



City of Englewood Water Efficiency Plan



Englewood, Colorado

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Project No. 159.8
February 10, 2023

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LIST OF ACRONYMS

AF	acre-feet
AF/yr	acre-feet per year
AWWA	American Water Works Association
AMI	Advanced Metering Infrastructure
CIP	Capital Improvement Plan
C.R.S.	Colorado Revised Statutes
CWCB	Colorado Water Conservation Board
CWLI	Colorado Water Loss Initiative
DOLA	Department of Local Affairs
EPA	United States Environmental Protection Agency
ft/yr	feet per year
FTE	full time equivalent
gpcd	gallons per capita per day
gpf	gallons per flush
gpm	gallons per minute
KPI	key performance indicator
kgal	kilogallons
USBR	United States Bureau of Reclamation
WTP	Water Treatment Plant

EXECUTIVE SUMMARY

The City of Englewood (Englewood) provides potable water service to a service area comprising approximately 35,000 residents and numerous businesses. Englewood, an established water provider with a history of reliable water service dating back to the 1950's, is committed to continuing efficient and reliable service of water to its customers. This Water Efficiency Plan (Plan) was developed by Englewood as an update to its 2013 Water Conservation Plan, as required by Colorado Revised Statute (C.R.S.) Section 37-60-126. The current Plan identifies Englewood's updated water efficiency goals based on recent water use and designs a set of water efficiency programs compatible with those goals.

Between 2017 and 2021, Englewood produced an average of 6,033 acre-feet (AF) of potable water per year, and its service area per capita water demand averaged 162 gallons per capita per day (gpcd). In the 2023 to 2029 implementation period of this Plan, Englewood is targeting a 6% reduction in its service area per capita water demand to 152 gpcd by 2029.

Thirty (30) water efficiency programs are proposed in this Plan. These are designed to achieve the targeted demand reduction, and they fall into six categories: metering and billing, water loss control, staffing and planning, technical improvements and incentives, rules and ordinances, and customer education. These categories and the related efficiency programs are described further in Section 4 and Table 5 of this report.

- **Metering and Billing:** To achieve further efficiency, Englewood will install meters on its approximately 1,200 remaining unmetered water customers and continue its program to replace old residential water meters. Data from water meters is used by Englewood Utilities staff to identify unusual water use. Englewood's water billing system is being upgraded to enhance communication with customers. In the longer term, Englewood plans to transition its meter stock to the newer AMI¹ metering technology which would allow remote monitoring of customer water usage.
- **Water Loss Control:** Assessing water loss in a distribution system requires metering or estimating as many end-uses as possible, including customer taps, water main and hydrant flushes, and main breaks. Therefore, Englewood's metering efforts relate to water loss control, as do Englewood's planned establishment of an Asset Management Program. The data collected in these ways will enable Englewood to update its system-wide water audit and identify areas where its water losses are controllable. This information can help inform the efforts of leak detection, repair, and water line replacement programs.
- **Staffing and Planning:** Englewood Utilities staff are committed to this Plan and will monitor and report progress on the water efficiency programs included in the Plan. Utilities staff are also familiar with Englewood's water system and supply planning efforts and are equipped to incorporate water efficiency targets into other planning efforts.

¹ Advanced Metering Infrastructure

- **Technical Improvements and Incentives:** Under this Plan, Englewood will pursue a program to identify and perform water fixture and appliance upgrades in municipal buildings to increase water efficiency. This investment can also be used to demonstrate and communicate to customers about the value placed upon water efficiency. In 2023, the Englewood Public Works Department is planning to conduct an energy and water audit of municipal buildings through cooperation with the Department of Energy. Additionally, Englewood's planned updates to the Broken Tee Golf Course irrigation system and its continued maintenance of City Ditch will improve the efficiency of Englewood's non-potable water use. In December 2022, the Englewood City Council expressed support about proposed incentive programs, and further steps are being pursued by the City to implement the programs. Additionally, Englewood staff are committed to applying for two grants to fund incentives which promote efficiency, such as customer rebates for water efficient fixtures and appliances. Englewood staff will consider offering water audits to select large water customers, pending staff availability. Finally, Englewood will consider partnership with EPA WaterSense, or similar water efficiency messaging campaign, to access updated water efficiency technical guidance for customer communication.
- **Rules and Ordinances:** Englewood's existing rules to require water meters for newly purchased properties and to limit water waste will continue to be in effect. Englewood is currently rewriting its zoning code and might consider adding some water efficiency requirements to that code. Within the implementation period of this Plan, Englewood City Council might reconsider adoption of the Green Construction Code.
- **Customer Education:** Englewood will improve its landscaping tips/water efficiency webpage (hosted through the Englewood Utilities website) and will evaluate adding a webpage addressing water use and efficiency in new development, which will aid staff in communicating water efficiency priorities to developers. Bill stuffers on water efficiency topics will be considered in the short term to communicate with customers. In the long term, such communication would transition to electronic format. Quarterly posts on water efficiency topics from Englewood's Facebook account will be considered, and an annual water efficiency article in the *Englewood Citizen* magazine will be targeted. Finally, Englewood will continue to encourage and engage participation in water decisions through citizen participation in the Water and Sewer Board and Sustainability Commission. Englewood will also pursue educational opportunities for customers to learn about low water landscaping.

This Water Efficiency Plan was funded in part by a grant from the Colorado Water Conservation Board (CWCB) and was reviewed by staff from Englewood Utilities, Sustainability Coordinator, Community Development, Water and Sewer Board, and Sustainability Commission. The Plan underwent public review from August 18 to October 18, 2022, received conditional approval from the CWCB in November 2022, and was reviewed and adopted by the Englewood City Council on February 6, 2023. On August 15, 2023, the Plan received final approval from CWCB. Englewood intends to update this Plan near or following the end of its implementation period in 2029 or 2030.

1. INTRODUCTION

The City of Englewood (Englewood) is a suburban metropolitan community located south of Denver, Colorado in Arapahoe County. Englewood provides potable water service to approximately 35,000 residential customers, including some from the neighboring City of Littleton², as well as the businesses and municipal facilities within Englewood’s municipal boundaries.

This Water Efficiency Plan was prepared as an update to Englewood’s 2013 Water Conservation Plan. As in 2013, Englewood remains committed to optimizing its water supplies and system through practical water efficiency programs which are compatible with the City’s resources and values. Many of the water efficiency programs reported at the time of the 2013 Water Conservation Plan have continued, and the current Plan adds additional programs and provides a framework for Englewood staff to target water efficiency goals. Englewood’s 2020 Strategic Plan includes goals to increase water efficiency and conservation, which this Plan helps to deliver.

The development of this Plan was funded in part by a grant from the CWCB. The Plan was developed in accordance with the Water Conservation Act of 2004³ and to meet the provisions of Colorado Revised Statute (C.R.S.) section 37-60-126, which requires retail water providers that sell at least 2,000 AF of water on an annual basis to have a state-approved water efficiency plan. The Colorado Water Conservation Board’s (CWCB) Municipal Water Efficiency Plan Guidance Document (July 2012), as well as its January 2019 Addendum related to land use planning, were referenced in preparation of this Plan.

The Englewood Utilities Department led this water efficiency planning effort, with input from the public, the Englewood Sustainability Coordinator, Community Development Department, Water and Sewer Board, Sustainability Commission, CWCB, and City Council. The effort began with a workshop including Englewood Utilities staff representing engineering, management, operations and maintenance, and field services, as well as outside consultants⁴. Public review of this Plan occurred between August 18 and October 18, 2022, as required by statute, and revisions to the Plan were made in response to public comment.

The water efficiency programs selected in this planning effort will be further evaluated or implemented by Englewood during the seven-year implementation period of this plan, which extends through 2029.

1.1 Profile of Existing Water Supply System

Englewood has been reliably serving potable water supplies to its customers since the 1950’s. Englewood’s potable water supplies are treated at the Allen Water Treatment Plant (WTP) and are delivered to customers via approximately 166 miles of pipe ranging from 4 inches to 36 inches in diameter. Englewood’s service area covers approximately 4,400 acres in size and its potable water

² The 2020 census population of Englewood was 33,659 people. However, Englewood serves water to approximately 905 additional residents of Littleton, as described in Section 2.1.

³ Colorado House Bill 04-1365

⁴ Martin and Wood Water Consultants, Inc.

distribution system includes three pressure zones. More information about Englewood's potable water delivery infrastructure can be found in the Water System Master Plan prepared for Englewood by Hazen and Sawyer (May 2020). The Water Master Plan is posted on the City's public-facing website.

Englewood uses non-potable water supplies, not treated at the Allen WTP, for irrigation on the municipal Broken Tee Golf Course as well as on four city parks. Englewood also provides non-potable water supplies to other customers, including Centennial Water and Sanitation District (Centennial).

1.1.1 Water Supply

Englewood's potable water supply is physically sourced from surface diversions from the South Platte River or its tributaries (including Bear Creek), with most diversions being made from the South Platte River at Union Avenue in Englewood or via City Ditch from Chatfield Reservoir. Access to the water is provided through the City's various water rights and agreements.

Englewood's non-potable water supplies are derived from shallow alluvial aquifer wells, ditch diversions, and three Denver Basin wells.

1.1.2 Water Facilities

Englewood treats its potable water supply at the Allen WTP (Figure 1). Wastewater is treated at the South Platte Renew plant.

Englewood's main local raw water storage facility, McLellan Reservoir, was built in the 1950s and has a capacity of approximately 5,000 AF. McLellan Reservoir is located east of the South Platte River, south of Englewood and north of Chatfield Reservoir. It can be filled by Englewood from the McLellan-City Ditch Pump Station from City Ditch, Dad Clark Gulch, and wells. Centennial also stores water in McLellan Reservoir. Englewood delivers non-potable water to Centennial through deliveries to the reservoir.

1.2 Water Supply Reliability

Englewood is located south of Denver in a high-population metropolitan area receiving an average of approximately 15 inches of rain per year⁵. Englewood is anticipating growth within its service area and intends to reliably supply water to all customers.

⁵ Water year 2000 through 2020 average precipitation recorded at the Marston Filter Plant NOAA weather station (USC00055402)



Englewood is located within and derives its water supplies primarily from the Metro Basin, which is a portion of the South Platte Basin as defined in the Colorado Water Plan. The Colorado Water Plan includes projections for future water supply conditions, including several different scenarios for potential growth and water supply outcomes. In the Colorado Water Plan's projection specific to Arapahoe County, population is projected to grow between 34% and 52% in the 2015 to 2050 period. This projected population growth represents an annual growth rate in the County between 0.8% and 1.2% per year.

The Colorado Water Plan also includes comparisons of water demand to estimated supplies. That Plan identified a 2050 water supply gap (unmet future water demand) in the South Platte Basin that ranged between 500,000 and 840,000 acre-feet per year (AF/yr).

Englewood's water rights provide sufficient capacity for Englewood to serve its current water demands. As water demands within Englewood's service area grow, Englewood's reliance on its storage water rights and groundwater rights may grow, particularly during the higher water use months of May through September.

Englewood's water rights portfolio is fairly resilient to drought conditions due to its senior water rights and water supply agreements, which collectively provide sufficient supplies even during dry years. Englewood's resilience to drought and ability to meet long-term needs may be impacted by increasing water demands, extended drought, water administration policy change, or changes in river hydrology.

1.3 Supply-Side Limitations and Future Needs

Englewood has provided reliable water supplies to its residents for over 70 years. To ensure this continues, Englewood is planning for various future water demand scenarios. This includes consideration of varied water right yield scenarios, potential future climate conditions which can impact both supply and demand, changing water needs within the community, growth within the water service area, and regional development trends.

This Water Efficiency Plan includes specific programs that can be implemented to reduce per capita water demands. A reduction in Englewood's per capita water demands will allow Englewood's existing water supplies to serve more growth and may lower or eliminate costs to develop new water supplies or infrastructure.

2. PROFILE OF WATER DEMANDS AND HISTORICAL DEMAND MANAGEMENT

2.1 Demographics and Key Characteristics of the Service Area

2.1.1 Service Area Population

In 2020, the Englewood water service area included an estimated 34,564 residents⁶. This population includes an estimated 905 residents who resided outside of Englewood's municipal boundaries but that were served water by Englewood.

The Colorado Department of Local Affairs (DOLA), State Demography Office projects a 1% annual population growth rate for Arapahoe County, the county in which Englewood is located, in the 2020 through 2025 period. Englewood's average annual growth rate within its municipal boundaries in the 2010 to 2020 period was 1.1%.

