9.8 percent. Therefore, FCLWD will target an overall reduction from their forecasted water use by 9.8 percent over the planning period because of implementation of this Plan.

Table 4.3d: Water Efficiency Goals Comparison

Water Use Categories:	Total Projected Water Use (2015 to 2024)	Reduction Goals for Planning Horizon		Adjusted Reduction Goals for Planning Horizon	
				Total Water Savings from Activities	Resulting Reduction
	(AF)	(%)	(AF)	(AF)	(%)
Residential (Res)	77,199	12.0%	9,264	7,232	9.4%
Residential Multiuse (RMU)	2,635	5.0%	132	86	3.3%
Non-Residential (NonRes)	14,335	3.0%	430	466	3.3%
Irrigation (IRR)	13,098	11.0%	1441	1,087	8.3%
Other	4,290	1.0%	43	24	0.6%
Non-Revenue Water	5,526	10.0%	553	2,602	47.1% (1)
Total Water Production:	117,082				
Total Demand Reduction:			11,862	11,496	
Total Percent Reduction:			10.1%		9.8%

(1) Note: The 47.1% reduction of Non-Revenue Water includes "Recycling Water Treatment Plant Filter Backwash", an activity that happens prior to the metering. Because of this fact, this likely represents a higher percentage than post-metering activities alone.

SECTION 5.0 – IMPLEMENTATION AND MONITORING PLAN

5.1 Implementation Plan

The implementation plan defines the process necessary to carry out the selected water efficiency activities. A description of the steps the District will use to implement the water efficiency plan is presented in Worksheet J, **Appendix B**.

5.2 Monitoring Plan

Monitoring types of demand data can be beneficial in tracking the savings generated from implementing a water efficiency plan. Total treated water produced is monitored at SCFP on a daily basis. Raw water delivered and treated water produced is monitored at the SCFP on a daily basis. Customer accounts have the capability of being monitored on an hourly basis but are typically monitored on a monthly basis. Other categories of raw and treated water are monitored on a monthly basis. Still other categories are monitored and evaluated on a semi-annual or annual basis. The demand data which will be collected during the monitoring period of the plan is presented in Worksheets K, **Appendix B**. An abbreviated table of Worksheet K is presented in the following, **Table 5.2a.**

Table 5.2a: Selection of Demand Data for Efficiency Plan Monitoring

Monitoring Data	HB 10-1051 Reporting Requirement					Selection			
	Annual	Monthly	Bi-Monthly	Daily		Annual	Monthly	Bi-Monthly	Daily
Total Water Use									
Total treated water produced (metered at WTP discharge)						X	X		X
Total treated water delivered (sum of customer meters)	√					X	X		
Raw non-potable deliveries to SCFP						X	X		X
Reclaimed water produced (metered at WWTP discharge)									
Reclaimed water delivered (sum of customer meters)									
Per capita water use						X	X		
Indoor and outdoor treated water deliveries						X	X		
Treated water peak day produced						X	X		X
Reclaimed water peak day produced									
Raw water peak day produced/delivered									
Non-revenue water	√					X	X		

Monitoring Data *(cont.)*	HB 10-1051 Reporting Requirement					Selection			
	Annual	Monthly	Bi-Monthly	Daily		Annual	Monthly	Bi-Monthly	Daily
Water Use by Customer Type									
Treated water delivered		√				X	X		X
Raw non-potable deliveries									
Reclaimed water delivered									
Residential per capita water use						X	X		
Unit water use (e.g. AF/account or AF/irrigated acre)						X	X		
Indoor and outdoor treated water deliveries						X	X		
Large users						X	X		
Other Demand Related Data									
Irrigated landscape (e.g. AF/acre or number of irrigated acres)						X			
Precipitation						X	X		
Temperature						X	X		
Evapotranspiration						X	X		
Drought index information						X			
Economic conditions						X			
Population						X	X		
New taps						X	X		

Terry Farrill (District Engineer) and Kathy Hawkins (Controller, Business Office Manager), will be chiefly responsible for coordinating the implementation of this Plan. They also realize that the most successful Plan is one that involves a team effort from many staff, other key personnel, and sometimes assistance outside of FCLWD's employees.

SECTION 6.0 – ADOPTION OF NEW POLICY, PUBLIC REVIEW AND FOMAL APPROVAL

6.1 Public Review Process

A public review process is required for all State approved plans. Since FCLWD has had a municipal water efficiency program in place since 1996, the public is likely familiar with the efficiency concept and activities. For this water efficiency planning process, the public is notified of the 60-day comment period from February 25, 2016 to April 27, 2016 and how to submit comments. The plan will be available on FCLWD's website and in its office for review. Written comments and responses to those comments will be included in **Appendix E**.

6.2 Local Adoption and State Approval Process

After the public comment period, the comments will be incorporated into the planning document as well as any additional revisions. The FCLWD Board will adopt the Plan at the Board meeting on June 21, 2016 and the Plan will be submitted to CWCB following the Board Meeting.

CWCB will provide written notification of approval, conditional approval or disapproval within 90 days of submittal. Conditions for conditional approval or disapproval will be addressed if necessary. The soonest possible approval of the Municipal Water Efficiency Plan will be in the fall of 2016. Research and set up of programs can begin upon approval and implementation of the selected measures will begin in the latter part of fall or winter of 2016. The education improvements will begin in the winter of 2016 and continue throughout the planning period. Likewise, research for each program will occur prior to the start date. The Cover Letter prepared for CWCB, CWCB's Approval Checklist, and CWCB's formal Approval Letter are included in **Appendix F**.

6.3 Periodic Review and Update

The District plans to review and update this conservation plan every seven years. The next update is scheduled to be completed in 2022.

APPENDIX A

Definition of Terms

DEFINITION OF TERMS & TERMINOLOGY

This section provides an overview of some of the common terminology used in this document. Please note that this is not a comprehensive list of all terms and definitions. Other important terminology is reserved for discussion in the document.

AF:	Acre-foot: The amount of water it would take to cover one acre of land to a depth of one foot; approximately 325,851 gallons.
AMI:	AMI stands for Advanced Metering Infrastructure. AMI meters, also known as Smart meters are updated, digital versions of the traditional electrical meter attached to the outside of a home or business. These new meters not only measure how much water (electrical and other meters are also common) is used, but also at what times during the day. More advanced Smart meters are also designed to transmit pricing and water information from the utility company to the consumer (two-way communication). Utility companies who provide their customers with Smart meters are able to implement a variety of water reduction and saving programs, helping reduce the cost of providing water to a community.
AMR:	AMR stands for Automatic Meter Reading. It is an older technology that only collects electrical energy consumption and transfers that data from the electric meter on the home to the utility (one-way communication). Typically AMR meters are a “drive-by” type that require the utility to be in close proximity in order to read the meter. (also see AMI)
C-BT Quota:	The percentage set by the NCWCD Board of Directors each water year which determines the amount of ac-ft per unit of CBT, i.e. 70% quota equals 0.7 ac-ft per CBT unit.
C-BT:	Colorado Big Thompson
CWCB:	Colorado Water Conservation Board

