PUBLIC WORKS & NATURAL RESOURCES
LONGMONTCOLORADO.GOV

December 22, 2017

Mr. Kevin Reidy
Colorado Water Conservation Board
1313 Sherman Street, Room 721
Denver, CO 80203

Dear Mr. Reidy,

Subject: City of Longmont 2017 Water Efficiency Master Plan

City of Longmont (City) is pleased to send Colorado Water Conservation Board (CWCB) its final 2017 Water Efficiency Master Plan Update (Plan), see attached. The Plan was unanimously approved by Longmont City Council on November 14, 2017; meeting minutes for this council session are Attachment 1 to this letter. The City is grateful to have received a planning grant from CWCB that partially funded preparation of the Plan. The Plan was prepared by the City with technical assistance from CH2M HILL Engineers, Inc. and WaterDM.

To help simplify the review process, I have included a checklist of the state's planning requirements in Section 7 of the Plan; the checklist is Attachment 2 to this letter for reference.

I will be the contact person for this Plan, my contact information is listed below:

Nelson Tipton
City of Longmont
1100 S. Sherman Street
Longmont, CO 80501
Phone: 303-651-8365 - Email address: nelson.tipton@longmontcolorado.gov

The City greatly appreciates the resources provided by CWCB and looks forward to continuing efforts towards efficient water use.

Sincerely,

Nelson Tipton
City of Longmont
Water Resources Analyst
Public Works & Natural Resources

City of Longmont

Water Efficiency Master Plan

Update to the 2008 Water Conservation Plan

September 2017

Submitted by

ch2m

WaterDM
DEMAND MANAGEMENT

FINAL REPORT

City of Longmont
Water Efficiency Master Plan

Update to the 2008 Water Conservation Master Plan

Prepared for
City of Longmont

September 2017

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Acronyms and Abbreviations

acre-feet	unit of volume to measure water equivalent to an acre of area covered with one foot of water (325,850 gallons), enough to provide water for approximately 6 people for about one year
AMI	advanced metering infrastructure
AMR	automated meter reading
AWWA	American Water Works Association
B&V	Black & Veatch
BMP	best management practice
CBT	Colorado-Big Thompson Project
cfs	cubic feet per second
CIP	capital improvement program
City	City of Longmont
CLCP	Carter Lake Connecting Pipeline
CRC	Center for ReSource Conservation
CWCB	Colorado Water Conservation Board
DF	dual flush toilets (no more than 1.6 gallons per flush for solids and 1.1 for liquids)
ET	evapotranspiration
EV	economic vitality
gpcd	gallons per capita per day
GIS	geographic information system
Gross Per Capita Water Use	total treated water production divided by total service population
HE	high efficiency
HOA	Home Owner's Association
ITWSMP	2013 Integrated Treated Water Supply Master Plan
IWA	International Water Association
LACP	Longmont Area Comprehensive Plan
LPA	Longmont Planning Area
MG	million gallons
mgd	million gallons per day
MSA	municipal service area
NCWCD	Northern Colorado Water Conservancy District (aka Northern Water)
NFWTP	Nelson-Flanders Water Treatment Plant and Wade Gaddis WTP

PACE	Partners for A Clean Environment
Plan	2017 Water Efficiency Master Plan
psi	pounds per square inch
Residential Per Capita Water Use	total residential + multifamily metered treated water demand divided by total service population
RF	radio frequency
RWMP	Raw Water Master Plan
SVSC	St. Vrain Supply Canal
WGWTP	Wade Gaddis Water Treatment Plant
WTP	water treatment plant

Executive Summary

Throughout its history, the City of Longmont (the City) has provided safe, reliable potable water to all its customers. Efficient water use has been part of the City's planning goals for over two decades, starting with the City's first Water Conservation Master Plan in 1996, the Water Conservation Master Plan Update in 2008, and this 2017 Water Efficiency Master Plan (Plan).

The purpose of the Plan is to assess the overall characteristics of current and future City water use, summarize the current status of raw water supply and treatment capacity, and use this information to frame the City's water conservation program with respect to current and ongoing water supply needs and water demand management. In addition, the Plan provides a detailed assessment related to the identification and selection of future water efficiency measures and programs the City will continue to implement and evaluate.

As of 2015, Longmont's Municipal Service Area encompassed 28.7 square miles, included 93,575 people, and provided treated water service through 27,223 metered connections. In the same year, Longmont's total treated water production was 14,973 acre-feet and the total metered demand was 13,828 acre-feet. Gross per capita water use was 140 gallons per capita per day (gpcd), total metered per capita water use was 129 gpcd, and metered residential per capita water use was 88 gpcd. In 2015, the City estimated its treated water loss at approximately 7 percent of treated water production, a comparatively low level and well within the normal range for a utility of this size and age.

The City implements the foundational water efficiency measures described in the American Water Works Association (AWWA) G480 Water Conservation Program and Management Standard (2013), including full metering, monthly billing, a conservation-oriented water rate structure, ordinances and design standards focused on water efficiency, and an established water efficiency program.

Beyond the foundational measures, this Plan proposes to extend Longmont's core conservation program activities into the future with the ability to modify and adapt annually. The program described in this Plan addresses both indoor and outdoor water use across all customers in Longmont and includes residential and commercial efficient toilet rebates, efficient dishwasher rebates, irrigation audits, Garden In A Box xeriscape promotion, rain sensor rebates, automated meter reading infrastructure, system water loss control efforts, and education and outreach. The current and proposed water efficiency programs implemented by the City closely follow the recommended measures and programs from the City's 2013 *Water Conservation Program Evaluation*.

The effectiveness of water efficiency programs is difficult to quantify due to other factors that influence water use, such as variable weather, changes in customer behavior, and organic replacement of old fixtures with more efficient fixtures. However, gross per capita water use in Longmont has declined from 215 gpcd in 1996 to 140 gpcd in 2015, a reduction of approximately 34 percent.

The City's goal is to reduce customer and City raw water demands by approximately 10 percent by buildout (assumed to be 2048), for an expected reduction of approximately 3,500 acre-feet (1,141 million gallons [MG]). This goal was originally established in the *2004 Raw Water Master Plan* when the projected raw water demand at buildout was 35,580 acre-feet (11,594 MG). This goal is consistent with the *2008 Water Conservation Master Plan* and is consistent with the *City's Sustainability Plan* completed and adopted by City Council in November 2016.

Based on the *2013 Water Conservation Evaluation*, the estimated annual treated water savings from programs implemented by the City to date was approximately 2,400 acre-feet (782 MG). This estimate of savings is conservative as it does not account for additional raw water savings from efficient irrigation practices or from passive savings (such as natural replacement of appliances and fixtures, and increased

efficiency of customers from education). Because of consistent master planning, the City is approaching its goal to reduce demands by 3,500 acre-feet annually by buildout. The Plan forecasts future water savings due to specific measures and programs growing from approximately 16 acre-feet in 2017 to 143 acre-feet in 2024 over the planning period. Combined with anticipated passive conservation savings achieved through national and state codes and standards for plumbing fixtures and appliances, and increased efficiency of customers from education it is estimated additional cumulative water savings will be approximately 73 acre-feet in 2017 to 644 acre-feet in 2024.

This Water Efficiency Master Plan complies with State of Colorado statutory requirements and will be approved and filed with the Colorado Water Conservation Board (CWCB) upon completion.

SECTION 1

Introduction

1.1 Purpose

Throughout its history, the City of Longmont (the City) has provided safe, reliable potable water to all its customers. Efficient water use has been part of the City planning goals for over two decades, starting with the City's first Water Conservation Master Plan from 1996, the plan updated in 2008, and this 2017 Water Efficiency Master Plan Update (Plan).

The purpose of the Plan is to assess the overall characteristics of current and future City water use, summarize the current status of raw water supply and treatment capacity, and use this information to frame the City's water conservation program with respect to current and ongoing water supply needs and water demand management. In addition, the Plan provides a detailed assessment related to the identification and selection of future water efficiency measures and programs that the City will continue to implement. This plan also meets the requirements of Colorado Revised Statute § 37-60-126 which requires covered entities to have plan for water efficiency that has been approved by the Colorado Water Conservation Board (CWCB).

The City is committed to responsible, environmentally sound, and efficient use of its precious natural resources. Although the City owns and maintains a robust water rights portfolio, it is constantly aware of the need to evaluate and refine its water supply and demand management efforts. The City and its water utility customers recognize the importance of efficient water use as an essential component of the community's culture—helping to maintain the local quality of life in a responsible, sustainable manner.

1.2 Organization

This Plan was prepared following the steps outlined in the Colorado Water Conservation Board (CWCB) Water Conservation Planning Guidance Document. The steps are as follows:

- Step 1—Profile of Existing Water Supply System
- Step 2—Profile of Water Demands and Historical Demand Management
- Step 3—Integrated Planning and Water Efficiency Benefits and Goals
- Step 4—Selection of Water Efficiency Activities
- Step 5—Implementation and Monitoring

Each step of the planning process has been integrated into the following sections in this Plan:

1. Introduction
2. Profile of Existing Water System (Step 1)
3. Service Area and Water Demands (Step 2)
4. Current and Future Water Efficiency Efforts (Steps 2 and 4)
5. Demand Forecast and Efficiency Goals (Step 3)
6. Plan Adoption and Implementation (Step 5)

1.3 Acknowledgements

Development of this Plan was not possible without the cooperative effort and support of the City's Public Works and Natural Resources Department, Parks and Open Space Department, Planning Department, and the Longmont Water Board. The Plan was prepared under the leadership of the Public Works and Natural Resources Department and partially funded with a grant from the CWCB.

SECTION 2

Profile of Existing Water System

The following section includes information on the City's main infrastructure of the water delivery system: raw water supply, drinking water treatment, and distribution. Current capacity and future capital projects are summarized and if water efficiency improvements impact the timing of major projects.

2.1 Raw Water Sources

Mountain watersheds are the City's current and future primary source of raw water for drinking water and raw water irrigation purposes. The City has established a robust raw water supply system with multiple alternate points of diversion. An overview of the City's raw water supply network is provided in **Table 2-1**.

The City has raw water diversion rights from the St. Vrain Creek Basin and the Upper Colorado River Basin. St. Vrain Creek Basin includes the North St. Vrain Creek, South St. Vrain Creek, and St. Vrain Creek. Headwaters of the North St. Vrain Creek are in Rocky Mountain National Park with Ralph Price Reservoir as the City's primary water storage facility. Headwaters of South St. Vrain Creek are near the Indian Peaks Wilderness Area. The north and south forks combine to form the St. Vrain Creek near the town of Lyons downstream of Ralph Price Reservoir. In 2015, 63 percent of Longmont's water supply was from North St. Vrain Creek and St. Vrain Creek (*2015 Water Quality Report*).

The City also has ownership in the Colorado-Big Thompson (CBT) project and Windy Gap trans-mountain diversion projects operated by the Northern Colorado Water Conservancy District (NCWCD). Water from the Colorado River headwaters is stored in several reservoirs west of the continental divide. CBT water is conveyed through the Alva B. Adams Tunnel to the east slope, and then through several lakes and reservoirs to Carter Lake. From Carter Lake, the City receives CBT water through the St. Vrain Supply Canal and Southern Water Supply Pipeline. In 2015, 37 percent of Longmont's water supply was from CBT water (*2015 Water Quality Report*).

Watershed basins that supply raw water and the infrastructure to deliver the water to the City's water treatment plants (WTPs), the Nelson-Flanders WTP (NFWTP), and Wade Gaddis WTP (WGWTP) are summarized in **Table 2-1.**

Table 2-1. Existing Raw Water Supply System Summary

Source Water Basin	Infrastructure for Delivery to City of Longmont Water Treatment Plants	Supply to NFWTP	Supply to WGWTP
Upper Colorado[1]	**Carter Lake Connecting Pipeline (CLCP)[2]** – Delivers CBT and Windy Gap Project water via Southern Water Supply Pipeline and CLCP.	Yes	Yes
	St. Vrain Supply Canal (SVSC) and Pipelines[3] – Delivers CBT and Windy Gap Project from Carter Lake via canal, then through a short pipeline segment to NFWTP from the canal.	Yes	No[4]
North St. Vrain	**North Pipeline** – Delivers N. St. Vrain from Ralph Price Reservoir via diversion point from Longmont Reservoir.	Yes	No[4]
South St. Vrain	**South Pipeline[4]** – Delivers S. St. Vrain via direct diversion from river to pipeline.	Yes	No

Table 2-1. Existing Raw Water Supply System Summary

Source Water Basin	Infrastructure for Delivery to City of Longmont Water Treatment Plants	Supply to NFWTP	Supply to WGWTP
St. Vrain (downstream of the confluence of the North and South St. Vrain)	**Highland Ditch** –Delivers St. Vrain via direct diversion from river.	Yes	Yes[5]
St. Vrain	**Burch Lake** – Delivers St. Vrain water conveyed to Burch Lake via Palmerton Ditch. The existing Burch Lake pump station is connected to WGWTP and could be connected to the CLCP in the future.	No	Yes

[1] Northern Water operates and maintains the CBT Project and Windy Gap projects. The City of Longmont owns allotment contracts in each project.
[2] The pipeline that delivers CBT water to the WTPs comprises four projects: CLCP (1999), to pipeline from Highland Ditch to WGWTP (1983), to pipeline along south side of Highway 66 (1974), to pipeline from Highway 66 to NFWTP (2005).
[3] SVSC is owned by Northern Water. The City has constructed two pipelines to deliver water from the SVSC to the NFWTP: Carter pipeline from the SVSC to Carter Pond (1973) and an extension of that pipeline upstream of Carter Pond to the NFWTP (2005).
[4] These raw water sources could be conveyed to WGWTP from NFWTP by reversing the normal flow direction of the CLCP when it is not supplying CBT water.
[5] This diversion is only used in emergency situations and can only convey water to WGWTP when the CLCP is not supplying CBT water.

Delivery capacity of each raw water supply to each treatment plant is important when evaluating infrastructure needs for ultimate build-out of the City. Current capacities of existing raw water supply infrastructure to each WTP are summarized in **Table 2-2**.

Table 2-2. Existing Raw Water Infrastructure Summary

Infrastructure for Delivery to City of Longmont Water Treatment Plants	Maximum Delivery to NFWTP (mgd)	Maximum Delivery to WGWTP (mgd)	Notes
Carter Lake Connecting Pipeline (CLCP)	15.5	15.5	Maximum allotment of CLCP, flow based on southern supply pipeline carriage agreements and not necessarily the hydraulic capacity of the pipeline. This amount of flow can be conveyed to either WTP. Cannot supply CLCP water to NFWTP if the Highland Ditch is open to WGWTP.
St. Vrain Supply Canal (SVSC)	32.3	0	SVSC flow based on 2003 Black & Veatch (B&V) Basis of Design Report and not necessarily the hydraulic capacity of the pipeline. SVSC is not available from November through May each year. Project planned in 2020 to enlarge intake.
North Pipeline	18.1	0	North Pipeline flow based 2003 B&V Basis of Design Report and not necessarily the hydraulic capacity of the pipeline.

