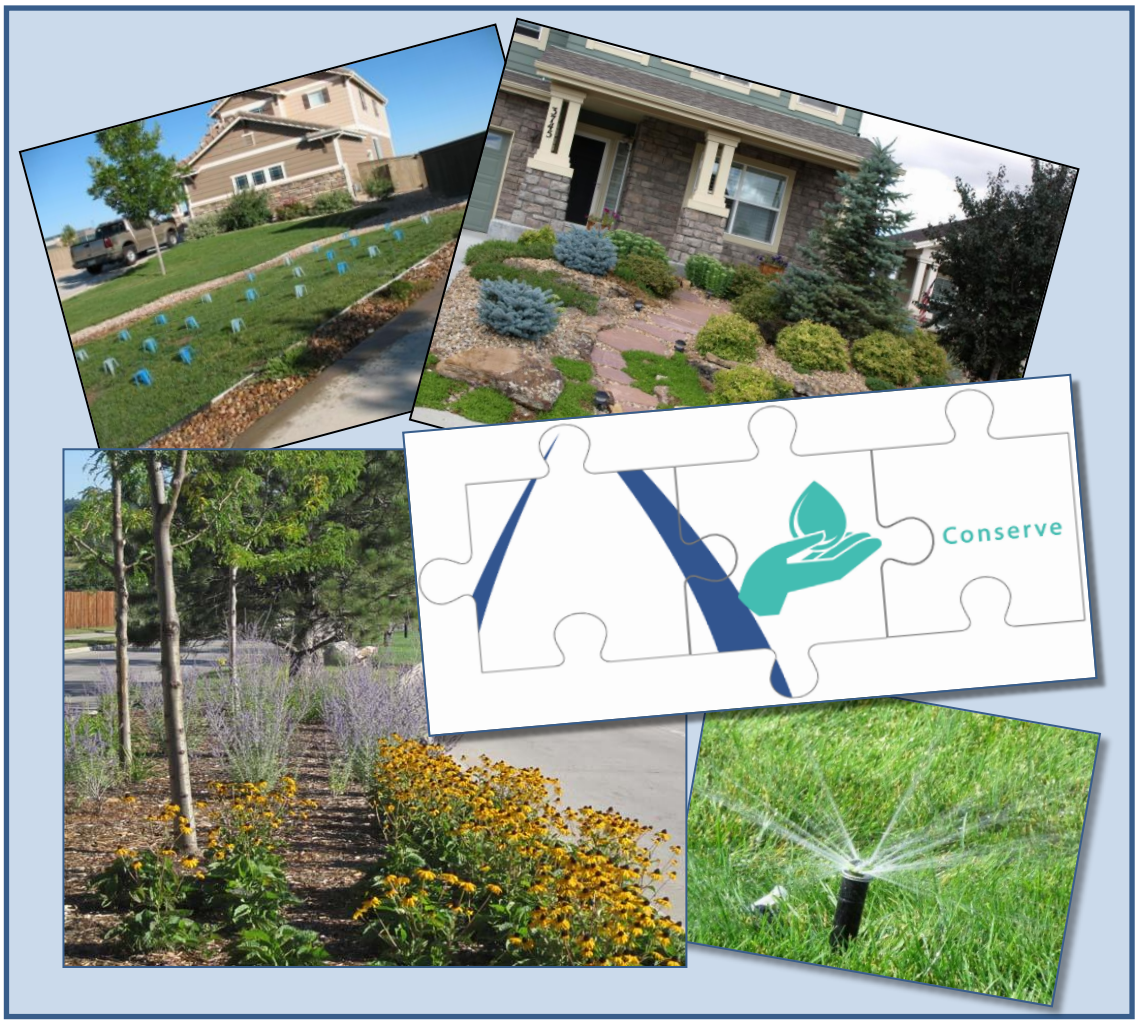
Water Efficiency Master Plan

2023



Castle Rock Water
Water Resources Division
Water Conservation Division

FINAL Date

Acronyms and Abbreviations

AF	acre-feet
AF/yr	acre-feet per year
AMI	Advanced Metering Infrastructure
AWWA	American Water Works Association
cfs	cubic feet per second
Town	Town of Castle Rock
CWCB	Colorado Water Conservation Board
deg F	degrees Fahrenheit
ET	evapotranspiration
gpcd	gallons per capita per day
gpd	gallons per day
gpf	gallons per flush
gph	gallons per hour
gpm	gallons per minute
HOA	Homeowner's Association
MG	million gallons
MGD	million gallons per day
PCWPF	Plum Creek Water Purification Facility
Plan	Water Efficiency Master Plan
sf	square feet
SFE	single family equivalent
w/	with
WISE	Water Infrastructure and Supply Efficiency

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Acknowledgments

The development of the Town of Castle Rock Water Efficiency Master Plan was a collaborative effort led by the Water Resources and Water Conservation Divisions at the Town of Castle Rock. The following staff members made significant contributions of time and input on this document:

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Executive Summary

Castle Rock Water has designated efficiency and conservation as key components of our long-term water plan. Castle Rock considers conservation to be a new water supply, and one of the few supplies we have complete control over. Conservation and efficiency are also part of our overall organizational strategic plan. One of our key goals is to reduce water consumption to below 100 gallons per capita per day in the next several decades. This is an approximate 15 percent decrease in the current per capita usage. Meeting this goal has the potential to save the Town an estimated $70 - $110 Million in long-term renewable water supplies and infrastructure over the long term. For decades, Castle Rock Water and our customers have been leaders in water conservation, and will continue to lead in this area, realizing that increased efficiency can lead to lower rates, steady and reliable supplies, and peace of mind. This 2023 Water Efficiency Master Plan has been designed to help us meet our long-term conservation goals and maximize the water efficiency of our system and customers.

Additionally, the Colorado Water Conservation Board (CWCB), through the Office of Water Conservation and Drought Planning, requires that water providers with total demand of 2,000 acre-feet per year (AF/yr) or more develop and implement plans that encourage customers to use water efficiently. This requirement was first established through the Water Conservation Act of 1991. During the 2004 legislative session, the State of Colorado revised the minimum requirements of the Water Conservation Act of 1991 in House Bill 04-1365. This House Bill now requires the conservation plans to include the following information:

- The steps the covered entity used to develop, and will use to implement, monitor, review, and revise its water conservation plan;
- The time period, not to exceed seven years, after which the covered entity will review and update its adopted plan; and
- Either as a percentage or in acre-foot increments, an estimate of the amount of water that has been saved through a previously implemented conservation plan and an estimate of the amount of water that will be saved through conservation when the new plan is implemented.

The April 1992 Water Resources Management Plan outlined conservation as a viable method of extending water supply. In June 1996, the Town of Castle Rock adopted a water conservation plan that set water conservation goals for the community. In December 2006, the Town of Castle Rock adopted the 2006 Water Conservation Master Plan, which was subsequently updated in 2015 as the Water Efficiency Master Plan. In April of 2022 the Water Resources Strategic Master Plan was approved and continues to reinforce conservation and efficiency as an integral part of future water supplies. Numerous factors require the plan to be updated including:

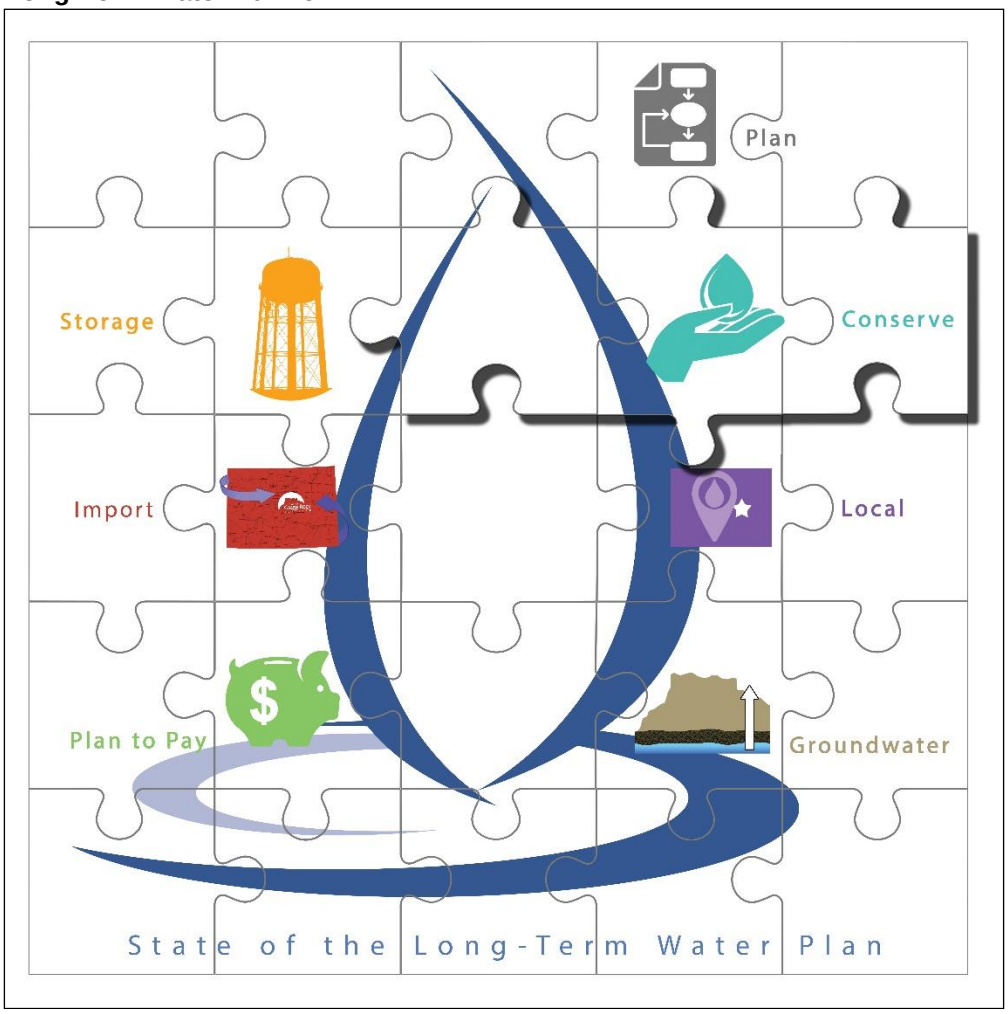
- CWCB's efforts in developing and implementing the Colorado Water Supply Plan;
- The projected population growth and the need for securing a sustainable renewable water supply for the future;
- Advancements in technology;
- Changes in conservation programs and goals; and
- Changes in the customer base with a significant increase of residential and non-residential accounts.

The 2023 Water Efficiency Master Plan (Plan), meets or exceeds the requirements of the CWCB Municipal Water Efficiency Plan Guidance Document and provides a brief summary of the Town, the water demand forecast, water use, system improvements, implementation and monitoring of programs, updated efficiency goals, and programs.

This Plan does not address long-term water supply plans; however, the Water Resources Strategic Master Plan, updated in 2022, does address long-term water supply. This Plan focuses on demand-side activities, such as customer education, water rate structure, rebates, audits, and regulations. This Plan also solidifies the Town's commitment to efficient water use and conservation.