2.1.2 Service Area Demographics and Housing Stock

The U.S. Census provided 2015-2019 average estimates related to Englewood's demographic characteristics. According to those estimates, 17% of the population within Englewood's municipal boundaries consists of people under the age of 18 and 14% consists of people aged 65 and older. The median household income in Englewood, in 2019 dollars, was \$59,774, and an estimated 14% of Englewood's population had income levels falling below the poverty line. An estimated 92% of the population aged 25 and older had a high-school equivalent level of education, and an average of 91% of households owned a computer. An estimated 12% of Englewood's population spoke a language other than English in the home.

As of 2016, 43% of Englewood's single-family housing stock dated from before 1940, 48% dated from the 1941 to 1960 period, 8% dated from the 1960 to 2000 period, and 1% had been built since 2001⁷. The U.S. Census estimates that 48.3% of housing units in Englewood were owner-occupied in the 2015 to 2019 period. The Englewood Community Development Department estimates that 69.6% of Englewood residents currently live in single-family housing, with the remaining 30.4% of residents in multi-family housing.

⁶ The City of Englewood's residential population, according to the 2020 United States (U.S.) Census, was 33,659 people. Englewood's water service area population is slightly larger than the City of Englewood U.S. Census population, due to the presence (in 2020) of 381 additional residential taps outside of Englewood's municipal boundary. These 381 taps consist of 377 single-family residential taps, three (3) multi-family taps, and one (1) mobile home park tap (2500 Hampden Avenue). Based upon the Department of Local Affairs (DOLA) estimate of average Englewood household size (2.08 people), an estimate of 7.78 households per multifamily tap, and an estimate of 72 residents of the mobile home park at 2500 Hampden Avenue, an estimated 905 people reside outside of Englewood municipal boundaries but are served potable water by Englewood.

⁷ Englewood Forward Comprehensive Plan, December 2016

2.2 Historical Water Demands

2.2.1 Potable Water Demands

In the 2017 through 2021 period, Englewood’s potable water supply was distributed to an average of 9,778 active metered taps and approximately 1,200 unmetered taps⁸. In this five-year period, Englewood produced an average of 6,033 AF/yr of potable water. The potable water distributed to customer or hydrant meters, according to billing records, averaged 5,269 AF/yr (Table 1A).

In the 2017 to 2021 period, the number of active metered taps increased 5% (by 466 taps, from 9,509 taps to 9,975 taps). Approximately 85% (400 taps of 466 taps) of the new active metered taps were preexisting unmetered taps converted to metered taps. By 2021, the number of remaining unmetered taps totaled 1,199 taps, consisting of 1,102 single-family taps, 88 multi-family taps, 7 commercial taps, and 2 industrial taps.

The largest amount of Englewood’s potable water was distributed to single-family residential customers (2,222 AF/yr), followed by multi-family residential customers (1,215 AF/yr), commercial customers (988 AF/yr), industrial customers (370 AF/yr), municipal customers (370 AF/yr), other customers (primarily schools, 100 AF/yr), and hydrant rentals (5 AF/yr), as detailed in Table 1A and displayed graphically in Figure 2. Table 1B is analogous to Table 1A except for conversion of amounts to million gallons (MG). Unmeasured End Use Water was the potable water measured at the Allen WTP distribution meter but not measured at a customer tap, and this water averaged 764 AF/yr, which is 13% of the average potable water production. Englewood’s Unmeasured End Use Water consists of water distributed to unmetered tap accounts as well as losses in its distribution system.

Table 1A
Englewood Potable Water Distribution
2017 through 2021
Units of Acre-Feet (AF)

Calendar Year	Potable Water Production (AF)	Total Billed (AF)	Total Billed by Customer Category (AF)							Unmeasured End Use Water (AF)
			Commercial	Industrial	Municipal	Single-Family Residential	Multi-Family Residential + Mobile Homes	Other	Hydrant Rentals	
2017	5,770	5,159	992	345	354	2,166	1,191	109	2	611
2018	6,059	5,144	945	357	420	2,162	1,172	83	4	915
2019	5,762	4,994	997	355	348	2,056	1,169	65	5	768
2020	6,626	5,479	957	348	376	2,432	1,254	102	11	1,147
2021	5,947	5,569	1,048	446	352	2,293	1,288	141	1	378
Average	6,033	5,269	988	370	370	2,222	1,215	100	5	764

Source: Englewood metered Allen WTP production and customer metered water use.

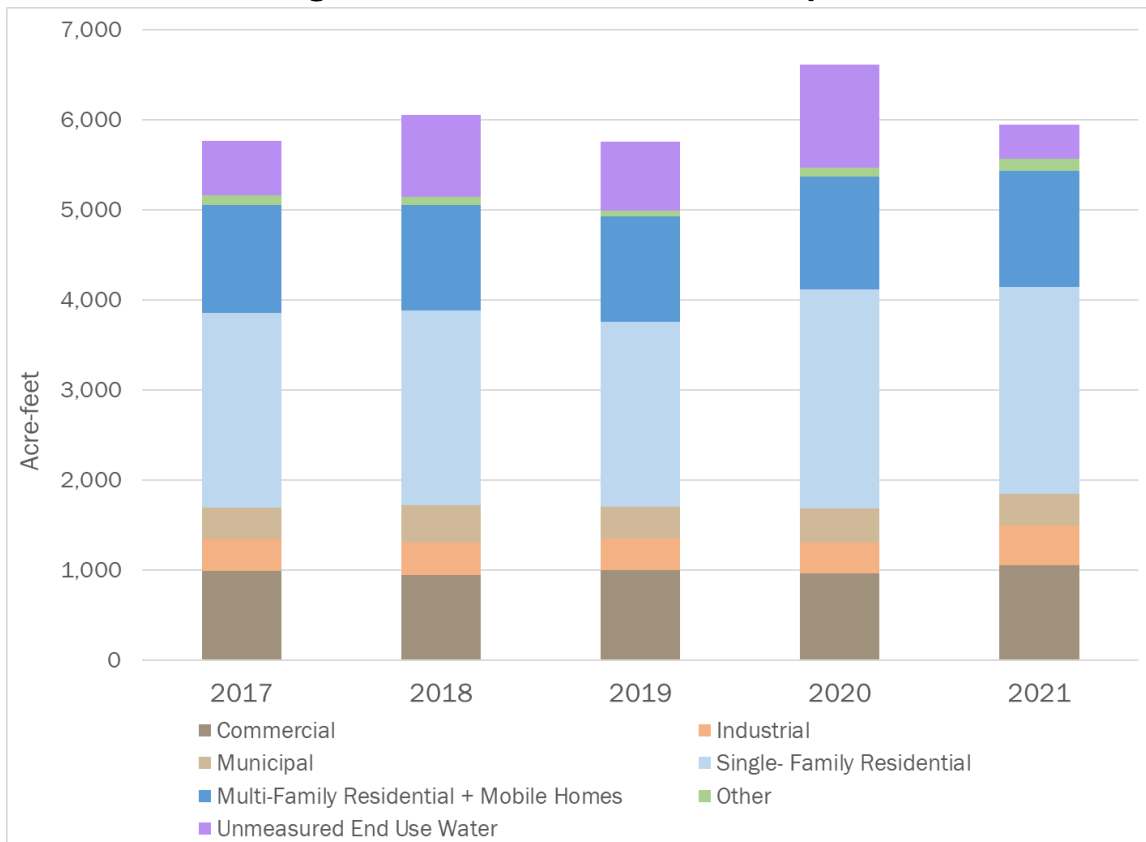
⁸ Water billing records were provided by the Englewood Utilities Department. Unique taps were identified by both customer account number (“c_account”) and by tap size identification (“c_billcode1”)

Table 1B
Englewood Potable Water Distribution
2017 through 2021
Units of Millions Gallons (MG)

Calendar Year	Potable Water Production (MG)	Total Billed (MG)	Total Billed by Customer Category (MG)							Unmeasured End Use Water (MG)
			Commercial	Industrial	Municipal	Single-Family Residential	Multi-Family Residential + Mobile Homes	Other	Hydrant Rentals	
						706	388			
2017	1,880	1,681	323	112	115	706	388	36	1	199
2018	1,974	1,676	308	116	137	705	382	27	1	298
2019	1,878	1,627	325	116	113	670	381	21	2	250
2020	2,159	1,785	312	113	123	792	408	33	3	374
2021	1,938	1,815	342	145	115	747	420	46	0	123
Average	1,966	1,717	322	121	121	724	396	33	1	249

Source: Englewood metered Allen WTP production and customer metered water use.

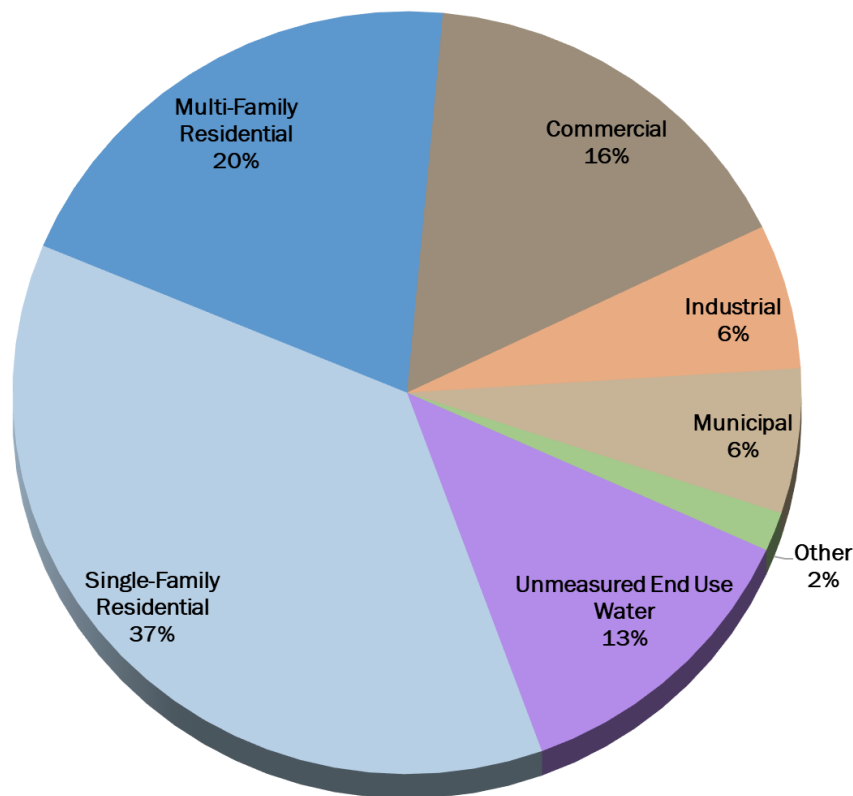
Figure 2
Englewood Potable Water Distribution by Year



In the 2017 through 2021 period, potable water use as a percentage of potable water production was distributed as follows (Figure 3).