Table 2-2. Existing Raw Water Infrastructure Summary

Infrastructure for Delivery to City of Longmont Water Treatment Plants	Maximum Delivery to NFWTP (mgd)	Maximum Delivery to WGWTP (mgd)	Notes
South Pipeline	7.7	0	Flow based on capacity of pipeline with gravity flow (12 cfs).
Highland Ditch	16.1	15	NFWTP value is the capacity of the Highland Ditch Pump Station. WGWTP value is based on actual flow during operation and is not necessarily the pipeline capacity. Cannot supply Highland Ditch water to WGWTP via connection at WGWTP if CLCP is online.
Burch Lake	0	18	Capacity of the influent pump station at WGWTP from Burch Lake.
Total Raw Water Delivery	**82**	**33 or 33.5**	Total raw water delivery for WGWTP reflects that supply from the CLCP and Highland Ditch to WGWTP cannot occur at the same time.

The capacity to deliver water to the treatment plants also depends on water rights agreements. For example, the CLCP and North Pipeline are available year round, while the SVSC is not available from November through May each year.

In addition to delivery capacity, the condition of the raw water supply facilities is also important. The North Pipeline, which supplies water from North St. Vrain, is located in the foothills and is most in need of repair and this has been identified as a project in the City's capital improvement program (CIP) to either repair the pipeline or change the point of diversion. A portion of the North Pipeline was damaged during the 2013 flood and there is a current project underway to repair this segment, as well as relocate a portion of the pipeline from the St. Vrain Creek bed alignment. The diversion to the South Pipeline was destroyed in the 2013 flood and has since been repaired so this is new infrastructure.

In 2015, the estimated total raw water storage capacity was 32,026 acre-feet. The estimated annual average treated water demand at build-out will require multiple raw water sources. The flexibility of the raw water supply system decreases at build-out because multiple raw water sources are required to meet demand above the annual average. However, peak demand can still be achieved in multiple ways.

Future alternatives for additional raw water supply and storage were evaluated in the 2004 Raw Water Master Plan (RWMP) and the 2013 Integrated Treated Water Supply Master Plan (ITWSMP). From these evaluations, future capital projects to maintain the reliability and flexibility of the raw water supply system include:

- Enlargement of the Button Rock Dam to increase the capacity of Ralph Price Reservoir (2004 RWMP)
- Enlargement of Union Reservoir and pipeline (2004 RWMP)
- Participation in Windy Gap Firming Project to construct Chimney Hollow Reservoir (2004 RWMP)
- North St. Vrain pipeline repair (CIP #WTR112)
- North St. Vrain alternate diversion point (2013 ITWSMP)
- South St. Vrain pipeline improvements (CIP #WTR153)
- Union Reservoir pump-back pipeline (CIP # WTR177)

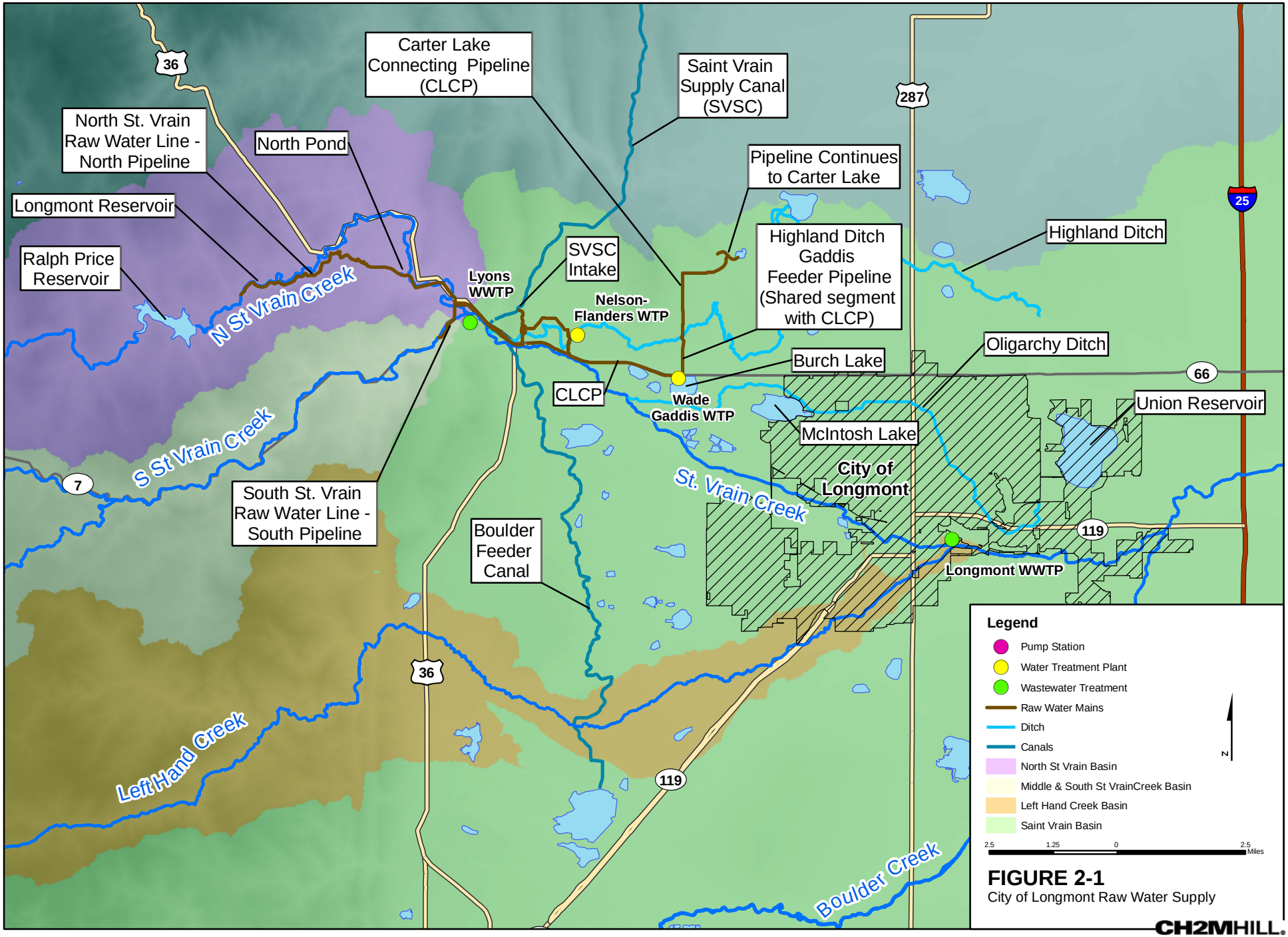


FIGURE 2-1
City of Longmont Raw Water Supply

CH2MHILL

Non-construction options to increase raw water supply include purchasing additional CBT rights, purchasing St. Vrain Creek water rights, and acquiring additional water rights through annexation.

In planning for future raw water supply, City leadership supports additional raw water supply capacity for added sustainability of the raw water system. Therefore, water efficiency may not influence the timing of the various large capital projects for additional raw water supply and storage.

2.2 Water Treatment Plants

The City currently has two WTPs. NFWTP is a 40-million-gallons/day (mgd) plant that became operational in 2007, while WGWTP is an older 15-mgd plant constructed in 1984. The original capacity of the NFWTP was 30 mgd. In 2013 it was re-rated to 40 mgd based on demonstration tests. The current combined total treatment plant capacity is 55 mgd if WGWTP is included at full rated capacity. The WGWTP serves as a peaking plant that provides additional drinking water capacity during the summer months when water demand exceeds the capacity of the NFWTP. However, the WGWTP has not been used since 2011 to meet peak demands. Significant improvements would also be needed to maintain WGWTP capacity and even then, the combined plan capacity does not meet the forecasted demands at build-out. The 2013 ITWSMP recommended expansion of the NFWTP to 60 mgd and decommissioning of WGWTP in 5 to 10 years; the City's CIP reflects this approach.

Forecasted peak-day water demand from the 2013 ITWSMP (without accounting for additional conservation measures) reaches 40 mgd between 2023 and 2030, depending on the City's growth rate. The City's CIP has the NFWTP expansion planned to begin in 2020. Water efficiency efforts in the future would limit the need for operation of the WGWTP to meet peak demands. The NFWTP expansion planned for 2020 is still being evaluated, but one approach would be to construct the infrastructure needed for ultimate plant capacity and phase in equipment over time as demand increases.

2.3 Water Distribution System

The City's water distribution system includes four water storage tanks and five pump stations that supply a network of more than 440 miles of pipe ranging from 2 to 66 inches in diameter. The total amount of storage in the City's existing water distribution system is 27 MG. However, several of the pipelines and storage facilities in the City's distribution system have reached the end of their expected life and need replacement. Two major projects identified in the City's CIP are the Clover Basin Water Transmission Line, and the Price Park Tank Replacement. The Clover Basin Water Transmission Line will increase capacity to the southwest portion of the City that is experiencing heavy residential growth. A new Price Park Tank is needed to replace two existing underground tanks that have condition issues and to increase water pressure to this zone.

In addition to large CIP project, the City rehabilitates water lines in the distribution system annually to improve water service, water quality, and decrease the frequency of water line breaks.

The City is also in the process of converting water meters from analog to digital meters that are automated meter reading/advanced metering infrastructure (AMR/AMI) capable (CIP project #WTR150). Approximately one-third of the meters have been replaced and approximately 16,000 are yet to be replaced. The project will also include centralized data management that will improve the City's ability to identify distribution system water loss and improve usage information for customers.

2.4 Raw Water for Irrigation

The City has the ability to reduce its overall treated water demand through the use of raw water for outdoor irrigation to save treatment and energy costs, especially in cases where direct ditch rights are available adjacent or in close proximity to irrigable areas. The City has an extensive network of canals

and irrigation ditches that convey raw water to parks, golf courses, schools, and greenways for irrigation. Currently, raw water is available to irrigate approximately 27 City and community parks, 2 golf courses, and 18 schools, representing 56 percent of parks, 66 percent of golf courses, and 60 percent of schools. The site of the City's main recreation facility is also irrigated with raw water. Availability of raw water for irrigation decreases demand for treated water from the treatment plant and conserves energy and chemicals required for treatment. The City continues to evaluate options for using raw water in place of treated water for irrigation and is proceeding with conversion of parks and greenways along Spring Gulch No. 2 south of 17th Avenue.

The City also installed flow monitoring systems on raw water irrigation intake points to improve raw water accounting. The City had started this flow monitoring effort previously, but is now also being required by the Colorado Division of Water Resources, also known as the Office of the State Engineer, to monitor irrigation flows.

Table 2-3 summarizes the City's estimated raw water supply and use information for 2015.

Table 2-3. Summary of Estimated Raw Water Supply and Use (2015)

Annual Water Supply	Annual Volume (acre-feet)	Percent Metered
Raw Water for Irrigation[a]	1,447	100%
Raw Water for Treatment	15,967	100%
Total Raw Water Used (Accounted)	17,414	-
Total Annual Water Sold[b]	12,994	100%

[a] Required raw water accounts for raw water that is non-transferrable to municipal uses and raw water from the Union Reservoir pump back.

[b] City does not bill municipal properties for treated water used (see Table 3-2).

Conversion of treated water irrigation to raw water irrigation effectively reduces overall water use by the City, since raw water savings will be realized due to reduced treatment plant water requirements (e.g., filter backwash) and distribution system losses. Additionally, removing irrigation demands from treated water supplies allows instream flows to remain in the St. Vrain Creek from the point of diversion to the WTP to other diversions further downstream. Finally, much of the raw water irrigation is non-virgin flow, creating better efficiency for the entire St. Vrain Creek Watershed.

SECTION 3

Service Area and Water Demands

The following section describes the City's water service area, includes a summary of historical data characterizing water demand in the service area, and summarizes the City's water rate structure.

3.1 Service Area and Population

The City of Longmont is located in Boulder County, approximately 30 miles north of the Denver metro area. St. Vrain Creek flows through the City and is a tributary to the South Platte River basin. The City's water service area follows the Longmont Area Comprehensive Plan (LACP) planning areas for managing the treated water service in the Municipal Service Area (MSA) and Longmont Planning Area (LPA) (**Figure 3-1)**. The MSA is the area that the City considers appropriate for urban development and intends to annex and provide urban services; it represents the greatest level of public investment for installation and maintenance of capital improvements. The LPA is the next tier outside the MSA. The City plans these areas in advance using a neighborhood planning area concept. Neighborhood planning areas are the basis planning unit; they include a mix of land uses that serves residents and workforce.

For purposes of this plan, evaluation of the current and forecasted water demands represents all metered water use in the current MSA and existing services outside the MSA. Existing services provided outside the MSA include water service to some residents in the Hygiene area and the Town of Lyons.

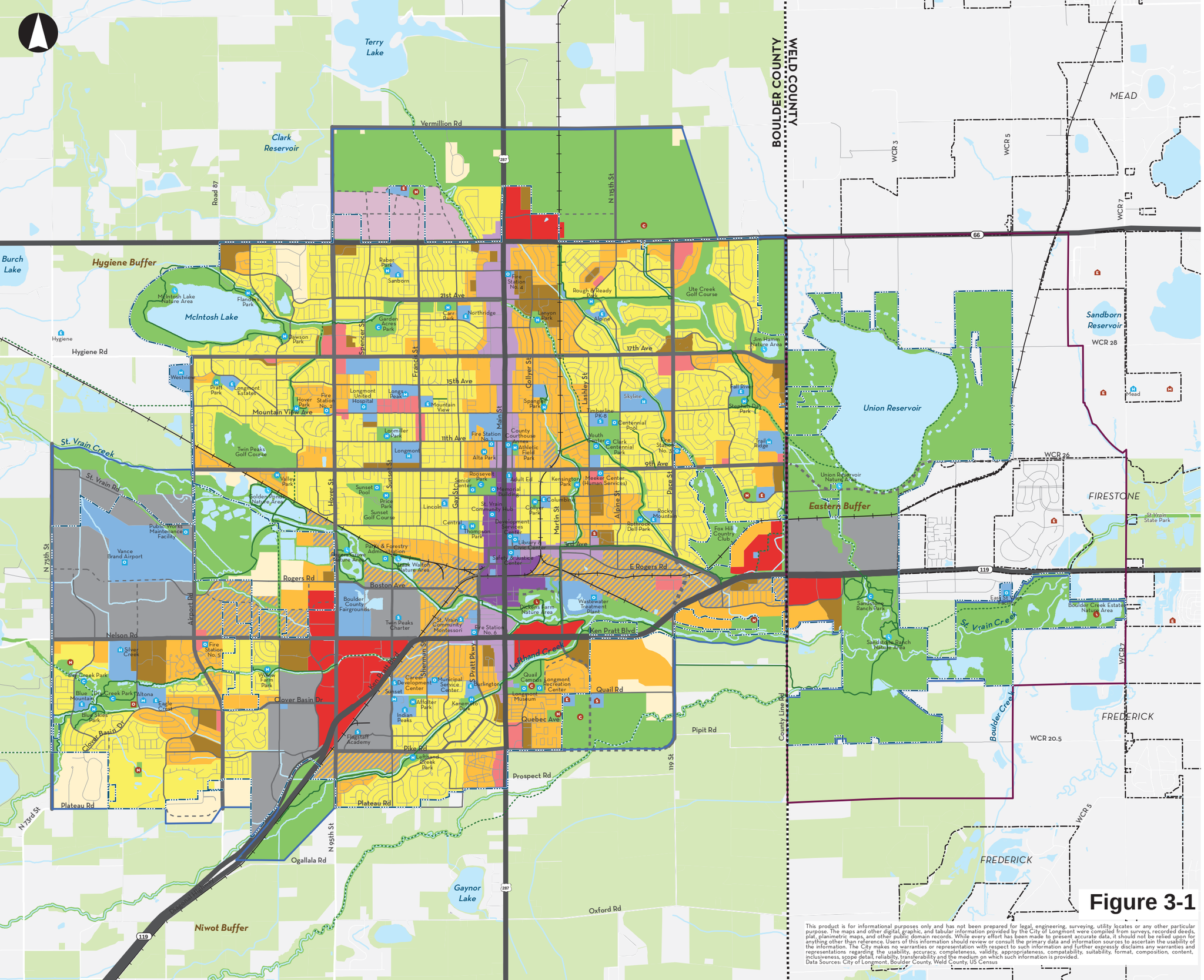
As of 2015, the City' MSA encompassed 28.7 square miles, or 18,367 acres, which has increased from 10.5 square miles in 1980 (*Longmont Community Profile 2015*). Growth has been primarily due to residential homes, but industrial development has also increased, providing a balance between housing and jobs.