Efficient water use is a key element of living in the semi-arid high desert climate, receiving less than 15 inches of precipitation each year, and is a critical part of the Town of Castle Rock's (Town) water resource strategy. Additionally, the State of Colorado requires that water providers who sell 2,000 AF/yr of water or more annually have a State approved water efficiency plan. As part of the Town's water resource planning approach, managing water demand is key. Effective management of the community's resources represents good environmental and financial stewardship. This 2023 Water Efficiency Master Plan (Plan) outlines a goal-oriented, performance based, and cost-effective strategy that delineates our current conservation programs and identifies the Town's plans for other conservation programs that will result in water savings to our community. The Plan, and conservation in general, are key to Castle Rock's long-term water plan as shown in **Figure 1**. Continuing to be a leader in conservation and efficiency has the potential to save the customers and community tens of millions of dollars in renewable water investments over the next thirty years.

Figure 1: Long-Term Water Puzzle



Water use efficiency has short and long-term positive social and economic impacts. The Town has involved the community in the development, review, and implementation of this efficiency plan. Water use efficiency ensures effective use of existing and future water resources.

Efficiency Goal

The Town has a future water conservation goal of 100 gpcd by 2050. Soon after implementation of the 2006 Water Conservation Master Plan, the Town decreased its water consumption from 165 gpcd to 135 gpcd. The current 5-year (2018-2022) average consumption rate is 116.9 gpcd. An additional 14.5% would reduce consumption to 100 gpcd. Staff estimates this additional reduction is achievable by the community. Colorado's first State Water Plan set a 2050 goal for our region of 129 gpcd. We have already surpassed that value but plan to continue conservation programs as outlined in this plan.

Stakeholder Participation

The Town sought feedback from Castle Rock Water customers during the planning process. The Town hosted an open house and an online survey to solicit input on the Plan. These were advertised on social media, the Town websites (CRgov.com and CRconserve.com), Town Talk, H2O Access, e-mail alerts, open houses, and Town Council. Approximately 500 residents attended the open house and 133 responded to the survey. The community feedback was valuable in guiding staff to select and modify water efficiency programs included in this Plan. A summary of this feedback is included within Section 6.

Current Programs/Policies

The following activities identified in the previous Water Efficiency Master Plan have been completed, or are currently underway:

- Advanced Metering Infrastructure
  - Transition and implementation currently underway.
- Water Budget Rate Structure Changes
  - Fly-over completed fall, 2018. Irrigated area updated for non-residential accounts in 2019 with changes to rate structure implemented in 2021.
- Public Right-of-Way & Town Park Landscape & Irrigation Retrofits
  - Metzler Park ball field retrofit
  - Public Works Service Center
  - Centennial Park tennis courts
  - Butterfield Park
  - Paintbrush Park ball field retrofit
- ColoradoScape Landscape Retrofit Rebate Expansion to Non-Residential/Commercial Customers implemented in 2018.
- Indoor Conservation Rebate/Incentive Program
  - 0.8 gallon per flush ultra-high efficiency toilet retrofit
  - Whole-Home water monitoring system with integrated shut-off
- Changes to Municipal Code to allow the use of graywater for toilet flushing
- Residential new construction landscape and irrigation inspection fees added to building permit
- Water Wiser Designation Expiration implemented in 2018
- Water Wiser Online Renewal Course implemented in 2020
- Training requirements for landscapers expanded including requirement for Qualified Water Efficient Landscaper (QWEL) completion
- Conservation Contests
  - ColoradoScape Makeover Contest implemented in 2019
- As of January 1, 2018 100% Kentucky Bluegrass lawns are no longer allowed on new construction or renovations.

- In late 2022, an ordinance stating no turf in front yards (must be a ColoradoScape design with low or very low water plant material) and less than 500 square feet of turf in backyards was passed and is a requirement for all new building permits starting January 1, 2023.

New Programs/Policies

Multiple new activities, incentive programs, ordinances/regulation changes, as well as educational activities will be considered over the next several years. These items are as follows:

- Complete implementation of advanced metering infrastructure and utilize data from the system to drive additional water efficiency and conservation including early leak detection for customers
- Formal Meter Testing Program
    - A formal meter testing process is currently in review and will be implemented when complete
- Water Budget Rate Structure Changes
    - Residential irrigated areas will be evaluated and may be updated
- Public Right-of-Way & Town Park Landscape & Irrigation Retrofits
    - Future projects may include Castle North Park, and Fire Stations 153 and 154 landscape conversions.
    - Additional areas will be considered in the future.
- Hot Water Recirculation Unit Incentive or requirement for new development
- Evaluate additional water saving options and potentially make changes to local building code to require 0.8 gallon per flush (gpf) toilets
- Re-evaluate and adjust up on an annual basis, as necessary, the incentive for removal of existing turf and replacement with a ColoradoScape design by existing customers.
- Consider hiring a landscape designer to help existing customers design ColoradoScape at no cost to the customer.
- Evaluate expanding incentives for additional graywater systems in new development including commercial development.
- Look at ways to improve our water loss evaluation and reporting to identify issues and find additional ways to save water
- Identify new technologies to monitor for leaks in our distribution system

1.0 Profile of Existing Water Supply System

1.1 Overview

Castle Rock is located midway between Denver and Colorado Springs.
The Town of Castle Rock occupies 34.7 square miles (with Castle Rock Water's service area being 51.4 square miles) and is the seat of Douglas County. Incorporated in 1881, the Town lies between 5,945 and 6,951 feet in elevation in the Plum Creek Valley along Interstate 25 at the base of the Rocky Mountains. Castle Rock's climate is known to be one of the best in the nation with more than 300 days of sunshine and clear blue skies.

The Town has a Council / Manager form of government. Water resources, water delivery, wastewater collection, and stormwater management services are provided through separate enterprise funds within the municipal government. Castle Rock Water provides these services to over 26,673 customer accounts. Wastewater treatment is provided by the Plum Creek Water Reclamation Authority (PCWRA), of which the Town is a member.

The estimated 2022 population of the Town was 82,710 people. The population of the Town is expected to continue to grow rapidly over the next several years. A table of Town population and growth projections is included in **Appendix A** of this Plan. By 2050, the Town estimates its population served could be as high as 155,000, which is an increase of approximately 199 percent over the estimated 2021 population served. **Figure 2** depicts the Town of Castle Rock's water service area.

The Town currently relies predominately on Denver Basin groundwater for approximately 67% of its annual water supply. The remaining 33% of the Town's annual water supply comes from renewable water rights in Plum Creek, captured at 14 alluvial wells and two diversion structures, reusable water, as well as imported renewable water from the Water Infrastructure and Supply Efficiency (WISE) project.

Population

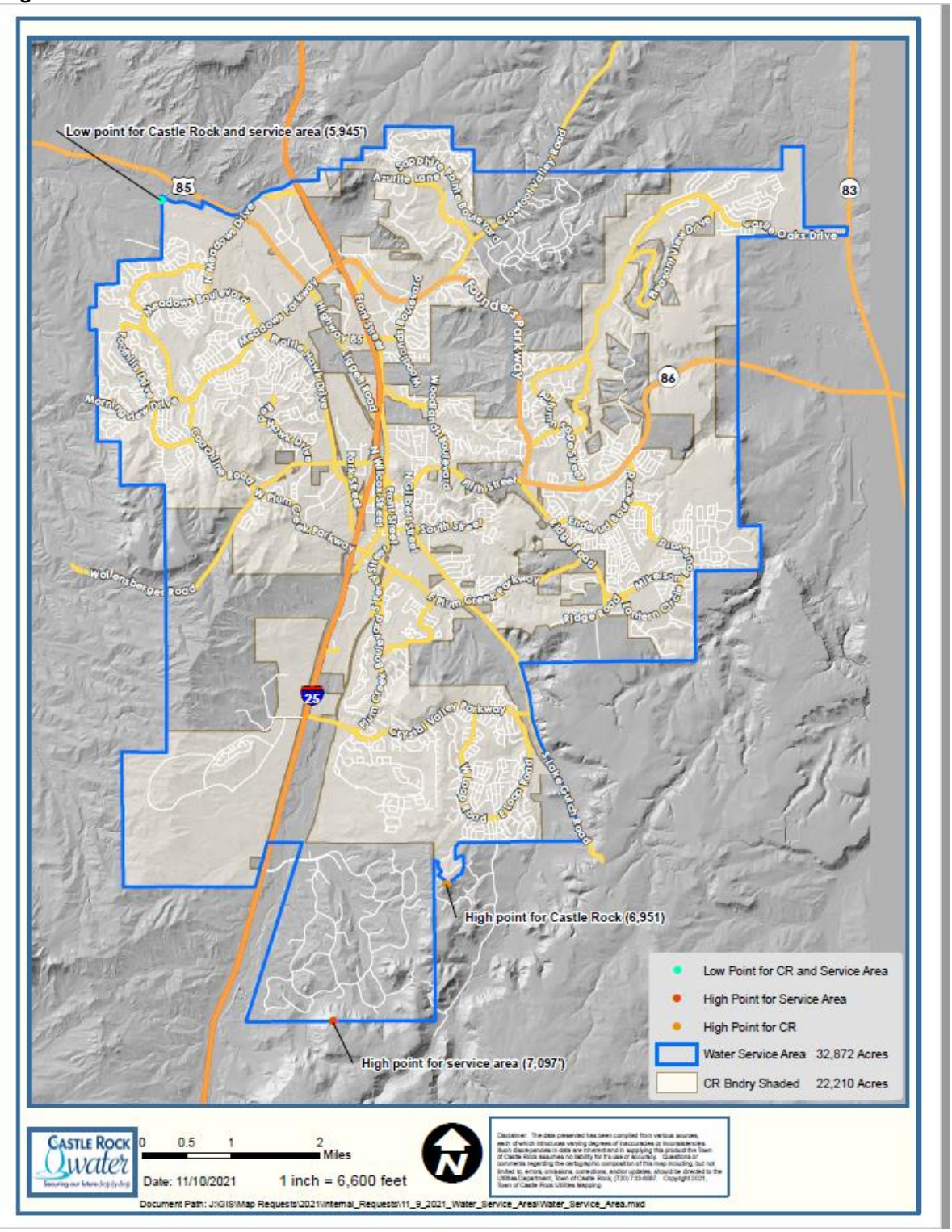
The previous master plan estimated serving a population of 105,200 by 2055, however, the population forecast has since been revised. The Town of Castle Rock currently estimates it could provide water service to approximately 155,000 people by 2050, which is an increase of 199 percent over the 2021 population served. Every year, the Town does a population estimate and compares the estimate to all current master plans.

Future Demand

Projecting future demands is difficult as population estimates and gallons per capita per day (gpcd) are highly variable. In order to plan for varying scenarios, Castle Rock Water (CRW) has identified projected demands could be as low as 15,434 acre feet (AF) under

the high water conservation scenario of 100 gpcd, and 112,000 people versus 24,883 AF under a low water conservation scenario of 130 gpcd with 155,000 people.

Figure 2: Town of Castle Rock Water Service Area



1.2 Water Supply and Reliability

- The majority of the Town's water supply is non-renewable groundwater
- The Town's goal is to be 75% renewable by 2050
- The Town currently provides renewable water as a supply via fourteen (14) alluvial wells and two (2) surface stream diversions;
- The Town obtains imported renewable water through the WISE project and through its partnership with Parker Water and Sanitation District (PWSD) and the Cherry Creek Water Project Authority (CCPWA);
- The Town reuses a large portion of its treated wastewater by diverting that water at a surface diversion near Sedalia, CO.