- Single-family residential: 37%
- Multi-family residential: 20%
- Commercial: 16%
- Industrial: 6%
- Municipal use: 6%
- Other uses (including for schools⁹): 2%
- Unmeasured End Use Water: 13%

Figure 3
Englewood Potable Water Distribution by Customer Type
2017 through 2021 Average



2.2.2 Non-Potable Water Demands

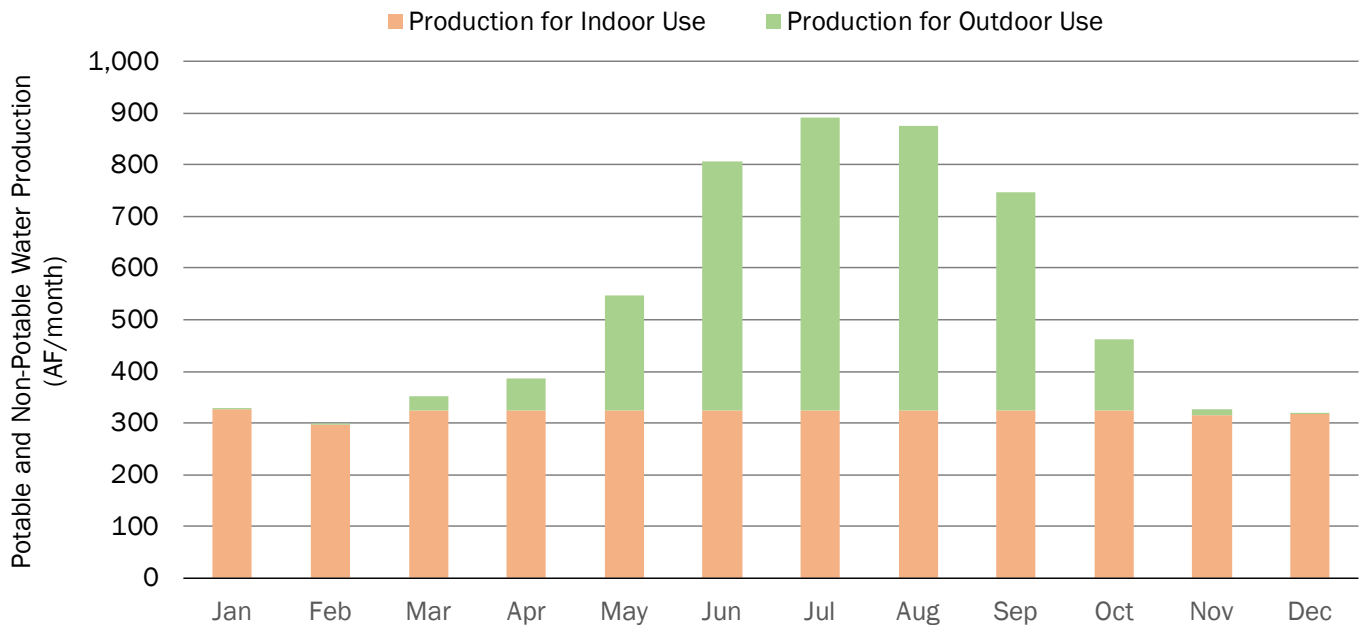
Englewood uses non-potable water at some of its parks and at the Broken Tee Golf Course. In the 2017 through 2021 period, Englewood used an average of 226 AF/yr of non-potable water to irrigate 94 acres and to fill ponds at the municipal Broken Tee Golf Course and an additional 80 AF/yr to irrigate approximately 30 acres of bluegrass at four city parks and to fill one 0.4-acre pond.

⁹ “Other” category includes four school taps, four mixed use commercial/residential taps, a small park irrigated by potable water, and metered hydrant water use with hydrant use averaging less than 1.6 MG per year.

2.2.3 Seasonality of Water Demands

Englewood’s potable and non-potable water demands are highest in the irrigation season months of April through October, based primarily on lawn irrigation water use and other outdoor water uses in those months (Figure 4). The data presented in Figure 4 are based on all water production (potable and non-potable) in the service area.

Figure 4
Englewood Indoor/Outdoor Water Use Distribution by Month
2017 through 2021 Average



Note: In December through February, water production for indoor use is calculated as the average monthly 2017 through 2021 potable water production. In those winter months, the only outdoor use is the small amount of non-potable water applied to parks or golf course. In March through November, water production for indoor use is equal to the monthly base use, which was estimated as the average of the 2017 through 2021 indoor water production from December through February. In those non-winter months, outdoor water production is equal to 2017 through 2021 average measured non-potable water use at parks/golf course plus average potable water production in each of those months that was higher than calculated monthly base use.

Throughout 2021, Englewood transitioned from a quarterly to a monthly water billing frequency. Since Englewood will not have a complete year of monthly water billing data until the end of 2022, monthly estimates of treated water use by customer category could not be provided at this time.

2.2.4 Per Capita Water Demands

In the most recent five-year period, Englewood’s per capita water demands have averaged 162 gallons per capita per day (gpcd) over its whole service area, 101 gpcd for only the metered residential customers (Table 2A), and 52 gpcd for commercial and industrial uses on a per-employee basis (Table 2B).

Englewood’s per-capita water demand over its whole service area includes potable water production for all customer categories divided by the estimated service area population. However, service area population only includes residential customers, and does not include Englewood’s substantial transient population composed mainly of workers who commute in from areas outside Englewood, estimated to have averaged 23,389 people in the 2017 through 2021 period (Table 2B). Because Englewood has not included this large transient population in calculation of its service area per-capita water demand, that calculated demand may be higher than compared to other municipalities that do not have large transient populations.

Table 2A
Per Capita Water Demand, Total and Residential-Only

Year	All Water Production and Customers			Metered Residential-Only Customers		
	Potable and Non-Potable Water Production (AF)	Total Service Area Population	Service Area Per Capita Water Demand (gpcd)	Residential-Only Billed Water (AF)	Metered Service Area Population	Residential-Only Per Capita Water Demand (gpcd)
	(1)	(2)	(3)	(4)	(5)	(6)
2017	5,990	34,825	154	3,358	29,626	101
2018	6,388	34,786	164	3,335	29,831	100
2019	5,991	34,745	154	3,225	30,034	96
2020	6,984	34,562	180	3,685	30,341	108
2021	6,245	34,899	160	3,581	31,182	103
Average	6,320	34,763	162	3,437	30,203	101

Note

- (1) Total potable and non-potable water production, with the former from Table 1.
- (2) Equal to municipal population data from Colorado Department of Local Affairs, State Demography Office added to an estimated 905 water customers located outside Englewood municipal boundaries.
- (3) Equal to (1), converted to gallons and divided by (2) and 365 days.
- (4) Equal to the sum of "Single-Family" and "Multi-Family + Mobile Homes" billed water from Table 1.
- (5) Metered population was estimated as (2) minus estimated unmetered population, based upon number of unmetered taps (from Billing Department or estimated by interpolation), and assuming 2.08 people per unmetered single-family tap and 16.18 people per unmetered multi-family tap.
- (6) Equal to (4), converted to gallons and divided by (5) and 365 days (366 days in 2020).

Table 2B
Per Capita Water Demand, Commercial and Industrial Only

Year	Commercial and Industrial Customers		
	Metered Potable Water Use (AF)	Employee Population	Comm/Ind Per Capita Water Demand (gpcd)
	(1)	(2)	(3)
2017	1,337	23,217	51
2018	1,302	23,266	50
2019	1,351	23,342	52
2020	1,305	23,445	50
2021	1,494	23,673	56
Average	1,358	23,389	52

Note

- (1) Commercial and Industrial metered potable use (Table 1A).
- (2) Equal to estimated non-transient population in Englewood. The May 19, 2022 Community Profile for Englewood from the Colorado State Demography Office estimated 24,500 employees in Englewood, and Englewood reported 23,673 employee population (added to the residential population) in its 2021 HB-1051 reporting. The employee population was estimated in 2017 through 2020 as the 2021 employee population, prorated by the total service area population level in that year relative to its level in 2021.
- (3) Equal to (1), converted to gallons and divided by (2) and number of days in the year.

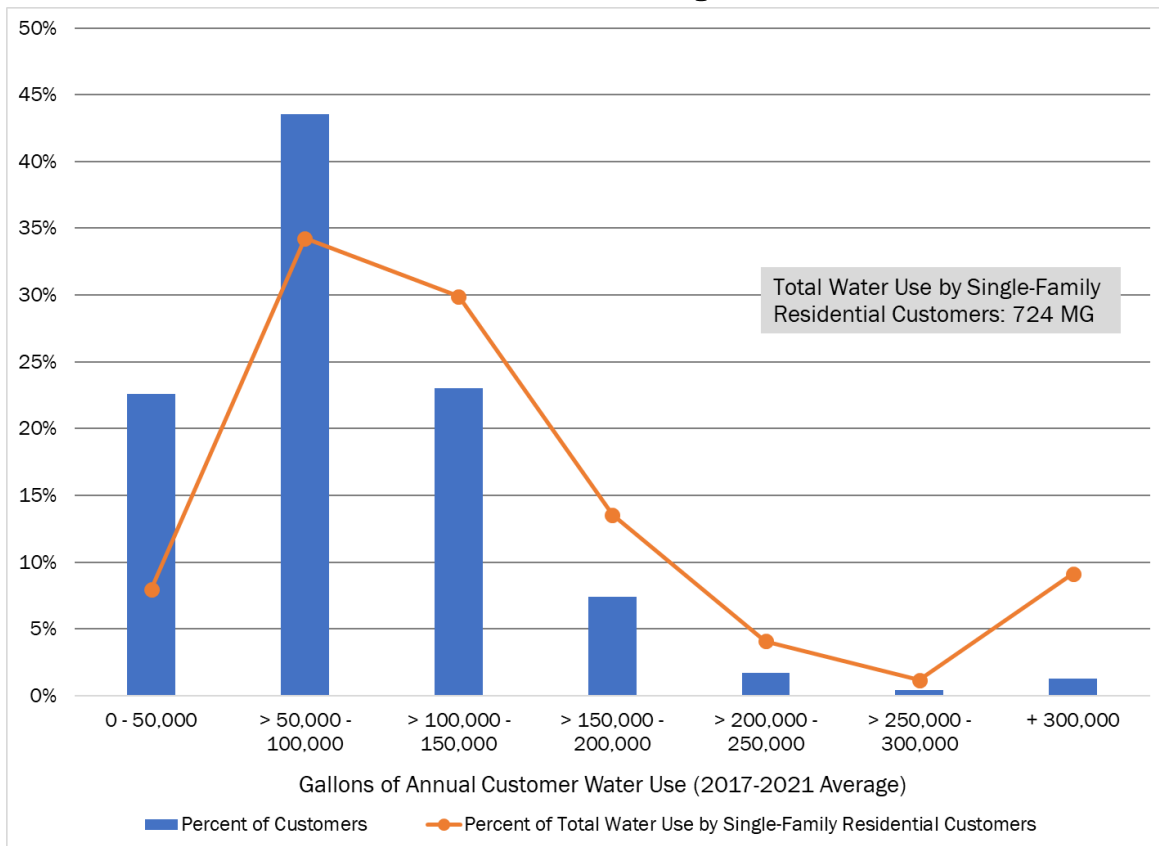
2.2.5 Single-Family Residential Water Demands

The largest portion of Englewood’s billed water serves single-family residential customers (2,222 AF/yr or 724 Million Gallons per year (MG/yr) billed on average in the 2017 through 2021 period). A histogram of single-family residential customer water use demonstrates that a few of the highest water users use an outsized portion of the water in this category (Figure 5).

Twenty-three percent (23%) of Englewood’s single-family residential customers were the lowest water users, using less than or equal to 50,000 gallons per year per customer in the 2017 through 2021 period. Their combined water use, less than 65 MG/yr, was less than the water use of the top 1% of single-family residential water users. These 1% of single-family residential water customers who had the highest water use in the 2017 through 2021 period (103 customers) used more than 300,000 gallons per year per customer, many in amounts far exceeding that level. Water efficiency efforts focusing on this small number of single-family residential customers would have the highest potential for water savings.

The majority of Englewood’s single-family residential customers (89%) used less than or equal to 150,000 gallons per year per customer on average in the 2017 through 2021 period.

Figure 5
Englewood Residential Water Use Histogram
2017-2021 Average



Note: Zero usage years were excluded in calculation of the customer 2017-2021 average annual use.

2.2.6 System Water Loss and Unmeasured End Use Water

System water losses refer to real water losses due to pipe and valve leaks within a water provider's distribution system. System water losses for potable water systems in Colorado typically range from 5% to 15%, with losses in newer or well-maintained distribution systems often lower than 10%. Englewood's system water losses are likely in the range of 4% to 7% of its potable water production¹⁰. A more accurate estimate of Englewood's system water losses will be possible after Englewood meters the 1,199 taps that remained unmetered in 2021.

Englewood's system water losses are a subset of the "Unmeasured End Use Water" category shown in Table 1. Unmeasured End Use Water is equivalent to what the American Water Works Association (AWWA) refers to as "non-revenue water", including system water losses (inadvertent real losses), apparent losses due to non-metering or meter inaccuracies, water theft, systematic data handling errors, and authorized unmetered consumption, including firefighting and main flushing. From 2017 through 2021, Englewood's Unmeasured End Use Water averaged 764 AF/yr or 13% of Englewood's average potable water production.

2.3 Past and Current Demand Management Programs and Impact on Demands

Englewood has implemented the following water efficiency (conservation) programs as a means of demand management. Some of these programs were implemented following Englewood's 2013 Water Conservation Plan.