Table 3-1 summarizes the service population, City population, and active and metered water accounts for 2007 to 2015.

Table 3-1. Population and Water Account Summary

Year	Service Population[a]	City Population	City Population Annual % Change	Total Water Accounts
2007	86,410	85,762	1.3%	26,289
2008	86,817	86,194	0.5%	25,999
2009	86,926	86,303	0.1%	26,513
2010	88,080	87,461	1.3%	26,636
2011	88,462	87,850	0.5%	26,740
2012	88,453	87,841	0%	26,933
2013	90,891	90,262	2.8%	26,843
2014	92,629	91,911	1.8%	27,007
2015	93,575	92,852	1.0%	27,223

[a] Population includes customers outside of the MSA and does not include the Town of Lyons; source: *Water Utility Annual Statistical Summary Reports*.



FUTURE LAND USE & TRANSPORTATION SYSTEM

Boundaries
- Municipal Service Area (MSA)
- Longmont Planning Area (LPA)
- Coordinated Planning Area (CPA)
- Neighboring Municipalities

Neighborhoods
- Rural Neighborhood
- Single-Family Neighborhood
- Mixed Neighborhood
- Multi-Family Neighborhood

Mixed-Use
- Downtown/CBD
- Regional Center
- Neighborhood Center
- Mixed-Use Corridor

Employment
- Mixed-Use Employment
- Primary Employment

Community
- Parks, Greenways, Open Space
- Public/Quasi-Public
- Union Reservoir Expansion Area

Other
- Terry Lake Mixed-Use Area
- Protected Lands Outside LPA

Transportation Network
- Regional Arterial
- Principal Arterial
- Minor Arterial
- Collector
- Local Street
- Multi-Use Trail
- Railroad
- Future Arterial
- Future Minor Arterial
- Future Collector
- Future Multi-Use Trail

Community Facilities

Existing	Proposed	
N	N	Neighborhood Park
C	C	Community Park
		Nature Areas
E	E	Elementary School
M	M	Middle School
H	H	High School
S	S	Special School
O	O	Other Facility

0 0.5 1 2 Miles

Figure 3-1

The City has been experiencing consistent growth over the last several years. Since 2007, the average rate of population growth has been approximately 1.0 percent per year. Water meter accounts have grown approximately 0.5 percent per year in the same period.

3.2 Treated Water Demand

In this plan the description of water demand is consistent with the International Water Association (IWA) and AWWA Water Balance approach, which was published in 2000 as part of the IWA publication, *Performance Indicators for Water Supply Services,* to provide utilities a consistent method for assessing water loss. Though the full assessment of a water balance is outside the scope of this plan, the terminology is consistent and is summarized in **Figure 3-2**.

Figure 3-2. IWA/AWWA Water Balance Summary (Source: 4th Edition AWWA M36 Manual (2016))

<table>
<tr><td rowspan="10">System Input Volume (corrected for known errors)</td><td rowspan="3">Authorized Consumption</td><td rowspan="2">Billed Authorized Consumption</td><td>Billed Metered Consumption (including water exported)</td><td rowspan="2">Revenue Water</td></tr>
<tr><td>Billed Unmetered Consumption</td></tr>
<tr><td rowspan="2">Unbilled Authorized Consumption</td><td>Unbilled Metered Consumption</td><td rowspan="7">Non-Revenue Water (NRW)</td></tr>
<tr><td>Unbilled Unmetered Consumption</td></tr>
<tr><td rowspan="6">Water Losses</td><td rowspan="3">Apparent Losses</td><td>Unauthorized Consumption</td></tr>
<tr><td>Customer Metering Inaccuracies</td></tr>
<tr><td>Systematic Data Handling Errors</td></tr>
<tr><td rowspan="3">Real Losses</td><td>Leakage on Transmission and Distribution Mains</td></tr>
<tr><td>Leakage and Overflows at Utility's Storage Tanks</td></tr>
<tr><td>Leakage on Service Connections up to point of Customer metering</td></tr>
</table>

3.2.1 Customer Classifications

Potable water use is metered according to the following seven customer classifications: residential (single family and duplexes), multifamily, small commercial, large commercial-industrial, irrigation, Town of Lyons, and City. The first meters on residential single-family homes were installed in 1975 and at of the end of 2006 there were no unmetered residential connections. Multifamily dwellings had meters first installed in 1976 and are completely metered. Meters for large commercial and small commercial customers were first installed in 1983 and 1984, respectively, and are now completely metered as well. Irrigation was separated into a new customer classification beginning in 2001 and primarily represents homeowner association (HOA) neighborhood irrigation systems, and separate irrigation taps for new small commercial establishments. Customer classification descriptions are summarized in **Table 3-2** and represent accounts that generate revenue for the City (except the City classification which is not billed back to the City).

Table 3-2. Customer Classifications

Category	Description
Residential—single family and duplexes	Residential single family homes and duplexes.
Multifamily	Three or more attached living units, includes mobile home parks. Newer developments may have multiple detached living units on one lot and are classified as multifamily. New multifamily complexes will have a multifamily tap to each building and a dedicated irrigation tap, and may also have a separate tap to the clubhouse area. The buildings are classified as multifamily, irrigation tap as irrigation, and the clubhouse area as small commercial.
Small commercial	Commercial taps that provide water to the building, including hotels, assisted living, and nursing homes. Commercial establishments may also have an irrigation tap, which is classified as irrigation.
Large commercial and industrial	Negotiated services based on water use characteristics. There are currently no active accounts within this category.
Irrigation	Dedicated irrigation taps. A separate irrigation tap is required in all new multifamily complexes and will eventually be required for all commercial unless the landscaping is less than a certain square footage. Irrigation for HOA areas and pocket parks is also included in this category.
Town of Lyons	The City of Longmont treats water for the Town of Lyons and delivers through a separate metered tap. This service is labeled as "Lyons" throughout this plan.
City (non-revenue)	City facilities such as libraries, memorial buildings, City buildings, fire stations, golf courses, greenways, arterials, and parks.

3.2.2 Water Use

A summary of water usage for each billing classification, including the City's own use, is provided in **Table 3-3** and **Table 3-4** for 2007 to 2015 (units of MG and acre-feet respectively), and is presented in **Figure 3-3**. WTP production is also shown in **Figure 3-3** and represents the treated water entering the distribution system, also referred to as WTP effluent.

Table 3-3. Metered Water Use by Customer Classification 2007-2015 (MG)

Year	Residential	Multi-family	Small Commercial	Large Commercial	Irrigation	Lyons	Hydrant Meters	City	Total
2007	2790	487	905	264	607	89	19	365	**5,527**
2008	2651	475	785	209	304	98	13	357	**4,891**
2009	2427	479	764	56	273	88	10	340	**4,436**
2010	2576	603	923	56	322	102	7	479	**5,068**
2011	2633	630	819	47	343	196	6	383	**4,967**
2012	2920	553	1022	4	406	128	5	390	**5,428**
2013	2396	508	797	0.3	310	89	28	281	**4,410**
2014	2306	515	861	0	317	205	19	294	**4,515**
2015	2428	538	825	0	348	85	10	272	**4,506**

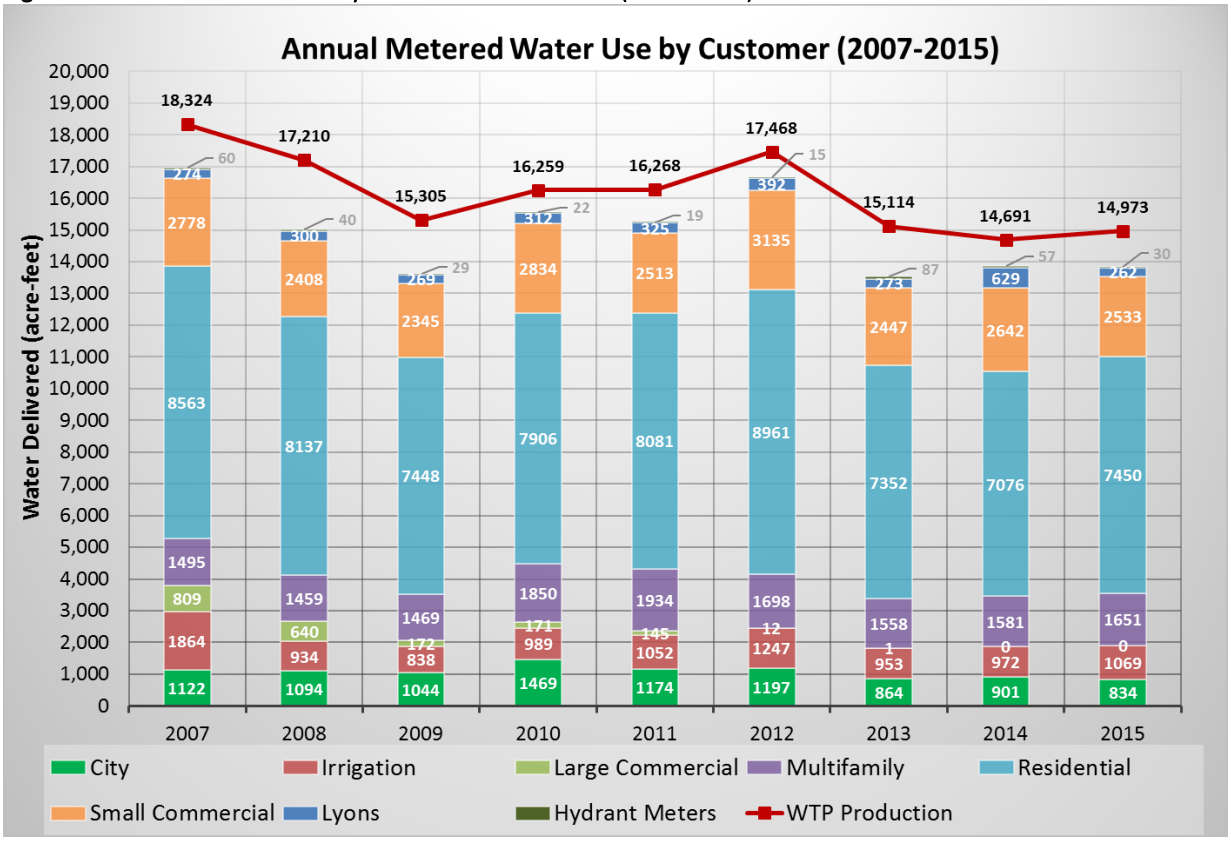
Source: *City of Longmont Monthly Billing Data*

Table 3-4. Metered Water Use by Customer Classification 2007-2015 (acre-feet)

Year	Residential	Multi-family	Small Commercial	Large Commercial	Irrigation	Lyons	Hydrant Meters	City	Total
2007	8,563	1,495	2,778	809	1,864	274	60	1,122	**16,964**
2008	8,137	1,459	2,408	640	934	300	40	1,094	**15,011**
2009	7,448	1,469	2,345	172	838	269	29	1,044	**13,614**
2010	7,906	1,850	2,834	171	989	312	22	1,469	**15,533**
2011	8,081	1,934	2,513	145	1,052	325	19	1,174	**15,244**
2012	8,961	1,698	3,135	12	1,247	392	15	1,197	**16,658**
2013	7,352	1,558	2,447	1	953	273	87	864	**13,534**
2014	7,076	1,581	2,642	0	972	629	57	901	**13,859**
2015	7,450	1,651	2,533	0	1,069	262	30	834	**13,828**

In 2015, the total metered water demand was 13,828 acre-feet, or 4,506 MG. Usage by the large commercial customers has decreased and was not measurable in 2014 and 2015. The City also meters and bills developers and contractors for water used from hydrants for construction or other purposes. Hydrant meter data are tracked separately through the City's Hydrant Meter Permit Program and are not in the monthly metered water use by customer classification.

Figure 3-3. Metered Water Use by Customer Classification (2007–2015)



Per capita water usage is a standard calculation to track usage efficiency and for comparison with other municipalities. For summary purposes in this Plan, three per capita values have been calculated: gross, metered, and residential, which are defined as follows:

- Gross per capita water use is calculated as the total treated water production (less usage by Town of Lyons) divided by the total service population.
- Metered per capita water use is calculated as the total metered usage (less usage by Town of Lyons) divided by the total service population.
- Residential per capita water use is calculated as the total metered usage from residential and multifamily accounts divided by the City's service population.

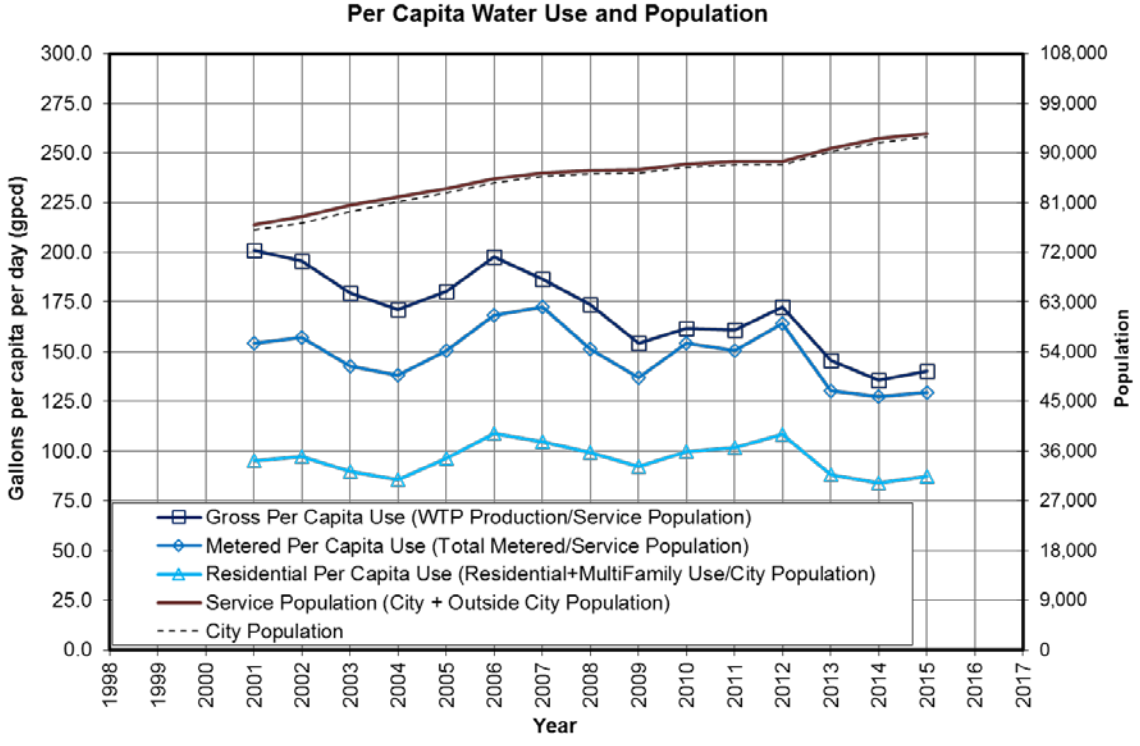
Treated water production, gross per capita, metered per capita, and residential per capita water use from 2007 to 2015 are provided in **Table 3-5** and **Figure 3-4**.