For a comprehensive review of Castle Rock's water supply portfolio, please refer to the 2021 Water Resources Strategic Master Plan (WRSMP), which is available at www.CRgov.com/plans.

2.0 Profile of Water Demands and Historical Demand Management

2.1 Demographics and Service Area Characteristics

The Town of Castle Rock provides treated water, wastewater services, and stormwater management to a service area with approximately 82,710 (year end 2022) people. The current population is expected to approximately double by the 2050s. The Town of Castle Rock was incorporated in 1881 but remained a small town of less than 4,000 residents until 1980 when parcels began annexing into the Town of Castle Rock and developing the land. The population has continued to grow steadily since. More detailed population data is attached in **Appendix A**.

The majority of the Town's customers utilize automatic irrigation systems. All new residential construction that includes landscaping is installed with a WI-FI enabled smart irrigation controller and rain sensor. Every commercial landscape over 500 square feet is installed with a smart irrigation controller, rain sensor, master valve, and flow sensor, as required by the Landscape and Irrigation Criteria Manual.

The peak day demand typically occurs between mid-June to mid-August each year. Over the past three years, the peak day ranged between 17.28 to 19.22 million gallons per day (mgd), which is approximately 2.05 times the average daily demand and 3.65 times the average winter monthly demand. The peak day demand is less than it would be without the Town's demand management program, which is described in the next section.

To better understand water use among different categories of customers, the Town of Castle Rock uses the following customer category assignments for its water service accounts. Each water account is assigned one of the following category designations:

- Residential
- Multi-family
- Commercial
- Irrigation
- Multi-family with irrigation
- Commercial with irrigation
- Bulk

Customer information is stored in Castle Rock Water's billing system. Every year, Castle Rock Water does a customer characteristics study and evaluates actual water consumption for the year by each of these customer classes and then looks at the three year rolling average as well. This data is used to design additional conservation and efficiency programs including rebates and education.

2.2 Historical Water Demands

According to billing data, the 5-year average annual metered-use by all customers is 8,845 acre-feet (2.88 billion gallons) between 2018 and 2022, which equates to 116.9 gpcd.

The Town began tracking water loss using the American Water Works Association (AWWA) Water Loss Control Committee Free Water Audit Software which utilizes the AWWA M36 methodology in 2013. Castle Rock has averaged a water loss of 7.2% in the five (5) years of 2017 through 2021. The Town continues to reduce water loss by:

- Evaluating a formal meter testing program,
- Performing acoustic leak detection testing on the potable water distribution system on an annual basis, and
- Identifying leaks within the distribution system by utilizing a data logger to monitor pressure.

As shown in **Table 1**, the residential customer category comprises approximately 92% of the Town's accounts and comprises approximately 66% of the Town's annual water demands between 2018 through 2022. Annual total demands per customer class are also presented.

Table 1: Historic Average Water Demand & Percentage by Customer Category, 2018-2022

Customer Category	Percent of Total Accounts	Percent of Total Annual Water Deliveries	Total Annual Demand (AF)
Residential	91.9%	66%	5,876
Multifamily	2.0%	7%	649
Commercial	2.8%	10%	881
Irrigation only	2.3%	13%	1,166
Bulk	0.9%	3%	274
Total	**100%**	**100%**	**8,845**

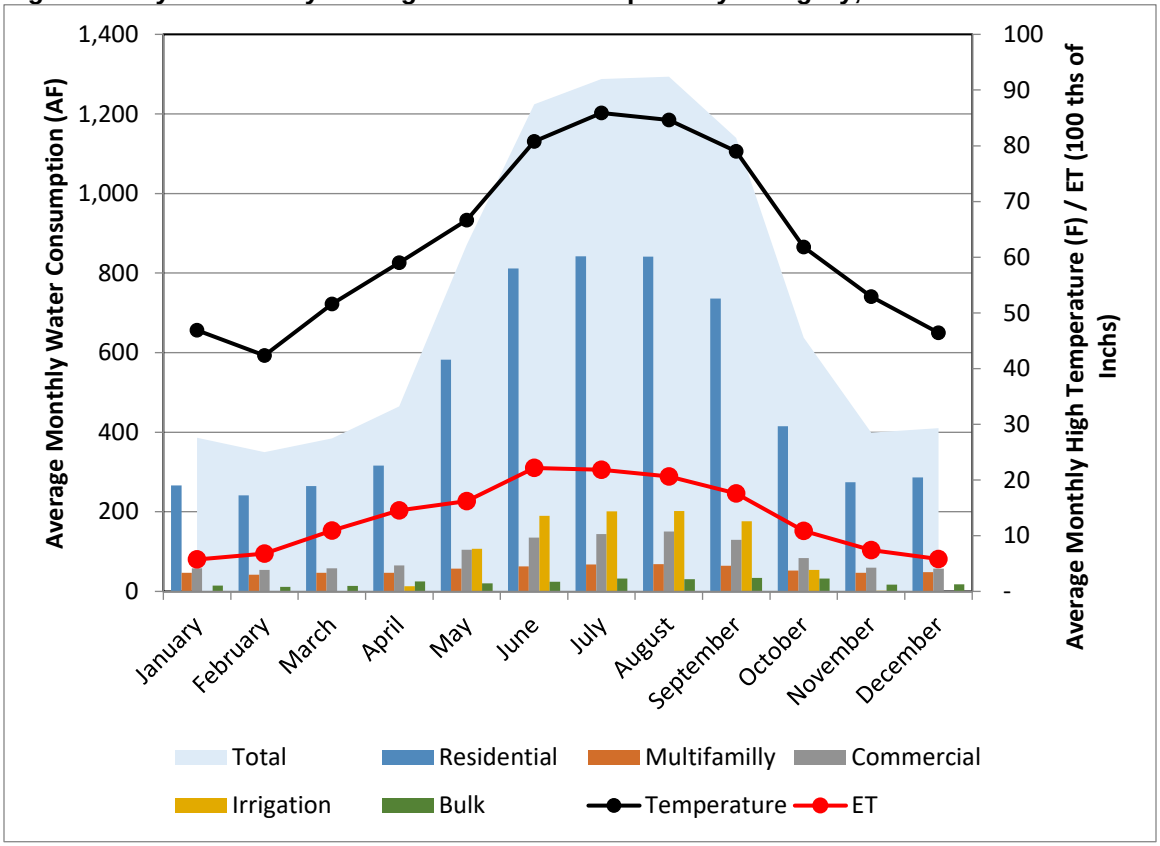
The most recent data shows the five largest customers in the Town of Castle Rock in terms of annual water use are:

1. Homeowner's Associations (HOA's)
2. Rental apartment community
3. Town of Castle Rock/Parks
4. Hospital
5. Douglas County Government Facilities

Over the past several years, the Town has taken the initiative to decrease water consumption in Town-owned and maintained parks by installing synthetic turf fields, renovating high water use plant material with low water use plant material, utilizing weather-based central control system, and rain and flow sensors. Castle Rock Water continues to provide outreach and education to the residents, HOAs, and the business community to find methods to decrease water consumption.

Figure 3 below represents the five (5) year (2018-2022) monthly average water consumption by category in relation to average monthly temperature and evapotranspiration during that same time-period. As expected, cooler temperatures relate to reduced water consumption and warmer temperatures relate to increased water consumption.

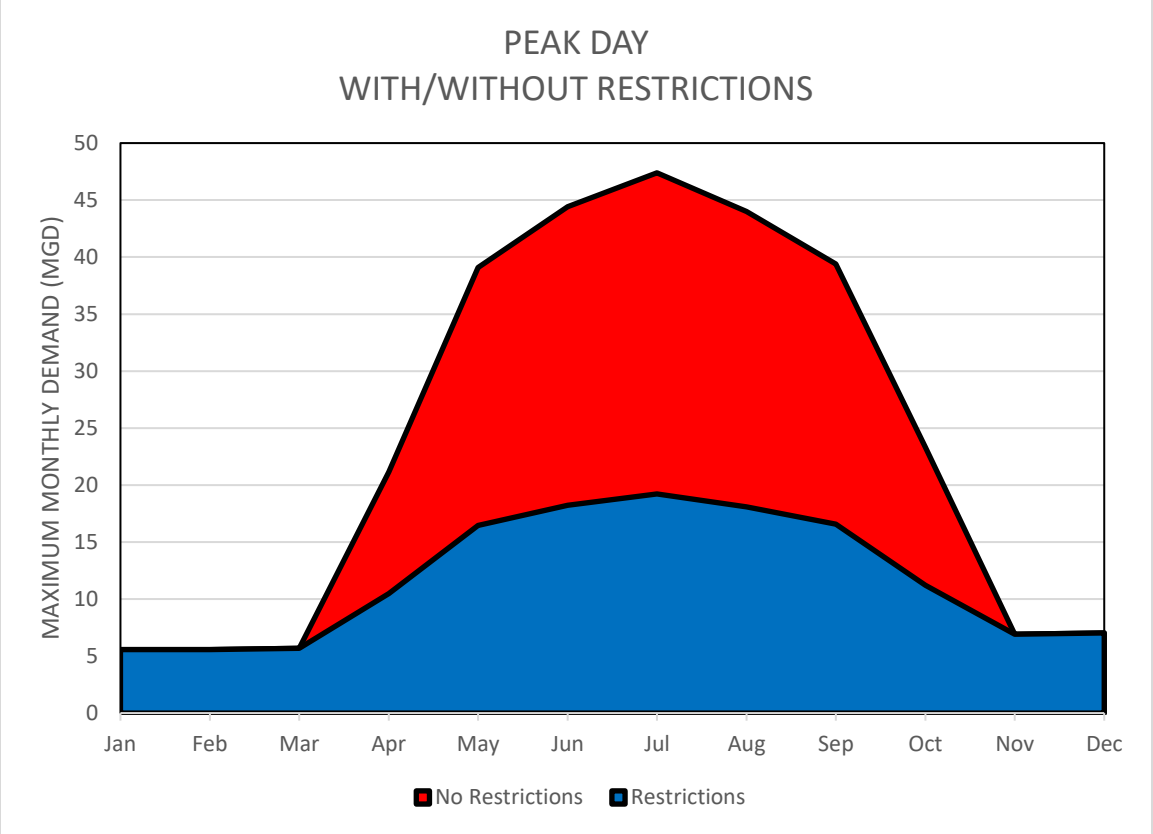
Figure 3: 5-year Monthly Average Water Consumption by Category, 2018-2022



2.3 Past and Current Demand Management Activities

The Town of Castle Rock has implemented several demand management activities over the past four decades that include every-third day watering schedules, with limited irrigation hours, as well as the water budget rate structure. The every-third day watering schedule, implemented in 1985, provides good water system management, while allowing adequate irrigation times for plant material health. Without watering schedules, the peak water demands would increase by approximately three hundred percent as presented in **Figure 4**.

Figure 4: Peak Day Demand Related to Every Third Day Water Restrictions Implementation



The water budget rate structure was implemented in 2009 and 2010. This billing structure promotes water conservation through a tiered rate system that encourages reduced water consumption within the allocated water budget.

The Town has numerous water efficiency activities that have been implemented over the past four decades. The earliest activity was outdoor watering schedules which is a demand management activity. Recent conservation efforts include a 2018 flyover and GIS mapping to re-evaluate non-residential irrigated areas and plant material to allow a

refined water budget for these properties. Customer outreach was completed during 2019 and 2020, and the revised water budgets were implemented in 2021.