Demand management:	The implementation of water efficiency activities to reduce water deliveries (demands) and or improve efficiencies within the distribution system. For purposes of this document, demand management refers to both system and customer water demands. Demand management is used interchangeably with water efficiency.
Demand-side:	The distribution and consumption of treated water supplies for domestic purposes or the delivery and use of reclaimed water or untreated raw (i.e. ditch water, groundwater) for non-potable purposes such as irrigation or industrial processes.
Dual water supply systems:	Water supply systems that use a combination of treated water to meet potable water needs and reclaimed water and/or non-treated water (i.e. untreated ditch water and groundwater) to meet non-potable water needs.
ELCO:	East Larimer County Water District
ET Controllers:	Evapo-transpiration controllers adjust the amount of water applied from sprinkler systems based on soil moisture and weather conditions.
ET:	Evapo-transpiration: The rate at which water is removed from the soil by evaporation and from plant surfaces by transpiration.
FCLWD:	Fort Collins-Loveland Water District
GPCD:	Gallons per capita per day: A measure of efficiency to determine the approximate amount of water that each resident within an area utilizes each day.
Maximum Day:	The largest amount of water used in a single day.
MG:	Million gallons
MGD:	Million gallons per day
MWEP:	Municipal Water Efficiency Plan
NCWCD:	Northern Colorado Water Conservancy District
NEPA:	National Environmental Policy Act
NISP:	Northern Integrated Supply Project

Non-Potable Use:	Water that is not treated and used for irrigation or other uses than potable. The District currently does not have a non-potable water supply.
Non-revenue water:	Annual non-revenue water (previously referred to as unaccounted for water) consists of unbilled authorized uses (i.e. hydrant flushing), apparent losses, and real losses[1]. Real losses consist of leaks in the water distribution system that does not reach the end user. Apparent losses consist of unauthorized consumption, customer metering inaccuracies, and data handling errors.
NPIC:	North Poudre Irrigation Company
NWCWD:	North Weld County Water District
Peak Hour:	The largest amount of water used in a single hour – typically occurs on the Maximum Day.
Phreatophytes:	Species of plants and trees that consume groundwater through their root zones below the water table such as Cottonwood and Russian Olive trees.
PIF:	Plant Investment Fee, fee charged to developers for on-going maintenance cost of infrastructure replacement and repair.
Potable Use:	Water that is treated to drinking water standards for municipal use, including residential and commercial use. The District's CBT water is used for potable use.
SCFP:	Soldier Canyon Filter Plant
SFE:	Single Family Equivalent, unit of measure used in planning to adjust water use for multi-family dwellings, such as townhomes or condominiums, to a single residential equivalent.
Supply-side:	Water supply operations and facilities that include the diversion, extraction, storage, and transmission of untreated water.
SWSI:	State Wide Supply Initiative

[1] Source: American Water Works Association. 2006 *Water Conservation Programs – A Planning Manual. Manual of Water Supply Practices M52.* First Edition.

System water demand:	Volume of water necessary to meet customer water needs within a certain period of time. System water demand is typically measured at the point of discharge from the water treatment plant and includes non-revenue water. In dual water supply systems, system water demand may also include the distribution and delivery of non-potable water (i.e.: reclaimed water and untreated ditch and groundwater) to meet irrigation needs.
Water efficiency:	Water efficiency includes the practices, techniques, and technologies that extend water supplies either directly through water savings or through substituting alternative supplies such as reuse. For purposes of this document, water efficiency is inclusive of water conservation and is used instead of "water conservation." The term water efficiency captures the essential objective of a local plan which is to improve the efficiency of a municipal demand and water supply system. Water efficiency includes both system demands and customer water demands. *Note: CWCB's former 2005 Water Conservation Plan Development Guidance Document and other literature on conservation and water use efficiency distinguish supply-side and demand-side water use efficiency. These resources generally characterize demand-side as technical efficiencies (e.g. water efficient toilets) and behaviors (e.g. taking shorter showers) that save water at the end use/water user level. Supply-side refers to water efficiency at the system level such as the repair of pipeline leaks and water reuse. For purposes of this Plan, the distinction between these water efficiency encompasses both supply and demand side efficiencies.*
Water efficiency activities:	Traditionally water efficiency activities have been referred to as water conservation measures and or water conservation programs. For purposes of this document, measures and programs are replaced with water efficiency activities. Water efficiency activities encompass all efforts to either save water or improve efficiencies within a water supply system.
Wind and Rain Sensor:	A device that is connected to the irrigation system controller that will temporarily shut off irrigation when a pre-determined amount of rain or wind is detected.
WTP:	Water treatment plant

APPENDIX B

Municipal Water Efficiency Plan Guidance Document Worksheets

WORKSHEET A - WATER SUPPLY LIMITATIONS AND FUTURE NEEDS

Limitation and/or Future Need [1]	[2] Yes	[2] No	Comments on Limitation or Future Need [3]	How is Limitation or Future Need Being Addressed [4]
System is in a designated critical water supply shortage area	X			
System experiences frequent water supply shortages and/or emergencies		X		
System has substantial non-revenue water		X	Averaged only 4.7% Non-Revenue Water (2010 - 2014)	
Experiencing high rates of population and demand growth		X	Steady growth	
Planning substantial improvements or additions		X		
Increases to wastewater system capacity anticipated		X	Managed by FCLWD but is a separate entity (South Fort Collins Sanitation District)	
Need additional drought reserves		X	FCLWD has several sources as back-up supply	
Drinking water quality issues		X	None	
Aging infrastructure in need of repair		X	FCLWD's system is relatively young	
Issues with water pressure in portions of distribution system		X	FCLWD's has 26 pressure zones	

Instructions:
[1] This column provides a list of limitations/future needs related to planning and operating the water supply system.
[2] Enter an "X" to show whether or not the system exhibits the limitations/future needs.
[3] Include any comments regarding the limitations/future needs that may be useful to consider in the planning process.
[4] If applicable, include how the limitation/future need is being addressed.

WORKSHEET D - IDENTIFICATION AND SCREENING OF FOUNDATIONAL ACTIVITIES

Water Efficiency Activities for Screening [1]	State Statute Requirement [2]	Identification		Qualitative Screening [5]				Carry to Evaluation [6]	Reason for Elimination [7]
		Existing/ Potential Activity [3]	Targeted Customer Category [4]	*Benefit in Water Savings*	*Staff Approval and Availability*	*Board and Public Approval*	Notes on Additional Pros/Cons to Consider		
Metering (BP1)									
Automatic Meter Reading (AMR) Installation and Operations	V, VII	E	All Categories	X	X	X		X	90% of system converted to auto read meters
Meter Testing and Replacement	V	E	Non-Revenue	X	X	X		X	
Meter Upgrades	V	E	Non-Revenue	X	X	X		X	
Identify Unmetered/Unbilled Treated Water Uses	V	E	Non-Revenue	X	X	X			All known treated water uses are monitored
Data Collection - Monitoring and Verification (BP2)									
Frequency of Meter Reading	VII	E	All Categories [b]	X	X	X			Capable of reading 4 times per day if needed (research potential leaks)
Tracking Water Use by Customer Type	VII	E	All Categories [b]	X	X	X			Part of existing billing system
Upgrade Billing System to Track Use by Sufficient Customer Types	VII	E	All Categories [b]	X	X	X			Part of existing billing system
Tracking Water Use for Large Customers	VII	E	All Categories [b]	X	X	X			Part of existing billing system
Water Use Efficiency Oriented Rates and Tap Fees (BP1)									
Volumetric Billing	VII, VIII	E	All Categories [b]	X	X	X			Already in place
Water Rate Adjustments	VII, VIII	E	All Categories [b]	X	X	X		X	In process of reviewing rates
Frequency of Billing	VII	E	All Categories [b]	X	X	X			Billing is done monthly with 4 billing cycles. Not interested in further evaluation
Inclining/Tiered Rates	VII, VIII	E	All Categories [b]	X	X	X			Evaluating the addition of a 4th tier
Rate Study with Regular Updates	VII, VIII	E/P	All Categories [b]	X	X	X		X	
Water Budgets	VII, VIII		All Categories [b]	X					Not interested in further evaluation
System Water Loss Management and Control (BP3)									
System Wide Water Audits	V	P	Non-Revenue	X	X	X		X	
Control of Apparent Losses (with Metering)	V	P	Non-Revenue	X	X	X		X	To be combined with System Wide Water Audits
Leak Detection and Repair	V	E	Non-Revenue	X	X	X		X	District will continue with existing program
Recycling WTP filter backwash	V	E	Non-Revenue	X	X	X		X	District will continue with existing program
Planning (BP2)									
Integrated Water Resources Plans		E	All Categories	X	X	X		X	District will evaluate the costs and benefits of all these planning efforts combined
Master Plans/Water Supply Plans		E	All Categories	X	X	X			
Capital Improvement Plans		E	All Categories	X	X	X			
Feasibility Studies		E	All Categories	X	X	X			
Staff (BP4)									
Water Conservation Coordinator			All Categories	X					Resources are not available for this activity