Table 3-5. Treated Water Production, Metered Use, and Per Capita Use from 2007-2015

Year	Total Treated Water Production[a] (acre-feet)	Total Metered Use (acre-feet)	Residential Per Capita[b] (gpcd)	Metered Per Capita[c] (gpcd)	Gross Per Capita[d] (gpcd)
2007	18,324	16,964	105	172	187
2008	17,210	15,011	99	151	174
2009	15,305	13,614	92	137	154
2010	16,259	15,553	100	155	162
2011	16,268	15,244	102	151	161
2012	17,468	16,658	108	164	172
2013	15,114	13,534	88	130	146
2014	14,691	13,859	84	128	136
2015	14,973	13,828	88	129	140

[a] Treated water entering the distribution system after treatment, also referred to as WTP effluent.
[b] Residential + multifamily metered use divided by City of Longmont population.
[c] Total metered use divided by total service population.
[d] Total treated water production divided by total service population.

Figure 3-4. Per Capita Water Use and Population



Since 2008, when the City's previous water conservation plan was adopted, the average residential per capita water use from 2009 to 2015 was 95 gpcd. For the same period, the gross per capita water use was 153 gpcd. The reduction in gross per capita usage and production may be attributed to a variety of factors, including, but not limited to, better accounting of water use, reduction in water loss, media attention on drought conditions, and increased water conservation practices. Residential water accounts were not fully metered until the end of 2006, and since that time the additional data have allowed for refinement of the estimated unit demand rates used for planning purposes and quantification of the volume of water losses. The trends in per capita use in Longmont suggest that long-term water efficiency measures have contributed to the decrease in per capita use, as anticipated. The City will continue to monitor these trends in the future to ensure efficiency gains planned into the future are realized.

3.2.3 Non-Revenue Water

Non-revenue water includes water that is entering the distribution system but not generating revenues for the City. In this plan, non-revenue water is separated into three main categories:

1. **Authorized unbilled metered consumption**—such as City billing classification and plant water at WGWTP
2. **Authorized unbilled unmetered consumption**—such as firefighting, fire training, inspection and pressure testing, parks and forestry watering, sanitary sewer jetting, hydrant flushing, storm sewer jetting, street sweeping, and tank cleaning
3. **Water loss**
   - **Apparent losses**—unauthorized uses, metering inaccuracies, and data handling errors
   - **Real losses**—main and service line leakage, and overflows

To more accurately characterize water demand, following the nomenclature shown earlier in **Figure 3-2**, estimates were made to quantify both the unbilled authorized water use and the apparent and real water losses from the system. The unbilled authorized use was developed looking at unbilled metered and unbilled unmetered authorized use. For 2015, the City provided estimates of the total annual volume of these unbilled authorized water uses, presented in **Table 3-6**. The estimated amount of unbilled unmetered water in **Table 3-6** is consistent with estimates in the City's 2012 Water Demand Evaluation, which estimated these uses at approximately 1 percent of the WTP production.

Table 3-6. Unbilled Authorized Water Consumption Estimate for 2015 (Treated Water Only)

Unbilled Authorized Consumption Category	Estimated Volume (acre-feet)	Notes
Unbilled Metered	0.3	Plant water at WGWTP (NFWTP plant water is accounted for prior to treated water production value), excludes the City billing classification that is tracked separately
Unbilled Unmetered	147	Firefighting, fire training, inspection and pressure testing, parks and forestry watering, sanitary sewer jetting, hydrant flushing, storm sewer jetting, street sweeping, and tank cleaning
Total	**147.3**	Non-revenue categories not accounted for in this estimate include unknown data handling errors, meter inaccuracies, and leakage

For 2015, the total estimated unbilled authorized water use was 147.3 acre-feet (48.1 MG).

Treated water not accounted for by billed authorized use (metered use), shown earlier in **Table 3-3**, and unbilled authorized use shown in **Table 3-6**, is considered water loss, either real or apparent. Essentially, water loss represents the difference between total treated water production entering the distribution system and the authorized consumption. **Table 3-7** summarizes metered use, unbilled authorized use, treated water production, and estimated water loss for 2015.

Table 3-7. Annual Water Loss Estimate (2015)[a]

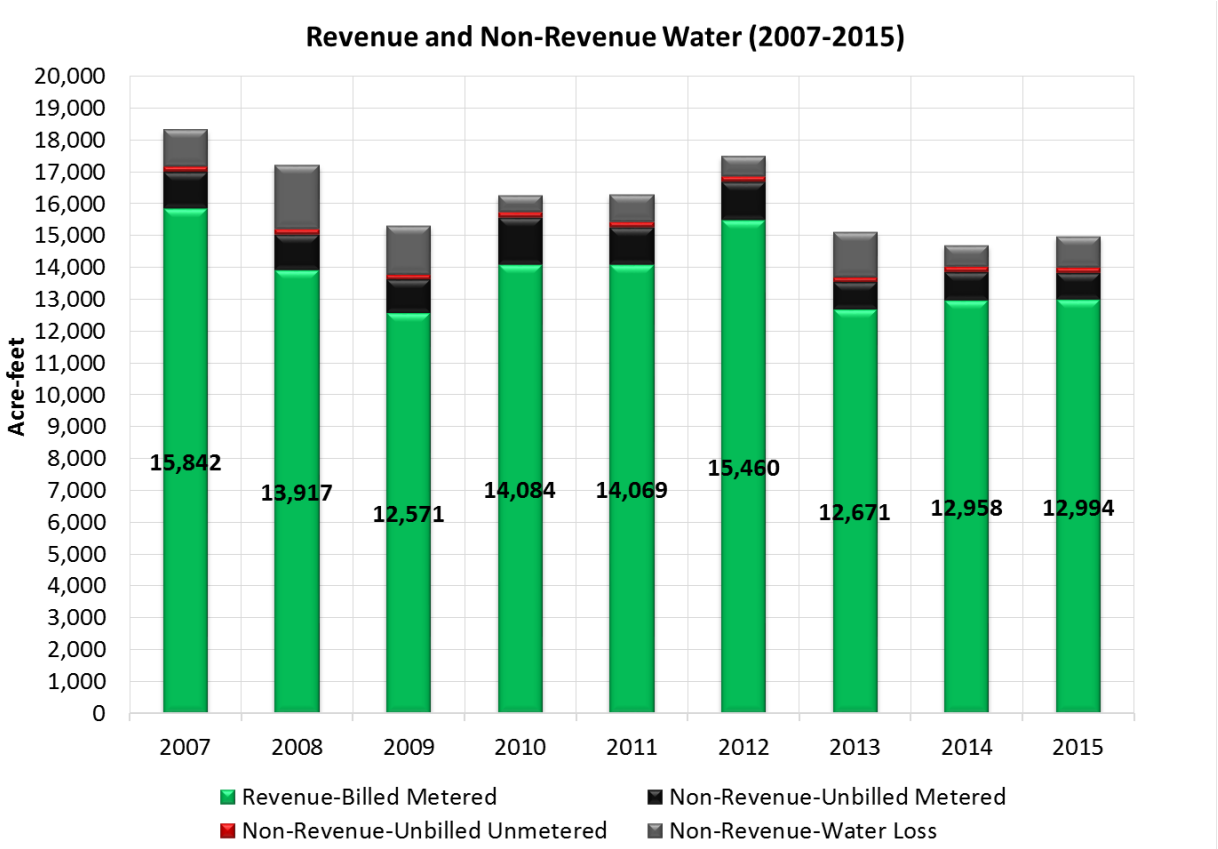
Parameter	(acre-feet and [MG])	Comments
Customer Metered Use	13,797 [4,496]	Total metered use of customer categories including the Town of Lyons and City
Hydrant Meter Program	30 [9.7]	Hydrant meters are not included in customer billing system
Other Unbilled Authorized Use	147 [48]	Unbilled metered and (estimated) unmetered
Total Authorized Use	13,976 [4,554]	
Treated Water Production	14,973 [4,879]	Water production leaving the water treatment plants
Approximate Water Loss	101 [33]	Water Loss = Treated Water Production – Billed Authorized Use – Unbilled Authorized Use
% Treated Water Loss	7	% Water Loss = Water Loss/Treated Water Production

[a] Water loss estimate provided by City based on refined data gathering for meters and authorized uses.

The IWA/AWWA Water Balance Method also has a formula to estimate the theoretical low limit of leakage that could potentially be obtained if all available best technologies were successfully applied. The theoretical estimate is based on the miles of water mains, number of service connections, average pressure in the system, and the distance of private water lines (to the curb stop). Based on rough assumptions for the distance of private water lines and an average system pressure of 70 pounds per square inch (psi), the theoretical low limit of annual water loss for the City would be 196 MG per year. Total water treatment plant production for 2015 was 4,879 MG (14,973 acre-feet). The theoretical low limit of water loss from the system is approximately 4 percent. This low limit number does not represent a realistic goal, but gives a theoretical reference point for the quantity of additional water savings that may be realized with an improved leak detection and repair program.

A summary of revenue and non-revenue water is provided in **Figure 3-5**.

Figure 3-5. Revenue and Non-Revenue Water (2007–2015)



For 2015, the estimated water loss from the City's potable water system was approximately 7 percent and the overall non-revenue water was at approximately 15 percent. These rates of water loss are relatively low compared to utilities across North America. A survey by the AWWA of 662 North American public water systems showed an average water loss of 12 percent (Billings). Water losses can vary tremendously, with age of the system usually being the most significant factor. The City monitors water loss and non-revenue water annually to identify changes that may require additional evaluation or pipeline repair.

3.3 Water Billing and Rate Structure

The City recently completed an update to its water rates; the update includes monthly meter reads, monthly billing, a monthly service charge (based on meter size), and charges based on the metered volume for residential, multifamily, small commercial, large commercial, and irrigation users. Longmont measures usage in gallons and thousands of gallons, considered a best practice per *AWWA G480 Conservation Program Operation and Management Standard* (2013).

The volume charge for residential users (single family and duplexes) is based on a four-tier increasing block rate structure, so the cost per unit of water increases with increasing usage. The volume charge for all other users is based on a uniform rate per 1,000 gallons. The City's volume-based water rate structure, effective January 1, 2017, is summarized in **Table 3-8**.

Table 3-8. City of Longmont Current Water Volume Rates (effective January 1, 2017)

	Inside City Limits	Outside City Limits
Residential Volume Rate		
0 to 5,000 gallons	$2.58	$3.87
5,001 to 15,001 gallons	$3.69	$5.54
15,001 to 35,000 gallons	$4.70	$7.05
All over 35,000	$6.53	$9.80
Multifamily Volume Rate per 1,000 gallons	$3.03	$4.55
Small Commercial, Mixed Use and Airport Volume Rate per 1,000 gallons	$3.20	$4.80
Irrigation Volume Rate per 1,000 gallons	$4.11	$6.17

The City evaluates fixed services charges and volume rates on a regular basis, and has adopted an annual service charge and rate increase plan through 2019. More information is available on the City's website at longmontcolorado.gov/utilities.

SECTION 4

Current and Future Water Efficiency Efforts

The City's first Water Conservation Master Plan in 1996 initiated several water conservation best management practices (BMPs) that helped the City prolong the adequacy of its existing water resources, and as appropriate, defer capital construction of new treatment plants, reservoirs, and related facilities. The City chose the primary emphasis of its BMPs to be education and effective communications rather than regulation. The underlying belief, which continues today, is that if Longmont's citizens understand the economics, methods, and positive effects of water efficiency, they will make informed decisions.

Since 1996, the City has expanded its water efficiency measures and programs, beyond those first BMPs identified. An update to the Water Conservation Master Plan was completed in 2008 and an in-depth evaluation of the effectiveness of efficiency programs was completed in January 2013 (*Water Conservation Program Evaluation*). The current water efficiency programs implemented by the City closely follow the recommended measures and programs from the 2013 *Water Conservation Program Evaluation*. **Table 4-1** lists water efficiency measures and programs the City currently offers and indicates the approximate years the programs started and their element status.

Table 4-1. City of Longmont Water Efficiency Program Summary

Program	Year Started	Residential	Commercial	City	Notes/Status
Indoor Water Efficiency Programs					
Toilet Rebates (Dual Flush and Low Volume)	2003	X	X		Ongoing
Dishwasher Rebates	2006	X			Offered through 2013
Clothes Washer Rebates	2003	X			Offered through 2016
Low Flow Bathroom Fixtures	2007			X	Completed for City facilities
Pre-Rinse Nozzle Conversion	2005		X		Coordinated with Partners for A Clean Environment (PACE); 35 restaurants in 2009-2010. Coordinated with Center for ReSource Conservation (CRC); 28 restaurants in 2015–2016.
Indoor Audits	2011	X	X		Residential: Coordinated with CRC pilot program 2010 Commercial: Coordinated with PACE
Outdoor Water Efficiency Programs					
Irrigation Audits	2005	X	X	X	Ongoing
Garden in a Box	2005	X			Ongoing
Rain Sensor Rebates	2009	X	X	X	Ongoing
Conversion to Raw Water Irrigation	1988			X	Project MUW-173, $674,000 budgeted for 2012-2016

Table 4-1. City of Longmont Water Efficiency Program Summary

Program	Year Started	Residential	Commercial	City	Notes/Status
Metering and Water Loss Prevention					
Automated Meter Reading (AMR)	1999	X	X		Currently being converted from analog to digital with radio frequency (RF) capability. Approximately one-third of units have been converted as of 2016.
Water Loss Prevention	-	X	X	X	Annual CIP and operation budget to improve distribution system
Education and Outreach					
Children's Water Fair with Education Kits	1998	X			Held through 2015
Public Outreach	1993	X	X		Ongoing
Local Paper Advertising	1993	X	X		Ongoing
City Newsletter	1993	X	X		Annually
Training Workshops	2000	X			Annually
Ordinances and Enforcement					
Watering Restrictions	-	X	X	X	In Code of Ordinances - Chapter 14.04.450
Water Wasting	-	X	X	X	In Code of Ordinances - Chapter 14.04.490
Plumbing fixtures	-	X	X	X	In Code of Ordinances - Chapter 14.04.500
Landscape and open space regulations	2007	X	X	X	In Code of Ordinances - Chapter 15.05.040 Section H
Soil amendments	-	X	X		Design Standards Section 602
Irrigation	-	X	X		Design Standards Section 603

This section summarizes the City's current water efficiency measures and programs under the following categories: indoor programs, outdoor programs, metering, education and outreach, and ordinances and enforcement.