Table 2 lists all water efficiency activities the Town has implemented by category and their current status.

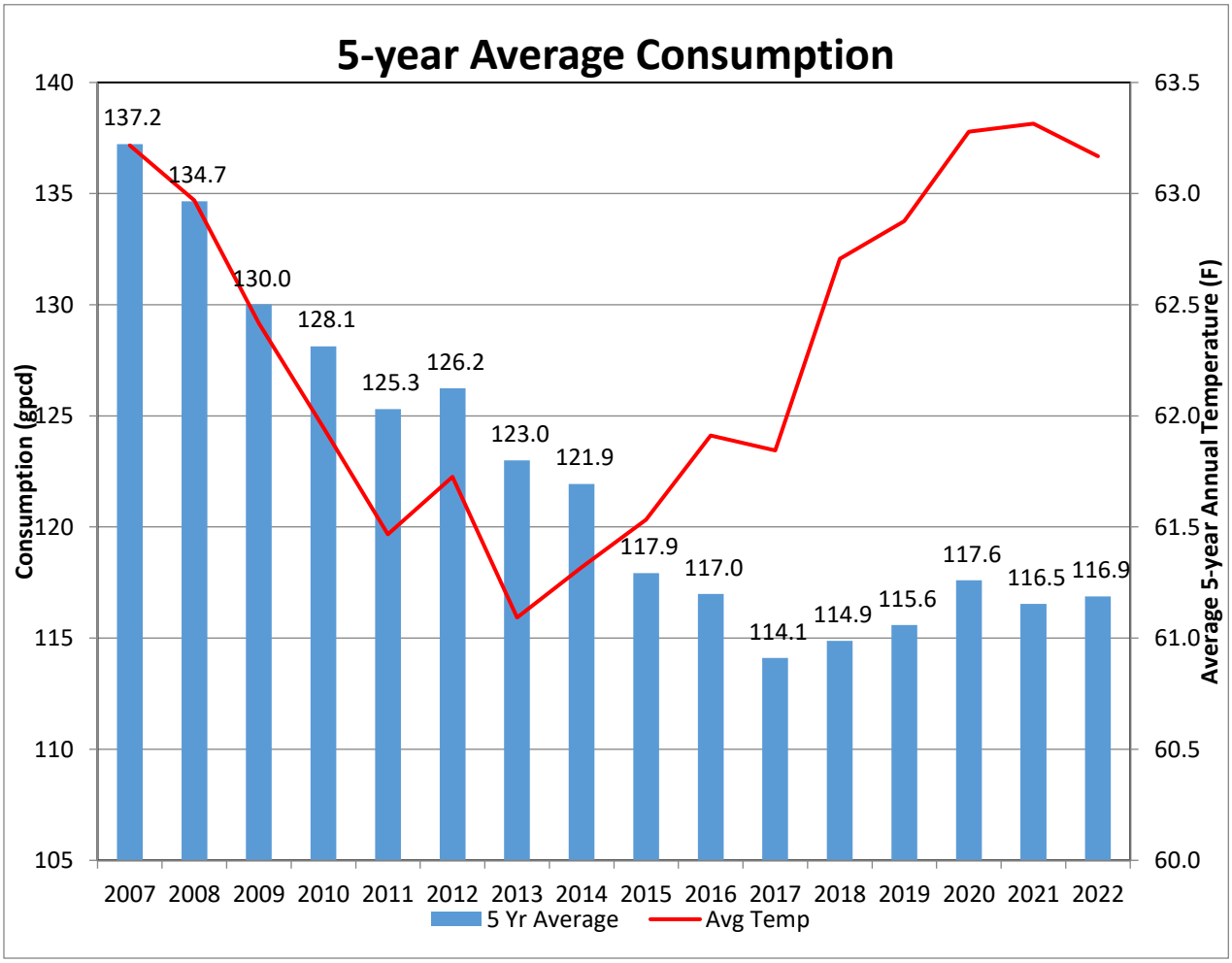
Table 2: Water Efficiency Activities

Water Efficiency Activities	Period of Implementation	Notes
Foundational Activities		
Increasing block rate structure	1989 – 2008	Water savings are not tracked by individual water efficiency activity.
Water budget rate structure (Commercial)	2008 – present	
Water budget rate structure (Residential)	2009 – present	
Historical consumption Information on Bills	2009 – present	
Public Rights-of-Way Retrofits	2009 - 2010	
Town owned landscape retrofits	2018 - present	
Leak Detection / Non-revenue Water Program	2008 – present	
Targeted Technical Assistance and Incentives		
Rotary nozzle retrofit	2009 – present	
ColoradoScape landscape renovation retrofit	2009 – present	
Rain sensor	2009 – 2017	
Smart controller	2009 – 2022	
Ultra-high efficiency toilet retrofit	2020 - present	
Whole-home Water Monitoring System	2020 - present	
Irrigation Audit/Sprinkler Inspection	2008 – 2019	
In-house landscape and irrigation assessments	2020 - present	
ColoradoScape renovation contest	2019 - present	
Ordinances and Regulations		
Water Use Management Plan	Early 2000 – present	
Watering schedules	1985 – present	
Water monitoring program	Early 2000 – present	
Soil amendment and inspection requirements	Early 2000 – present	
Irrigation exemptions	1985 – present	
Landscape regulations for new and re-development	1999 – present	
Water efficiency plan guidelines	2014 – Present	
Registration for landscape professionals	2004 - present	
Education Activities		

Historical Consumption Info on Bills	2009 – present	
Water Wiser workshops	2004 – present	
ColoradoScape Design workshops	2007 – present	
Water purification facility tours	Early 2000 – present	
Classroom visits	Early 2000 – present	
Winterization workshops	2007 - 2022	
ColoradoScape demonstration gardens	Early 2000 – present	
ColoradoScape landscape renovation contest	2019 – present	
Registration for Landscape Professionals	2004 – present	
Water Ambassador Program	2009 – present	
Water Conservation Website	2010 - present	

The Town has estimated the amount of water saved over the last five years. The amount of water that was consumed was compared to the gallons per capita per day value calculated in 2007 after the implementation of the 2006 Water Conservation Master Plan. The amount of water saved each year is realized as a dollar amount for the Town. Water saved is water that the Town does not have to secure in the future as part of the Town's long-term water plan. The Town currently estimates that the cost to secure fully-developed renewable water is estimated to be as high as $45,000 per acre-foot. Driving down our usage to 100 gpcd by 2050 would reduce the need to develop some new water supplies, potentially avoiding $70 million to over $110 million in future investments.

Figure 5: 5-year average gpcd and daily temperature 2007 - 2022



Outdoor water consumption is highly variable as it is dependent on temperature and precipitation. The slight uptick per capita water usage since 2017 can be correlated with the increase in average temperature.

3.0 Integrated Planning and Water Efficiency Benefits and Goals

3.1 Water Efficiency and Water Supply Planning

The Town of Castle Rock has a Water Resources Strategic Master Plan within which supply options are delineated. The Town has a goal of 75% renewable water supply by 2050 and 100% renewable water supply in an average hydrologic year by 2065. In order to achieve this goal, The Town must import water and continue to emphasize conservation and water efficiency. Conservation and water efficiency are in essence considered a water supply, or at least an excellent opportunity to extend the supplies we have. In either case, the estimated cost for obtaining new, fully developed, renewable water supplies is as high as $45,000 per acre foot. To address future water supply needs, Castle Rock maintains a diverse portfolio of water sources, treatment facilities, storage reservoirs, and agreements with other water providers to meet our customer's needs. Detailed information on our water supply mix is available in the Water Resources Strategic Master Plan (WRSMP).

3.2 Water Efficiency Goals

Water efficiency is a primary goal of future supply planning. The 2006 Water Conservation Master Plan and subsequent 2016 Water Efficiency Master Plan both listed three efficiency goals that were selected because they were measurable and practical. The Town of Castle Rock feels these same three goals are still the same goals for this updated Water Efficiency Master Plan because of their proven effectiveness.

Goal 1: Reduce current and future water demands.

Water usage per Town resident is expressed as "gallons per capita per day" (gpcd), which is used to compare demand. Gpcd is calculated two different ways. The first is "Potable gpcd", calculated using metered sales of water from billing data and monthly population estimates. The second is "Raw gpcd", calculated using source water distribution data (such as a meter at the well), calculated using water production data prior to delivery, and monthly population estimates. The potable gpcd is a true measurement of water being used by the community. The raw gpcd is a more accurate reflection of the total water needed to serve the community, and takes into account such things as hydrant flushing, fire suppression, water main breaks, and system losses. **Figure 5**, as presented in the previous section, provides an historical representation of metered potable gpcd since 2007.

Goal 2: Create a community culture that embraces water efficiency.

In order for water efficiency to be a sustainable effort, the community needs to understand the "value of water". The Castle Rock community needs to know where our water comes from, that deep groundwater is a finite resource, and that transitioning to renewable surface water is expensive, but necessary. Castle Rock's goal is to supply 75% of our water from renewable surface water and 25% of our water from non-renewable groundwater by the year 2050 with the ultimate goal of 100% renewable by 2065. This goal is all about educating and engaging our community in water conservation and efficiency. Castle Rock Water uses community surveys to evaluate our success with this goal. In addition, the amount of customers that access our rebate program and our educational classes help us evaluate the success of this goal.

Goal 3: Ensure financial stability.

Castle Rock Water is a "cost of service" (COS) based utility. The basic philosophy behind a COS methodology is that utilities should be self-sustaining enterprises that are adequately financed with rates and fees that are based on sound engineering and economic principles. In order to ensure the rates are set appropriately for each customer class, a cost of service rate study is completed at the end of each year, and adjustments to the rates and fees are made, as needed, for the coming year.

Water budget rate structures encourage the efficient use of water by our customers. For Castle Rock, tier one is calculated using an average of the winter (indoor) consumption during the months of November – February. Tier two is calculated using the actual irrigated area for each property/customer. Tier three is any water used in excess of the tier one and two allocations. Tier four (residential only) is charged for all consumption over 40,000 gallons in a single billing cycle. When the customer exceeds their monthly allocation they are billed at the next higher tier/rate.

In 2008, a non-residential water budget rate structure was developed and implemented. In 2018 a flyover was completed to re-evaluate the irrigated area and plant material on all non-residential accounts. Non-residential education and outreach, based on this updated information, was completed in 2019 and 2020. The revised non-residential water budgets were implemented in 2021 to reflect the actual water needs of the plant material onsite and the revised irrigated areas.

In 2009, a residential water budget rate structure was developed and implemented. The water budget rate structure uses the average winter monthly consumption (AWMC) to calculate the indoor budget and sewer charge for the year and the actual irrigated area to provide a monthly outdoor allocation during April – October. All meters are read monthly, on the first, second, or third day of each month. All billing is done in thousand gallons.

3.3 Water Efficiency Objectives and Implementation

The Town developed objectives to help meet the goals set for the Water Efficiency Master Plan. Each objective is summarized within this section.

Objective 1: Ensure that water consumption is 100 gpcd or less by 2050.

As stated in the original Town of Castle Rock Water Conservation Master Plan (adopted by Town Council December 2006), the goal was to reduce consumption from 165 GPCD to 135 GPCD. This goal was achieved in 2008 with a 5-year average (2004-2008) of 135 GPCD. Since then, each individual year, and the running 5-year average, Castle Rock has maintained consumption at or below this original goal.