Customer Category Abbreviations: Res = Residential, RMU = Residential Multiuse, NonRes = Non-Residential, IRR = Irrigation,

Instructions:

[1] This column provides a list of possible activities & identifies the Best Practice activity as defined in the Colorado WaterWise Guidebook of Best Practices (BP) for Municipal Water Conservation in Colorado. List additional activities identified through the planning process.
[2] This column identifies, by roman numeral, the elements that correspond with the best practices and that shall be fully considered in the planning process per Colorado State Statute 37-60-126.
[3] Specify whether the activity is "Existing" or a "Potential" activity to carry through screening by entering an "E" or "P", respectively.
[4] As applicable, specify which customer category (residential, commercial, etc.) is/would be impacted by the activity.
[5] Enter screening criteria based on qualitative goals developed in Step 3 and insert an "X" for activities that meet the listed screening criteria.
[6] Based on the screening process, indicate which activities will be carried onto the evaluation phase with an "X".
[7] If eliminated via screening, comment on why.

Notes:

[a] All categories except Other
[b] All categories except Non-Revenue

WORKSHEET E - IDENTIFICATION AND SCREENING OF TARGETED TECHNICAL ASSISTANCE INCENTIVES

Water Efficiency Activities for Screening [1]	State Statute Requirement [2]	Identification					Qualitative Screening [6]				Carry to Evaluation [7]	Reason for Elimination [8]
		Existing/ Potential Activity [3]	SWSI Framework Levels [4]			Targeted Customer Category [5]	*Benefit in Water Savings*	*Staff Approval and Availability*	*Board and Public Approval*	Notes on Additional Pros/Cons to Consider		
			Level 1 Municipal Uses	Level 2 Customers with the Largest Water Use	Level 3 Customer Type(s) in Service Area							
Installation of Water Efficient Fixtures and Appliances												
Indoor Residential Water Audits	I	P		X	X	Res	X	X	X		X	
Faucet and Showerhead Retrofits (e.g. aerator installation)	I	P		X	X	Res	X	X	X		X	Combined with Residential Water Audits
Low Water Use Landscapes												
Removal of Phreatophytes	II		X	X	X	Non-Revenue						None are located near existing water supply
Residential Irrigation Audits	II	E/P		X	X	Res, IRR	X	X	X		X	
Outdoor Irrigation Controllers	II		X	X	X	All Categories (a) (b)	X					Not interested in further evaluation at this time
Rain Sensors	II		X	X	X	All Categories (a) (b)	X					
Water- Efficient Industrial and Commercial Water-Using Processes												
Commercial Indoor Fixture and Appliance Rebates/Retrofits	III			X		NonRes	X					The District would like to pursue other measures at this time
Commercial and Industrial Water Audits	III			X	X	NonRes	X	X	X			District will look to partner with the City of Fort Collins on this in the future.
Pre-Rinse Spray Valve (PRSV) Upgrades	III	P				NonRes	X	X	X		X	
Incentives												
Toilet Rebates	X			X	X	Res, RMU	X					Not interested in further evaluation at this time
Showerhead Rebates	X			X	X	Res, RMU	X					
Water Efficient Faucet or Aerator Rebates	X			X	X	Res, RMU	X					
Water Efficient Washing Machine Rebates	X			X	X	Res, RMU	X					
Water Efficient Dishwasher Rebates	X			X	X	Res, RMU	X					
Efficient Irrigation Equipment Rebates	X			X	X	Res, RMU, IRR	X					
Xeriscape Incentives	X			X	X	Res, RMU, IRR	X					Resources are not available for this activity

Customer Category Abbreviations: Res = Residential, RMU = Residential Multiuse, NonRes = Non-Residential, IRR = Irrigation,

Instructions:

[1] This column provides a list of activities & if applicable, identifies the Best Practice activity as defined under *Colorado WaterWise Guidebook of Best Practices (BP) for Municipal Water Conservation in Colorado.* List additional activities identified through the planning process.
[2] This column identifies, by roman numeral, the elements that correspond with the best practices and that shall be fully considered in the planning process per Colorado State Statute 37-60-126.
[3] Specify whether the activity is an "Existing" or "Potential" activity to carry through screening by entering an "E" or "P", respectively.
[4] Specify which level the historical/potential activities fall under by entering an "X" in the appropriate column.
[5] As applicable, specify which customer category (residential, commercial, etc.) is/would be impacted by the activity.
[6] Enter screening criteria based on qualitative goals developed in Step 3 and insert an "X" for activities that meet the listed screening criteria.
[7] Based on the screening process, indicate which activities will be carried on the evaluation phase with an "X".
[8] If eliminated via screening, comment on why.

Notes:
[a] All categories except Other
[b] All categories except Non-Revenue

WORKSHEET F - IDENTIFICATION AND SCREENING OF ORDINANCES AND REGULATIONS

Water Efficiency Activities for Screening [1]	State Statute Requirement [2]	Identification					Qualitative Screening [6]				Carry to Evaluation [7]	Reason for Elimination [8]
		Existing/ Potential Activity [3]	SWSI Framework Levels [4]			Targeted Customer Category [5]	*Benefit in Water Savings*	*Staff Approval and Availability*	*Board and Public Approval*	Notes on Additional Pros/Cons to Consider		
			Level 1 Customer Type(s) within the Existing Service Area	Level 2 New Development	Level 3 Point of Sales on Existing Building Stock							
General Water Use Regulations												
Water Waste Ordinance (BP 5)	IX		X			All Categories (a) (b)	X					Part of the Districts drought response
Time of Day Watering Restriction	IX	E/P	X			All Categories (a) (b)	X	X	X		X	
Landscape Design/Installation Rules and Regulations												
Rules and Regulations for Landscape Design/Installation	IX			X		All Categories (a) (b)	X					These regulations exist at some level for other entities within the District service area, however they cannot be controlled or enforced by the District
Restrictive Covenants Ordinance	IX		X			Res, RMU	X					
Soil Amendment Requirements (BP 9)	IX			X		All Categories (a) (b)	X					
Indoor and Commercial Regulations												
Requiring Wind and/or Rain Sensors for Commercial and Open Space Irrigation	IX		X	X		NonRes, IRR	X					Not interested in further evaluation at this time

Customer Category Abbreviations: Res = Residential, RMU = Residential Multiuse, NonRes = Non-Residential, IRR = Irrigation,

Instructions:

[1] This column provides a list of possible activities & if applicable identifies the Best Practice activity as defined under Colorado WaterWise Guidebook of Best Practices (BP) for Municipal Water Conservation in Colorado. List additional activities identified through the planning process.
[2] This column identifies, by roman numeral, the elements that correspond with the best practices and that shall be fully considered in the planning process per Colorado State Statute 37-60-126.
[3] Specify whether the activity is an "Existing" or "Potential" activity to carry through screening by entering an "E" or "P", respectively.
[4] For current/historical activities, specify which level the activities fall under by entering an "X" in the appropriate column.
[5] As applicable, specify which customer category (residential, commercial, etc.) is/would be impacted by the activity.
[6] Enter screening criteria based on qualitative goals developed in Step 3 and insert an "X" for activities that meet the listed screening criteria.
[7] Based on the screening process, indicate which actives will be carried on the evaluation phase with an "X".
[8] If eliminated via screening, comment on why.