4.1 Indoor Water Efficiency Programs

4.1.1 Residential

The City currently offers rebates to residential customers as follows, per the 2008 Water Conservation Plan:

- **Toilets**: Dual flush (DF) ($100) and high efficiency (HE) toilet ($50) rebates

Participation in the rebate programs is steady, but the return on investment for the City diminishes each year as non-efficient appliances become obsolete and as new appliances alternatives are predominately higher efficiency. Through CRC, the City plans to add a program that offers $150 toward toilets with Stealth technology (vacuum-assisted technology that uses 0.8 gallons per flush). This effort by the City would continue a similar program currently offered by Boulder County that may discontinue in 2018.

The HE clothes washer rebate offer ended in 2016 and the HE dishwasher rebate ended in 2013. These decisions were warranted because national codes and standards have reduced the water and energy use of nearly all washers in the market today. The City is also evaluating better targeting of the toilet rebate program to achieve higher savings. Longmont will reallocate some of the budget previously set aside for these rebates and re-distribute these funds to outdoor programs such as water audits, Garden In A Box, and evapotranspiration (ET) smart controllers.

A pilot program of residential indoor audits was completed in 2010, coordinated with the CRC. There was low interest in the indoor audits; the City is trying to increase participation and interest by having Slow the Flow offer an indoor audit while onsite for the outdoor water audit. Outreach and education to residents on water efficiency may be combined with the City's Sustainability Plan communications strategy based on two-way communication with neighborhood groups and community organizations.

4.1.2 Commercial

Commercial development typically lags behind residential development in the City, which provides an opportunity to implement water efficient practices with new commercial development. The City has continued to develop indoor water efficiency techniques for small commercial and industrial businesses. Moving forward, it will be valuable for the City to help commercial customers identify potential water savings measures that can be implemented to improve the efficiency of their processes and water applications. Outreach and efforts to engage commercial customers in water efficiency programs may be combined with the economic vitality (EV) strategies in the City's Sustainability Plan. Strategy EV-2 is to create a Longmont sustainable business recognition program, which would build upon PACE programs to recognize sustainable business practices.

The City continues to work with PACE and CRC to expand these programs. In 2015 and 2016, with coordination with CRC, the City replaced old dishwashing pre-rinse nozzles with water efficient nozzles in 28 restaurants throughout the City.

4.2 Outdoor Water Efficiency Programs

4.2.1 Residential Audits and Garden In A Box

The City offers the following outdoor programs aimed at residential customers:

- Irrigation audits with the CRC
- Garden In A Box with CRC
- Xeriscape Garden Seminars with CRC (the City is hosting two in Longmont in 2017)

For several years, the City has sponsored free irrigation audits to customers in cooperation with the CRC. The audits are free to customers and information is provided in the City's monthly newsletter sent with utility bills (City Line) and on the City's website. Participation in outdoor irrigation audits remains steady. CRC incorporates education on water efficient practices during each audit. Also in cooperation with the CRC, the City offers affordable Garden In A Box packages that include several planting plan options with various plants and information on maintaining the plants. Participation in the Garden In A Box program has been high and the City is responding to the demand by increasing budget for this program if available.

ET controllers (smart controllers), or rebates on this equipment, for irrigation systems have been offered by the City in the past; the City plans to continue this as part of the plan to increase the focus on outdoor water efficiency.

4.2.2 Commercial and Homeowner Associations

The City offers outdoor irrigation audits through CRC to its commercial and HOAs. Since 2015, there has been an increasing demand for this program from HOAs. As new commercial development continues it will be important for the City to have adequate resources to continue the outdoor irrigation audit program for commercial and HOA customers; therefore, the City is planning to increase the budget for these programs. Commercial development will likely continue beyond when residential build-out occurs so the outdoor program for commercial customers should continue.

4.2.3 City's Use of Raw Water for Irrigation

Much of the City's water usage is for irrigation of parks, schools, greenways, arterials, and other public spaces. The City has an extensive network of canals and irrigation ditches that convey raw water to City facilities for irrigation. Currently, raw water is available to irrigate approximately 27 City and community parks, 2 golf courses, and 18 schools, representing 56 percent of parks, 66 percent of golf courses, and 60 percent of schools; totaling approximately 2,036 acres. The site of the City's main recreation facility is also irrigated with raw water. Availability of raw water for irrigation decreases demand for treated water from the treatment plant and conserves energy and chemicals required for treatment. The use of irrigation water also increases flows in the St. Vrain creek, below the Water Treatment Point of Diversion, which is viewed favorably for the environment.

To improve raw water tracking and meet State Engineer requirements, the City installed flow monitoring stations on raw water intake points from natural streams that previously did not have monitoring.

The City continues to maximize its use of raw water for irrigation instead of treated water. The City is proceeding with a design to convert parks, greenways and schools along spring Gulch #2, south of 17th Avenue, to raw water irrigation. A study is also planned to evaluate the capacity of the existing raw water system to irrigate additional ball fields at Sandstone Ranch Community Park.

In addition, on City open space properties, with conversion of irrigation from treated water to raw water, the City is also evaluating opportunities to convert raw water irrigation from flood irrigation to center-pivot irrigation which uses less water. City open space properties are leased to tenant farmers and use raw water for irrigation. This program has started and the City plans to continue its implementation on a case by case basis.

4.3 Metering and Water Loss Prevention

4.3.1 Automated Meter Reading (AMR)

Accurate and efficient water use metering has been a priority of the City's for many years. The City's treated water system is fully metered, aside from the few authorized uses listed earlier in **Table 3-5**. The City has taken steps to improve registering water use with AMR systems and meters with leak detection capabilities for high volume users. Meter connections greater than 3 inches are equipped with leak detection capability and are tested biannually.

Water meters throughout the City are currently being converted from analog to digital with RF capability. Approximately one-third of units have been converted as of 2016. Fixed base data collectors will be constructed that can read the RF signal, which will enable the utility to improve management of meter reading, reduce field labor, and increase options for tracking water use. The City's CIP has $475,000 budgeted over the next 5 years (through 2021) to complete this conversion.

4.3.2 Water Loss Prevention

Programs to reduce water loss and water main breaks are part of the City's annual operating plan. The City has several annual maintenance programs to continually repair the distribution system and decrease leakage and water main breaks. The City's annual operating budget for water distribution maintenance projects for the past 5 years is summarized in **Table 4-2**.

Table 4-2. Water Distribution Line Repair/Maintenance Operating Budget Summary (2012–2017)

	2012	2013	2014	2015	2016	2017
Line Repair/Maintenance	$210,000	$215,000	$220,000	$220,000	$220,000	$220,000
Hydrant Repair/Maintenance	$3,000	$4,000	$4,000	$4,000	$4,000	$4,000
Meter Repair/Maintenance	$12,000	$12,000	$12,000	$12,000	$12,000	$12,000
Total Repair/ Maintenance	**$225,000**	**$231,000**	**$236,000**	**$236,000**	**$236,000**	**$236,000**

In addition to the annual operating budget for water line repair and maintenance, the City's CIP has an annual budget to address water distribution system improvements. The budget is typically used for large capital projects to improve areas that are currently being serviced by aging infrastructure that have frequent breaks or leaks. The 2017–2021 CIP has $5,510,740 budgeted for these types of repair projects to improve maintenance access, reduce water line leaks and breaks, and improve water delivery.

4.3.3 Metering Raw Water

The City is in the process of installing flow monitoring systems on raw water irrigation intake points to improve raw water accounted. The City had completed this flow monitoring effort, but is now also being required by the Colorado Division of Water Resources, also known as the Office of the State Engineer, to monitor irrigation flows.

4.4 Ordinances and Standards

Several practices supporting efficient water use and responsible building practices have been implemented into City ordinances and design standards. **Table 4-3** summarizes the applicable ordinances and design standards that support efficient water use.

Table 4-3. Summary of Ordinances and Design Standards that Support Efficient Water Use

Ordinance or Standard	Description	Summary
Code of Ordinances – Chapter 14.04 Water Utility and Wells	14.04.450 Watering restrictions	Provides director of public works and natural resources authority to implement watering restrictions if necessary.
Code of Ordinances – Chapter 14.04 Water Utility and Wells	14.04.490 Waste of water prohibited	Customers shall not cause or permit water "to run to waste in any gutter or other impervious surface, or other application."
Code of Ordinances – Chapter 14.04 Water Utility and Wells	14.04.500 Plumbing fixture standards established	Requires developers to install fixtures that meet certain water use criteria for urinals, toilets, faucets and showerheads.

Code of Ordinances - Chapter 15.05 Development Standards	15.05.040 Section H Landscape and open space regulations	Requires developer to use xeric practices in the design, installation and maintenance of landscaping and irrigation systems in private common open spaces areas in residential developments.
Design Standards and Construction Specifications	Section 602 Grading and Find Grading	Requires a soil amendment of 3 cubic yards per 1,000 feet, tilled to a depth of 6 inches, to obtain a Certificate of Occupancy.
Design Standards and Construction Specifications	Section 603 Irrigation	Requires developer to use xeric practices in the design, installation and maintenance of landscaping and irrigation systems in common open spaces areas in residential developments and City property.

The City now contracts with a landscape development contractor to confirm there is compliance with Section 15.05.040 to use xeric practices. This Plan will also support revisions to the City's Land Development Code and Design Standards and Construction Specifications to incorporate sustainability and efficient water use practices; the City is planning to update codes and standards in 2018.

4.5 Water Reuse

The City has a water rights portfolio that allows for reuse of certain water rights transfers of consumptive uses and Windy Gap water. Currently, the City uses downstream exchanges of its treated wastewater effluent return flows to allow for increased surface water diversions at its water treatment plant and other raw water supply ditches. In the future, the City will evaluate other options to capture and reuse treated wastewater effluent return flows using Union Reservoir and the existing network of canals and ditches that cross the City. Given the complexity of the water rights, the potential reuse scenarios and variability due to climate change, the evaluation of reuse options is periodically reviewed.

4.6 Education and Outreach

4.6.1 Education and Outreach

Educational programs have long been the hallmark of local water efficiency programs in Colorado; however, this trend is changing as more programs are being identified for municipalities to effectively reduce customer water demand at a reasonable cost and/or for municipalities to more efficiently distribute and bill for water. It is important to maintain a public outreach program promoting the work that the water utility performs for the City's citizens. However, a public relations program does not necessarily promote wise water use and water use efficiency. To this point, it is important to identify those educational programs that link to and complement the water efficiency programs that the City chooses to implement. The City's network of public water efficiency resources continues to evolve, and includes several different lines of communication to share information. Education and outreach is focused on the following:

- Water efficiency program messaging through the City's Water Matters brand (image below)
- Information printed periodically in *City Line* (the City's monthly newsletter that is sent with each customer's utility bill)
- Information accessible on the City's website (City Line newsletter, water efficiency tips, rebate program information, etc.)
- Hosting seminars by Center for ReSource Conservation on Xeriscape Gardens, etc.

Outreach and efforts to engage commercial customers in water efficiency seminars may be combined with the strategies in the City's Sustainability Plan.

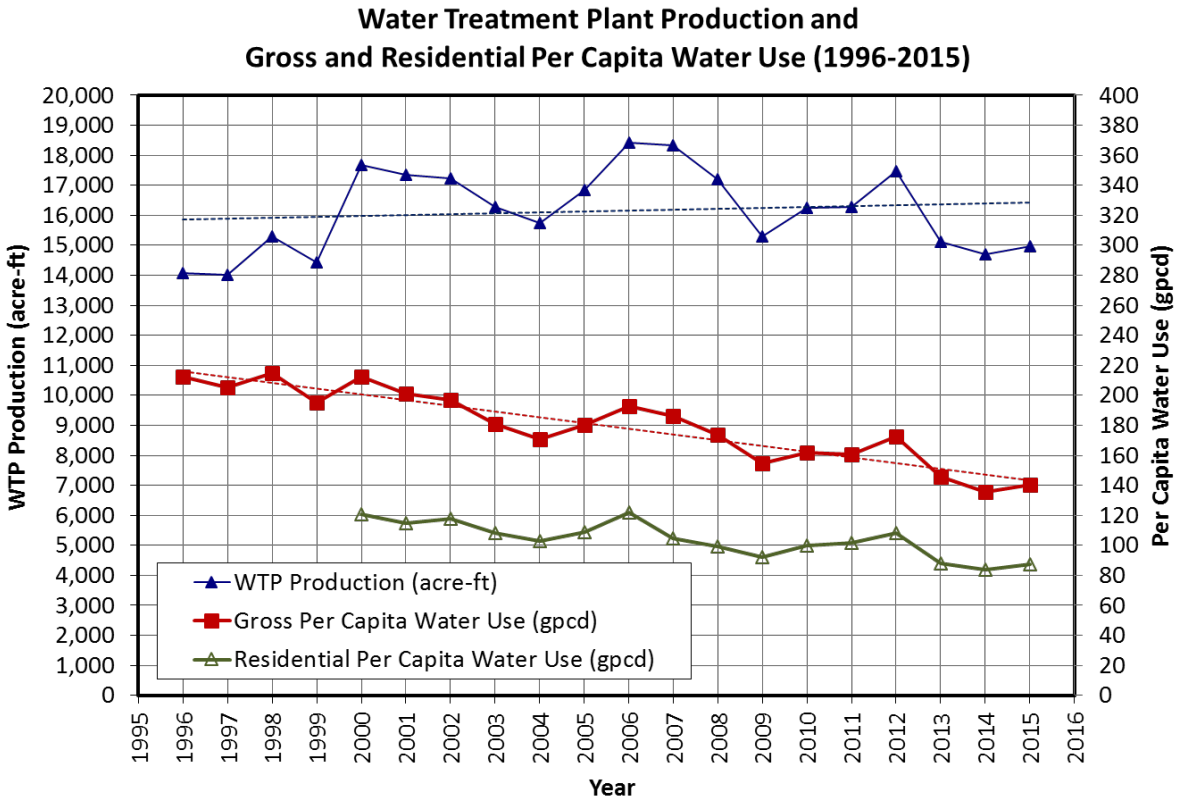
4.6.2 City as an Example

To encourage changes in water use behavior and demonstrate its commitment to water conservation, the City has replaced toilets in its offices, public buildings, and recreation facilities with water efficient fixtures. The Public Works and Natural Resources building also has DF toilets in its facility. The City continues to identify opportunities to improve water efficiency of its own facilities where feasible.

4.7 Existing Program Effectiveness

The effectiveness of water efficiency programs may be difficult to quantify due to other factors that influence water use such as variable weather, changes in customer behavior, and organic replacement of old fixtures with more efficient fixtures. Historical water treatment plant production, gross per capita, and residential per capita water use from 1996 to 2015 are shown in **Figure 4-1**. However, using the metric of gross per capita water use, the total treated water production divided by total service population, a general decrease in water use per capita is observed from 1996 to 2015.