The current goal is to conserve an additional 14.5% as we continue to promote the efficient use of water. The current five-year average (2018 – 2022) is 116.9 gpcd, potable. While additional strides need to be made to reduce consumption to 100 gpcd, the implementation for new construction (effective January 1, 2023) of no turf grass in front yards, and a limitation of 500 sf of new turf grass in backyards should greatly help drive this number down. Castle Rock Water will continue to monitor this key performance indicator and make additional adjustments as necessary to continue the progress towards the goal.

Objective 2: Preserve / enhance Castle Rock's landscape architecture.

What is the "Castle Rock look"? Castle Rock resides in a semi-arid high desert climate. According to local Castle Rock weather stations, maintained by the Town of Castle Rock, Castle Rock has received an average of 11.8" of precipitation during an average irrigation season (April – October) over the past seven years.

The "look and feel" of Castle Rock can vary greatly, depending on the part of town. The topography, elevation, and exposure are highly variable. The elevation ranges from 5,945' to 6,951'. The low point is at the northern edge of town where East Plum Creek intersects with the town boundary. The high point is on the south side of town, southwest of the Crystal Valley Ranch neighborhood. The natural landscape includes heavily wooded evergreen trees, Gamble Oak, natural grasslands, and rocky plateaus.

There are 72 known HOA's serving 148 neighborhoods, 18 apartment home communities, and 38 known metropolitan districts serving the Town of Castle Rock. Each of these associations or districts maintains common area landscaping and irrigation systems, and may also choose to promote and protect the natural surroundings of their own individual neighborhood. Because of the variable natural surroundings throughout the town, the look and feel of each neighborhood, through its HOA or Metropolitan District, may be determined by specific covenants.

The geographic location and climate reinforce water conserving plant selections and efficient irrigation techniques. By using natural surroundings, future development could remain more sustainable. The objective is to create a landscape aesthetic that is more focused on sustainable landscapes.

Castle Rock Water has adopted the "ColoradoScape" term to describe the preferred xeric landscape to aid in our conservation efforts. ColoradoScape is defined as a natural landscape which uses low to very low water (less than ten (10) inches of water per year) plant material which blends in with the native Castle Rock landscapes. Plant material must be maintained in its natural form, utilizing a combination of hardscape and landscape materials which provide a variety of colors, textures, sizes, shapes and seasonal interest. We offer a plant finder on www.CRconserve.com to help guide our customers in choosing the low-water plant material that will meet this definition. Castle Rock Water's goal is to incentivize removal and reductions of the non-functional turf in Castle Rock by 30% from today's numbers by 2050 and transform it to more sustainable drought tolerant landscapes.

Implementation Strategy

The Town has developed an implementation strategy to help achieve the goals and objectives of the water efficiency plan. The strategies include implementation of the landscape regulations updated in 2022, maximizing the utilization of all of the rebates we offer, helping customers take advantage of the information available through advanced metering infrastructure, looking for opportunities to reduce water loss through our water loss monitoring and reporting, and improving and expanding our public education programs.

The Town has implemented landscape regulations for new development that results in efficient use of water, is aesthetically pleasing, and enhances the type of land use. The first regulations specific to landscape and irrigation were included in the Public Works Regulations, and adopted in 1999. The next several years saw greater development and the need for a stand-alone document to address landscape and irrigation concerns. This led to the *Town of Castle Rock Landscape Regulations and Principles*, adopted in July 2003. As time, development, technology, and management practices all continued to move forward, it became clear that a revision and update to the 2003 regulations was needed. In December 2012, the Landscape and Irrigation Performance Standards and Criteria Manual was adopted, with the first update to this manual taking place in early 2015. Additional updates were completed in 2018, 2020, and 2022, when the manual title was changed to "Landscape and Irrigation Criteria Manual".

Currently reviews and updates occur on an annual basis as part of our implementation strategy to continuously improve landscape regulations as they relate to water efficiency. This manual sets forth clear guidelines for design and construction of new development and re-development. This includes such areas as residential homes, multi-family residential, parks, streets, religious institutions, commercial, and HOA common areas. The Town plans to continue working with the development community to ensure changes and updates are realistic and achievable. Castle Rock Water does this through monthly meetings with the Economic Development Council Water Subcommittee.

The most recent revision to this Criteria includes no turf allowed in residential front yards and limited to a maximum of 500 sq. ft. of turf in back yards for new single-family homes permitted after January 1, 2023. This new landscape requirement is expected to show a significant decrease in water usage going forward. Castle Rock Water has developed a detailed procedure for overseeing these new landscapes including design review and inspection. Castle Rock Water has also incentivized the installation of both the front yard and the back yard by the home builders as they are the most qualified to ensure the new landscapes meet our regulations (as opposed to private residents). Home builders can receive an incentive of up to 40% off of the normal system development fees for water, wastewater and water resources if they install both the front and back yards for these new houses.

Castle Rock Water Conservation Staff conducts an annual review of the rebate and incentive program. Through this annual review, a variety of data points are analyzed, including level of participation, financial impact, and water savings attributable to each rebate category. Periodic adjustments are made which include discontinuance of ineffective programs, increasing or decreasing the level of incentive, and addition of new products / technologies.

The transition and implementation to Advanced Metering Infrastructure (AMI) is currently underway. Castle Rock Water will be investigating ways to leverage AMI to improve / promote conservation and efficiency, identify and repair leaks, and increase customer engagement through the online portal.

Raising awareness and increasing education is critical to the success of the conservation and efficiency program. It is important for our customers to understand the importance of water so we can properly manage our most valuable resource. Additional educational programs will be explored for all our customers and stakeholders, including residents, HOA's, business owners, landscape architects, irrigation designers, landscape and irrigation contractors, and the development community. Since 2004, the Town has implemented several public education programs outlined in **Table 4** above.

3.4 Short-term Drought Response

The Town has regulations within the Municipal Code (Chapter 13.12.070) that allow regulation of water usage during times of drought, shortage, fire or other emergencies.

As part of Castle Rock Water's Strategic Plan, in 2018 the department developed a Drought Management Plan that aligns with regional water providers. The Town has five (5) different stages whereby water use can be limited. The drought management plan can be found at www.CRgov.com. This plan will be reviewed for updates again in 2025.

4.0 Selection of Water Efficiency Activities

4.1 Summary of Selection Process

The Town has had a positive experience with the water efficiency goals and objectives selected implemented in previous plans. These goals and objectives helped the Town meet the initial conservation goal taking the individual usage rate from 165 to 135 gpcd and have since brought the individual usage rate to an even lower amount of around 117 gpcd, and were therefore selected to remain goals and objectives for this Water Efficiency Master Plan revision. The Town has developed a few additional conservation objectives that are currently in the process of being developed or are under review for economic feasibility. These include possible expansion of the rebate and incentive program, the use of AMI to increase public engagement with their water use, the use of AMI for leak detection, and the implementation of 0.8 gpf toilets for new residential construction. The selection process for future water efficiency activities flows from these objectives and utilizes the tracking of key performance indicators, the success of past activities, input from our customers, and the availability of financial resources. A robust conservation program helps promote the efficient use of water and ensures long-term stability.

4.2 Components of Water Efficiency Plan

4.2.1 Foundational Activities

The Town has several foundational conservation activities that help with water demand management and these activities will be continued and improved where possible.

Water Budget Rate Structure

The Town has had a tiered rate structure for several decades (refer to **Appendix B**). The Town implemented rate strategies, such as a water budget rate structure that rewards efficient water use and discourages water waste. In 2008, a non-residential water budget rate structure was developed and implemented. In 2018 a flyover was completed to re-evaluate the irrigated area and plant material on all non-residential accounts. Non-residential education and outreach, based on this updated information, was completed in 2019 and 2020. The revised non-residential water budgets were implemented in 2021. These budgets will be continued in this updated plan.

In 2009, a residential water budget rate structure was developed and implemented. These rate structures calculate the indoor budget during the winter months of November

– February, and provide a monthly outdoor allocation during the months of April – October. These rate structures consist of four (4) inclining tiers described below.

Tier one is based on the average winter monthly consumption (AWMC) of November – February. It is assumed all water used during this period is indoor consumption only, as it is outside the normal irrigation period. If the AWMC does not average to an even thousand gallons, then the average is rounded up to the nearest thousand gallons to become tier one and rounded down to the nearest thousand gallons to establish the sewer charge until the next AWMC period.

Tier two is the "in budget" outdoor irrigation rate. Each account that has irrigation is assigned a square footage based on the actual irrigated area for that meter. These actual irrigated areas have historically been estimated. Castle Work Water is working to ensure these irrigated areas are more accurate with recent development. Residential accounts are limited to a maximum of 7,000 square feet. The other change to outdoor irrigation budgets for residential customers is working to incorporate not only irrigated area but plant type into these budgets. Castle Rock Water has been performing pilot testing of actual residential lots to develop new, more accurate water budgets. Castle Rock Water is also evaluating how best to update outdoor irrigation water budgets for residential customers going forward. Several options are being considered and the goal will be to finalize an approach in this iteration of the water efficiency plan.

Tier three is the out of budget or "excess" tier for irrigation. For residential customers, this tier is anything in excess of tier two, up to 40,000 gallons in a single billing cycle.

Tier four (residential only) is the conservation surcharge and only applies to consumption in excess of 40,000 gallons in a single billing cycle.

Castle Rock Water will continue to use residential water budget rates as part of this plan. As noted above, residential water budget rate structures will be evaluated to determine any need for future updates with a specific focus on the outdoor irrigation portion of the water budgets.

Historical Consumption Information on Bills

The Town began showing historical consumption information on utility bills in 2009. This historical use encourages the customer to adjust usage based on their projected budget. If consumption increases, it highlights the significance of changes in household usage or potential leaks. Castle Rock Water will continue to show historical consumption information on bills. For customers that use paperless billing, Castle Rock Water is adding significant improvements to this historical consumption usage information including 3 years of data graphed with temperature overlaid on top of it. Castle Rock Water will look for additional ways to improve the messaging on bills related to historical consumption.

Advanced Metering Infrastructure (AMI)

Castle Rock Water is currently in the process of installing AMI equipment. When inventory is available, meters not currently AMI capable will be upgraded. AMI equipment includes hardware and software that provides real-time consumption data for Castle Rock Water and its customers via a webpage or mobile Application. The Town realizes that AMI has significant benefits, which include providing real-time data for customers to track water usage for conservation efforts and locating leaks in the system. Complete AMI access for all customers is expected to be in place by end of year, 2026 with many customers getting access much sooner.

Formal Meter Testing Program

Castle Rock Water is currently in the process of developing a formal meter testing program. The program will identify a standard operating procedure for testing meters within the system on a recurring basis and help reduce non-revenue water from inaccurate meters. This helps ensure our financial stability contributing to goal number 3.

Leak Detection / Non-Revenue Water Program

In 2012, Castle Rock Water's Operation and Maintenance Division launched a systematic leak detection program to determine repair and rehabilitation areas of the potable water distribution system. As of year-end 2022, the Town had 432 miles of potable water distribution piping with a goal to perform leak detection over the entire system every three (3) years to reduce non-revenue water. Furthermore, the Town has performed some form of leak detection on the system that dates back to 1995.