Notes:

[a] All categories except Other
[b] All categories except Non-Revenue

WORKSHEET G - IDENTIFICATION AND SCREENING OF EDUCATION ACTIVITIES

Water Efficiency Activities for Screening [1]	State Statute Requirement [2]	Identification					Qualitative Screening [6]				Carry to Evaluation [7]	Reason for Elimination [8]
		Existing/ Potential Activity [3]	SWSI Framework Levels [4]			Targeted Customer Category [5]	Benefit in Water Savings	Staff Approval and Availability	Board and Public Approval	Notes on Additional Pros/Cons to Consider		
			Level 1 One-Way	Level 2 One-Way with Feedback	Level 3 Two-way communication							
Customer Education (BP6)												
Bill Stuffers	VI	E	X			All Categories (b)	X	X	X		X	
Newsletter	VI	E	X			All Categories (b)	X	X	X		X	
Newspaper Articles	VI	E	X			All Categories (b)	X	X	X		X	
Mass Mailings	VI	E	X			All Categories (b)	X	X	X		X	
Web Pages	VI	E	X			All Categories (b)	X	X	X		X	
Water Fairs	VI	E	X			All Categories (a) (b)	X	X	X		X	
K-12 Teacher and Classroom Education Programs	VI			X		All Categories (a) (b)	X					This activity is already taken care of within the school districts
Send ET irrigation scheduling information in water bill	VI		X			All Categories (b)						Will re-evaluate with future planning efforts
Technical Assistance												
Water Conservation Expert Available	VI				X	All Categories	X					Resources are not available for this activity

Customer Category Abbreviations: Res = Residential, RMU = Residential Multiuse, NonRes = Non-Residential, IRR = Irrigation,

Instructions:
[1] This column provides a list of possible activities & if applicable identifies the Best Practice activity as defined under Colorado WaterWise Guidebook of Best Practices (BP) for Municipal Water Conservation in Colorado. List additional activities identified through the planning process.
[2] This column identifies, by roman numeral, the elements that correspond with the best practices and that shall be fully considered in the planning process per Colorado State Statute 37-60-126.
[3] Specify whether the activity is an "Existing" or "Potential" activity to carry through screening by entering an "E" or "P", respectively.
[4] For current/historical activities, specify which level the activities fall under by entering an "X" in the appropriate column.
[5] As applicable, specify which customer category (residential, commercial, etc.) is/would be impacted by the activity.
[6] Enter screening criteria based on qualitative goals developed in Step 3 and insert an "X" for activities that meet the listed screening criteria.
[7] Based on the screening process, indicate which activities will be carried on the evaluation phase with an "X".
[8] If eliminated via screening, comment on why.

Notes:
[a] All categories except Other
[b] All categories except Non-Revenue

WORKSHEET J - IMPLEMENTATION PLAN

Selected Water Efficiency Activities [1]	Period of Implementation [2]	Implementation Actions [3]	Milestone Deadlines [4]	Entity/Staff Responsible for Implementation [6]	Coordination and Public Involvement [7]
Foundational Activities					
Meter Testing and Replacement/Meter Upgrades	*ongoing*	Continue present plan (reevaluate in 7 years)	none specified	Terry Farrill and Engineering Staff	
System Wide Water Audits	*ongoing*	Continue present plan	none specified	Terry Farrill, Kathy Hawkins	
Automatic Water Meter Reading Installation and Operations	*ongoing*	Continue present plan	none specified	Terry Farrill, Kathy Hawkins	
Water Efficiency Rate Structure with Regular Updates to Rate Study	*ongoing*	Continue present plan	none specified	Terry Farrill, Kathy Hawkins	
Leak Detection and Repair	*ongoing*	Continue present plan	none specified	Terry Farrill and Engineering Staff	
Recycling Water Treatment Plant Filter Backwash	*ongoing*	Continue present plan	none specified	SCFP	
Master Plans/Water Supply Plans	*ongoing*	Continue present plan	none specified	Terry Farrill, Kathy Hawkins	
Targeted Technical Assistance and Incentives					
Residential Irrigation Audits (partner with Fort Collins)	*ongoing*	Continue present plan. Inform customers of availability	none specified	Kathy Hawkins	Coordinate with City of Fort Collins
Indoor Residential Water Audits (partner with LCCC)	*ongoing*	Contact Megan Butler, Program Director for LCCC	2016 or 2017	Kathy Hawkins	Coordinate with Megan Butler and LCCC
Education Activities					
Bill Stuffers	*ongoing*	Continue present plan	none specified	Kathy Hawkins and Admin Staff	
Newsletter	*ongoing*	Continue present plan	none specified	Kathy Hawkins and Admin Staff	
Newspaper Articles	*ongoing*	Continue present plan	none specified	Kathy Hawkins and Admin Staff	
Mass Mailings	*ongoing*	Continue present plan	none specified	Kathy Hawkins and Admin Staff	
Website	*ongoing*	Contact Website Coordinator	none specified	Kathy Hawkins and Website Coordinator	Communicate with Website Coordinator

Instructions:
[1] Provide the list of water efficiency activities selected for implementation during Step 4.
[2] Provide period in which activity is going to be implemented.
[3] Include information on specific actions necessary to implement the activates (e.g. advertise rebates to public).
[4] Indicate timing of when the action are scheduled to be implemented (e.g. when leaks will be repaired, when rebate program will start, etc.).
[5] Insert anticipated annual costs.
[6] Specify which entity/staff responsible for implementing the activities.
[7] If applicable, comment on necessary coordination among staff/other entities and how the public will be involved. This includes educational campaigns, feedback, direct participation in certain actions, etc.
[8] Add any additional comments.