Figure 4-1. Per Capital Water Use and Total Service Population



The general decline in gross per capita water use after 1996 is likely due to several reasons, and increased customer-side efficiency is an important part of the story. The City's first water conservation planning effort started in 1996, and efforts have only increased since that time at the local, state, and national levels. The impact of increased customer education and various municipal retrofit projects likely assisted in the reduction of overall per capita water use in the late 1990s. However, it wasn't until the year 2000 when the City implemented inclining block water rates, and 2006 when the system was fully metered that per capita water use began to steadily drop. Average gross per capita water use from 1997 to 2000 was about 210 gpcd. After the system was fully metered, coupled with the drought of 2002 and subsequent customer response, the gross per capita water use from 2006 to 2008 averaged 186 gpcd. More recently, the gross per capita water use from 2013 to 2015 averaged 141 gpcd. One reason for the decrease in gross per capita water use is that residential development is ahead of small commercial and industrial development. As small commercial and industrial development catches up with residential buildout, overall water use may increase and the gross per capita metric may level off and not continue to decrease.

However, residential per capita water use, also shown on **Figure 4-1,** has remained fairly steady since 2000. There appears to be a decrease from 2013 to 2015 compared to previous years, but the decrease in 2013 may be attributed to the September 2013 flood, with potentially lasting effects into subsequent years as residents were more aware of rainfall events and may have adjusted their irrigation practices more than in years prior to 2013.

In addition to tracking per capita metrics, the City also completed a *Water Conservation Program Evaluation* in 2013 to assess the effectiveness of the rebate, Garden In A Box, and irrigation audits water efficiency programs and recommended adjustments to these programs. The evaluation revealed the most successful programs include the City's rebate programs; however, other water demand reductions are occurring in the City, perhaps due to a combination of other City programs and organic changes in customer water use brought on by changing technology and behaviors. A summary of the water demand

reductions from the 2013 evaluation is provided in **Table 4-4** (this is the same as Table 14 in the 2013 *Water Conservation Program Evaluation*).

Table 4-4. Summary of Program Water Demand Reductions
(From Table 14 in 2013 Water Conservation Program Evaluation)

Program	Number of Participants	Estimated Water Demand Reductions (Avg. acre-feet per year)
Rebate Programs		
High Efficiency (HE) Clothes Washers	2,250	39.8
HE Dishwashers	1,450	6.2
Ultra-low Volume Toilets	1,177	28.1
Dual Flush (DF) Toilets	414	5.0
Promotional Programs		
Garden in a Box	325	0.3
Slow the Flow Irrigation Audits	546	4.6
Total Water Savings from Programs	-	84
Estimated Overall Savings (Programs, Organic Fixture Replacement, and Customer Behavior)[2]:		
Single Family Residential (Indoor)	24,800 connections	390
All Customers (Indoor and Outdoor)	87,850 population[1]	2,400[2]

[1] 2011 Population Estimate for the City of Longmont from the Department of Economic Development Planning Division.

[2] Based on the reduction in water use from the average gross per capita use from 2005–2007 compared to 2009–2011.

The full 2013 *Water Conservation Program Evaluation* is available on the City's Water Conservation website for reference.

4.8 Water Efficiency Recommendations

Based on the information presented in Sections 4.1 to 4.7, the implementation of measures and programs planned through 2024 is summarized in **Table 4-5**. The estimated water savings for each efficiency program were developed using technical resources and are summarized in **Table 4-6**. Actual water savings will be dependent upon numerous internal and external forces influencing customer water use. The City will periodically monitor the progress of its proposed water efficiency programs. Implementation of water efficiency programs each year is subject to available funds in the City's budget which is reviewed annually and may change to account for program cost increases, decreases, changes in program allocations, or to address higher priority projects.

In addition to the water efficiency programs, it is recommended the City complete a water audit that follows the AWWA publication *M36 Water Audits and Loss Control Programs*. The City tracks water use according to a similar method, but the M36 method is a recommended best practice.

Table 4-5

Recommended Water Efficiency Programs[3]

Program	Estimated Annual Qty. (2018)	Unit Cost[1]	Estimated Total Cost
Programs - Indoor			
High Efficiency (HE) Toilet Rebates (1.28 gpf)	75	$50	$3,750
Dual Flush (DF) Toilet Rebates (1.6/1.1 gpf)	35	$100	$3,500
Stealth-Technology Toilets (0.8 gpf)	15	$150	$2,250
Pre-Rinse Nozzle Conversion	15	$170	$2,550
Programs - Outdoor			
Evapotranspriation (ET) Controller Rebates	50	$50	$2,500
MP Rotators (10 MP heads per unit)	400	$25	$10,000
Rain Sensor Rebate	50	$35	$1,750
Garden in a Box	175	$50	$8,750
Programs - Water Audits			
Residential - Irrigation Audits (Slow the Flow)	150	$120	$18,000
HOA - Irrigation Audits (Slow the Flow)	10	$1,625	$16,250
Commercial - Indoor	15	$1,200	$18,000
Education & Outreach			
Education and Outreach	Lump sum	$20,000	$20,000
Programs Subtotal	-	-	**$107,300**
Contract Services			
Contract Services (CRC, etc)	Lump sum	$35,000	$35,000
Program and Contract Servcies Subtotal	-	-	**$142,300**
Personnel Needs	Hours	Cost/Hour[2]	Cost
Indoor Rebates	100	$38	$3,800
Outdoor Rebates	40	$38	$1,520
Outdoor Promotional Programs	40	$38	$1,520
Audits	80	$38	$3,040
Ordinances	80	$38	$3,040
Soil Amendment Enforcement	140	$38	$5,320
Water Waste Complaints	80	$29	$2,320
Education	80	$29	$2,320
Monitoring	120	$38	$4,560
Personnel Subtotal	760	-	**$27,440**
Water Efficiency Program Total[3]			**$169,740**

[1] Unit cost may represent base program fee plus unit cost (i.e. Garden in a Box has a base program fee and an additional cost for each garden supplied beyond the original contract amount).

[2] Professional full-time engineer (FTE) at $80,000 annually ($38/hour), average FTE at $60,000 annually ($29/hour), seasonal employee at $20,000 annually ($12/hour) including some time for support from an FTE.

[3] Budget may be adjusted annually by City of Longmont to account for program cost increases, decreases, or changes in program allocations.

Table 4-6

Water Efficiency Program Estimated Savings (2017-2024)

Annual Savings Decay Rate = 0.05

		Cumulative Water Savings (MG)								
		2017	**2018**	**2019**	**2020**	**2021**	**2022**	**2023**	**2024**	**Comments/Source**
Programs - Indoor										
Low Volume (LV) Toilet Rebates	qty.	75	75	75	75	75	75	75	75	
Unit Savings (gal/toilet/year)	8,000	0.60	1.17	1.74	2.31	2.88	3.46	4.03	4.60	Based on WRF Residential End Uses of Water 4309 (2016)
Dual Flush (DF) Toilet Rebates	qty.	35	35	35	35	35	35	35	35	
Unit Savings (gal/toilet/year)	10,000	0.35	0.68	1.02	1.35	1.68	2.02	2.35	2.68	Based on WRF Residential End Uses of Water 4309 (2016)
Stealth Technology Toilet Rebates	qty.	15	15	15	15	15	15	15	15	
Unit Savings (gal/toilet/year)	11,000	0.17	0.32	0.47	0.61	0.75	0.87	1.00	1.15	Based on WRF Residential End Uses of Water 4309 (2016)
Pre-Rinse Nozzle Conversion	qty.	15	15	15	15	15	15	15	15	
Unit Savings (gal/nozzle/year)	19,000	0.29	0.56	0.83	1.10	1.37	1.64	1.91	2.18	Based on data from Center for Resource Conservation (CRC)
Programs - Outdoor										
ET Smart Controller Rebates	qty.	50	50	50	50	100	100	100	100	
Unit Savings (gal/controller/year)	10,000	0.50	0.98	1.45	1.93	2.90	3.85	4.81	5.76	Estimate by Water DM based on smart controller research
MP Rotators (10 MP heads per unit)	qty.	400	400	400	400	400	400	400	400	
Unit Savings (gal/day/nozzle)	1.6	0.11	0.22	0.33	0.44	0.54	0.65	0.76	0.87	MWD Field Research (WSI 2016)
Rain Sensor Rebates	qty.	50	50	50	50	100	100	100	100	
Unit Savings (gal/sensor/year)	15,000	0.75	1.46	2.18	2.89	4.36	5.78	7.21	8.64	3,000 gallons per rain shutdown x 5 rain events per season
Garden in a Box	qty.	175	175	175	175	200	200	200	200	
Unit Savings (gal/box/year)	400	0.07	0.14	0.20	0.27	0.35	0.42	0.50	0.58	Estimate by WaterDM
Programs - Water Audits										
Residential Irrigation Audits (Slow the Flow)	qty.	150	150	150	150	150	150	150	150	
Unit Savings (gal/audit/year)	2,500	0.38	0.73	1.09	1.45	1.80	2.16	2.52	2.87	Estimate by WaterDM
HOA Irrigation Audits (Slow the Flow)	qty.	10	10	10	10	20	20	20	20	
Unit Savings (gal/audit/year)	50,000	0.50	0.98	1.45	1.93	2.90	3.85	4.81	5.76	Estimate by WaterDM
Commercial - Indoor	qty.	15	15	15	15	15	15	15	15	
Unit Savings (gal/audit/year)	100,000	1.50	2.93	4.35	5.78	7.21	8.64	10.07	11.50	Estimate by WaterDM
Annual Water Savings (MG)		5.2	4.9	5.0	4.9	6.7	6.6	6.6	6.6	
Annual Water Savings (AF)		16.0	15.2	15.2	15.2	20.6	20.3	20.3	20.4	
Cumulative Water Savings (MG)		5.2	10.2	15.1	20.1	26.7	33.4	40.0	46.6	
Cumulative Water Savings (AF)		16.0	31.2	46.4	61.5	82.1	102.4	122.6	143.0	
Annual Cost - Programs ($)		$142,300	$142,300	$142,300	$142,300	$164,050	$164,050	$164,050	$164,050	Excluding City personnel costs
Cumulative Cost - Programs ($)		$142,300	$284,600	$426,900	$569,200	$733,250	$897,300	$1,061,350	$1,225,400	
Annual Cost - City Personnel ($)		$27,440	$27,989	$28,549	$29,120	$29,702	$30,296	$30,902	$31,520	Including City personnel costs
Cumulative Cost - City Personnel ($)		$27,440	$55,429	$83,977	$113,097	$142,799	$173,095	$203,997	$235,517	
Total Annual Cost - Programs and Personnel ($)		$169,740	$170,289	$170,849	$171,420	$193,752	$194,346	$194,952	$195,570	
Total Cumulative Cost - Programs and Personnel ($)		$169,740	$340,029	$510,877	$682,297	$876,049	$1,070,395	$1,265,347	$1,460,917	
Passive Water Savings										
Annual Passive Savings	MG	19	19	20	20	21	21	22	22	Calculated as 0.3% of gross per capita use. Basis is Water Research Foundation (2016) Residential End Uses of Water Study, Version 2. Water Research Foundation, Denver CO., USGS Water Use in the United States (water.usgs.gov/watuse)
Annual Passive Savings	AF	57	59	60	62	63	65	67	68	
Cumulative Passive Savings	MG	19	38	57	78	98	119	141	163	
Cumulative Passive Savings	AF	57	116	176	238	301	366	433	501	
Total Cumulative Water Savings (Programs + Passive)	**MG**	**24**	**48**	**72**	**98**	**125**	**153**	**181**	**210**	
Total Cumulative Water Savings (Programs + Passive)	**AF**	**73**	**147**	**222**	**300**	**383**	**468**	**556**	**644**	

SECTION 5

Demand Forecast and Efficiency Goals

5.1 Water Demand Forecast

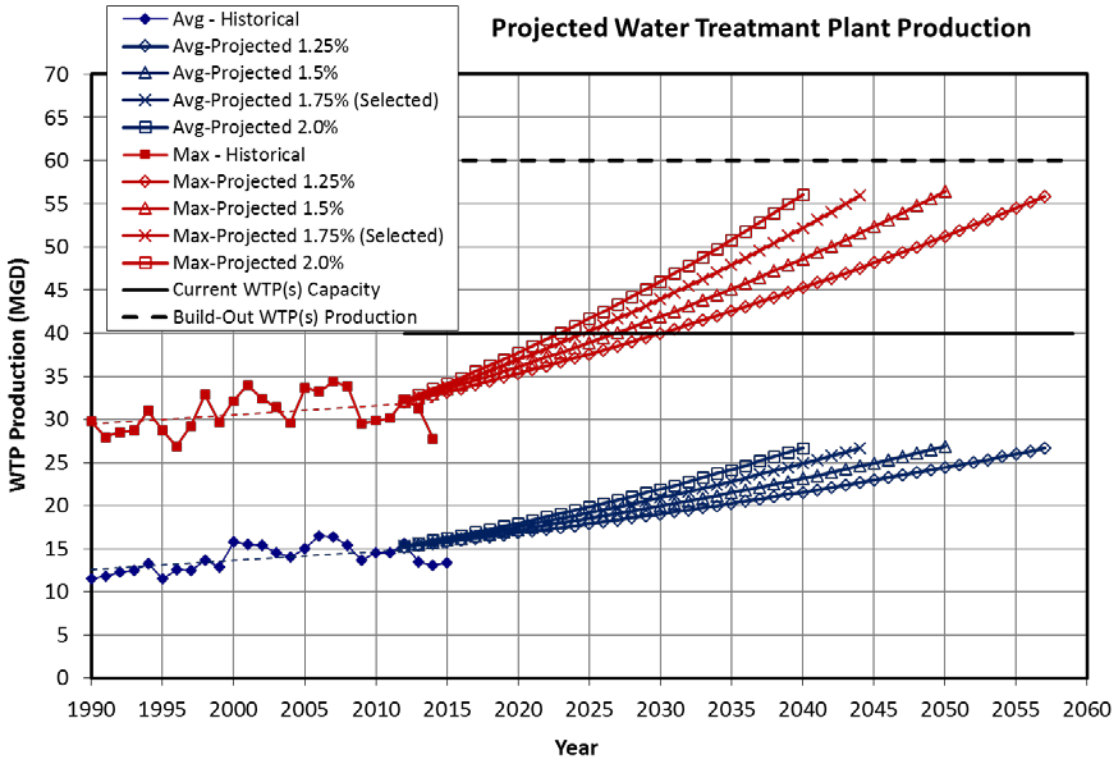
Forecasting and estimating water demands are important parts of the master planning process. Water demand forecasts allow the City to prioritize and define capital project needs across a wide range of infrastructure areas: raw water storage and conveyance, drinking water treatment, drinking water distribution, wastewater collection, and wastewater treatment.