1. **Public Information:** At the time of the 2013 Water Conservation Plan, Englewood communicated water efficiency topics to its customers via a newsletter. Since that time, this communication has evolved into a water efficiency webpage on the Englewood Utilities' website.
2. **Customer Water Metering:** Englewood municipal code requires metering upon property sale, and Englewood has pursued several customer incentives for metering. Approximately 800 additional customer accounts were metered since the time of the 2013 Conservation Plan.
3. **Leak Detection and Repair:** Englewood's operations and maintenance on its potable water distribution system has been continuous, and Englewood is currently working toward an Asset Management System to better manage their work in this area.
4. **Plumbing Code:** In 2013, Englewood's plumbing code specified maximum flow rates for plumbing fixtures as 1.6 gallon-per-flush (gpf) for toilets and 2.5 gallons-per-minute (gpm) for faucets and showerheads. Englewood has since upgraded to the 2018 International Plumbing Code, which has the same maximum flow rates, except the rate for faucets has been lowered to 2.2 gpm¹¹.

¹⁰ Estimated based on 764 AF/yr of Unmeasured End Use Water in the 2017 through 2021 period, less an estimated 360 AF/yr to 540 AF/yr of water use from the average of 1,275 unmetered taps in the 2017 through 2021 period. The difference, ranging from 224 AF/yr to 404 AF/yr, represents 4% to 7% of Englewood's 207 through 2021 average potable water production of 6,033 acre-feet per year.

¹¹ Table 604.4 in Section 604 of the 2018 International Plumbing Code

Further, starting in 2016, plumbing fixtures not meeting WaterSense standards have not been allowed for sale in Colorado¹². WaterSense standards currently are 1.6 gpf for toilets, 1.5 gpm for faucets, and 2.0 gpm for showerheads.

5. **Non-Potable Systems**: Englewood has several non-potable water systems serving outdoor water demands on its parks and the municipal golf course; this use of non-potable systems reduces the amount of potable water that Englewood is required to treat and deliver.
6. **Online Access to Water Bill and History**: Delivering on a goal of the 2013 Conservation Plan, in 2020, Englewood customers who create an online account to pay their water bill gained the ability to access two years' worth of their historical water use data.
7. **Billing Software Upgrades**: Englewood continues to upgrade and change its billing system. Englewood is currently in the process of a billing system upgrade that will allow enhanced communication with customers.
8. **Water Waste Ordinance**: Englewood's ordinance prohibiting water waste (12-1A-7) has existed since at least 1985. The ordinance prohibits overspray, running water to keep pipes from freezing, or other practices which do not beneficially use water.
9. **Educational Programs**: Englewood hosts schoolchildren at the Allen WTP for field trips, communicating the value of water to these young customers.
10. **Water Rates**: Englewood increased its water rates in 2021 and in 2022.
11. **Customer Water Leak Checks**: Englewood water customers may schedule a water leak check to be performed by Englewood staff at the customer's meter. These checks are not advertised to customers and are typically performed for customers who call about a high water bill. Staff can determine the presence of a water leak, but not the source of the leak.

The impacts of the water efficiency programs described above have not been measured specifically. To assess the net impact of the programs on a wider basis, the per capita water demands between 2007 and 2011 (reported in the 2013 Water Conservation Plan) can be compared to per capita water demands between 2017 and 2021. While a reduction was not observed in the service area per capita water demand (160 gpcd in the earlier period to 162 gpcd in the later period), service area per capita water demand can reflect many factors, such as how much business is supported within the community. On the other hand, Englewood's per capita residential-only metered water demand appears to have lowered 13% between those two periods, from approximately 116 gpcd¹³ to 101 gpcd, indicating that many water users did become more efficient.

¹² C.R.S. 6-7.5-102(26) and C.R.S. 6-7.5-103.

¹³ Per capita water demand reported in Englewood's 2013 Water Conservation Plan for the 2007 through 2011 period averaged 160 gpcd system-wide (equivalent to service area-wide) and 89 gpcd residential-only. However, the residential-only value was not corrected for the presence of unmetered residential population. Using the same assumptions for household size (2.08 people per household) and number of households per multi-family tap (7.78 households per tap) as are used in this Plan, the adjusted 2007 through 2011 residential-only per capita water demand was 116 gpcd.

2.4 Demand Forecasts

The implementation period for this Water Efficiency Plan is seven years, consisting of the 2023 through 2029 period.

Future potable water demands during the implementation period were projected based upon the following assumptions.

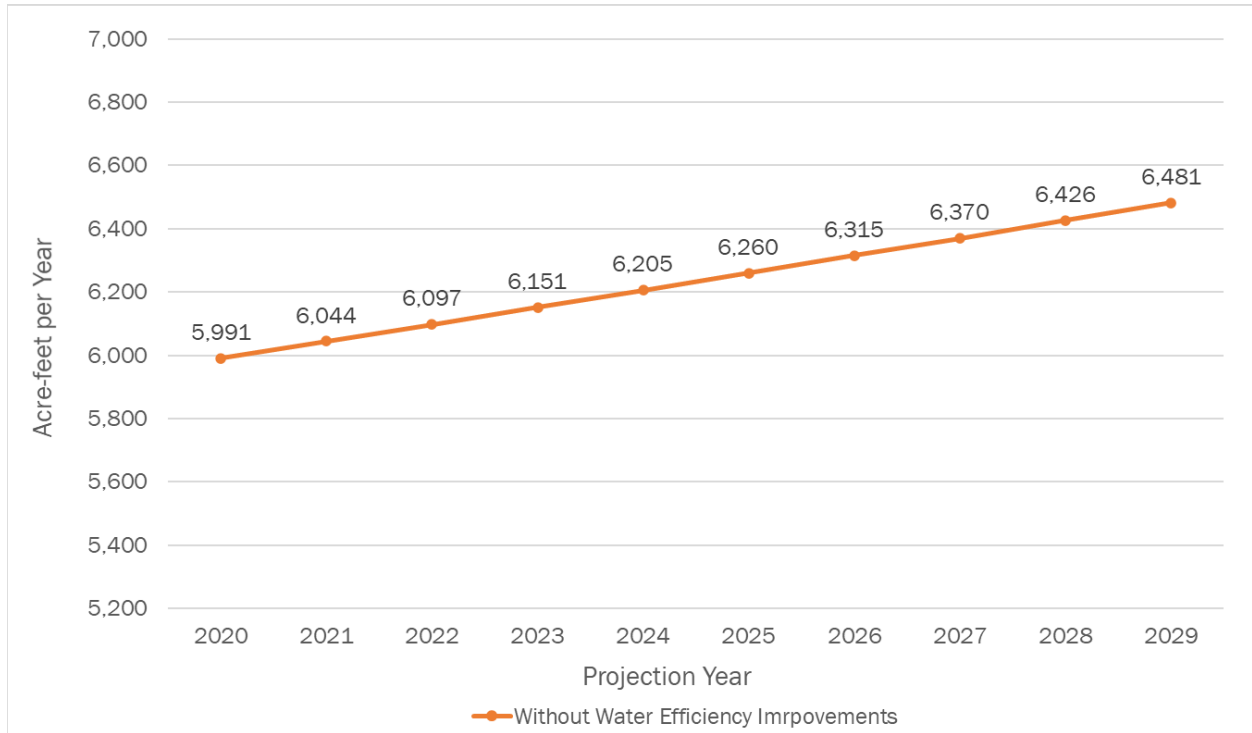
- Projected per capita water demand based on Englewood's 2011 through 2020 average potable water demands¹⁴.
- 1% annual population growth from the baseline 2020 Englewood water service area population of 34,564.
- 80% of new residential development consisting of multi-family development, 20% consisting of single-family development¹⁵.
- 9% growth in commercial, industrial, and municipal water use from 2020 to 2029.
- No water efficiency programs modifying the average water demands.

Based on the assumptions above, Englewood's potable water production in 2029, assuming average year conditions, is projected to be 6,481 AF (Figure 6).

¹⁴ 2011-2020 is a recent study period used by Englewood for planning purposes; the 2020 baseline potable water demand of 5,991 acre-feet is equal to Englewood's 2011-2020 study period average and includes a small amount (0.6%) of in-plant treatment losses which are not shown in the potable water production values shown in Table 1.

¹⁵ An estimated 69.4% of Englewood's existing residents live in single-family dwellings, with the remaining residing in multi-family dwellings. However, the majority of future residential development is expected to be multi-family, based on Englewood's nearly built-out condition.

Figure 6
Englewood Projected Potable Water Production
Without Water Efficiency Improvements



3. INTEGRATED PLANNING AND WATER EFFICIENCY BENEFITS AND GOALS

3.1 Water Efficiency and Water Supply Planning

Englewood is anticipating that future per capita water demands may be lower than historical per capita water demands. In the long term, it is anticipated that water efficiency programs could result in per capita water demands that are up to 19% lower than historical demands¹⁶. However, during the implementation period of the current Plan (2023 through 2029), it is anticipated that a 6% per capita water demand reduction is achievable, resulting in the future per capita water demand averages shown below.

Table 3
Current and Targeted Englewood Per Capita Water Use

Period		Service Area Per Capita Water Demand (gpcd)	Residential-Only Per Capita Water Demand (gpcd)
Current	2017 – 2021 Average	162	101
Targeted	2029*	152	95
Percent Reduction:		6%	6%

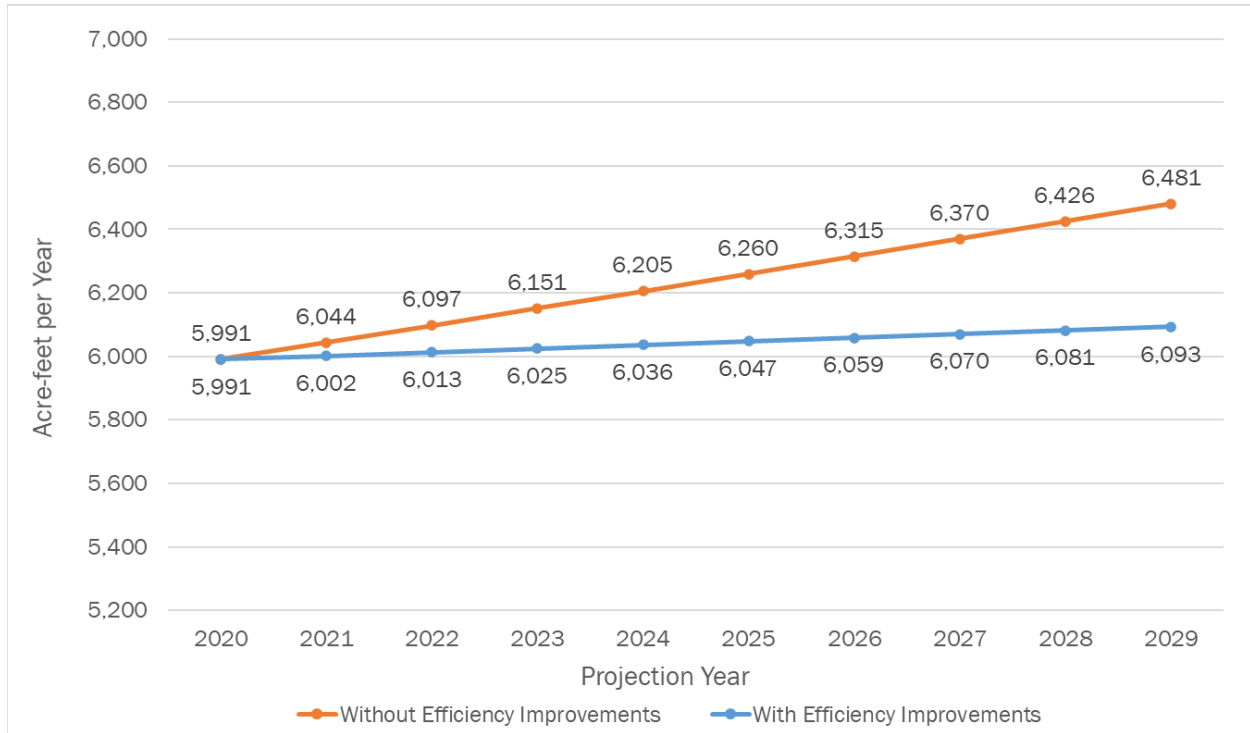
Note: * A 6% reduction in per capita water demands was assumed based on recent and planned water efficiency improvements and assumes that 2029 climate and water demand conditions are similar to 2017 through 2021 average conditions.

A second projection of Englewood’s potable water production in the 2020 through 2029 period was made using the same assumptions described in Section 2.4, except with the assumption of a 6% reduction in per capita water demand due to water efficiency improvements. With this change, Englewood’s projected water demands still increase through 2029, but the increase is less than if the efficiency improvements had not been made (Figure 7). In 2029, under average year¹⁷ conditions, water demand is projected to be 6,093 AF/yr, 6% lower and 388 AF/yr less than the projection absent any water efficiency improvements.