WORKSHEET K - SELECTION OF MONITORING DEMAND DATA FOR MONITORING PLAN

Monitoring Data [1]	HB 10-1051 Reporting Requirement [2]				Selection [3]				Entity/Staff Responsible for Data Collection and Evaluation [4]	Schedule/Timing of Monitoring [5]	Comments [6]
	Annual	Monthly	Bi-Monthly	Daily	Annual	Monthly	Bi-Monthly	Daily			
Total Water Use											
Total treated water produced (metered at WTP discharge)					X	X		X	SCFP (Chris Harris)		
Total treated water delivered (sum of customer meters)	√				X	X			SCFP (Chris Harris)		
Raw non-potable deliveries to SCFP					X	X		X	SCFP (Chris Harris)		
Reclaimed water produced (metered at WWTP discharge)											
Reclaimed water delivered (sum of customer meters)											
Per capita water use					X	X			Engineering/Admin.		e.g. method of calculation
Indoor and outdoor treated water deliveries					X	X			Engineering/Admin.		e.g. estimation method
Treated water peak day produced					X	X		X	SCFP (Chris Harris)		
Reclaimed water peak day produced											
Raw water peak day produced/delivered											
Non-revenue water	√				X	X			Engineering/Admin.		
Insert other demand data											
Water Use by Customer Type											
Treated water delivered		√			X	X		X	Engineering/Admin.		
Raw non-potable deliveries											
Reclaimed water delivered											
Residential per capita water use					X	X			Engineering/Admin.		e.g. method of calculation
Unit water use (e.g. AF/account or AF/irrigated acre)					X	X			Engineering/Admin.		e.g. method of calculation
Indoor and outdoor treated water deliveries					X	X			Engineering/Admin.		e.g. estimation method
Large users					X	X			Engineering/Admin.		note: could either specify use of individual customers or show aggregate total
Insert other demand data											
Other Demand Related Data											
Irrigated landscape (e.g. AF/acre or number of irrigated acres)					X				Engineering/Admin.		specify whether total irrigated lands in service area and/or per customer types (e.g. parks)
Precipitation					X	X			Engineering/Admin.		
Temperature					X	X			Engineering/Admin.		
Evapotranspiration					X	X			Engineering/Admin.		
Drought index information					X				Engineering/Admin.		
Economic conditions					X				Engineering/Admin.		
Population					X	X			Engineering/Admin.		
New taps					X	X			Engineering/Admin.		
Insert other demand related data											

Instructions:
[1] This worksheets provides a list of possible demand data. Add additional demand data provider would like to monitor.
[2] Specifies annual reporting requirements per HB 10-1051.
[3] Select demand data provider plans to use to monitor effectiveness of water efficiency activities by inserting an "X" in appropriate boxes.
[4] Specify staff/entity responsible for data collection and evaluation.
[5] Specify the timing and/or set schedule in which data will be collected and evaluated.
[6] Add any additional comments.

APPENDIX C

Additional Tables

Table C1: Water Efficiency Activity Evaluation

Water Efficiency Activities for Evaluation	Existing/ Potential Activity	Targeted Customer Category	Review of Qualitative Screening: Qualitative Goals: Benefit in Water Savings	Staff Approval and Availability	Board and Public Approval	Evaluation: Projected Water Savings: Total Water Savings over the Planning Period (MG)	Total Water Savings over the Planning Period (AF)	Average Annual Water Savings (MG/yr)	Average Annual Water Savings (AF/yr)	Cost per 1,000 gal saved	Projected Implementation Costs over Planning Period Including Lost Revenue	Quantitative Goals: Helps to Achieve Overall Savings Goals	Low Cost w/ Significant Water Savings	Beneficial to Community
Foundational Activities														
Meter Testing and Replacement/Meter Upgrades	E	Non-Revenue	X	X	X	**4.5**	**13.81**	**0.45**	**1.38**	**$26.33**	**$118,530**	X		X
System Wide Water Audits	E	Non-Revenue	X	X	X	**18.0**	**55.26**	**1.80**	**5.53**	**$2.22**	**$40,000**	X		X
Automatic Water Meter Reading Installation and Operations	E	All Categories	X	X	X	**666.3**	**2,044.67**	**66.63**	**204.47**	**$1.86**	**$1,240,835**	X		X
Water Efficiency Rate Structure with Regular Updates to Rate Study	E/P	All Categories [b]	X	X	X	**1,573.2**	**4,827.89**	**157.32**	**482.79**	**$0.03**	**$42,000**	X	X	X
Leak Detection and Repair	E	Non-Revenue	X	X	X	**90.0**	**276.28**	**9.00**	**27.63**	**$0.71**	**$64,000**	X		X
Recycling Water Treatment Plant Filter Backwash	E	Non-Revenue	X	X	X	**640.9**	**1,966.97**	**64.09**	**196.70**	**$0.01**	**$4,000**	X	X	X
Master Plans/Water Supply Plans	E	All Categories	X	X	X	**95.4**	**292.70**	**9.54**	**29.27**	**$4.29**	**$409,350**	X		X
Targeted Technical Assistance and Incentives														
Residential Irrigation Audits	E	Res, IRR	X	X	X	**49.0**	**150.43**	**0.89**	**2.74**	**$3.18**	**$155,648**	X		X
Indoor Residential Water Audits	P	Res	X			**3.8**	**11.65**	**0.07**	**0.21**	**$3.92**	**$14,883**	X		X
Pre-Rinse Spray Valve (PRSV) Upgrades	P	NonRes	X			**11.0**	**33.76**	**0.20**	**0.61**	**$2.95**	**$32,401**	X		X
Ordinances and Regulations														
Time of Day Watering Restrictions	P	All Categories [a][b]	X			**11.4**	**34.99**	**1.14**	**3.50**	**$2.26**	**$25,756**	X		X
Education Activities														
Bill Stuffers	P	All Categories [b]	X			**604.8**	**1,855.94**	**60.48**	**185.59**	**$2.22**	**$1,342,799**	X	X	X
Newsletter	P		X									X	X	X
Newspaper Articles	P		X									X	X	X
Mass Mailings	P		X									X	X	X
Website	E/P		X									X	X	X

[a] All categories except Other
[b] All categories except Non-Revenue

APPENDIX D

Activity Cost and Benefit Analysis

Meter Testing and Replacement Program/Meter Upgrades

Existing meters are tested periodically for leaks and accuracy and are replaced with upgrades as necessary. Faulty meters account for apparent losses (i.e. losses due to meter inaccuracies) and real losses (also known as physical losses).

Planning Period	2015 to 2024	
Years in Planning Period	10	
Program Length	10	years

Estimated Water Savings

Annual Estimated Savings Rate	0.25%	
Annual Estimated Non-Revenue Water without Savings	180.05	MG/yr
Estimated Annual Water Savings	**0.45**	MG/yr
Estimated Savings over Planning Period	**4.5**	MG

Notes:

2010 - 2014 average system non-revenue leakage/loss rate was 4.7%. Natural Resources Defense Council estimate 10% of homes have leaks that waste 90 gals or more per day. These leaks are often unaccounted for in faulty meters.

Costs

Total Cost to Water Provider

Labor Costs		
Staff Hours	90.0	
Hourly Cost	$80.00	
Annual Staff Costs	$7,200	
Third Party Costs		
Evaluation and Follow-up Costs		
Annual Labor	**$7,200**	
Materials Costs		
Unit Cost	$155.10	/participant
Number of Meters/Year	30	/year
Annual Materials	**$4,653**	/year

Notes:

The $155.10 weighted average unit cost includes meter testing and replacement costs.
Residential = $150/meter, NonRes and other categories = $200/meter

Estimated Annual Cost	**$11,853**	/year
Estimated Total Cost over Planning Period	**$118,530**	
Cost per 1000 Gallons Saved	**$26.33**	

System Wide Water Audits

By utilizing System Wide Water Audits and paired with other measures (e.g., Metering), FCLWD will identify unmetered and unbilled treated water uses in order to assess where losses are occurring and how losses can be addressed. These losses are considered non-revenue water.

Planning Period	2015 to 2024	
Years in Planning Period	10	
Program Length	10	years

Estimated Water Savings

Annual Estimated Savings Rate	1.0%

Category	Average Water Use MG	*Estimated Annual Water Savings gallons/yr*
Non Revenue Water	180.05	1,800,544

Estimated Annual Water Savings	**1.80**	MG/yr
Estimated Savings over Planning Period	**18.0**	MG

Notes:

By specifically identifying these losses, additional actions can be taken to reduce the water lost. This measure has the potential to improve all categories. A conservative reduction of 1.00% of projected annual water use was assumed.