The City completed an extensive study of total water demand as part of the *Water Demand Evaluation*, which was accepted by the Longmont City Council in January 2012. The *Water Demand Evaluation* provided an updated forecast of total water demand, including both raw and treated water demands, for build-out of the LPA. The basis for the City's water demand forecast is based on unit demand rates for each of the land use classifications included within the LACP. Unit demand rates were developed based on a review of historic water records. The City's GIS, in combination with Microsoft Excel spreadsheets and pivot tables, was used to complete the evaluation. Considerable effort was completed by the City to thoroughly review and modify, as appropriate, the multiple data sets and GIS coverage to increase confidence in analysis results. The *Water Demand Evaluation* also included an adjustment to water demand for irrigation due to climate variability. Based on the procedures developed during the *Water Demand Evaluation,* the City will periodically evaluate and update the underlying assumptions that are input into the water demand forecast.

Following the 2012 *Water Demand Evaluation*, and based on its method, the City completed the ITWSMP in 2013, which focused on the treated water demand forecast. The ITWSMP evaluated data to determine peaking factors and estimated timeframe to build-out. The treated water demand forecast from the 2013 ITWSMP is presented here as the basis for the water demand forecast and the potential savings due to water efficiency programs moving forward. Demand forecasts in this Plan are based on the *Water Demand Evaluation* and the 2013 ITWSMP, therefore impact from climate variability is inherently included in the evaluation of water efficiency and water supply.

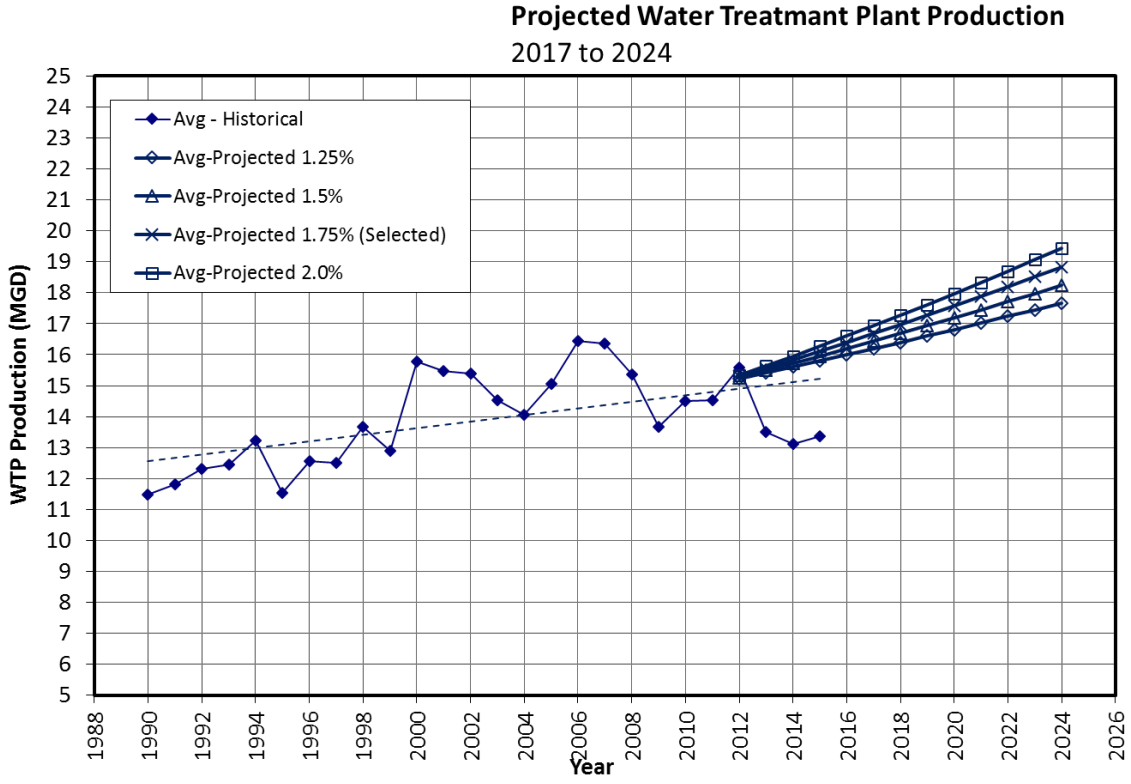
The treated water demand forecast through buildout and various growth rates is presented in **Figure 5-1**, which is the same forecast that was presented in the ITWSMP, with the addition of data points through 2015.

Figure 5-1. Treated Water Production Forecast (*from 2013 ITWSMP Figure 1-3*)



For purposes of this Plan, the water demand forecast will focus on the near-term forecast from 2017 to 2024 when these measures and programs will be implemented and only for the average forecast. The near-term annual average forecast, not accounting for additional water conservation, is presented in **Figure 5-2** and summarized in tabular format in **Table 5-1**.

Figure 5-2. Treated Water Production Forecast (2017–2024)



The near-term annual average forecast, not accounting for additional water conservation, is summarized in tabular format in **Table 5-1**.

Table 5-1. Treated Water Demand Forecast (2017–2024)

Units: acre-feet (mgd)	1.25% Growth	1.5% Growth	1.75% Growth	2.0% Growth
2017	18,143 (16.2)	18,413 (16.4)	18,687 (16.7)	18,964 (16.9)
2018	18,369 (16.4)	18,689(16.7)	19,014 (16.9)	19,343 (17.3)
2019	18,599 (16.6)	18,970 (16.9)	19,347 (17.3)	19,730 (17.6)
2020	18,832 (16.8)	19,254 (17.1)	19,685 (17.5)	20,125 (18.0)
2021	19,067 (17.0)	19,543 (17.5)	20,030 (17.9)	20,527 (18.3)
2022	19,305 (17.2)	19,836 (17.7)	20,380 (18.2)	20,938 (18.7)
2023	19,547 (17.5)	20,134 (18.0)	20,737 (18.5)	21,357 (19.1)
2024	19,791 (17.7)	20,436 (18.2)	21,100 (18.8)	21,784 (19.5)

5.2 Efficiency Goals

The City has a diverse and flexible water supply portfolio. Because of past planning and securing needed water supply, the City does not have pressing infrastructure or raw water supply shortages that require immediate aggressive water efficiency activities. Therefore, the goals and objectives for future water efficiency measures and programs set by the City have been developed to help address future community sustainability and regional water supply reliability. The City has always been a good steward of the community, the region and the environment, and those policies that the City has established and implemented in the past will be further strengthened by additional, meaningful water efficiency.

To this end, the City's goal is to reduce customer and City raw water demands by approximately 10 percent by buildout (assumed to be 2048), for an expected reduction of about 3,500 acre-feet (1,141 MG). This goal was originally established in the 2004 Raw Water Master Plan when the projected raw water demand at buildout was approximately 35,580 acre-feet (11,594 MG). This goal is consistent with the 2008 *Water Conservation Master Plan* and is consistent with the City's *Sustainability Plan* completed and adopted by City Council in November 2016.

Based on the 2013 Water Conservation Evaluation, the estimated annual treated water savings from measures and programs was approximately 2,400 acre-feet (782 MG). This estimate of savings is conservative as it does not account for additional raw water savings from efficient irrigation practices from passive savings (such as natural replacement of appliances and fixtures, and increased efficiency of customers from education). Even in terms of treated water demand, the City is closing in on the goal to reduce demands by 3,500 acre-feet annually by buildout. This plan will focus on measures and programs through 2024. Overall the City needs to achieve additional annual savings of approximately 1,100 acre-feet (358 MG) to meet the City's goal.

5.3 Impacts of Proposed Water Efficiency on Forecast

The City is planning to implement water efficiency measures and programs, as discussed in Section 4, for purpose of reducing the amount of water used on an annual basis by the City's customers. A reduction of raw and treated water use will allow the City to extend its current water supplies further into the future without additional water supply development, maintain more flow in the St. Vrain Creek as it

passes through the City, and reduce energy and water treatment costs associated with the production of potable and non-potable water supplies.

The total estimated water savings that the City will realize through the implementation of proposed water efficiency efforts (shown earlier in **Table 4-5**), and passive savings, over the next 7 years, are summarized in **Table 5-2**.

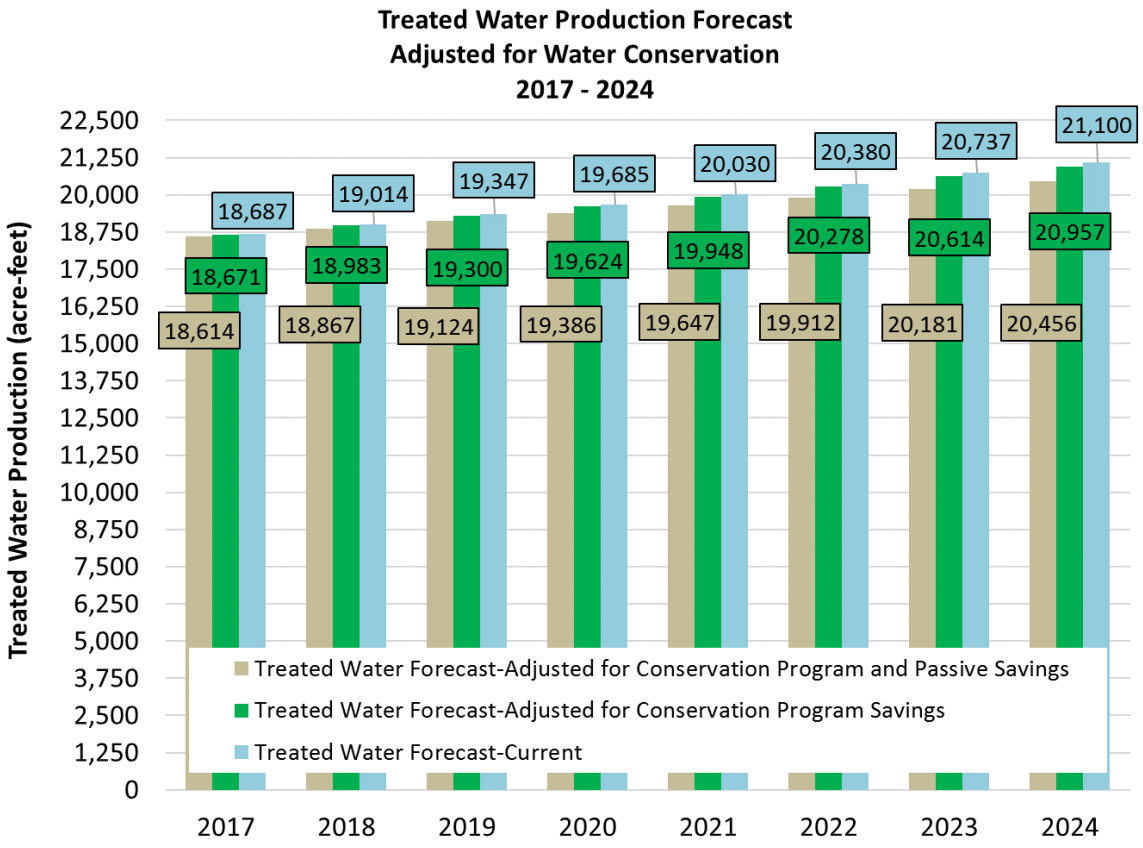
Table 5-2. Estimated Treated Water Conserved (2017–2024)

	Cumulative Treated Water Conserved		
Year	**Programs (acre-feet)**	**Passive (acre-feet)**	**Programs + Passive (acre-feet)**
2017	16	57	73
2018	31	116	147
2019	46	176	222
2020	62	238	300
2021	82	301	383
2022	102	366	468
2023	123	433	556
2024	143	501	644

The estimated cumulative water savings from the selected water efficiency programs amount to approximately 143 acre-feet by 2024. Estimating and accounting for passive savings over the same time amounts to an additional 501 acre-feet of water savings. The total estimated water savings from programs and passive activities is approximately 644 acre-feet by 2024, which is slightly more than half of the additional water savings (1,100 acre-feet) needed by the City to meet the current water efficiency goal discussed in Section 5.2. Passive savings may decrease over time and it is recommended the City reevaluate passive savings as part of the water efficiency planning process. Continuation of the City's Water Efficiency Plan beyond 2024 will plan for the remaining savings.

The updated treated water forecast from 2017 to 2024, accounting for estimated savings from the water efficiency programs and estimated passive savings, is provided in **Figure 5-3**. If all the estimated water savings are realized, the treated water production would be approximately 20,456 acre-feet (6,666 MG) in 2024.

Figure 5-3. Treated Water Production Forecast with Conservation Programs and Passive Savings (2017–2024)



SECTION 6

Plan Adoption and Implementation

The following section discusses the process the City used to receive public input and adopt the Plan, the approach for monitoring and updating the Plan, and the estimated cost for implementation. Implementation of measures and programs is summarized in Section 4.8, Recommended Water Efficiency Programs.

6.1 Public Input

Public participation and support of the efficiency plan is critical for implementation. Key dates of the public information and input process for development of this plan are summarized in **Table 6-1**.

The following public outreach was performed by the City:

- Published news release
- Posted on City's water conservation web page with link to plan and online comment form
- Emailed news release to residents signed up for email notifications
- Posted notice on City's Facebook and Twitter sites
- Provide hard copy of plan in Longmont Library

Table 6-1. Public Information Process During Plan Development

Event	Date
Water Board Meeting – Open to Public	February 27, 2017
Big Projects Open House	March 2, 2017
Water Board Meeting – Open to Public	March 20, 2017
Official Posting/News Release of Plan for Public Comment	April 17, 2017
Article in *Longmont Times-Call*	April 18, 2017
Board of Environmental Affairs Meeting – Open to Public	May 17, 2017
End Public Comment	June 18, 2017
Water Board Meeting – Open to Public	September 18, 2017
City Council First Reading	Planned for October/November 2017

Documentation of the public notice advertised, the City's Water Conservation web page, the online comment form, and the list of public comments received and responses is included in **Attachment 1**.

The City also completed a public input process for the *Sustainability Plan*, which included three public workshops as well as online comments; the plan was adopted by City Council in December 2016. These public comments were also reviewed as part of preparing this Water Efficiency Plan. Several of the comments were focused on improving outdoor water efficiency and promoting water-efficient landscape options, which is consistent with the City's plan to focus on outdoor water efficiency programs.

6.2 Monitoring and Plan Updates

Monitoring and verification of program effectiveness will be a continuous process conducted through a combination of tracking efforts to measure the value of various individual measures and programs being implemented by the City. The monitoring and verification metrics that the City proposes to initiate for each measure or program are presented in **Table 6-2**.

Table 6-2. Summary of Monitoring and Verification Activities for Tracking Water Savings

	Tracking Method and Metric					
Measures and/or Programs	**Number of Audits and/or Rebates**	**Individual Customer Water Use**	**Customer Class Water Use**	**Per capita Water Use**	**Unaccounted for Water**	**Peak and Annual Treated Water Demand**
Indoor Programs						
Rebates	**X**	**X**	**X**	**X**		**X**
Audits	**X**	**X**	**X**	**X**		**X**
Outdoor Programs						
Irrigation Audits	**X**	**X**	**X**	**X**		**X**
Metering and Water Loss Prevention					**X**	
Ordinances and Standards				**X**		
Education and Outreach		**X**	**X**	**X**	**X**	**X**

6.3 Water Efficiency Plan Cost and Funding

The estimated annual cost to implement the recommended measures and programs and support the City's water efficiency efforts with staff in 2018 is approximately $170,000. The annual water efficiency budget may be adjusted annually by the City to account for program cost increases, decreases, or changes in program allocations. Implementation of water efficiency programs each year is subject to available funds in the City's budget, which is reviewed annually and may change to address higher priority projects. The overall cost to implement this Plan is estimated to be approximately $170,000 to $195,000 per year from 2017 to 2024, for a cumulative total of $1,461,000.