¹⁶ This estimated demand reduction potential is based on the per capita water demands achieved by nearby municipalities.

¹⁷ Englewood’s average-year water demands are defined and projected based on 2011 through 2020 average per capita and per-SFE (single-family equivalent) water demands, although actual annual water demands will vary from the multi-year average.

Figure 7
Englewood Projected Potable Water Production
With Efficiency Improvements



While the projected water demands in this Plan do not assume higher levels of outdoor water use due to climate change, the 2019 Colorado Water Plan projects an increase in vegetative evapotranspiration (ET) in Arapahoe County under climate change conditions that ranges between 9% and 15% over historical ET. Englewood acknowledges that future water supply conditions remain unknown, and that historical conditions may not accurately represent future conditions. Englewood is taking steps to prepare for a wide range of potential future climate conditions.

3.2 Water Efficiency Goals

Englewood aims to reduce its per capita water demands by 6% through efficiency programs by the end of 2029. Achievement of this goal is anticipated to reduce potable water production in 2029 by 388 AF relative to what production would have been without water efficiency improvements (Table 4). This goal was set based on the water efficiency programs proposed in this Plan (Table 5) and the estimated savings that may result from the implementation of the programs over the next seven years.

Englewood will evaluate progress toward its goal of a 6% reduction in per capita water demands by monitoring these demands annually using updates to Table 1 and Table 2 from this Plan. These updates will include a consideration of changes in the numbers of metered customers and updated estimates of Englewood’s municipal population from DOLA.

**Table 4
Target Reduction in 2029 Water Production
Based on Efficiency Programs Proposed**

Efficiency Program Category	Resulting Annual Reduction** in 2029 Water Production (AF)
Foundational*	323
Technical Improvements and Incentives	45
Rules/Ordinances	10
Customer Education	10
Total	388

Notes:

*Foundational programs include metering and billing, water loss control, and staffing and planning.

**The reduction in 2029 water production is a relative reduction. Water production in 2029 is still anticipated to be higher than that in 2020 (Figure 7), but production will not increase as much as it would without water efficiency improvements.

4. SELECTION OF WATER EFFICIENCY PROGRAMS

4.1 Summary of Selection Process

Englewood Utilities staff, including representatives from the engineering, management, operations and maintenance, and field services divisions, met virtually on December 13, 2021 to discuss water efficiency. During the meeting, the group reviewed data on Englewood's water use and selected water efficiency programs for Englewood to pursue or further evaluate based on identified criteria. The group, with the assistance of Martin and Wood Water Consultants, reviewed detailed worksheets listing more than 140 potential water efficiency programs (see Appendix A, Worksheets 1 through 4, which were based upon Worksheets D through G of Colorado Water Conservation Board's (CWCB) Municipal Water Efficiency Plan Guidance Document¹⁸). The potential programs were screened by Englewood staff based on the following criteria which were agreed upon by the group.

1. Resources are available to implement and manage the efficiency measure
2. City Leadership concurrence and public support for the efficiency measure
3. Measurable, cost-effective water savings will be realized once the efficiency measure is implemented

Thirty water efficiency programs were selected through this process for further consideration or pursuit. These programs are listed in Table 5 and are described in more detail in this section, with references to their listing number indicated in Table 5.

4.2 Foundational Programs

Foundational water efficiency programs are generally considered to be the most important and fundamental programs for a water utility to implement. Foundational programs include water use metering, organized billing practices, system loss monitoring, and water system planning. The CWCB and other Colorado water efficiency professionals identify foundational programs as prerequisites for higher-level water efficiency efforts.

As discussed above, this Plan aims to reduce Englewood's average-year water demand at the end of the Plan period (in 2029) by 388 AF/yr, or 6% of the water demand otherwise projected. Of this demand reduction, it is expected that approximately 323 AF/yr, will result from the foundational programs that are part of this Plan.

Foundational programs screened for this Efficiency Plan are summarized in Worksheet 1, provided in Appendix A, and discussion of the selection process and programs selected for this Plan are discussed below.

¹⁸ Worksheets D through G heavily reference Best Practices (BPs) described in the *Guidebook of Best Practices for Municipal Water Conservation in Colorado*, published by Colorado WaterWise in August 2010. Colorado WaterWise is a professional organization providing resources and education to the Colorado water conservation community.

4.2.1 Metering (Programs 1-3)

Metering All Customer Accounts (Program 1)

Englewood recognizes that customer metering is one of the first steps to accurately track water use and losses. Since 1987, Englewood’s municipal code has included the requirement to install customer water meters in previously unmetered homes when the property ownership or usage changes. Englewood additionally has programs that incentivize customer metering, including the Meter Assistance Program which helps customers pay for a new water meter. Englewood is committed to converting the remaining unmetered accounts to metered accounts and has included funding from Englewood’s Water Infrastructure Financing Innovation Act loan to accelerate installation of the remaining unmetered customers in the next five to seven years. Englewood’s most recent water system Capital Improvement Plan (CIP)¹⁹ includes a program for Meter Installation for Non-Metered Accounts (PRG-WAT-D-020).

Meter Replacement (Program 2)

According to the billing department, Englewood currently replaces approximately 40 residential meters per month due to meter age or identified maintenance issues. In addition to this ongoing residential meter replacement program, the CIP includes a program for meter replacement targeting larger commercial meters (PRG-WAT-D-019).

Conversion to AMI Metering (Program 3)

Englewood’s customer meter stock is relatively old. An upgrade to AMI-type metering technology was anticipated in Englewood’s CIP, projected to start between 2025 and 2036, and therefore possibly starting within the implementation period of this Water Efficiency Plan (PRG-WAT-D-024). AMI metering would allow near real-time monitoring of Englewood customers’ potable water use, which can aid in detecting leaks and can help customers monitor their own water use habits.

4.2.2 Monitoring and Billing (Programs 4-6)

Monitoring (Program 4)

Each month, Englewood Utilities staff pull water meter reads into their billing system, which generates exception reports for unusually high or low water usage, zero water usage, and meter turnover. Billing staff review the exception reports and send field staff out to check on meters as required. This system has allowed Englewood to monitor customer water use and to address maintenance issues as they arise. Englewood’s recent transition to monthly (from quarterly) billing has likely improved customer water use monitoring due to the higher frequency of billing data review.

Billing (Program 5)

Through 2020, Englewood operated on a quarterly water billing cycle, with each customer receiving a bill just four times a year. This system made detailed tracking of customer water use and system losses difficult, and in 2021, Englewood transitioned to monthly billing for every customer. Monthly billing

¹⁹ CIP elements were described in Englewood’s May 2020 Water System Master Plan

records can greatly enhance Englewood's and its customers' ability to track and monitor potable water use. Monthly billing allows customers to see their water use more frequently, allowing customers or Englewood staff to more quickly identify potential high water use that may be due to leaks. It also allows customers to more easily compare their usage between months which may help with their planning and goal setting. More frequent water bills may help remind customers of their water use, potentially motivating more water efficiency. Finally, Englewood can better track water loss and project customer water use using more frequent customer meter data.

Englewood provides a small amount (averaging 5 AF/yr) of hydrant water to commercial, industrial, and construction uses via water rentals. This water is measured by manual reads from rented meters, and the use is billed on an annual basis. Because this water use is a small percentage of the total water billed, annual billing for hydrant use is considered acceptable at this time.

Englewood is currently in the process of a billing system upgrade that will allow enhanced communication with customers. Customers will be able to view their water use in the current month compared to their water use in the same month of the previous year, which may help customers better understand their water use trends. Additionally, customers will have the new opportunity to schedule field leak checks²⁰ by Englewood staff via their customer portal.

Water Rates (Program 6)

Englewood bills all metered customers for water use volumetrically, meaning that customers are billed, at least in part, based on the amount of water they use. Englewood has a declining block rate structure, with two rate levels. Inside City limits, customers are charged \$3.58 per kilogallon (kgal) for usage up to 400 kgal per month and \$2.22 per kgal for monthly usage above that level. This rate structure is not considered optimal for encouraging water efficiency, as customers who use more water are billed at lower rates. However, the tier for the lower rate (400 kgal per month) is high enough that few customers experience the lower rate, and these customers are likely to be the larger commercial, municipal, and industrial customers.

Englewood's water rates are lower than those of many nearby water providers, though Englewood did increase its water rates in 2021 and in 2022. These water rate increases were accompanied by extensive communications with the public regarding Englewood's water supply costs and justification for the rate increases.

Englewood anticipates conducting water rate studies every three to five years. In the next rate study, the City will evaluate and consider changes to the rate structure to promote water efficiency, such as an inclining block rate structure.

²⁰ As described in Section 2.3, these leak checks assist customers in determining whether they have a leak in their building, although Englewood staff will not diagnose the location of the leak.

4.2.3 System Water Losses (Programs 7-10)

Englewood maintains its distribution system, repairing and replacing water mains and distribution system components as needed, and these efforts help to control system water losses. Englewood's efforts to meter customers and track all water end uses will lower Englewood's system water loss percentage (currently estimated to be between 4% and 7% as described in Section 2.2.6) and will help identify both real and apparent water losses.

Englewood values the efficient delivery of potable water in its system; in 2021, Englewood developed key performance indicators (KPIs) for the Utilities Department that include two KPIs related to water loss tracking.

Distribution System Maintenance (Program 7)

In addition to Englewood's ongoing efforts to identify and repair leaks in its water distribution system, the CIP includes at least eight programs that address loss or apparent loss of Englewood's potable water supplies in its distribution system, including the following.

- PRG-WAT-D-013 Valve Inspection and Exercising
- PRG-WAT-D-014 Valve Replacement
- PRG-WAT-D-016 Transmission Main Inspections
- PRG-WAT-D-017 Water Distribution Main Replacement
- PRG-WAT-D-018 Transmission Main Replacement
- PRG-WAT-D-019 Meter Replacement²¹
- PRG-WAT-D-025 Emergency Repair Projects – Distribution System

Englewood's CIP also includes several programs related to the regulation of water pressures within its distribution system. Uneven or varying water pressures within a distribution system can lead to higher system losses. Therefore, Englewood's effort to maintain consistent system pressures could aid in the reduction of system water losses.

Asset Management (Program 8)

As part of its recent CIP, Englewood is working with an outside consultant to set up an Asset Management Program (PRG-WAT-D-011), which will make use of Englewood's existing asset management software to monitor infrastructure conditions and track maintenance/repairs. Water-efficiency related monitoring which might be accomplished as part of an Asset Management Program include tracking of meter condition and replacement, tracking of hydrant flushes and water main flushes, and tracking of main and line breaks, including estimates of leaked water amounts. This will include a workorder process that may help in collecting data on main breaks, repairs, and flushing to better track water losses. The Asset

²¹ This program is specifically intended to target larger, commercial meters.

Management Program will gather the data needed to detect leaks in Englewood’s distribution system, potentially reducing system losses and Unmeasured End Use Water.

System-Wide Water Audit and Colorado Water Loss Initiative (Programs 9-10)

Englewood’s CIP includes funding for a system-wide water audit to be performed, targeting a 2025 start, ideally post-dating the conversion of all flat-rate customers to meters. The CIP recommended a desktop-based water audit to start, using the AWWA M36 standard for water loss control. Later, likely after the timeframe of this Plan, Englewood might enhance its water audit approach by implementing field testing of meters, leak detection, and other more intensive field checking methods.

The Colorado Water Loss Initiative (CWLI) aims to train Colorado water providers in methods to monitor and reduce real and apparent water losses in potable water distribution systems. It provides workshops and guidance for water providers to learn about and implement the AWWA M36 audit procedure to estimate and measure system water losses. Two engineers from Englewood, representing both engineering and operations staff, attended two CWLI workshops, one in 2021 and one in 2022. Englewood staff will continue to prioritize efficiency through reduced losses.

4.2.4 Staffing Support (Program 11)

The implementation of this Plan requires an Englewood staff member or members to track and manage Englewood’s water efficiency efforts as described in Section 5.2 (annual updates to Table 1 and Table 2 and reports every two years to the Water and Sewer Board and to the Sustainability Commission). These tasks will be performed by Englewood Utilities staff, possibly assisted by the Englewood Sustainability Coordinator. When Englewood begins its Water Loss Control Study (PRG-WAT-D-022 in the CIP and Program 9 in this Plan), anticipated in 2025, dedicated staff time may increase.