Since 2012, Castle Rock Water has been tracking non-revenue water loss using the AWWA Loss Control Committee Free Water Audit Software which utilizes the AWWA M36 methodology. This software also helps us improve our water accounting, which then leads to more accurate consumption and water loss estimates. We utilize both acoustic and pressure data loggers to identify and locate leaks. We are also proactive by replacing larger sections of pipe, often including entire streets, in our older parts of town where the infrastructure is aging. This targeted replacement program upgrades the pipe before it fails, preventing future leaks and service interruptions.

Public Rights-of-Way Retrofit & Town Park Landscape & Irrigation Retrofits

In 2009, the Town funded two landscape median projects: Woodlands and Meadows medians. The Town pays for water to irrigate these medians. The Meadows medians landscaping and irrigation is maintained by the area metro district. The Woodlands median has historically been maintained by the area metro district. Beginning in 2022 these medians are now maintained by the Town. While the total costs of the projects amounted to about $250,000, the Town has estimated an annual savings of $11,000 in operation and maintenance costs, as well as approximately $121,726 saved in long-term renewable water needs.

In 2019 the Town of Castle Rock Parks department completed a landscape retrofit within Metzler Park to replace the Kentucky Bluegrass ball fields with artificial turf. Castle Rock Water unused rebate funds are allocated to this project at the end of each year. This renovation has saved approximately 3,964,000 gallons of water annually, resulting in a savings of $547,650 of renewable water.

Also in 2019, the Parks department removed over 26,000 square feet of high-water use Kentucky Bluegrass at the Public Works Service Center and replaced it with a drought tolerant native seed blend.

In 2021 the Parks department retrofitted over 20,000 square feet of Kentucky Bluegrass around the Town tennis courts in Butterfield Park to a very low water, low maintenance native blend.

In 2022 the Parks department continued to work with Castle Rock Water to be a steward of conservation by replacing over 58,000 square feet of Kentucky Bluegrass with the same native seed blend that has previously been used successfully on other Town projects.

Also in 2022, Castle Rock Water and the Parks department partnered on replacing the grass ballfields at Paintbrush Park with artificial turf.

Future plans include landscape renovations to remove high water turf at Fire Stations 153 and 154, as well as the Milestone Pump Station. Staff will continue to monitor and complete renovations where possible.

The Town's GIS staff estimates there is 18,468,920 square feet (approximately 424 acres) of non-residential irrigated turf within our service area. The goal is to reduce non-functional turf by 30% by 2050. Assuming half of that turf is non-functional (9,234,460 square feet) then this 30% reduction goal would propose to remove 2,770,338 square feet (approximately 63.6 acres) and replace with ColoradoScape. Retrofitting with ColoradoScape would potentially reduce the water consumption for this area by as much as 66%.

4.2.2 Targeted Technical Assistance and Incentives

The Town has implemented incentive programs encouraging existing properties to be water efficient and aesthetically pleasing. The following is a list of the current rebate and customer assistance programs. The funds for the rebate programs are limited and the rebates are issued on a first-come, first-served basis. Additionally, a resident must be a participant in the Water Wiser program to be eligible for any of the following rebate programs. This is something which Castle Rock Water will evaluate in this planning period to see if this is a necessary feature of the rebate program and whether removing this requirement will increase the number of customers utilizing the rebate program. Rebates are available to all customers within the Castle Rock Water service area. Every year, Castle Rock Water evaluates the budget for these programs and will continue to do this. Increases in the budget will be based on the success of the water conservation achieved and the funding available. Funding levels have been $145,000 per year for the last 5 years. The funding for 2023 has increased to $200,000. The proposed funding allocation and percentage split is shown in **Table 3** below. The goal is to use all funding available to receive the maximum benefit from the rebate program.

Table 3: Rebate and Customer Assistance Program Funding Summary

Category	2020		2021		2022		Average %	2023 (proposed)	
	Total $	% of Total	Total $	% of Total	Total $	% of Total	of Prior Years	$ per Category	% of Total
Residential ColoradoScape Renovation Rebate	$34,027	35%	$42,193	46%	$80,941	54%	45%	$105,000	53%
Non-Residential ColoradoScape Renovation Rebate	$42,290	43%	$35,895	39%	$60,665	40%	41%	$85,000	43%
Rotary Nozzle Retrofit Rebate	$1,815	2%	$1,653	2%	$1,439	1%	2%	$1,500	1%
Smart Irrigation Controller Rebate	$9,093	9%	$8,364	9%	$5,608	4%	7%	$0	0%
Toilet Retrofit Rebate	$8,797	9%	$2,700	3%	$1,200	1%	4%	$7,500	4%
Whole Home Water Monitoring System Rebate	$1,350	1%	$1,697	2%	$337	0%	1%	$1,000	1%
Total	$97,372	100%	$92,502	100%	$150,191	100%	N/A	$200,000	100%

Outdoor Conservation Incentive Program

Rotary Nozzles

Residential and non-residential customers can receive a rebate up to $5 per nozzle ($2,000 maximum for non-residential customers) when less efficient traditional spray nozzles are replaced with more efficient rotary nozzles. Customers are required to provide an application, receipt, and old nozzles to take advantage of this program.

ColoradoScape Renovation

Residential customers can receive a rebate of $1.50/square foot for removal of high water use plant material (such as Kentucky Bluegrass), and replacement with a ColoradoScape design. This is an increase from the $1.20 per square foot offered in 2022. Residential customers choosing to install artificial turf, concrete, wooden decks, or other impervious surfaces can receive a rebate of $1.00/square foot (maximum for both options is 1,500 sq. ft.). The sprinkler system must also be retrofitted with drip irrigation for ColoradoScape areas, or removed for hardscape areas. As part of our biannual resident survey, Castle Rock Water is seeking feedback on what level of incentive, if it were raised above $1.50 per square foot, would tempt more customers to take advantage of the ColoradoScape rebate. Castle Rock Water will continue to evaluate the rebate and the value of the water saved each year and adjust the rebate appropriately.

In 2018, Castle Rock Water expanded its existing ColoradoScape Renovation rebate to include non-residential customers, commercial businesses, public rights-of-way, and Town facilities. This will continue into the future.

Castle Rock Water staff compares water usage before and after a rebate is processed to determine necessary adjustments and the rebate program is evaluated annually to extend the success of the program.

Historically we have modified the rebates offered and rebate amounts and budgets have been adjusted and this will continue into the future.

Irrigation Audits & Sprinkler Inspections

During the years of 2008 – 2019, Castle Rock Water offered Irrigation audits to our customers. The irrigation audits consisted of a catch cup audit, review of the irrigation clock and programming, and a recommendation on how to improve management and overall system efficiency. The Town previously contracted with ReSource Central to provide their Slow the Flow Colorado irrigation audit program. Through ReSource Central's Impact Analysis, average Slow the Flow program water savings was 5,000 gallons per season per participant. Castle Rock customers that participated in the program in 2013 showed an average water savings of 33,000 gallons per season per participant after implementing recommendations.

Beginning in 2020, Castle Rock Water staff began offering personalized landscape and sprinkler system assessments and recommendations to Castle Rock Water customers. These assessments are free to residents in our water service area and support the continued effort of water conservation and efficiency. The goal of these assessments is to identify problems within the landscape, focusing on soil and plant health, irrigation coverage, and controller programming. It is worth noting many customers have replaced dead or declining turf, only to have it die again. Without addressing the root cause of the dead grass, they are never going to solve the problem. More often than not, the root cause of the problem can be traced back to improper soil preparation and inefficient or ineffective sprinkler systems/coverage. Going forward, Castle Rock Water will continue to improve on the audit procedures to maximize the benefits to the utility and the customer.

Indoor Conservation Incentive Program

Toilet Retrofit

Castle Rock Water customers who currently have fixtures using 1.6 gallons per flush (gpf) or higher can receive a rebate of up to $150, maximum of four (4) toilets, when replacing with an ultra-high efficiency toilet using 0.8 gpf or less. This incentive alone has shown a 16% reduction in water usage since its inception in 2020. The number of toilets replaced in 2020, 2021, and 2022 were 71, 27, and 18, respectively. This program has a significant

potential to improve town wide water efficiency. Going forward, the goal will be to do a minimum of 40 replacements per year.

Whole-Home Water Monitoring System

The Whole Home Water Monitoring System rebate encourages the installation of this customer-driven whole-home water monitoring, leak detection, and automatic shut-off device. The purpose of the device is to encourage conservation by raising customer awareness of their own individual water use, and to detect and reduce waste through the integrated water shut-off valve. The rebate amount is 50% of the cost of the device, not to exceed $200. Since inception in 2020, participation in this category has been relatively low. We have had 18 customers take advantage of this category. 2020 (7), 2021 (9), 2022 (2). As AMI comes online, we may consider discontinuing this rebate category.

Conservation Incentives Currently Under Consideration

Hot Water Recirculation System

The Town is considering offering a rebate to install hot water recirculation systems. Hot water recirculation systems have demonstrated both water and energy savings

4.2.3 Ordinances and Regulations

Water Use Management Plan

The Water Use Management Plan includes watering schedules / restrictions, water monitoring program, rain water harvesting, and watering exemptions for new sod and seed. This plan is evaluated annually and adjusted as appropriate.

Watering Schedules / Restrictions

The Town has implemented mandatory every third day watering schedules / restrictions since 1985. By scheduling water usage for outdoor irrigation, the Town has limited the demands on the system during the summer months by approximately one-third. The restrictions are enforced through the water monitor program during the peak irrigation season (May through September).

Non-residential customers can irrigate from 12 am to 8 am three days per week and residential customers can irrigate before 8 am or after 8 pm every third day, on their designated day. The program is reviewed each year to determine if any adjustments are needed to improve efficiency.

Water Monitoring Program

During the restriction season, water monitors look for water waste which includes broken sprinklers, sprinklers out of adjustment, or sprinklers running too long creating runoff. The water monitors also look for customers watering on the incorrect day or at the incorrect time. The water monitors initially approach the violation as an opportunity to educate the

water user about conservation methods. If the education effort fails, the water monitors have the authority to issue violations.

On average, over the last five years (2018 – 2022), 2,721 residential violations and 399 non-residential violations have been issued each year. There does not appear to be a clear trend up or down. There also does not seem to be a direct correlation with the weather (temperature, precipitation). The largest factor seems to be the length of the watering schedule season and the number of monitors employed over the course of that season. In other words, longer season (3 months in 2018 vs. 5 months for each year after that) leads to more violations, and the number of water monitors hired each season. More monitors in the field generally equals more violations issued. The goal for Castle Rock Water is to reduce the number of violations we have to issue. This means that we need to continue to educate our customers. We also may need to revisit the violation surcharges to further incentivize customers to follow the outdoor watering rules. Finally, we will need to review the number of water monitors hired to work each irrigation season based on the workload to enforce the watering rules

Watering Exemptions

Watering exemptions can be issued for new construction of landscape or retrofits. New sod exemptions are issued for 21 days. New seed or other plant material exemptions are issued for 30 days. The customers who qualify are then exempt from the every third-day restriction but normal watering times and water budgets still apply. Historically July is the hottest month of the year and receives very little moisture. As a result, watering exemptions are not issued or applicable during the month of July.

Landscape Regulations for New Development

The landscape and irrigation regulations consist of residential and non-residential irrigation efficiency requirements. The Town has developed the Landscape and Irrigation Criteria Manual that all new development must follow. The key requirements in this manual include water efficient design, construction, and maintenance components.