Costs

Total Cost to Water Provider

Labor Costs		
Staff Hours	50	/year
Hourly Cost	$80.00	/hour
Annual Staff Costs	$4,000	
Third Party Costs		/year
Evaluation and Follow-up Costs		/year
Annual Labor	**$4,000**	/year

Notes:

Estimated staff costs for Staff to spend approximately 50 hours per year at $80.00/hour.

Although some revenue may be lost on the demand side, more revenue will likely be realized on the supply side.

Estimated Annual Cost	**$4,000**	/year
Estimated Cost over Planning Period	**$40,000**	
Cost per 1000 Gallons Saved	**$2.22**	

Automatic Water Meter Reading Installation and Operations

FCLWD has a majority of their meters (approximately 90% of meters) already networked in an Advanced Metering Infrastructure (AMI); they hope to complete the remainder of the meters over the Planning Period (2015 - 2024).

Planning Period	2015 to 2024	
Years in Planning Period	10	
Program Length	10	years

Estimated Water Savings

Customer Category	Avg. Annual Water Use over Planning Period (MG)	Estimated Annual Savings Rate	Estimated Annual Water Savings (MG/yr)
Non-Revenue Water	180.05	5.0%	9.003
Residential (Res)	2,515.54	2.0%	50.311
Residential Multiuse (RMU)	85.86	0.5%	0.429
Non-Residential (NonRes)	467.10	0.5%	2.336
Irrigation (IRR)	426.79	1.0%	4.268
Other	139.78	0.2%	0.280

Estimated Annual Water Savings	**66.63**	MG/yr
Estimated Savings over Planning Period	**666.26**	MG

Notes:

Estimated savings rate are used until more data can be obtained to establish an actual savings rate.

Costs

Total Cost to Water Provider

Labor Costs

Staff Hours	45	/year
Hourly Cost	$80.00	/hour
Annual Labor	**$3,600**	/year

Material Costs

Unit Cost	**$175.00**	
Number of Meters/Year	**10**	
Annual Materials	**$1,750**	/year

Notes:

Estimated annual staff time is estimated at approximately 45 hours. This time includes water savings tracking.

Automatic Water Meter Reading Installation and Operations

Water Rates

Rate Category	Average Monthly Usage (gals/tap)	Current Rates/Fees (per 1,000 gals)
Residential (Res)	12,895	$1.95
Residential Multiuse (RMU)	19,557	$2.40
Non-Residential (NonRes)	58,583	$2.67
Irrigation (IRR)	117,598	$2.97
Other	1,337,212	$3.24

Water rates are based on a weighted average for each customer category and incorporate seasonal usage.

The revenue calculations do not include the base fee since the base fee does not cover any usage volume.

Estimated Revenue assumes that the current rates will not change significantly over the planning period.

Estimated Average Annual Revenue without Water Savings	$8,067,323.93	/year
Estimated Average Annual Revenue with Water Savings	$7,948,590.43	/year
Estimated Annual Revenue Loss Related to Water Savings	$118,733.50	/year

Estimated Annual Cost	**$124,083**	/year
Estimated Cost over Planning Period not including Lost Revenue	**$53,500**	
Estimated Total Cost over Planning Period Including Lost Revenue	**$1,240,835**	
Cost per 1000 Gallons Saved	**$1.86**	

Water Efficient Rate Structure with Regular Updates to Rate Study

Based on many studies, water rates (e.g., inclining and/or tiered) are one of the most effective ways to encourage efficient water use. A rate study is necessary to ensure maximum water conservation savings. FCLWD is currently in the process of having their water rates evaluated by an independent consultant.

Planning Period	2015 to 2024	
Years in Planning Period	10	
Program Length	10	years

Estimated Water Savings

Customer Category	Average Water Use (MG/yr)	Annual Estimated Savings Rate	*Estimated Annual Water Savings (MG/yr)*
Residential (Res)	2,515.54	5.0%	125.78
Residential Multiuse (RMU)	85.86	1.0%	0.86
Non-Residential (NonRes)	467.10	2.0%	9.34
Irrigation (IRR)	426.79	5.0%	21.34
Other	139.78	0.0%	0.00

Assumed a conservative percent reduction of per customer category of projected total billed water. Rate change studies have shown an even greater savings (e.g., Southwest Florida Water Management District study indicated a 13% savings).

Estimated Annual Water Savings	**157.3**	MG/yr
Estimated Savings over Planning Period	**1,573**	MG

Costs

Total Cost to Water Provider

Labor Costs		
Staff Hours	10	/year
Hourly Cost	$80.00	/hour
Annual Staff Costs	$800.00	
Third Party Costs (Rate study)	$3,400.00	/year
Evaluation and Follow-up Costs (Labor/Consultant)		/year
Annual Labor	**$4,200**	/year

Notes:

Annual staff costs include coordination with consultants.

Annual Revenue Lost due to water savings is not incorporated into the Total Cost to Water Provider because these costs are absorbed and included in the rate adjustments to the customers.

Total Cost to Water Provider

Estimated Annual Cost	**$4,200**	/year
Estimated Total Cost over Planning Period Including Set-up	**$42,000**	
Cost per 1000 Gallons Saved	**$0.03**	

Leak Detection and Repair Program

The current leak detection program at FCLWD uses customer meters, pressure reducing vaults, SCADA, and the billing software and database to track water use and leaks in the system.

Planning Period	2015 to 2024	
Years in Planning Period	10	
Program Length	10	years

Estimated Water Savings

Annual Estimated Savings Rate	5.0%	
Annual Estimated Non-Revenue Water without Savings	180.05	MG/yr
Estimated Annual Water Savings	**9.00**	MG/yr
Estimated Savings over Planning Period	**90.0**	MG

Notes:

2010 - 2014 average system unaccounted leakage/loss rate was 4.7%.
Savings is the estimated production (without savings) equals the current projected water usage including metered and non-revenue water.

Costs

Total Cost to Water Provider

Labor Costs		
Staff Hours	80	/year
Hourly Cost	$80.00	/hour
Annual Staff Costs	$6,400.00	
Third Party Costs (Leak Detection Consult)		/year
Evaluation and Follow-up Costs (Labor/Consultant)		/year
Annual Labor	**$6,400**	/year

Notes:

Annual staff costs include analysis of customer data, evaluating pressure tests, etc.

Estimated Annual Cost	**$6,400**	/year
Estimated Total Cost over Planning Period Including Set-up	**$64,000**	
Cost per 1000 Gallons Saved	**$0.71**	

Recycling Water Treatment Plant Filter Backwash

FCLWD anticipates 95% of the backwash at the Soldier Canyon Filter Plant will be able to be recycled back into the treatment process.

Planning Period	2015 to 2024	
Years in Planning Period	10	
Program Length	10	years

Estimated Water Savings

Planning Period Savings Rate	1.7%	
Annual Estimated Total Raw Water without Savings	3,815.12	MG/yr
Estimated Annual Water Savings	**64.1**	MG/yr
Estimated Savings over Planning Period	**641**	MG

Notes:

Estimated Backwashes:
1.7% of FCWLD raw water usage from historical data provided by SCFP

Costs

Total Cost to Water Provider

Labor Costs		
Staff Hours	5	/year
Hourly Cost	$80.00	/hour
Annual Staff Costs	$400	
Annual Labor	**$400**	/year

Notes:

Very little additional labor costs are associated with WTP Filter Backwash. No revenue is lost due to water savings since measure is performed prior to meters.

Estimated Annual Cost	**$400**	/year
Estimated Total Cost over Planning Period Including Set-up	**$4,000**	
Cost per 1000 Gallons Saved	**$0.01**	

Master Plans/Water Supply Plans

FCLWD plans to continue developing, updating, and evaluating plans (i.e. Master Plans, Water Supply Plans, Capital Improvement Plans, and Water Efficiency Plans) that will improve its overall water efficiency and help plan for future use.