4.2.5 Water Efficiency Considerations in Water Supply Planning (Programs 12-13)

In 2020, Englewood completed a Water System Master Plan, which informed its CIP. Many of the programs in this Plan and the CIP have the potential to improve Englewood’s water efficiency. Englewood is also evaluating its water supplies and future water demands under various conditions. These planning efforts keep Englewood staff informed of the impact of decisions related to water efficiency.

Within the next seven years, Englewood plans to conduct a feasibility study for water reuse. The feasibility of water reuse by Englewood will depend on many factors including wastewater treatment considerations, the existence of suitable uses for the reuse water, location or piping needs, and the legal considerations related to Englewood’s water rights.

4.2.6 Land Use Planning and Water Efficiency (Program 14)

Land use planning has the potential to impact a municipality’s water demands and water efficiency performance. Likewise, land use decisions have an impact on water supply planning. Most of Englewood’s land area has already been developed, so new development in Englewood typically consists of re-development, upward development, or infilling of previously industrial areas.

Based on its existing land uses, Englewood projects that approximately 80% of future residential development will consist of multi-family development (currently, it is estimated that 30.4% of Englewood residents live in multi-family housing). As new residents move into multi-family housing, Englewood's ratio of multi-family customers to single-family customers will likely increase, and this trend is likely to lower Englewood's per capita water demand over time. Based on recent Englewood water billing data, multi-family residential customers in Englewood used 38% less water than single-family residential customers, likely due mostly to lower outdoor water use on multi-family properties.

Englewood Utilities staff, who are primarily responsible for Englewood's water supply planning, also review Utility permit applications for potable water demand projections and tap sizing. As part of this review process, Englewood Utilities staff interact with Community Development staff, who are primarily responsible for land use planning, forming a natural link between Englewood's water supply and land use planning efforts.

In the future, Englewood Utilities staff will communicate water efficiency messages to developers as part of its building permit review process. To inform developers about Water Efficiency, Englewood plans to add an informational webpage to the Englewood Utilities website. This page might include target water demand guidelines for new development and highlight project examples that met high water efficiency standards. Building permit review feedback can include reference to this webpage. As a point of reference, new development in Englewood typically meets higher water efficiency standards than existing development, partly because codes have updated over time and partly because water fixtures now sold are typically more water efficient than older fixtures. However, Englewood recognizes that a wide range of new-building efficiencies still exist and targeting higher efficiency in new buildings and renovations is a community goal.

4.3 Technical Improvements and Incentives

Water efficiency programs which assist customers in implementing technical water efficiency improvements or which provide customers with incentives to increase their efficiency tend to be some of the more expensive water efficiency programs that a water provider might implement. Englewood screened this category of Incentive/Technical Assistance programs, as summarized in Worksheet 2 (Appendix A). Discussion of the selection process and programs selected for this Plan are discussed below.

Of the 388 AF/yr demand reduction targeted for this Plan, it is expected that approximately 45 AF/yr of savings will result from the programs described in this section.

4.3.1 Municipal Facility Water Efficiency (Programs 15-17)

Englewood plans to initiate a program to evaluate fixtures and appliances in municipal buildings, including the City's Recreation Center, to consider retrofitting for water efficiency. The dual purpose of this is to reduce water use in those facilities and to demonstrate the value of water efficiency in the community. This program is currently planned to also include an evaluation of the Recreation Center's hot water delivery system to determine whether a circulation pump might reduce the lag time for hot

water delivery to showers, a community concern. In addition, water-efficient fixtures will be sought for any future municipal building projects.

The Englewood Public Works Department is planning to conduct an energy and water audit of municipal buildings through cooperation with the Department of Energy. These audits, which are projected to occur in 2023, are anticipated to provide Englewood with valuable information about water efficiency in its buildings, potentially informing future improvements.

Englewood operates non-potable water systems to irrigate the Broken Tee Golf Course and four city parks. Englewood's use of non-potable water supplies (instead of potable water) in these locations reduces Englewood's total water demand due to avoided treatment and transmission losses. Englewood's irrigation application rates to bluegrass at the golf course and parks ranged from 2.08 feet per year (ft/yr) to 2.79 ft/yr. These application rates are less than or within 3% of the average bluegrass irrigation requirement in Englewood (2.70 ft/yr²²) before sprinkler spray losses are included. Including spray losses increases the water needed, so it is likely that Englewood's non-potable irrigation is currently applied in a relatively efficient manner.

However, there may be ways that the irrigation systems of these parks can be further improved, resulting in better landscaping results or lower water use (bluegrass can survive and appear healthy even with less than its full irrigation demand supplied). In April 2021, Englewood's City Council approved Englewood's first Sustainability Plan, which included goals of replacing or maintaining park irrigation systems and undertaking a water usage analysis of City facilities.

Broken Tee Golf Course staff are currently working on designing a new irrigation system for the west side of the golf course ("Back 9"). The Back 9 constitutes approximately half of the irrigated acreage on Broken Tee Golf Course. The original irrigation system that was built in 1976 will be replaced in the fall of 2022 with a new irrigation system including new piping and sprinkler heads. The new irrigation system is anticipated to use approximately 25% less water than the old irrigation system, due to the elimination of leaks and despite a 10-acre increase in bluegrass irrigated by the new system.

Englewood maintains City Ditch, which delivers raw water from Chatfield Reservoir to the Allen WTP as well as to contract users along the ditch. Maintenance includes removing phreatophyte plants to control water losses from the ditch. Additionally, Englewood is currently working on a project to complete the preliminary design necessary to pipe the remaining open channel portions of City Ditch, an infrastructure improvement which could essentially eliminate ditch losses in stretches of the ditch.

The Englewood Parks Department recently completed a project at its Depot Park to transition bluegrass landscaping to prairie meadow grasses. In the first year after the transition was made, when establishment watering was still underway, 73% less water was applied to irrigation of the transitioned area. That savings is expected to rise to 80% to 90% in the long term. This project provides a template for future similar projects for Englewood to pursue.

²² Based upon a Blaney-Criddle analysis using water year 2000 through 2020 air temperature and precipitation data from the Marston Filter Plant NOAA weather station (USC00055402)

4.3.2 Management of Largest Customer Demands (Program 18)

Englewood will research organizations to partner with for water audits of commercial customers or evaluate the staff resources required to create this program in house. Offering audits to a few of the largest commercial customers might offer Englewood the potential to reduce commercial water demands while limiting the investment of money or staff time required.

4.3.3 Management of Remaining Customer Demands (Programs 19-20)

In December 2022, the Englewood Sustainability Coordinator presented the Garden-in-a-Box²³ and turf replacement programs through Resource Central to the Englewood City Council. City Council was enthusiastic about the proposed direction, and further steps are being pursued by the City to implement incentive programs. Englewood recognizes the benefit of such programs, both to incentivize water savings and to communicate the value of water efficiency to customers. Therefore, Englewood Utilities staff commit to applying for at least two water efficiency funding grants for the purpose of offering a rebate or other incentive program to customers. Grant programs that will be considered include United States Bureau of Reclamation (USBR) WaterSMART Water and Energy Efficiency Grants and CWCB's Colorado Water Plan Grants.

Englewood will consider partnership with EPA WaterSense, or similar water efficiency messaging campaign. Such a campaign can provide customer communication materials, including pamphlets on water efficiency topics which might help Englewood staff provide water efficiency technical guidance to customers.

4.4 Ordinances and Regulations

Water efficiency ordinances and regulations are typically a relatively low-cost way for a water provider to realize customer water savings within its service area. This category of programs screened for this Plan are summarized in Worksheet 3 (Appendix A), and the selection process and programs selected for this Plan are discussed below.

Of the 388 AF/yr demand reduction targeted for this Plan, it is expected that approximately 10 AF/yr, will result from the programs described in this section. Englewood believes there will be greater customer participation and support resulting in water savings through measures that involve partnering with community members, as opposed to rules and ordinance-based programs.

4.4.1 Ordinances/Regulations Applicable to Existing Service Area (Programs 21-24)

Englewood will continue its Meter Requirements Rule (Municipal Code 12-1A-4), which requires water meter installation upon property transfer.

Englewood will also continue its Water Waste Rule (Municipal Code 12-1A-7) which prohibits water waste, including leaving water running to prevent freezing pipes and overspray onto public walks and streets.

²³ <https://resourcecentral.org/gardens/>

This rule also leaves open the possibility that “irrigation of lawns shall only be used during the hours and in the manner specified by the City Manager or designee”, foreseeing the potential for a rule allowing irrigation only on alternating days. Because bluegrass can achieve stronger root systems with deeper, less frequent watering, such a rule would not limit lawn irrigation to less than is required by bluegrass but would rather cause customers to regulate their irrigation schedules and improve the drought hardiness of their lawns. Additionally, Englewood’s peak water demands have the potential to decrease with the implementation of such a rule, potentially lowering the cost of future water infrastructure and water rights acquisitions.

The Englewood Sustainability Commission is investigating ways to update Englewood’s municipal code to make it more sustainable. In addition, the 2020 Unified Development Code Assessment Report²⁴ for Englewood recommended an expansion of the Englewood’s municipal code related to xeriscaping. Water efficiency improvements to Englewood’s zoning code will be considered in the ongoing update of Englewood’s zoning code. Currently, Englewood’s zoning code encourages, but does not require, water efficiency measures in landscaping, including xeriscaping. Because requirements for xeric or low water use plants are not present, and because of minimum landscaping percentages and maximum percentages of non-living material specified in Englewood’s zoning code, there are ways in which the water efficiency focus of Englewood’s zoning code could be improved.

In 2021, Englewood evaluated the possibility of adopting portions of the Green Construction Code. While City Council decided against this adoption in 2021, it left open the possibility of adopting the Green Construction Code in the future. The goal of enacting Green Construction Code was stated in Englewood’s April 2021 Sustainability Plan. Because of this history, Englewood staff believe that adoption of Green Construction Codes might be possible in the next 5-6 years, pending City Council approval.

4.4.2 Ordinances/Rules Applicable to New Construction

Englewood has not adopted ordinances or rules related to water efficiency in new development. However, as noted above, plumbing fixtures sold in Colorado must meet EPA WaterSense standards: toilets 1.6 gpf, faucets 1.5 gpm, showerheads 2.0 gpm. Also, any new code Englewood adopts would impact new construction.

4.4.3 Point-of-Sale Ordinances Applicable to Existing Building Stock

Englewood has not adopted ordinances or rules related to water efficiency of existing development, with the exception of the water metering requirement upon property sale. While these types of ordinances can be helpful for transitioning older building stock to more water efficient standards, Englewood has decided to focus on other water efficiency programs instead at this time.

²⁴ Report dated March 11, 2021

4.5 Education and Communication Programs

Water efficiency education and communication programs can help increase customer awareness and engagement, which can increase customer water efficiency over the long-term. Education and communication programs screened for this Efficiency Plan are summarized in Worksheet 4 (Appendix A), and discussion of the selection process and programs selected for this Plan are discussed below.

Of the 388 AF/yr demand reduction targeted for this Plan, it is expected that approximately 10 AF/yr, will result from the programs described in this section. Water savings from customer communication programs are typically difficult to estimate, so a conservative estimate of savings has been provided.

4.5.1 One-Way Education Programs (Programs 25-28)

Englewood's April 2021 Sustainability Plan targeted communication with Englewood citizens to educate the public regarding water availability, conservation, and individual responsibilities. Englewood's current communication regarding water efficiency consists of webpages on the Englewood Utilities website which provide water conservation and landscaping tips as well as information for converting to metered taps. During this planning period, Englewood will improve its landscaping tips webpage to add information on low-water landscaping, rain barrels, and/or other water efficiency topics. In addition, Englewood will promote educational opportunities related to these topics. Also during this planning period, Englewood will create a webpage presenting information on water efficiency in new development.

Englewood additionally intends to target one bill stuffer regarding water efficiency to send to customers each year, possibly providing irrigation system maintenance tips at the beginning of each irrigation season. When Englewood's water customer interface evolves and electronic communication with customers becomes possible, Englewood aims to transition to paper-free communications with customers on water efficiency topics.

As discussed in Section 4.3.3, Englewood will consider partnership in a water efficiency messaging campaign such as that of EPA WaterSense or Colorado WaterWise's "Live Like You Love It" Campaign. These campaigns may provide Englewood staff with communication materials and pamphlets they might share with customers at events that staff attend.