In order to maintain consistency with new landscape and irrigation methods and technology, the Landscape and Irrigation Criteria Manual is reviewed and updated annually. The most recent update in 2022 (effective date November 17, 2022) changed some key items for all new residential building permits issued beginning January 1, 2023 include:

- The landscape and irrigation for the whole yard must be designed by the builder and submitted for approval as part of the building permit application.
- No turf allowed in front yard (ColoradoScape only).
- Additional plant species diversity requirements added to complement the ColoradoScape design.

- 500 square feet maximum turf allowed in back yard.
    - These requirements will be incentivized through a reduction in system development fees if the whole yard landscape and irrigation is installed by the builder.
- Master valve required.

Future updates to the criteria manual will be considered as appropriate in order to remain consistent with the needs of the community, new landscaping methods, and emerging irrigation technology.

Soil Amendment and Inspection Requirements

New development is required to amend soil with a minimum of four (4) cubic yards of organic material per 1,000 square feet, tilled to a minimum depth of six (6) inches. Organic material must be fully finished, stabilized, and mature product, derived from organic materials such as leaves, grass clippings, wood chips, and other yard wastes. Finished compost is dark and crumbly, does not resemble the original contents, and has an earthy smell. Acceptable compost will not contain any human or animal waste. If and when compost is suspected of not meeting this requirement, the Town reserves the right to stop installation, perform laboratory testing to ensure compliance, and require removal if the product is found to be out of compliance. New or renovated landscapes must pass a soil inspection prior to receiving an irrigation exemption.

4.2.4 Educational Activities

Historical Consumption Information on Bills

Previously outlined. See Section 4.2.1 for full discussion on this top

Water Wiser workshops

Water Wiser is an interactive, hands-on workshop, aimed at residential customers. The workshop focuses on leak detection, irrigation efficiency, and water management to provide customers with easy to implement conservation techniques, as well as indoor efficiency procedures. Once customers complete the program, they are allowed to water on any day as long as the time and approach are consistent with our other rules. This allows for the flexibility to water on days when irrigation is needed, and will be the most beneficial, not just to water on their designated day. The Water Wiser designation must be renewed every five (5) years.

Through the community outreach effort, it was determined that nearly all respondents to the online survey who completed the Water Wiser workshop found the program to be useful. 309 residents completed the Water Wiser workshop in 2022, bringing the total to 3,507 current participants. Returning Water Wiser participants, needing to renew, can complete a web-based course at their convenience or attend the full workshop.

Water Wiser participants are evaluated to determine how their water consumption compares before they took the course and after they took the course. They are also compared to other customers to determine if Water Wisers are actually using less water. To date, the results do not show significant water savings by these customers. As a part of this plan, Castle Rock Water will explore ways to improve this program and generate more water savings.

ColoradoScape Design Workshop

Residents often refer to a xeric design as “Zeroscape” which implies no plant material, no water, and no maintenance. In an effort to reduce confusion and clarify the intent of our program, Castle Rock water has adopted the term “ColoradoScape” to describe a xeric design landscape. We define ColoradoScape as “A natural landscape which uses low to very low water (less than ten (10) inches of water per year) plant material which blends in with the native Castle Rock landscapes. Plant material must be maintained in its natural form, utilizing a combination of hardscape and landscape materials which provide a variety of colors, textures, sizes, shapes, and seasonal interest”.

These workshops focus on design, installation, and maintenance for a ColoradoScape landscape, including low water use plant material that thrives in the semi-arid high-desert climate of Castle Rock, appropriate irrigation for the plant material, and fire-wise landscapes.

The workshops are currently held at the Castle Rock Water offices and include a tour of the ColoradoScape demonstration garden. Over the last five years, 31 customers on average have taken the workshop each year. Interest in this topic contuse to grow, and 2023 has seen a record number of residents sign for the workshop. Castle Rock Water

plans to continue offering this course to our customers and to begin tracking how many of the customers who take the course actually install this type of landscape. Additionally, Castle Rock Water is considering the benefit of bringing on a landscape architect to provide ColoradoScape design services to our customers at no cost.

Facility Tours

Castle Rock Water offers water treatment facility tours to all interested groups including businesses, schools, civic organizations, residents, and other water providers. Attendees are able to witness the treatment process at the Plum Creek Water Purification Facility. Since the plant was constructed, we have had more than 2,000 people tour the facility.

These tours help raise awareness of not only where our water comes from, but the processes involved in treating, storing, and delivering water. Once people understand all that is involved in delivering clean water, they can then appreciate the true value of water and understand why using this resource efficiently and responsibly is imperative to creating a sustainable community.

Classroom Visits

Castle Rock Water coordinates classroom visits with local schools. The interactive presentation covers: the water cycle, where Castle Rock gets its water, groundwater and surface water, stormwater and water quality, and the importance of conservation and water efficiency.

ColoradoScape Demonstration Garden

Castle Rock Water has five (5) ColoradoScape demonstration gardens to show residents that it is possible to have a beautiful yard or landscape without using a lot of water. The ColoradoScape demonstration gardens are located at Ray Waterman Regional Water Treatment Facility, Plum Creek Water Purification Facility, Castle Rock Water Administration offices, Milestone Pump Station, and Diamond Ridge Pump Station.

Castle Rock Water is currently planning a renovation, and much larger demonstration garden, at the Ray Waterman Regional Water Treatment Facility. Design and construction is expected to begin in 2023.

Registration for Landscape Professionals

Water efficiency is a priority for Castle Rock Water and the educational programs we have put in place are making a difference. We have reduced per person water consumption by more than 30% in the last decade alone and part of that is due to the required landscaper registration and training.

Castle Rock Water requires industry professionals, including designers, installers, and maintenance contractors performing commercial landscape and / or irrigation work within the Town's service area, to be registered and trained to irrigation efficiency standards and comprehension of Castle Rock Water regulations.

In order for a contractor to become registered with the Town, they must complete a two-step process. Step 1 is to successfully complete the Qualified Water Efficient Landscaper (QWEL) training class and pass the certification exam. QWEL is a comprehensive training program covering the following landscape and irrigation topics:

- Where our water comes from
- Sustainable landscaping
- Soils
- Landscape water
- Irrigation systems
- Irrigation maintenance & troubleshooting
- Irrigation system auditing
- Complete a hands-on irrigation audit
- Irrigation scheduling
- Irrigation controllers
- Complete and pass a comprehensive exam covering all topics above

Castle Rock Water. Through our membership in the South Metro Water Supply Authority (SMWSA) offered the first regional QWEL training and certification class in April 2019. Since that time, we have completed 15 classes (14 in English and 1 in

Spanish). A total of 378 landscape, irrigation, and municipal professionals have completed the program.

In addition to QWEL, they must also successfully complete the Castle Rock specific presentation and exam. This piece focuses on those requirements specific to the Town of Castle Rock and Castle Rock Water. They include, but are not limited to:

- Landscape and irrigation design
- Design submittal, review, and approval
- Permit requirements
- Pre-construction meetings
- Inspections
- Project completion and permit close-out
- Watering schedules
- Irrigation exemptions
- Watering violations

Landscape Company Registration

Castle Rock Water requires landscape companies to be registered to conduct business in non-residential / commercial projects. The landscape company must designate one or more individuals directly responsible for the design, installation, and maintenance activities occurring within the Castle Rock Water service area.

This Responsible Landscape Professional is directly responsible for ensuring compliance with all criteria set forth in the Water Use Management Plan and the Landscape and Irrigation Criteria Manual for landscape and irrigation work conducted within our service area. The Responsible Landscape Professional must be a Qualified Water Efficient Landscaper (QWEL certified, see section above) and have successfully completed the Castle Rock Water training.

For maintenance work done by these contractors for non-residential customers that does not comply with our requirements, they can lose their registration with Castle Rock Water. They are also subject to violations from our water waste regulations if they are doing maintenance for a non-residential customer.

Water Ambassador Program

The Water Ambassador Program is a water education program serving the South Denver Metro area since 2009. The program empowers students to make wise choices about how they use water through engaging, interactive, classroom presentations. The program has recently been updated to reflect the changes in academic expectations and teaching methods.
Presentations provide in-depth information about where water comes from and how scarce the resource really is. Discussions are followed to come up with ideas of ways to

realistically conserve water in our daily lives! Presentations are designed for classroom-size groups and can be customized to complement classroom learning goals. All presentations are FREE and are coordinated by the South Metro Water Supply Authority.

Water Conservation Website

In 2010, the Town began creating the water conservation website, CRconserve.com, which was formally launched in August 2011. A total website overhaul was completed 2018, and we continue to update the website, as needed. The website is intended for residential customers but non-residential customers can also benefit from the information available. The website contains local weather station information, watering schedules, water conservation tips, plant finder, run-time calculator to help residents determine the schedule that fits the needs of their landscape and irrigation, and ColoradoScape information. The website had nearly 72,000 page views in 2022. While not due for a major redesign just yet, beginning in 2023 the website will receive a series of small updates. Some of the items under consideration include.

- Add additional educational and instructional videos.
- Add weekly or monthly landscape and irrigation tips.
- Update weather station information to include real-time precipitation data.
- Update the plant finder to include more plants and photos.
- Expand the ColoradoScape gallery.
- Expand scope of website to include more comprehensive information for HOAs and commercial customers.

Conservation Contests

In 2019, Castle Rock Water launched our first ColoradoScape Front Yard Makeover Contest. The winner is selected each year from a pool of video applications. These videos are reviewed and the application with the highest number of votes is selected as the winner. The winner receives a front yard makeover showcasing a ColoradoScape design. Castle Rock Water coordinates and promotes the contest, posts videos submitted to social media, and solicits donations of landscape materials and irrigation equipment. Once the winner has been selected, Conservation staff works directly with the homeowners to create the design and then coordinate the installation by a local contractor. The contest has proven to be popular and successful, and will continue moving forward.


Before


After


Before


After

5.0 Implementation and Monitoring Plan

5.1 Implementation Plan

The Water Conservation Division of Castle Rock Water is chiefly responsible for implementation of this plan. The Water Conservation Division has been successfully implementing the Town's water conservation program since 2007. The Town will continue to work to appropriately budget money and pursue water efficiency grants to further its water conservation goals. The 2022 budget for water conservation was $565,483. Staffing included two full time equivalents, one-part time staff member and seasonal water monitors. In 2023, the conservation team added two full time equivalents (an Office Assistant II and a Water Efficiency Technician).

The existing programs as listed in **Table 2** are ongoing and have been implemented. Through the community outreach effort, it has been determined that customers are very interested in most of the existing conservation programs. The Town developed a schedule for the possibility of adding new water efficiency activities as shown in **Table 4**. The Town continues to evaluate the conservation program costs and water savings and adjusts as needed.

Table 4: Planned Water Efficiency Activities

Water Efficiency Activities	Evaluation Period of New Activities
Foundational Activities	
Formal Meter Testing Program	Program details currently under development
Residential water budget rate structure changes	Considering viability of changes
Town owned Landscape & Irrigation Retrofits	Projects completed annually
Advanced Metering Infrastructure	Installation underway. Complete and maximize data to promote efficiency
Targeted Technical Assistance and Incentives	
Expand Indoor Conservation Incentive Program	Considering viability of program
Indoor Conservation Assessments	Considering viability of program
Ordinances and Regulations	
Hot Water Recirculation Units for New Development	Considering viability of program
Ultra-high Efficiency toilets for New Development	Considering viability of program
Local Building Code Changes	Consider any water saving changes to incorporate
Flow sensing for residential irrigation	Consider viability of program
Education Activities	
ColoradoScape Makeover Contest	Ongoing. Consider ways to enhance
Update Conservation Website	Ongoing. Look for other opportunities

Additionally, the Town currently markets conservation efforts, primarily education activities, foundational activities, incentives, and regulations on its websites, in bills, mailers, flyers, e-mails, and coordinates school conservation programs with interested neighborhood schools. The Town also provides conservation information to HOAs to help minimize water usage. These programs are offered to all customers within the Castle Rock Water service area.