Planning Period	2015 to 2024	
Years in Planning Period	10	
Program Length	10	years

Estimated Water Savings

Annual Estimated Savings Rate	0.25%

Notes:

This measure has the potential to improve all categories. A conservative reduction of 0.25% of projected annual water use was assumed.

Category	Average Water Use MG	*Estimated Annual Water Savings gallons/yr*
Non-Revenue Water	180.05	450,136
Residential (Res)	2,515.54	6,288,861
Residential Multiuse (RMU)	85.86	214,651
Non-Residential (NonRes)	467.10	1,167,751
Irrigation (IRR)	426.79	1,066,966
Other	139.78	349,439

Estimated Annual Water Savings	**9.54**	MG/yr
Estimated Savings over Planning Period	**95.4**	MG

Costs

Total Cost to Water Provider

Labor Costs		
Staff Hours	90	/year
Hourly Cost	$80.00	/hour
Annual Staff Costs	$7,200.00	
Third Party Costs	$14,000.00	/year
Evaluation and Follow-up Costs		/year
Annual Labor	**$21,200.00**	/year

Notes:

Estimated staff costs for Staff to spend approximately 90 hours per year at $80.00/hour to assist with these plans for the District.

Master Plans/Water Supply Plans

Water Rates

Rate Category	Current Rates (per 1,000 gals)
Weighted average of customer rates	$2.17

Estimated Average Annual Revenue without Water Savings $7,894,002 /year

Estimated Average Annual Revenue with Water Savings $7,874,267 /year

Estimated Annual Revenue Loss Related to Water Savings **$19,735** /year

The annual revenue loss was estimated based on a weighted average of current rates for all FCLWD customers.

Estimated Revenue assumes that the current rates will not change significantly over the planning period.

Estimated Annual Cost	**$40,935** /year
Estimated Cost over Planning Period not including Lost Revenue	**$212,000**
Estimated Total Cost over Planning Period Including Set-up and Lost Revenue	**$409,350**
Cost per 1000 Gallons Saved	**$4.29**

Residential Irrigation Audits

Residential irrigation audits are performed by the City of Fort Collins. FCLWD has partnered with Fort Collins to offer its customers that are within the City Limits to be able to benefit from this service. "Free sprinkler system assessments will be conducted by Fort Collins Utilities from June through August for residents of single-family homes or homeowners associations. Home assessments last up to two hours and are designed to help participants water more efficiently, resulting in healthier lawns and reduced water use."

Planning Period	2015 to 2024	
Years in Planning Period	10	
Program Length	10	years

Estimated Water Savings

Annual Estimated Savings Rate	5%

Customer Category	Outdoor Water Use Per Tap gallons/tap	*Estimated Annual Water Savings gallons/yr/tap*	*Annual Program Participants (taps)*
Residential (Res)	99,544	4,977	94
Irrigation (IRR)	1,411,173	70,559	6

Estimated Annual Water Savings	**0.891**	MG/yr
Estimated Savings over Planning Period	**49.0**	MG

The outdoor use estimates are based on the following approximations for each customer category: Residential = 64%, Residential Irrigation = 100%
Assumed a conservative estimate of 5% savings of projected outdoor water usage . Customers have to put Auditor's advice and suggestions into practice.
Program Participants based on other water providers' participation rates for similar number of people.

Costs

Total Cost to Water Provider

Labor Costs		
Staff Hours	10	/year
Hourly Cost	$80	/hour
Annual Labor	**$800**	/year
Materials Costs		
Audit Cost	$85	
Number of Participants	100	/year
Annual Cost	**$8,500**	/year

Notes:

Costs include staff time for implementing (approximately 10 min. per participant). Scheduling and coordination is all done by City of Fort Collins.
Third Party Costs include Fort Collins' time.
Residential audits = $85/audit

Residential Irrigation Audits

Water Rates

Rate Category	Current Rates (per 1,000 gals)
Residential (Res)	1.95
Irrigation (IRR)	2.97

Estimated Average Annual Revenue without Water Savings	$125,295	/year
Estimated Average Annual Revenue with Water Savings	$119,030	/year
Annual Revenue Loss Related to Water Savings	**$6,265**	/year

Notes:

The annual revenue loss was estimated based on current rates for the following District customer categories (Residential and Irrigation).

Estimated Revenue assumes that the current rates will not change significantly over the planning period.

Estimated Annual Cost	**$15,565**	/year
Estimated Cost over Planning Period not including Lost Revenue	**$93,000**	
Estimated Total Cost over Planning Period Including Set-up and Lost Revenue	**$155,648**	
Cost per 1000 Gallons Saved	**$3.18**	

Indoor Residential Water Audits

Larimer County Conservation Corps (LCCC) offers free Home Efficiency Assessments which includes a basic inspection for FCLWD customers utilizing City Fort Collins Utilities or Loveland Water and Power for power. These assessments include inspections of home insulation, appliances, windows, toilets, and heating/cooling system. More importantly, they may ***install appropriate efficiency measures*** *based on a home's needs. These products may include:* ***water conserving showerheads and aerators****, smoke/carbon monoxide detectors, clotheslines, CFL bulbs, programmable thermostats and* ***high-efficiency toilets.*** *In addition customers are* ***educated about water*** *and energy* ***efficiency practices and services****.*

Planning Period	2015 to 2024	
Years in Planning Period	10	
Program Length	10	years

Estimated Water Savings

Annual Estimated Savings Rate	5%

Customer Category	Indoor Water Use Per Tap gallons/tap	*Estimated Annual Water Savings gallons/yr/tap*	*Annual Program Participants (taps)*
Residential (Res)	55,199	2,760	25

Estimated Annual Water Savings	**0.069**	MG/yr
Estimated Savings over Planning Period	**3.79**	MG

The indoor use estimates are based on the following Residential = 36%.
Assumed a conservative estimate of 5% savings of projected indoor water usage . Customers have to put Auditor's advice and suggestions into practice. Shower heads and aerators will be installed by LCCC. New toilets are assumed to have the greatest savings; toilets are installed by LCCC if participants qualify.
Program Participants based portion of FCLWD qualifying customers and total number of LCCC assessments. From 2010 - 2014, LCCC performed 2,889 assessments.

Costs

Total Cost to Water Provider

Labor Costs		
Staff Hours	6.25	/year
Hourly Cost	$80	/hour
Annual Staff Costs	$500	
Third Party Costs	$0	/year
Evaluation and Follow-up Costs	$250	/year
Annual Labor	**$750**	/year
Materials Costs		
Annual Materials Budget	$0	/year
Annual Materials	**$0**	/year

Notes:

Costs include staff time for implementing and evaluation.

There are no Third Party Costs for FCLWD because LCCC provides service through funds provided by Cities of Fort Collins and Loveland.

Indoor Residential Water Audits

Water Rates

Rate Category	Current Rates (per 1,000 gals)
Residential	*1.95*

Estimated Average Annual Revenue without Water Savings	$14,767	/year
Estimated Average Annual Revenue with Water Savings	$14,028	/year
Annual Revenue Loss Related to Water Savings	**$738**	/year

Notes:

The annual revenue loss was estimated based on current rates for the District Residential customer category.

Estimated Revenue assumes that the current rates will not change significantly over the planning period.