Englewood will consider including one water efficiency-related article or advertisement per year in Englewood's Citizen Magazine.

4.5.2 One-Way Education With Feedback (Program 29)

Englewood intends to increase its water efficiency messaging to customers by adding quarterly water efficiency posts on the Englewood Facebook page. A message related to World Water Day was posted in March 2022. These posts may include information on both indoor and outdoor water efficiency, primarily targeted to residential customers.

4.5.3 Two-Way Education Programs (Program 30)

Englewood's Water and Sewer Board includes citizen members who bring the public's perspective to Englewood's water decisions, including decisions on water efficiency. This Plan will be reviewed by the Water and Sewer Board, as well as by the general public, and these forums will provide a way for public input on water efficiency issues.

In January 2022, Englewood Utilities staff provided a presentation to the Englewood Sustainability Commission on water efficiency issues and programs in the City. This presentation was used as an opportunity to inform Commission members on the state of Englewood's water management efforts and also to gain Sustainability Commission members' perspective on the direction water efficiency programs should take.

5. IMPLEMENTATION AND MONITORING

5.1 Implementation Plan

Englewood Utilities staff are responsible for implementing this Water Efficiency Plan. Thirty (30) water efficiency programs will be pursued or continued as part of this Plan (Table 5). The specific actions necessary to implement each of these programs will be defined by Englewood upon implementation.

An approximate cost associated with each program is provided in Table 5 as required by C.R.S. 37-60-126(4). The costs were estimated based on the anticipated effort and requirements of the program and may be used to further consider the value of the various efficiency programs.

Englewood's targeted annual water savings under this plan (6% of the recent average) has the potential to correspondingly reduce Englewood's volumetric billing-based revenue. However, Englewood is an established water utility with reserves adequate to respond to any loss in revenue associated with the modest water savings proposed in this plan. Further, there are some anticipated cost savings associated with lower per capita water use. Actual water efficiency savings realized from efficiency programs can be taken into consideration at the time of Englewood's next water rate study and before development of additional water supplies.

Table 5
Englewood Water Efficiency Programs to Continue/Pursue

Category	Program	Implementation Period								Estimated	
		2022	2023	2024	2025	2026	2027	2028	2029	Annual Budget	
Foundational	Metering and Billing	1. Metering Unmetered Customers: existing incentives, CIP PRG-WAT-D-020, and seeking grants									\$ 524,761
		2. Meter Testing and Replacement, including CIP PRG-WAT-D-019									\$ 888,500
		3. Upgrade to AMI meters									\$ 3,360,000
		4. Monitoring metered water use; exception reports, field staff checks									\$ 28,800
		5. Billing system upgrade (in progress), and continued monthly billing.									\$ 97,800
		6. During next rate study, evaluate inclining block rate structure.									\$ 5,000
	Water Loss Control	7. Distribution System Maintenance: CIP PRG-WAT-D-013, 014, 016, 017, 018, 025									\$ 2,942,000
		8. Asset Management: CIP PRG-WAT-D-011, monitor distribution system									\$ 47,733
		9. System Wide Water Audit: CIP PRG-WAT-D-022 Water Loss Control Study									\$ 50,000
		10. Colorado Water Loss Initiative, staff training									\$ 9,000
	Staffing and Planning	11. Water Efficiency Staffing Support									\$ 15,600
		12. Incorporate water efficiency into ongoing water supply planning									\$ 5,714
		13. Water reuse feasibility study									\$ 40,000
		14. Land Use Planning and Water Efficiency									\$ 1,125
Technical Improvements and Incentives	15. Program to identify and perform water fixture/appliance upgrades in municipal buildings, including a water audit									\$ 250,000	
	16. Golf Course and park irrigation system improvements									\$ 500,000	
	17. Maintenance of City Ditch (removal of phreatophytes, piping the ditch)									\$ 4,000	
	18. Offer limited large customer water audits if possible									\$ 1,800	
	19. Garden-in-a-Box and turf replacement rebates; grant applications									\$ 18,875	
	20. Become a WaterSense or LLYLI Partner: use promotional materials for community events									\$ 1,000	
Rules/ Ordinances	21. Rule Requiring Metering of Unmetered Connections Immediately After Property Transfers (12-1A-4)									\$ -	
	22. Water Waste Rule and Water Overspray Limitations									\$ -	
	23. Expansion of the City's code and landscaping rules related to xeriscaping									\$ 20,000	
	24. Possible adoption of Green Construction Code									\$ 30,000	
Customer Education	25. Improve landscaping tips webpage, post learning opportunities									\$ 1,114	
	26. Webpage on water use and water efficiency in new development									\$ 6,000	
	27. Bill stuffers on water efficiency topics, with later transition to electronic communication instead									\$ 12,000	
	28. Water efficiency educational materials - hand out at events Utilities staff attend; consider annual article in the <i>Englewood Citizen</i> magazine									\$ 1,900	
	29. Social Networking (e.g Facebook) - quarterly water efficiency posts									\$ 2,368	
	30. Citizen participation in Water and Sewer Board, Sustainability Commission									\$ -	

Notes:

Englewood Utilities staff will take the lead on the water efficiency measures and programs listed above. Annual costs estimated relative to the implementation period shown, with CIP costs referenced as applicable and scaled accordingly.

5.2 Monitoring Plan

Englewood will monitor progress on the implementation of this Plan by annually updating Table 1 and Table 2 of this report to track its system losses and per-capita water demands. Englewood continues to prepare its required annual reporting under Colorado House Bill (HB) 10-1051 on its water use and water conservation efforts. Additionally, Englewood Utilities staff will report progress on the water efficiency programs proposed in this Plan once every two years to the Water and Sewer Board and to the Sustainability Commission.

6. ADOPTION OF NEW POLICY, PUBLIC REVIEW AND FORMAL APPROVAL

6.1 Adoption of New Policy

This Plan proposes two new policies for Englewood to consider pursuing, listed below.

1. Expansion of the Englewood municipal code related to xeriscaping and water-efficient landscaping.
2. Adopt Green Construction Code.

The final decision on whether to implement these policies, and the process to do so, will be made by Englewood staff and/or City Council.

6.2 Public Review Process

As required by C.R.S. 37-60-126, this Plan was shared publicly for review from August 18 to October 18, 2022. The Plan's sharing for public comment was advertised via a link on the Englewood Engaged website, was available in hard copy at two Englewood recreation centers, was shared on the Englewood Facebook page, and advertised through a mailer in customer water bills. Public comments were reviewed by City staff, and revisions to the Plan were made in response to public comment.

6.3 Local Adoption and State Approval Processes

This Plan was approved by Englewood City Council on February 6, 2023. This Plan was conditionally approved by CWCB in November 2022 and CWCB comments were subsequently addressed. Final CWCB approval of the Plan occurred on August 15, 2023.

6.4 Periodic Review and Update

This Plan was developed based upon Englewood's 2013 Water Conservation Plan, analysis of Englewood's 2017 through 2021 water use data, and Englewood's water system management priorities in 2022. Update of this plan should take into consideration the water efficiency programs proposed in this plan, including their status and any implementation data available to evaluate their performance. Englewood should consider initiating an updated water efficiency plan near or after the end of the implementation period for this Plan (2029 or 2030)

REFERENCES

1. January 2000 through December 2020 average precipitation and air temperature recorded at the Marston Filter Plant NOAA weather station (USC00055402)
2. United States Census data
3. Colorado Department of Local Affairs (DOLA) demography data
4. Water billing records provided by the Englewood Utilities Department
5. Water diversion and Allen WTP production records from the Englewood Utilities Department
6. 2019 Technical Update to the Colorado Water Plan, Colorado Water Conservation Board (CWCB)
7. Municipal Water Efficiency Plan Guidance Document, Prepared for CWCB, July 2012
8. Best Practices for Implementing Water Conservation and Demand Management Through Land Use Planning Efforts, Prepared for CWCB, Addendum to the 2012 Guidance Document, January 2019
9. Guidebook of Best Practices for Municipal Water Conservation in Colorado, published by Colorado WaterWise, August 2010
10. City of Englewood (Utilities Department) 2013 Water Conservation Plan
11. City of Englewood Water System Master Plan, Hazen and Sawyer, May 2020
12. Englewood Forward Comprehensive Plan, December 2016
13. 2020 Unified Development Code Assessment, City of Englewood, March 11, 2021
14. 2018 International Plumbing Code
15. Water Loss Control Terms Defined, American Water Resources Association, 2012

Appendix A

Screening Worksheets for Water Efficiency Programs

Worksheet 1
Foundational Efficiency Programs
City of Englewood

<u>Category</u>	<u>No.</u>	<u>Program</u>	<u>Existing?</u>	<u>Pursue/Continue?</u>	<u>Achievable by Staff?</u>	<u>Acceptable to Public/Leadership?</u>	<u>Cost Effective and Measurable Savings?</u>	<u>Other Notes</u>
Metering	1	Meter Testing and Replacement	yes	yes	yes	yes	yes	CIP PRG-WAT-D-019 Meter Replacement
	2	Metering Unmetered Customers	yes	yes	yes	yes	yes	CIP PRG-WAT-D-020. Also seeking grants.
	3	Water Meter Conversion program	yes	yes	yes	yes	yes	Target upgrade to AMI meters in 5-7 years
	4	Meter Assistance Program	yes	yes	yes	yes	yes	
	5	Test Drive a Water Meter program	yes	yes	yes	yes	yes	
	6	Submetering for Large Users (Indoor and Outdoor or Submetering Apartments)	no	no	no	no	yes	Submetering isn't feasible for Englewood at this time.
	7	Meter Upgrades	no	yes	yes	yes	yes	Target upgrade to AMI meters in 5-16 years (PRG-WAT-D-024)
	8	Identify any taps that are unmetered (municipal taps? Irrigation-only taps?)	n/a	n/a	n/a	n/a	n/a	Staff does not believe there are any left.
	9	Identify Unmetered/Unbilled Treated Water Uses	n/a	yes	yes	yes	yes	Asset Management:CIP PRG-WAT-D-011, monitor leaks, main flushes, etc.
Monitoring	10	Transition to monthly meter reading	yes	yes	yes	yes	yes	
	11	Tracking Water Use by Customer Type	yes	yes	yes	yes	yes	
	12	Billing system upgrade (in progress)	yes	yes	yes	yes	yes	
	13	Upgrade Billing System to Track Use by Sufficient Customer Types	yes	yes	yes	yes	yes	
	14	Track water truck refills and all hydrant water use (rental meters)	yes	yes	yes	yes	yes	
	15	Tracking Water Use for Large Customers	no	no	no	yes	yes	Staff will focus on different programs for now; these might be achievable later.
	16	Tracking area of irrigated lands in Service Area (e.g. acres)	no	no	no	no	yes	
	17	Track date, rate, and duration of hydrant flushes	no		yes	yes	yes	
	18	Tracking main flushings, date, rate, duration	no	yes	yes	yes	yes	Asset Management Program under development will enhance tracking in these areas.
	19	Invest in leak detection equipment? Scheduled leak checks?	no		yes	yes	yes	
	20	Track date, hole area, and pipe pressure for all main breaks	no		yes	yes	yes	
	21	Track park irrigation (application rate feet/year, by park or zone)	no	no	no	yes	no	Park and golf course irrigation application has been reasonable.
22	Colorado Water Loss Initiative, AWWA M36 Audit, water use tracking	no	yes	yes	yes	yes	Two staff members attended two workshops. Will continue work.	
Billing	23	Volumetric Billing	yes	yes	yes	yes	yes	
	24	Water Rate Adjustments	yes	yes	yes	yes	yes	Recent rate increases; next rate study will evaluate rate structure update.
	25	Frequency of Billing	yes	yes	yes	yes	yes	Recently transitioned to monthly billing for all customers.
	26	Inclining/Tiered Rates	no	no	no	no	yes	Recent rate increases; no additional rate changes for now.
	27	Customer Water Budgets	no	no	no	no	yes	
	28	Lower tap fees for water efficient development projects	no	no	no	no	yes	
System Loss	29	Control of Apparent Losses (with Metering) (see "Monitoring" section)	yes	yes	yes	yes	yes	Asset Management: better monitoring of hydrant/main flushes.
	30	Leak Detection and Repair	yes	yes	yes	yes	yes	
	31	Water Line Replacement Program	yes	yes	yes	yes	yes	CIP PRG-WAT-D-013, 014, 016, 017, 018, 022, 025
	32	Monitoring metered water use; exception reports, field staff checks	yes	yes	yes	yes	yes	
	33	System Wide Water Audits	yes	yes	yes	yes	yes	CIP PRG-WAT-D-022 Water Loss Control Study
	34	Water reuse systems	no	yes	yes	yes	yes	Water reuse feasibility study in next 5-7 years.
Planning	35	Integrated Water Resources Plans	yes	yes	yes	yes	yes	Varied water efficiency scenarios in water supply planning.
	36	Master Plans/Water Supply Plans	yes	yes	yes	yes	yes	
	37	Capital Improvement Plans	yes	yes	yes	yes	yes	2020 CIP
	38	Feasibility Studies	no	yes	yes	yes	yes	Water reuse feasibility study in next 5-7 years.
Staff	39	Water Efficiency Coordinator	no	yes	yes	yes	yes	Dedicate staff to this role.
Land Use	40	Establish Regular Contact and Information Sharing	yes	yes	yes	yes	yes	
	41	Align Data and Information Used	no	yes	yes	yes	yes	Water planning staff in Utilities review building permits for fire flows. Will seek to increase interaction between Utilities and Community Development and to engage developers on water efficiency topics.
	42	Integrate Water Considerations into the Development Approval Process	no	yes	yes	yes	yes	
	43	Establish Coordinated Procedures for Post-Occupancy Monitoring and Enforcement	no	no	no	no	yes	
	44	Integrate Long Term Land Use and Water Planning	no	no	no	no	yes	