The Town may consider expanding marketing for the education programs based on feedback from community outreach. The Town also uses social media to advertise future programs, events, or conservation efforts. The Town has a Facebook page, Instagram, and Twitter account that are utilized to regularly post conservation information, efforts, or tips.

Additionally, these items are a part of Castle Rock Water's Strategic Plan and are monitored regularly for achievement, implementation goals, and/or modification.

The Town conducts an annual rates and fees analysis using the 5-year capital improvements and operations budget information that is refined each year. Depending on the needs of the conservation program modifications, the Town may adjust the rates and fees accordingly.

5.2 Monitoring Plan

The Town monitors the water demands on a daily basis and is able to track daily supplies. Conservation rebate program impacts are evaluated annually following the end of a calendar year. The Water Conservation division maintains an extensive data set of water use, summarizes and evaluates water demands on a regular basis, and evaluates the impacts of the water conservation rebate program.

6.0 Adoption, Public Review, and Approval of the Water Efficiency Master Plan

6.1 Water Efficiency Master Plan Adoption

On _____, 2023, the Water Commission recommended Town Council approval of the Plan.

On _____, 2023, Town Council was updated on the Water Efficiency Master Plan and directed staff to make the Plan available for public comment. The 60-day public comment period began on _____, 2023 and ended on _____, 2023. Staff received _____ public comments from residents and minor changes were included in the Plan. The public comments are included in **Appendix E**.

6.2 Public Review Process

The Town hosted one open house on September 21, 2022, to obtain public feedback and opinions regarding conservation practices, as well as gaining insight of how residents would like to be educated in conservation techniques. This information is summarized below:

- Gain a deeper level of insight and understanding of the attitudes and behavior of residents of the Town of Castle Rock, better understanding key decision-makers' tacit and emotional beliefs about water usage and water conservation, now and in the future.
- Evaluate respondent reactions to the Town of Castle Rock's Water Efficiency Master Plan to understand overall appeal and interest, identify the most compelling elements, and determine opportunities to optimize overall appeal.
- Identify the most effective and compelling means to educate residents of the Town of Castle Rock on water conservation methods, and any new implications from the new Water Efficiency Master Plan.

Valuable information was gathered from the open house and community survey and is summarized below:

At Castle Rock Water, engaging the public is essential for each plan update. The 2016 Water Efficiency Master Plan was updated in late 2022 and a community survey solicited input as well as gauged knowledge of water efficiency practices. The survey was online and open from September 1, 2022 to October 31, 2022. The survey was advertised through a customer email newsletter, social media, and open houses. A webpage with the link and detailed information on the current and proposed programs was created.
The key information obtained from the online survey is summarized below:

There were 133 respondents with 60% having lived in Castle Rock less than 11 years and 75% were from the 80104 (west, southwest portion of Town). Though the response was significant, this was a voluntary survey and a scientific, random sampling was not realized. A statistically significant survey was conducted in 2016 and, as in the recent survey, most respondents were interested in learning about and encouraging more stringent conservation efforts.

Primary points from the 2022 survey:

- 20% still do not know where Castle Rock gets its water and 80% understood we got our water from a variety of sources.
- An overwhelming majority of respondents practice indoor conservation efforts, though low-flow faucets and toilets were not as utilized.
- 80% of respondents do use an irrigation timer (which has been required in all new building for a decade) with a significant portion using a smart controller.
- Almost 75% did say they monitor for overspray and water waste.
- Regarding AMI and real-time access to water usage, 30% would look at this information daily/frequently and make adjustments and 56% would look at it periodically to keep track of usage or leaks.
- Two-thirds of respondents support the ban on front yard turf for new development and those that opposed were primarily concerned about aesthetics.
- Most respondents were aware that water budgets, water schedules, violations and prescribed plants were required. Soil amendment, water schedules for non-residential properties, and required landscaper education was not generally known.
- 45% felt that if development stopped, the water supply issue would be resolved and 30% understood the requirements of development and their own water supply.
- 85% of the respondents had heard of the Water Wiser program, while about half of these respondents have completed the program.
- 72% have heard of CRconserve.com but little more than half had visited the website.

Comparison points from the 2016 survey:

- 2022 respondents tended to feel that we use more water than the national average while 2016 felts we used less.
- 2022 respondents tended to engage more in indoor and outdoor conservation efforts than 2016 respondents.
- A large majority of respondents from 2016 and 2022 are interested in water audits (at a cost).

- About half of the respondents from both 2016 and 2022 have attended a Water Wiser workshop and an overwhelming majority found it useful.
- While 72% of respondents from 2022 had heard of CRconserve.com, similar to 2016 percentages, there was a 10% dip in percentage of people who visited the website.

Respondents' Comments:

Respondents were provided an opportunity for open-ended comments and there was a significant amount of mentions regarding limiting building, requiring developers to have water supply, and to install efficiency products (like instant water heater). There were many comments about enforcing conservation in HOAs and making them allow xeriscape plans. Respondents need help in designing, creating and paying for ColoradoScapes and are appreciative of any and all education. While mentions were made for rewarding conservation, many were in favor of developing stricter and higher priced water budget tiers.

Selection of actual comments:

- Easier programs to help residents to remove turf and create a ColoradoScape.
- Require builders to install low-flow faucets, instant water heaters, etc.
- Change laws to allow for more water reuse.
- Suggesting showering less frequently was a disgusting way to suggest water conservation.
- Annual irrigation checks for non-residential customers.
- Enforce HOA to practice conservation.
- Make my HOA allow residents to xeriscape.
- Provide more help in creating a xeriscape.
- Zero Use Days like No Shower Saturday or No Washing Machine Wednesday.
- More aggressive structured fee scheme. Pay a LOT more for watering grass after reaching low cost limit.
- Real time monitoring and alerts (text/email) when there's a spike.
- Home water audits.
- Reward water conservation not punishment.
- Adopt graywater systems and require Douglas County to adopt graywater. Credit for getting rid of sod. Be strict on water days for residential and commercial.

The complete online survey summary is located in **Appendix F.**

6.3 Efficiency Plan Approval

6.3.1 Local Approval

Staff provided Town Council and the community with the Plan to provide comments. Public comments were received and proposed changes were presented to the Town Council on _____, 2023. Town Council formally adopted the 2023 Water Efficiency Master Plan on _____, 2023 by resolution.

6.3.2 CWCB Approval

Following Town Council approval of the Castle Rock Water Efficiency Master Plan in _____, 2023, staff submitted a copy of the Plan to the Colorado Water Conservation Board (CWCB) Office of Water Conservation and Drought Planning for approval. _____, 2023, CWCB issued conditional approval of the 2023 Plan and provided _____ comments on the Plan, which were addressed in this version. A revised Plan dated _____, 2023 was returned to the CWCB for final approval which was received on _____, 2023. CWCB's comments and the approval notice are located in **Appendix D.**

6.4 Water Efficiency Master Plan Review and Update

The Town plans to review and update this efficiency plan every seven (7) years. The next update is scheduled for 2030. Demand data and program information collected during this period will be used to help update the plan in 2030.

7.0 References

Water Efficiency Master Plan, 2015. Prepared by the Water Resources and Water Conservation Divisions at the Town of Castle Rock.

Colorado Water Plan, 2023. Prepared by the Colorado Water Conservation Board Directors and staff.

Municipal Drought Management Plan, May, 2018. Prepared for the Town of Castle Rock with input from the Castle Rock Water Leadership team and staff, as well as a stakeholder group.

Water Resources Strategic Master Plan, 2021. The development of the Town of Castle Rock Water Resources Strategic Master Plan was a collaborative effort led by the Water Resources staff at Castle Rock Water.

Town of Castle Rock Municipal Code Chapter 13.12.070 - Emergency regulation of water.

Appendix A – Population and Growth Projections

YEAR	% GROWTH	POPULATION
1990*	N/A	8,708
1995*	22.9	10,700
2000	89.0	20,224
2005*	90.1	38,451
2010	27.4	49,002
2015*	19.4	58,492
2020*	29.6	75,857
2025*	18.8	90,163
2030*	14.3	103,131
2035*	13.5	116,098
2040*	11.1	129,065
2045*	10.0	142,033
2050*	9.1	155,000
2055*	0	155,000

*Note: Actual population/growth percentages are not available, or are estimated.

Appendix B Castle Rock Water's Rate Structure Summary2023 Water service charges:

Water Volume Charge $/1,000 gallons				
Irrigation Season – April 1 through October 31 Consumption				
Class	**Tier 1 AWMC**	**Tier 2 Irrigation**	**Tier 3 Excess**	**Surcharge >40kgals**
Residential	$2.95	$6.00	$8.95	$8.95
Multi-family (domestic / indoor)	$2.95	n/a	$3.87	n/a
Multi-family With irrigation	$2.95	$5.09	$7.61	n/a
Commercial (domestic / indoor)	$2.95	n/a	$4.12	n/a
Commercial With irrigation	$2.95	$5.15	$7.70	n/a
Greenbelt (Irrigation)	n/a	$8.21	$12.31	n/a
Winter Season – November 1 through March 31 Consumption				
Residential	$2.95	n/a	$6.00	$8.95
Multi-family (domestic / indoor)	$2.95	n/a	$3.87	n/a
Multi-family With irrigation	$2.95	n/a	$5.09	n/a
Commercial (domestic / indoor)	$2.95	n/a	$4.12	n/a
Commercial With irrigation	$2.95	n/a	$5.15	n/a
Greenbelt (Irrigation)	n/a	n/a	$12.31	n/a

Water Monthly Service Charge	
Meter Size	**Cost**
5/8" x ¾"	$9.97
¾"	$9.97
1"	$14.34
1.5"	$19.63
2"	$27.17
3"	$43.66
4"	$98.36
6"	$153.89

Renewable Water Monthly Service Charge	
Meter Size	**Cost**
5/8" x ¾"	$28.95
¾"	$28.95
1"	$109.74
1.5"	$207.61
2"	$347.17
3"	$652.06
4"	$1,663.44
6"	$2,689.89

Appendix C – Colorado Water Conservation Board Review Comments

Appendix D – Public Comments

All State approved plans require public review process per Colorado Revised Statute (C.R.S.) 37-60-126 (5). The minimum duration of public review is 60 days. To comply with this requirement, staff made the draft Plan available at www.crgov.com/WEMP and provided a form for comments. The 60-day public comment period began on _____, 2023, and ended on _____, 2023. Staff advertised this public comment period via *Town Talk,* e-mail, and Facebook/Twitter feeds.

The Town received _____ questions and/or comments, which were all from Castle Rock Water customers. Staff followed-up individually with each customer. The questions and/or comments are listed below.

1. QUESTION/COMMENT:

   ANSWER:

2. QUESTION/COMMENT:

   ANSWER:

3. QUESTION/COMMENT:

   ANSWER:

Appendix E – Online Survey Summary