The estimated cumulative water savings from specific programs by 2024 is 143 acre-feet, which is an average cost of approximately $10,600 per acre-foot of water conserved. For comparison, the future cost of a new water supply is currently estimated by the City at $11,375 per acre-foot (based on the cash in lieu construction cost for a new water supply). For the City to obtain a similar amount of replacement water to meet this supply (i.e., 644 acre-feet), it would cost approximately $7.3 million. The cost of achieving conservation savings varies significantly depending upon the program measure and implementation vehicle. The cost of water conservation as a water supply may continue to increase over time as the measures for achieving savings become costlier.

The estimated cumulative water savings from passive measures by 2024 of 501 acre-feet is not assigned a cost and is not included in the estimated cost per acre-foot of savings.

It is anticipated that the City will pursue implementation grants from the State over the next 7 years to supplement City funds. The grant requests will focus on providing audits, education, and rebates to the City's commercial and irrigation customers.

6.4 Summary of Recommendations

Following is a summary of recommendations for the City provided throughout this Plan:

- Implement the water efficiency measures and programs summarized in **Table 4-5 Recommended Water Efficiency Programs** with more focus on efficiency of outdoor water use
- Add to the City's existing tracking process to complete a water audit that follows the AWWA publication M36 Water Audits and Loss Control Programs Continue to evaluate and include passive savings in the water efficiency planning process
- Incorporate the findings of this Water Efficiency Plan into other planning efforts related to or impacted by this Plan including the Water Demand Evaluation and the Sustainability Plan

SECTION 7

7 Compliance with State of Colorado Planning Requirements

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

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

The City of Longmont developed this Water Efficiency Plan to comply with C.R.S. § 37-60-126. Each element of compliance is summarized in **Table 7-1** and where it is discussed in the Plan.

Table 7-1. Water Efficiency Plan Compliance with State Statutes

Compliance Element	Completed/Discussion	Location in Plan
1. Name and contact information	Yes	Cover Letter
2. Organizations and individuals assisting with plan development	Yes	Section 1.3
3. Quantified annual retail water delivery	Yes	Section 3.2
4. Identified population served by retail water delivery	Yes	Section 3.1
5. Public comment period	The Water Efficiency Plan approval process included the required 60-day comment period. The public participation process started April 17, 2017. The 60-day comment period ended on June 18, 2017. Public comments received are included in Attachment 1.	Section 6.1
6. Signature with authority to commit resources of the submitting entity	Yes	Cover Letter

Table 7-1. Water Efficiency Plan Compliance with State Statutes

Compliance Element	Completed/Discussion	Location in Plan
7. Water saving measures and programs	-	-
(I) water-efficient fixtures and appliances	The current program includes rebates for HE clothes washers, dishwashers, and toilets	Section 4.1
(II) water-wise landscapes	The current program includes steady promotion of water efficiency landscaping with Garden In A Box and Slow the Flow Irrigation Audits.	Section 4.2
(III) water-efficient industrial and commercial water-using processes	The current program includes partnering with PACE to promote water-efficient commercial fixtures.	Section 4.1
(IV) water reuse systems	Effluent water from the wastewater plant is used to satisfy augmentation, return flow, and potable and non-potable demands (by exchange).	Section 4.5
(V) distribution system leak identification and repair	The City implements industry best management practice approaches to water loss control. Longmont has a low rate of non-revenue water and water loss and has programs and procedures in place to ensure these remain low.	Section 4.3
(VI) information and education	The current program includes various public information campaigns with bill stuffers and related informational materials, and Xeriscape education.	Section 4.6
(VII) conservation oriented rate structure	Longmont bills customers monthly using a conservation-oriented increasing block rate structure.	Section 3.3
(VIII) technical assistance	Longmont applied for and received a grant from the CWCB to complete this plan with the assistance of CH2M HILL Engineers, Inc. and WaterDM.	Cover Letter
(IX) regulatory measures designed to encourage water conservation	The current program includes: voluntary watering restrictions, efficient plumbing fixture ordinance, soil amendment ordinance, water wasting ordinance, and irrigation ordinances.	Section 4.4
(X) incentives to implement water conservation techniques including rebates	A range of incentive and rebate programs are included in the rebates described above as well as free products.	Sections 4.1 and 4.2
8. Role of conservation in the entity's supply planning	Longmont has an annual expenditure of approximately $150,000 for conservation. The conservation program is well integrated into overall water supply planning and anticipated conservation savings are included in future demand projections. Water demand forecasts include the expected impacts of water conservation.	Section 5.1
9. Plan implementation, monitoring, review, and revision	Longmont has developed a plan implementation program along with monitoring mechanisms and scheduled review and revisions.	Section 6.2

Table 7-1. Water Efficiency Plan Compliance with State Statutes

Compliance Element	Completed/Discussion	Location in Plan
10. Estimated savings from previous conservation efforts as well as estimates from implementation of current plan and new plan	The Longmont water conservation program has accomplished significant demand reductions. The savings attributed to water efficiency rebate programs in 2013 was approximately 2,400 acre-feet. Longmont has established a goal of an additional 143 acre-feet through implementation of programs, and 501 acre-feet of passive savings, in this Plan through 2024.	Sections 4.7, 5.2, and 5.3
Water demand forecast based on land-use planning	Longmont's water demand forecast is based on unit rates for each land classification and is aligned with the planned land classifications in the Longmont Area Comprehensive Plan (LACP).	Section 5.1

Attachment 1
Summary of Public Comments

News List

Public Review & Comment: Draft Water Efficiency Plan

Post Date: 04/17/2017 8:00 am

The City of Longmont is updating the 2008 Water Conservation Master Plan and has developed a Draft Plan for review and comment. The purpose of the Plan is to assess the overall characteristics of current and future City water use, summarize the current status of raw water supply and treatment capacity, and use this information to frame the City's water conservation program with respect to current and ongoing water supply needs and water demand management. In addition, the Plan provides a detailed assessment related to the identification and selection of future water efficiency measures and programs that the City will continue to implement.

Review & Comment

View the 2017 Draft Water Efficiency Master Plan Update and preceding plans at LongmontColorado.gov/water.

A comment period will be open for 60 days beginning April 17, 2017 and ending June 15, 2017.Comments can be submitted two ways:

- Online: Comment Form at LongmontColorado.gov/water
- Mail: City of Longmont - PWNR, Attn: Nelson Tipton, 1100 S Sherman Street, Longmont, CO, 80501

All comments will be documented and considered by the project team as the Plan update moves forward.

Return to full list >>

Water Conservation

Draft Water Efficiency Master Plan Update

The City of Longmont is updating the 2008 Water Conservation Master Plan and has developed a Draft Plan for review and comment. The purpose of the Plan is to assess the overall characteristics of current and future City water use, summarize the current status of raw water supply and treatment capacity, and use this information to frame the City's water conservation program with respect to current and ongoing water supply needs and water demand management. In addition, the Plan provides a detailed assessment related to the identification and selection of future water efficiency measures and programs that the City will continue to implement.

Review & Comment

View the 2017 Draft Water Efficiency Master Plan Update >

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Longmont's Commitment to Conserving Water

We are committed to responsible, environmentally sound, and efficient use of our precious natural resources. The City and its customers recognize the importance of wise water use and water use efficiency as an essential component of the community's culture – helping to maintain the local quality of life in a responsible, sustainable manner.

Guiding Plans

2008 Water Conservation Master Plan

2013 Water Conservation Program Evaluation

2017 Draft Water Efficiency Master Plan Update

Resources for Residents

Longmont

- Conserving Water Outdoors
- Conserving Water Indoors
- Water Supply and Drought Management Plan

Boulder County

- Water Conservation and Protection

Colorado and Regional Information

- Community Collaborative Rain, Hail & Snow Network
- Colorado Water Wise
- Northern Water Conservancy District
- Water Conservation Board

Water Efficiency Plan Comment Form

Water Efficiency Plan Comment Form

The City of Longmont is conducting an update of its Water Conservation Master Plan. The full draft plan is available for review at https://LongmontColorado.gov/water. A comment period will be open for 60 days beginning April 17, 2017 and ending June 15, 2017. Your submission will be documented and considered by the project team.

Please note that all information in City databases is subject to the Open Records Act, including information submitted via this form.

Please provide your comments. *

Name *

First Last

Email

Phone Number

– ### –

Address

Street Address

Attachment 1 – Summary of Public Comments

City of Longmont 2017 Water Efficiency Master Plan

The City of Longmont appreciates all comments received from the public during development of the Water Efficiency Plan. A summary of public comments provided at public meetings and from the online comment form (open from 4/17/2017-6/18/2017), is provided below. Comments were evaluated by the City and incorporated into the Water Efficiency Plan where possible.

Comment ID	Date Received	Submitted via	Comment
1	2/27/2017	Longmont Water Board Meeting	Preliminary information for the Water Efficiency Plan was presented to the Longmont Water Board by the project team on 2/27/2017. Water Board requested additional detail on revenue and non-revenue water, changes to the units used in the plan, and more background on development of the City's overall water conservation goal. In general, the Board requested more focus on outdoor water efficiency programs.
2	3/20/2017	Longmont Water Board Meeting	A draft of the Water Efficiency Plan was provided to the Water Board prior to the 3/20/2017 meeting for their review. In addition to editorial corrections the Board commented to confirm the Garden In A Box rebate amount, remove the 2013 Water Conservation Program Evaluation as an attachment and just refer to it in the Plan, and update the City's LACP map to be consistent with the Envision Longmont program. The Board also requested the plan be sent to the City's Board of Environmental Affairs for review. Overall the Board was pleased with the Plan.
3	5/17/2017	Longmont Board of Environmental Affairs Meeting	A draft of the Water Efficiency Plan was provided to the Board of Environmental Affairs (BEA) prior to the 5/17/2017 meeting for their review. The BEA encouraged the water conservation program to be more aggressive with targeting outdoor water efficiency. The BEA also commented to have more discussion on the City converting systems from treated water to raw water irrigation and efficient raw water use. Overall the BEA was pleased with the Plan, and wants to be included in the review process in the future.
4	5/25/2017	Online Comment Form	The plan looks good, however it lacks looking at enabling residential consumers (the largest group of users to the system) to make behavioral changes. Progress looks good with changes of older toilets and washing machines for more water-friendly devices, but much of this is from attrition anyway. Enabling consumers to see their use at a finer detail and providing comparative data to neighbors, across the City has shown to lead to much greater conservation, to the tune of 20-50%, as shown by several California and Texas water districts. I can get electricity use and production (Solar PV) data on a near-real time basis, allowing me and my family to look at areas where we are not being efficient, and modify our behavior to reduce waste. This isn't true with water. The gross measurement of water consumption by month doesn't allow for measuring use by time of day, or to monitor lawn use (where most of our water is spent). Even with the planned update of all meters to RF meters, the data would still only be reported monthly. I would like to propose that the Water Conservation plan allow consumers to have a WiFi enabled water meter added to their incoming water line. This does not necessarily negate the use of the monitors the City would like to use. Allowing and encouraging consumers to add a monitor that they can get more detailed information about their use would go a long way to help many early-adopting, conservation-minded consumers to do more. Several friends and I would then like to share our data, share best practices, and

Comment ID	Date Received	Submitted via	Comment
			help create a resource where consumers can go to learn to do more. Ideally, this would be managed at the City level, and be part of the Water Conservation plan. Recommendation for meters that are WiFi enabled, and a software solution that can help create a standard platform for users to see and share data. I believe many of these platforms allow the municipality to see this data and monitor trends too. Maybe set it up as a pilot program for this Conservation period. Another benefit of an added meter is to be able to set "smart" controls on water consumption, so if there is a leak or break at a consumers home, the meter could close water to the home. I had the unfortunate luck to have a sprinkler main burst in an early freeze a few years ago, and had thousands of gallons of water pump out (luckily onto my lawn) while we were away. If the City is looking to see where it can find and reduce leaks through smarter meter monitoring, households can too. Finally, as part of the conservation efforts, behavior-based education and outreach to kids would be a great place to spend effort and funds. Helping kids learn about water conservation, having stickers to put on their vanity mirrors to shut off the faucet while brushing teeth, or getting simple timers for their showers would go a LONG way to support household conservation. Gamifying this for kids, or even for adults that share their data (above), would l to bigger returns then paying for subsidies to many who are already buying more water-consuming faucets, toilets, and washers. Thanks for your time.
5	6/6/2017	Online Comment Form	It is good to know that there is some review of both soil composition and plantings for large housing developments to ensure that contractors really are following the approved site landscaping plans. For those past housing developments where it is found that contractors did not meet the soil amendment requirements before planting the approved plantings, has there been any thought regarding creating more xeric landscaping through working with the HOAs? Perhaps help to do some redesigning: more drought resistant plantings? Or convert some lawned areas into native prairie grasses? Since Longmont does have two water purification plants, and expects to have to need some more potable water, why would it not be beneficial to continue to keep one as a backup? I may have missed the part of the plan that related to the use of "gray water" or perhaps that discussion may be found in a different plannng process or department? Should there not be some consideration for using gray water to lessen the need for cleaned raw water for all consumption?
6	6/15/2017	Online Comment Form	On behalf of the Center for ReSource Conservation(CRC), we would like to first congratulation the City of Longmont in their water conservation leadership. Our work with Nelson Tipton and Longmont residents shows year after year the conservation ethic that exists within the city and we look forward to continuing to play a role in helping staff and homeowners to meet their water saving goals. Below are a few comments or corrections to CRC's pricing structure as referenced in the plan. In regards to Table 4-5 - Pre-Rinse Nozzle Conversion: program cost is $2500 for 20. - Residential Irrigation Audits: Program cost is around $120 per unit.

Comment ID	Date Received	Submitted via	Comment
			- HOA Irrigation Audits: Allocation seems low based on historical spending. This is hard to estimate, but should be higher unit cost, or lower number of units. In addition, Table 4-5 are estimates the quantity, unit cost, and total budgets for the water efficiency programs through 2024. However, by stating a set budget of $150,000 from the implementation of the plan through 2024, there is no room for cost of living increases, which tend to be on the order of 2% per year for CRC programs and we would imagine costs increase for the city as well. At this rate, the budget should grow from $150K in 2018 to approximately $170K in 2024. Or, the expected quantity (and therefore water savings impact), will be lower than estimated. In regards to Table 4-6 - Pre-Rinse Nozzle Conversion - The current estimate in the plan is 14,000 gal/nozzle savings annually. The average estimated savings from the installs that we performed in 2015 & 2016 has been 19,000 gal/nozzle. - The estimate of 25 PRSVs installed per year is a little low, we have typically installed around 15 per year. - Residential Irrigation Audits - Good estimate of savings per audit when compared against our impact analysis results specific to Longmont. We hope this information is helpful and please let us know if we can provide further details. Best of luck in finalizing the plan and thank you for the opportunity to provide feedback.