Worksheet 2
Technical Improvements and Incentive Programs
City of Englewood

<u>Category</u>	<u>No.</u>	<u>Program</u>	<u>Existing?</u>	<u>Pursue/Continue?</u>	<u>Achievable by Staff?</u>	<u>Acceptable to Public/Leadership?</u>	<u>Cost Effective and Measurable Savings?</u>	<u>Other Notes</u>
Water Efficient Fixtures and Appliances	45	Offer Indoor Water Use Audits	no	no	yes	yes	no	Municipal buildings only: Program to identify and perform fixture/appliance upgrades in municipal buildings. Newly-planned municipal building construction will be reviewed for water efficiency.
	46	Toilet Retrofits	no	yes	yes	yes	no	
	47	Urinal Retrofits	no	yes	yes	yes	no	
	48	Showerhead Retrofits	no	yes	yes	yes	no	
	49	Faucet Retrofits (e.g. aerator installation)	no	yes	yes	yes	no	
	50	Water Efficient Washing Machines	no	yes	yes	yes	no	
	51	Water Efficient Dishwashers	no	yes	yes	yes	no	
	52	Efficient Swamp Cooler and Air Conditioning Use	no	yes	yes	yes	no	
	53	Fixture/appliance upgrade for municipal buildings	no	yes	yes	yes	no	
Low Water Use Landscapes	54	Golf Course and park irrigation system improvements	yes	yes	yes	yes	no	Back 9 irrigation system to be replaced in 2022; Sustainability Plan goals. Continued maintenance of City Ditch.
	55	Maintaining City Ditch to control ditch loss (removal of phreatophytes, piping the ditch)	yes	yes	yes	yes	no	
	56	Drought Resistant Vegetation	no	no	no	no	no	Not a good service area match.
	57	Offer Outdoor Water Use Audits	no	no	no	no	no	
	58	Outdoor Irrigation Controllers	no	no	no	no	no	
	59	Irrigation Scheduling/Timing	no	no	no	no	no	
	60	Rain Sensors	no	no	no	no	no	
	61	Residential Outdoor Meter Installations	no	no	no	no	no	
62	Xeriscape City Parks / Municipal Facilities	no	no	no	no	no		
63	Other Low Water Use Landscapes	no	no	no	no	no		
64	Irrigation Equipment Retrofits	no	no	no	no	no		
Industrial/Commercial	65	Specialized Nonresidential Surveys, Audits and Equipment Efficiency Improvements	no	yes	yes	yes	no	Offer up to 3 water audits per year due to limited resources; target largest customers. Consider offering rebates for water efficient fixtures/appliances based on audit results.
	66	Commercial Indoor Fixture and Appliance Rebates/Retrofits	no	yes	yes	yes	no	
	67	Cooling Equipment Efficiency	no	no	no	no	no	
Incentives	68	Toilet Rebates	no	no	no	no	no	Englewood recognizes the utility of customer incentive programs. Therefore, Englewood Utilities staff commit to applying for at least two water efficiency funding grants for the purpose of offering a rebate or other incentive program to customers.
	69	Urinal Rebates	no	no	no	no	no	
	70	Showerhead Rebates	no	no	no	no	no	
	71	Water Efficient Faucet or Aerator Rebates	no	no	no	no	no	
	72	Water Efficient Washing Machine Rebates	no	no	no	no	no	
	73	Water Efficient Dishwasher Rebates	no	no	no	no	no	
	74	Efficient Irrigation Equipment Rebates	no	no	no	no	no	
	75	Landscape Water Budgets Information and Customer Feedback	no	no	no	no	no	
76	Turf Replacement Programs/Xeriscape Incentives	no	no	no	no	no	In December 2022, Englewood City Council expressed support about proposed incentive programs, and this is being pursued further.	
77	Give-aways	no	no	no	no	no		
Land Use	78	Developer Incentives to Reduce Water Demand	no	no	no	no	no	Add a webpage regarding water use in new development. New development in Englewood consists primarily of re-development and vertical infill development, and the outdoor water uses in this category tend to be quite low. Due to updates to water efficiency standards for indoor fixtures and appliances, new development also tends to have lower water use than older development. Or a "Live Like You Love It" partner
	79	Conservation-Oriented Tap Fees	no	no	no	no	no	
	80	Water Efficient Land Development Patterns	no	no	no	no	no	
	81	Model Landscape Plans	no	no	no	no	no	
	82	Incentives for Reduced Irrigation	no	no	no	no	no	
	83	Water-Smart Home Options	no	no	no	no	no	
	84	Become a WaterSense Partner	no	yes	yes	yes	no	
	85	Low Water Use Demonstration Homes	no	no	no	no	no	
86	Water Audits	no	no	no	no	no		
87	Rainwater Reuse	no	no	no	no	no		

Worksheet 3
Rules/Ordinances Efficiency Programs
City of Englewood

<u>Category</u>	<u>No.</u>	<u>Program</u>	<u>Existing?</u>	<u>Pursue/Continue?</u>	<u>Achievable by Staff?</u>	<u>Acceptable to Public/Leadership?</u>	<u>Cost Effective and Measurable Savings?</u>	<u>Other Notes</u>
General Water Use Rules	88	Rule Requiring Metering of Unmetered Connections Immediately After Property Transfers	yes	yes	yes	yes	yes	Municipal Code 12-1A-4. Keep the rule as is.
	89	Water Waste Rule	yes	yes	yes	yes	yes	Municipal Code 12-1A-7. Keep the rule as is.
	90	Water Overspray Limitations	yes	yes	yes	yes	yes	Part of 12-1A-7
	91	Time of Day Watering Restriction	no	no	no	no	yes	
	92	Day of Week Watering Restriction	no	no	no	no	yes	
Landscape Rules	93	Rules and Regulations for Landscape Design/Installation	no	yes	no	no	yes	While Englewood does have landscaping rules, they are not targeted toward water efficiency. The "2020 Unified Development Code Assessment" for Englewood recommended an expansion of the City's code related to xeriscaping.
	94	Soil Amendment Requirements	no	no	no	no	yes	
	95	Turf Restrictions	no	no	no	no	yes	
	96	Irrigation Equipment Requirements	no	no	no	no	yes	
	97	Landscaper Training and Certification	no	no	no	no	no	Not applicable to Englewood's service area.
	98	Irrigation System Installer Training and Certification	no	no	no	no	no	
	99	Outdoor Water Audits/Irrigation Efficiency Regulations	no	no	no	no	yes	
100	Green Building Construction Code - outdoor water use	no	yes	no	no	yes	City opted not to adopt parts of the Green Construction Code in 2021, but left consideration of that open for future years.	
Indoor and Commercial Water Use Rules	101	Green Building Construction Code - indoor water use	no	yes	no	no	yes	Consider a rule for municipal buildings.
	102	Commercial Cooling and Process Water Requirements	no	no	no	no	yes	
	103	High Efficiency Fixture and Appliance Replacement	no	no	no	no	yes	
	104	Indoor Plumbing Requirements	no	no	no	no	yes	
	105	City Facility - water efficiency requirements	no	no	no	no	yes	
	106	Required Indoor Residential Audits	no	no	no	no	yes	
	107	Required Indoor Commercial Audits	no	no	no	no	yes	
	108	Commercial Water Use Regulations (Car Washes, Restaurants, etc.)	no	no	no	no	yes	
	109	High Efficiency Fixture and Appliance Requirements for New Development	no	no	no	no	yes	
Land Use Rules	110	Examine Existing Land Use Regulations for Barriers and Conflicts	no	no	no	no	yes	Plumbing fixtures sold in Colorado must meet EPA WaterSense: toilets 1.6 gpf, faucets 1.5 gpm, showerheads 2.0 gpm.
	111	Water Conservation in New Development, Re-Development, and Annexation	no	no	no	no	yes	
	112	Incorporate Water Efficiency into Zoning Codes and Rezoning Procedures	no	no	no	no	yes	
	113	Subdivision or Site Plan Regulations that Include Water Conservation	no	no	no	no	yes	
	114	Implement Requirements that Contribute to Water Efficiency and Compact Infrastructure	no	no	no	no	yes	
	115	Water Efficient Landscape Code	no	no	no	no	yes	
	116	Building and Plumbing Codes	no	no	no	no	yes	
	117	Ordinances Promoting Efficient Fixtures in Existing Buildings	no	no	no	no	yes	
118	Regional Coordination of Water Policy and Procedures	no	no	no	no	yes		

Worksheet 4
Education/Outreach Efficiency Programs
City of Englewood

<u>Category</u>	<u>No.</u>	<u>Program</u>	<u>Existing?</u>	<u>Pursue/Continue?</u>	<u>Acheivable by Staff?</u>	<u>Acceptable to Public/Leadership?</u>	<u>Cost Effective and Measurable Savings?</u>	<u>Other Notes</u>
Customer Education	119	Education and Outreach related to water rate hikes and transition to monthly billing	yes	n/a	yes	yes	no	Transitions are complete - ceased this communication.
	120	Citizen Advisory Boards	yes	yes	yes	yes	no	Englewood Sustainability Commission, Water and Sewer Board
	121	Water Efficiency Web Page	yes	yes	yes	yes	no	Improve Landscaping Tips page; add a page for new development efficiency.
	122	Bill Stuffers	no	yes	yes	yes	no	Bill stuffers in short term; electronic communication long-term.
	123	Newsletter	no	yes	yes	yes	no	Consider an annual water efficiency article in the <i>Englewood Citizen</i> .
	124	Newspaper Articles	no	no	yes	yes	no	
	125	Mass Mailings	no	no	yes	yes	no	
	126	Water Fairs	no	yes	yes	yes	no	Bring water efficiency brochures to events Utilities attends.
	127	K-12 Teacher and Classroom Education Programs	no	no	yes	yes	no	
	128	Water Efficiency Message Development/Campaign	no	no	yes	yes	no	Use EPA WaterSense or LLYLI materials.
	129	Interactive Websites	no	no	yes	yes	no	
	130	Social Networking (e.g Facebook)	no	yes	yes	yes	no	Quarterly water efficiency posts from Englewood Utiliies
131	Customer Surveys	no	no	yes	yes	no		
132	Focus Groups	no	no	no	no	no		
Technical Assistance	133	Customer Water Use Workshops	no	no	no	no	no	
	134	Landscape Design and Maintenance Workshops	no	no	no	no	no	
	135	Xeriscape Demonstration Garden	no	no	no	no	no	
	136	Water Conservation Expert Available	no	no	no	no	no	
Land Use	137	Consistent Online Information related to water code and water dedication	no	yes	yes	yes	no	Add a webpage regarding water use in new development.
	138	Water Provider and Planning Department Work Together to Educate the Public	no	no	yes	yes	no	
	139	Lead by Example	no	no	yes	yes	no	
	140	Jointly Engage with the Development Community and HOAs	no	no	yes	yes	no	
	141	Share Success Stories and Case Studies with Other Communities and the Public	no	yes	yes	yes	no	Add a webpage regarding water use in new development.
142	Coordinate Education and Outreach Across the Region	no	no	yes	yes	no		