Estimated Annual Cost	**$1,488**	/year
Estimated Cost over Planning Period not including Lost Revenue	**$7,500.00**	
Estimated Total Cost over Planning Period Including Set-up and Lost Revenue	**$14,883**	
Cost per 1000 Gallons Saved	**$3.92**	

Pre-Rinse Spray Valve (PRSV) Upgrades

Center for ReSource Conservation (CRC) offers this program. "Save water in commercial kitchens with a quick, easy, and effective pre-rinse spray valve (PRSV) upgrade. This 15-minute swapping service is offered at no cost to businesses and creates instant, measurable water and energy savings"

Planning Period	2015 to 2024	
Years in Planning Period	10	
Program Length	10	years

Estimated Water Savings

Annual Estimated Savings Rate	8.4%

Customer Category	Indoor Water Use Per Tap gallons/yr/tap	*Estimated Annual Water Savings gallons/yr/tap*	*Annual Program Installs*
Non-Residential (NonRes)	357,107	30,000	10

Estimated Annual Water Savings	**0.20**	MG/yr
Estimated Savings over Planning Period	**11.0**	MG

The indoor use estimates are based on indoor use being approximately 51% of total Non-Residential (i.e., Commercial, Industrial, etc.) water use.
CRC estimates a savings of 20,000 per PRSV swap. Pre-rinse nozzles for dishwashers are installed by CRC. It is estimated that approximately 1½ PRSV swaps will be made per customer.

Costs

Total Cost to Water Provider

Labor Costs		
Staff Hours	2.5	/year
Hourly Cost	$80	/hour
Annual Staff Costs	$200	
Third Party Costs	$2,500	/year
Evaluation and Follow-up Costs	$100	/year
Annual Labor	**$2,800**	/year

Notes:

Costs include staff time (approximately 1/4 hr./participant) for implementing and evaluation.

Third Party Costs include CRC time.
Material cost is incorporated into Third Party Costs and includes the cost of the fixture.

Pre-Rinse Spray Valve (PRSV) Upgrades

Water Rates

Rate Category	Current Rates (per 1,000 gals)
Non-Residential (NonRes)	2.67

Estimated Average Annual Revenue without Water Savings	$52,392	/year
Estimated Average Annual Revenue with Water Savings	$47,991	/year
Annual Revenue Loss Related to Water Savings	**$4,401**	/year

Notes:

The annual revenue loss was estimated based on current rates for the NonRes District customer category.

Estimated Revenue assumes that the current rates will not change significantly over the planning period.

Estimated Annual Cost	**$3,240**	/year
Estimated Cost over Planning Period not including Lost Revenue	**$28,000**	
Estimated Total Cost over Planning Period Including Set-up and Lost Revenue	**$32,401**	
Cost per 1000 Gallons Saved	**$2.95**	

Time of Day Watering Restrictions

Currently there are no specific restrictions on times during the day for watering. Customers are encouraged ("Conservation Tips") to irrigate landscaped areas before 10 a.m. and after 6 p.m. and to minimize or discontinue water use for non-essential purposes. Water supply is monitored throughout the year to determine what, if any, additional measures will be needed.

Planning Period	2015 to 2024	
Years in Planning Period	10	
Program Length	10	years

Estimated Water Savings

Annual Estimated Savings Rate	0.05%	

Customer Category	Outdoor Water Use Gal	*Estimated Annual Water Savings gallons/yr*
Residential (Res)	1,618,218,362	809,109
Residential Multiuse (RMU)	5,160,505	2,580
Non-Residential (NonRes)	229,821,214	114,911
Irrigation (IRR)	426,786,203	213,393

Estimated Annual Water Savings	**1.14**	MG/yr
Estimated Savings over Planning Period	**11.4**	MG

Notes:

Estimate that approximately 15% of Commercial, 100% of Commercial Irrigation, 40% of Residential, 100% of Residential Irrigation, and 100% of Reg 84 is outdoor use. Other categories were not included due to small percentage or lack of impact.

A conservative estimate of 0.1% savings of projected outdoor water usage was assumed.

Costs

Total Cost to Water Provider

Labor Costs

Staff Hours	5	/year
Hourly Cost	$80.00	/hour
Annual Staff Costs	$400.00	
Annual Labor	**$400.00**	/year

Notes:

Costs include staff time for implementing water restrictions for existing measure.

Water Rates

Rate Category	Current Rates (per 1,000 gals)
Residential (Res)	$1.95
Residential Multiuse (RMU)	$2.40
Non-Residential (NonRes)	$2.67
Irrigation (IRR)	$2.97

Notes:

The annual revenue loss was estimated based on current weighted rates for select customer categories

Estimated Revenue assumes that the current rates will not change significantly over the planning period.

Time of Day Watering Restrictions

Estimated Average Annual Revenue without Water Savings	$4,351,193	/year
Estimated Average Annual Revenue with Water Savings	$4,349,018	/year
Annual Revenue Loss Related to Water Savings	**$2,176**	/year

Estimated Annual Cost	**$2,576**	/year
Estimated Cost over Planning Period not including Lost Revenue	**$4,000**	
Estimated Total Cost over Planning Period Including Set-up and Lost Revenue	**$25,756**	
Cost per 1000 Gallons Saved	**$2.26**	

Educational Activities

Analysis of costs and benefits for educational activities are combined as shown below. Activities include Bill Stuffers, Newsletter, Newspaper Articles, Mass Mailings, and Water Efficiency Page on FCLWD Website.

Planning Period	2015 to 2024	
Years in Planning Period	10	
Program Length	10	years

Estimated Water Savings

Customer Category	Avg. Annual Water Use over Planning Period (MG)	Estimated Annual Savings Rate	Estimated Annual Water Savings (MG/yr)
Residential (Res)	2,515.54	2.0%	50.31
Residential Multiuse (RMU)	85.86	1.5%	1.29
Non-Residential (NonRes)	467.10	0.5%	2.34
Irrigation (IRR)	426.79	1.5%	6.40
Other	139.78	0.10%	0.14

Estimated Annual Water Savings	60.5	MG/yr
Estimated Savings over Planning Period	**605**	MG

Costs

Total Cost to Water Provider

Labor Costs		
Staff Hours	40	/year
Hourly Cost	$80.00	/hour
Annual Labor	**$3,200.00**	/year
Materials Costs		
Unit Cost (cost of Bill Stuffers)	$0.25	/participant
Avg. Number of Participants (receiving bill stuffers) over Planning Period	17,598	/year
Annual Materials	**$4,399.43**	/year

Notes:

Staff hours include time spent preparing newsletter, updating website, and preparing bill stuffers.

In 2014 there were over 16,000 active tap accounts. The average affected number of taps during the planning period is projected to be approximately 17,600.

The annual revenue loss was estimated based on current rates for all District customers and assumes rates will not change significantly over the planning period.

Water Rates

Rate Category	Average Monthly Usage (gals/TE)	Current Rates (per 1,000 gals)
Residential (Res)	154,743	$1.95
Residential Multiuse (RMU)	234,690	$2.40
Non-Residential (NonRes)	702,990	$2.67
Irrigation (IRR)	1,411,173	$2.97
Other	16,046,539	$3.24

Educational Activities

Estimated Average Annual Revenue without Water Savings	$8,067,324	/year
Estimated Average Annual Revenue with Water Savings	$7,940,643	/year
Estimated Annual Revenue Loss Related to Water Savings	**$126,680**	/year

Estimated Annual Cost	**$134,280**	/year
Estimated Cost over Planning Period not including Lost Revenue	**$75,994**	
Estimated Total Cost over Planning Period Including Lost Revenue	**$1,342,799**	
Cost per 1000 Gallons Saved	**$2.22**	

APPENDIX E

Public Comments and Response

APPENDIX F

Colorado Water Conservation Board Cover Letter and Approval